TECHNICAL PROGRESS REPORT

ROBOTIC TECHNOLOGIES FOR THE SRS 235-F FACILITY

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Principal:

Leonel E. Lagos, PhD, PMP®

FIU Applied Research Center Collaborators:

Peggy Shoffner, MS, CHMM, PMP®
Himanshu Upadhyay, PhD
Alexander Piedra, DOE Fellow

SRNL Collaborators:

Michael Serrato

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FIU | Applied Research Center
FLORIDA INTERNATIONAL UNIVERSITY

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EXECUTIVE SUMMARY

In support of the DOE-FIU Cooperative Agreement under Project 3 (Waste and D&D Engineering and Technology Development), Task 2 (D&D Support for Technology Innovation, Development, Evaluation and Deployment), the Applied Research Center (ARC) at Florida International University (FIU), in close collaboration with Savannah River National Laboratory (SRNL), is leading the development and implementation of a phased approach to improve the operational effectiveness of fixative technologies in the critical area of fire resistance to better address the unique deactivation and decommissioning (D&D) challenges being faced by the Savannah River Site (SRS) 235-F Project and other high priority efforts across the DOE complex. Taking advantage of firsthand knowledge and experience of ARC research scientists in the use of robotic technologies for D&D activities across the DOE Complex, a study was initiated to identify robotics and remote system technologies that may have application in the various D&D challenges faced at the SRS 235-F facility.

This research was conducted under FIU *"Task 2.1.3: Robotic Technologies for SRS 235-F"*. The SRS 235-F facility has a need to identify a remote system that can make a one-time entry into highly contaminated areas. The one-time-entry requirement indicates that the technology will not be retrieved at the end of the work, but would remain inside the facility due to the high levels of contamination. FIU performed research to identify robotic technology systems applicable to the challenges and needs of the SRS 235-F facility. Research included working with SRNL to define the requirements for the robotic technology and utilizing the Robotic Database in D&D KM-IT to search and identify potential technologies that meet the defined requirements.

The results of the study culminated in a compilation of almost 500 robotics and remote systems technologies from across the world. The technologies are presented in tabular form in Appendix A of this report. These technologies will form the initial database to promote discussions with SRS 235-F facility personnel and identify the best fit for potential application to SRS 235-F D&D challenges. The potential application of these robotic and remote system technologies to several of the most pressing D&D challenges across the DOE Complex was also identified. ARC will continue to work with SRS, HQ and other DOE sites to expand this initial effort and identify D&D application across the DOE Complex.

INTRODUCTION

During the past couple of years, robotics has received increased interest in the effort to deactivate and decommission (D&D) legacy facilities across the U.S. Department of Energy (DOE) complex. Many of these facilities pose hazards which prevent the use of traditional industrial demolition techniques. Such hazards include radiological, chemical, and hazardous materials contamination and structural instability. Efficient and safe D&D of the facilities will almost certainly require the use of remotely operated technologies to protect personnel and the environment during potentially hazardous D&D activities and operations.

The D&D Knowledge Management Information Tool (KM-IT) contains over 1,200 D&D technologies, including over 500 robotics and remote system technologies that can be used in D&D activities across the DOE Complex. A large number of the robotics and remote systems technologies contained within the KM-IT system comes from collaboration between DOE HQ and NuVision/Cogentus where a database of robotics technologies was developed. The resulting database was provided to FIU for incorporation into the KM-IT system.

This research was conducted under FIU *"Task 2.1.3: Robotic Technologies for SRS 235-F Facility"* as part of the DOE-FIU Cooperative Agreement Year 6 work scope. The SRS 235-F facility has a need to identify a remote system that can make a one-time entry to highly contaminated areas. The one-time-entry requirement indicates that the technology will not be retrieved at the end of the work, but would remain inside the facility due to the high levels of contamination. FIU performed research to identify robotic technology systems applicable to the challenges and needs of the SRS 235-F facility. Research included working with SRNL to define the requirements for the robotic technology and utilizing the Robotic Database in D&D KM-IT to search and identify potential technologies that meet the defined requirements. The deliverable which was a summary report on robotic technologies applicable to the SRS 235-F facility was reforecast to August 12, 2016. The circumstances and path forward, including the new reforecast date for this deliverable, have been closely coordinated with the stakeholders at Savannah River Site and DOE HQ. FIU discussed the issue with the SRNL collaborators and confirmed the agreement of the new deliverable date with an email sent to SRS on May 24, 2016 and DOE HQ contacts on May 27, 2016.

The results of this research are presented in Appendix A of this document. Appendix A contains a compendium of almost 500 robotics and remote systems applicable for D&D operations. The technologies were classified by application purpose (i.e., decontamination, characterization, dismantlement, etc.) as well as Technology Development Level (i.e., commercial, research & development). In addition, a brief description is provided for each technology along with vendor contact information and corresponding URL/website.

EXPERIMENTAL DESIGN

Various robotics and remote system technologies were researched via: (1) FIU D&D technology databases (D&D KM-IT), (2) Peer-reviewed journal publications/literature searches, (3) Internet searches, (4) Professional conferences and forums, and (5) Vendor/manufacturer engagement and interface. Research results were used to assemble a robust compendium of robotics and remote systems technologies presented in Appendix A.

Knowledge Management Information Tool

D&D work is a high priority across the DOE complex. Subject matter specialists associated with the DOE sites and the D&D community have gained extensive knowledge and experience over the years. To prevent the D&D knowledge and expertise from being lost over time, an approach is needed to capture and maintain this valuable information in a universally available and easily usable system.

The overall objective of the KM-IT system (see Figure 1) is to provide a focused web-based tool to assist the DOE D&D community in identifying potential solutions to their problem areas by using the vast resources and knowledge-based tools available through the web. This includes:

- Providing a mechanism to the global D&D community for searching relevant D&D information.
- Collecting information from subject matter specialists.
- Building a knowledge repository for future reference.
- Archiving lessons learned, best practices, photos/videos, and other relevant documents.
- Providing a secured collaboration platform for the global D&D community to share knowledge.

Currently the KM-IT system contains:

- 1,285 total D&D technologies
- 495 robotics and remote systems technologies (Figure 2)
- 948 D&D vendors
- 195 questions and solutions in a Hotline module
- 169 ALARA Center reports archived and available
- 231 Innovative Technology Summary Reports (Green Books) archived and available
- 910 registered users from across the world
- 97 D&D subject matter specialists

Figure 1. Knowledge Management Information Tool for D&D – website.

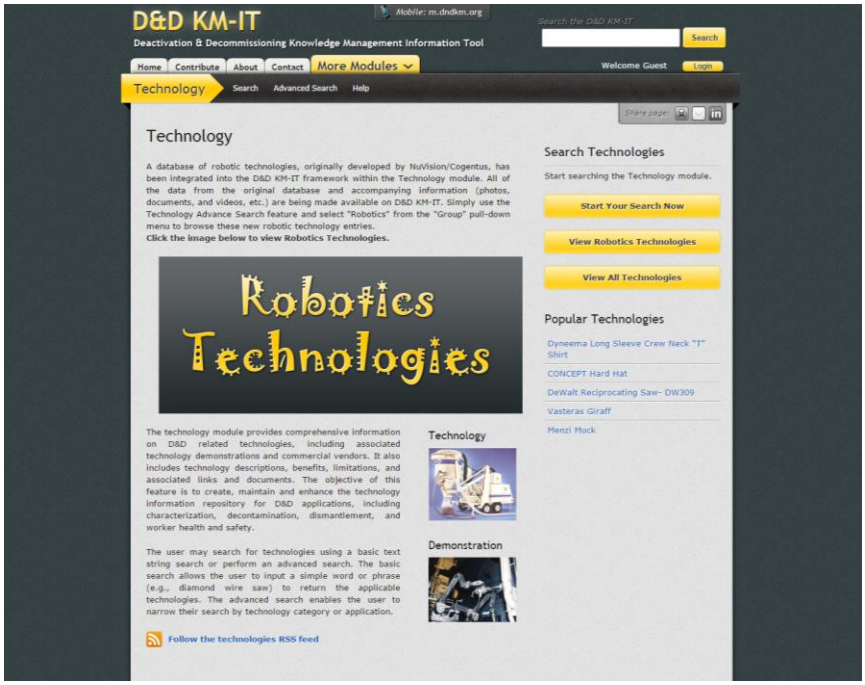


Figure 2. KM-IT Robotics Module.

Data Mining and Extraction

With the large amount of robotics technologies in the KM-IT system, it was essential to extract and organize this data. After finalizing the categories and information to be presented for each technology, a query was developed to obtain the robotics-related data from the KM-IT database. The information extracted included: technology name, description, category, website, picture, URL address, vendor information, and development stage for each robotics technology. The information was then imported into an Excel spreadsheet and formatted to be presentable and easily read.

This process had several challenges requiring multiple solutions. To begin, the formatting of text within the KM-IT system did not carry over to Excel. The contents for both the technology descriptions and vendor information columns had no line breaks to separate information, and were in one continuous line of text. These columns also contained html code within the text leftover from the KM-IT database. This made the information somewhat difficult to read. To solve this problem, Excel's Find and Replace tool was utilized to find these recurring pieces of html code within the entire document and replace them with a new line to conveniently format the descriptions, or they were simply cut to reduce clutter. This effectively applied a fix to the entire two columns and made them far easier to read. Upon further review, it was realized that the data in the vendor information column was still not pleasing to read. . A Visual Basic for Applications code was therefore applied to bold specified text within this column. Vendor information categories such as address, phone, and email were now bolded which made the information more identifiable and easier to locate.

To continue, the KM-IT data extracted contained URL codes directing to an image of each technology. This meant that the picture column in the spreadsheet contained picture URLs rather than the pictures themselves. Further investigation revealed that Excel does not have a native feature to easily input a picture from a URL and display the image. It was also determined that Excel cannot reliably format and place images in a cell. This meant features such as centering a picture on a cell, and resizing it to fit in a cell, do not exist. Various examples of VBA codes on the internet were analyzed to possibly find an automated process to obtain the pictures and format them, otherwise the pictures would have to be downloaded and inserted into the document individually. After much trial and error, several versions of a VBA macro were created. The final code enabled several tasks which include: obtaining the picture from the URL, resizing the picture to fit in its respective cell while keeping the image's original aspect ratio (so as to not distort the picture), centering the image horizontally and vertically on the cell, and finally embedding the picture in the document. An additional macro was created which stipulates a minimum size for cells so that the images within them are clearly visible.

RESULTS

A robust compendium of almost 500 robotics and remote systems technologies applicable for D&D activities was assembled as a result of this research and is presented in Appendix A of this report. The bulk of these technologies were data mined from the KM-IT system hosted and maintained by FIU's Applied Research Center. In addition, other robotics and remote systems technologies were obtained from internet searches, national and international conference proceedings, journal articles, and contacting industry vendors. The technologies were classified by application purpose (i.e., decontamination, characterization, dismantlement, etc.) as well as Technology Development Level (i.e., commercial, research & development). In addition, a brief description is provided for each technology along with vendor contact information and corresponding URL/website. The next section highlights a few of the robotics and remote systems technologies contained in Appendix A.

Robotic and Remote Systems Technologies for D&D

Figure 3 below shows the types of technologies found to be applicable to the characterization and inspection of contaminated DOE facilities. A number of these technologies are radiation hardened which allows the deployment of these systems in high radiation areas. Additional remote technologies can be found in Appendix A.

Characterization and Inspection		
MoniRobo	A 1.5-meter tracked robot with a manipulator arm for removing obstacles and collecting samples. It features a 3D camera, radiation detector, and heat and humidity sensors. MoniRobo weighs 600 kilos and is limited to a speed of 2.4 kilometers per hour. It is heavily shielded to harden the electronics from radiation. It can be remotely operated from a portable control room that was designed to fit inside a C-130 cargo aircraft for rapid deployment. The control center remains in a safe area and communicates with the robot via radio. Repeater stations can extend the range of the radio link if required. Site: Japan, Other Industry: Nuclear Size: Very Large (>100kg/200lb, >120cm/48in) TRL: Demonstration (7-8) TRL2: Demonstration (7-8)	

Quadruped – Smaller Inspection Robot	The four legged robot by Toshiba has a smaller inspection robot that it can deploy when the larger robot can go no further. It weighs 4pk and can fold to get into small spaces. Site: Fukushima Industry: Nuclear Size: Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL: Demonstration (7-8) TRL2:Demonstration (7-8) Tether: No tether Endurance 30-60 minutes	
Sea Snake	The next generation snakebot from CMU incorporates series elastic actuators into every joint. The actuators allow for torque control and compliant motions, giving the snake a gravity compensation mode. Industry: Research, Size: Tiny (<1kg/2lb, <10cm/4in useable length) TRL: Research (1-3) Tether: Yes	
Trunk Snake	A snake robot on a wheeled platform. Industry: Research Size: Unknown TRL: Development (4-6)	
ACM-R3H	This Active-Chord Mechanism (ACM) is a wireless-controlled snake-like robot. It is composed of several modules with passive wheels and active joints; it moves smoothly as it reproduces the motion of a snake. ACM-R3H can generate tri-dimensional motions. Ideal for research, for entertainment and advertisement. It is fully reprogrammable with adding sensors based on the user's needs. ACM-R3n in each unit is powered by one Titech SH2 Tiny controller controlling one servo motor; all SH2 Tiny controllers are connected by CAN bus.	

	Industry: Research Size: Tiny (<1kg/2lb, <10cm/4in useable length) TRL: Research (1-3)	

Figure 3. Characterization and Inspection Technologies.

Figure 4 below shows the types of technologies found to be applicable to the decontamination of DOE facilities. A number of remote technologies have been designed to perform cleanup activities on floors, walls and ceilings. Additional remote technologies can be found in Appendix A.

Decontamination		
Decon Robot	This is essentially a remote controlled vacuum which uses dry ice to blast, evaporate, and remove radioactive materials. The robot is to be deployed at Fukushima Daiichi to decontaminate walls and floors. The robot was originally designed to scrape paint off of airplanes, but this one has been specially equipped with robotic tracks and four cameras which allow operators to monitor the work being performed. Site: Fukushima Industry: Nuclear Size: Very Large (>100kg/200lb, >120cm/48in) TRL: Demonstration (7-8) TRL2: Demonstration (7-8)	
Weda Electric Floor Crawler	The cleaner was deployed into the Centre Bay in readiness for underwater cleaning below the scum line prior to drain down. Cleaning the scum line using this method resulted in a significant reduction in contamination levels. Also used in FHP (B311, Pond 5) more than 10 years ago, and Thorp around the same time. Site: Sellafield Industry: Consumer Size: Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in) TRL: Operational (9) TRL2:Operational (9)	

Figure 4. Decontamination Robotics Technologies.

Figure 5 below shows the types of technologies found to be applicable to the demolition and dismantlement of DOE facilities. Additional remote technologies can be found in Appendix A.

Demolition/Dismantling		
Brokk 60	Range of remote-operated backhoe-style tracked vehicles with a variety of attachments for demolition and similar heavy-duty applications. Probably the most common robots in use in the UK nuclear industry. They have been used at most Sites across the Estate. Also widely used in the US. Site: US Other Industry: Construction Size: Very Large (>100kg/200lb, >120cm/48in) TRL: Operational (9) TRL2: Operational (9)	
ERO Demolition Robot	Concept design for robot intended to strip concrete from rebar using a waterjet deployed on an articulated arm. The robots will use omnidirectional cylindrical tracks and operate semi-autonomously. Industry: Construction Size: Very Large (>100kg/200lb, >120cm/48in) TRL: Operational (9) Manipulator: No	

Figure 5. Decontamination Robotics Technologies

Figure 6 below shows other types of technologies that can potentially have application in D&D activities in its current and/or future development stages. Additional remote technologies can be found in Appendix A

Retrieval/Humanoids and Others		
Big Dog	BigDog is a rough-terrain robot that walks, runs, climbs and carries heavy loads. BigDog is powered by an engine that drives a hydraulic actuation system. BigDog has four legs that are articulated like an animal's, with compliant elements to absorb shock and recycle energy from one step to the next. BigDog is the size of a large dog or small mule; about 3 feet long, 2.5 feet tall and weighs 240 lbs. Industry: Defense/Homeland Security Size: Very Large (>100kg/200lb, >120cm/48in) TRL: Demonstration (7-8) Payload: 100-250kg/200lb-500lb	
Powerball Lightweight Arm	A mobile gripping system. The lightweight arm with compact performance with three highly-integrated Powerball modules offers 6 degrees of freedom. Integrated intelligence makes powerful, mobile handling possible. The battery operation makes it mains-independent. Combining it with the SDH 3-finger hand, increases the number of degrees of freedom by another 7, and also permits typical tasks to be accomplished flexibly in the area of service robotics. Industry: Industrial Automation Size: Unknown TRL: Development (4-6)	

Figure 6. Retrieval/Humanoids and Other Technologies.

These initial results and findings have prompted ARC researchers to recommend continued investigation into the applications of these technologies for D&D activities in the SRS 235-F facility as well as across the DOE Complex. As a next step, it is envisioned that these technologies will be matched to specific D&D activities within the SRS 235-F facility. For example, a number of the technologies could potentially be adapted to spray fixatives inside SRS 235-F hot cells, especially in hard-to-reach places within the hot cell environment where current methods cannot apply fixatives onto these surfaces.

FUTURE WORK

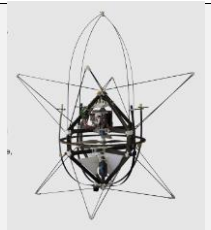
As a first step, a robust compendium of robotics and remote systems technologies has been assembled and provided in Appendix A of this report. Through SRNL points of contact, this report will be shared with SRS 235-F personnel to obtain initial feedback. It is envisioned that this report will aid SRS 235-F personnel in expediting their planning of R&D and D&D related efforts.

It is envisioned that future work will involve collaboration between SRNL and SRS 235-F personnel and the FIU team to select technologies that have direct and/or indirect applications to the SRS 235-F facility D&D. Based on this selection/screening, a few technologies (or types of technologies) can be selected for further examination and proof-of-concept testing at FIU. As part of a parallel D&D task and past research conducted at FIU, a mock up hot cell facility was constructed at FIU. This facility can potentially be used for cold demonstration of robotics and remote systems identified as a result of this study and discussion with SRNL, SRS 235-F team.

APPENDIX A

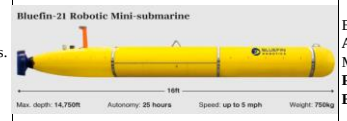
Robotic and Remote Systems Technologies for D&D

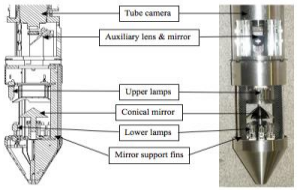
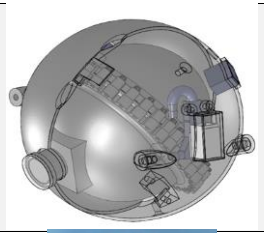
Technology Name	Description	Category	Website	Picture	Vendor	Development Stage
ACM-R1H	Snake like robot reproducing the concept of the first snake like robot created by Prof. Shigeo Hirose back in the 1972. Each link is equipped with free casters and by only one actuators vertically displaced in order to connect the next unit of the body and to recreate the sinuous motion of a snake. Ideal for research or for entertainment. It is fully reprogrammable with adding sensors based on the user's needs. ACM-r1 is powered by one HiBot's TITechSH2 Controller that controls, each TitechDriver ver 5 installed in every segment., , Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Characterization and Inspection	www.hibot.co.jp		HiBot, **Address:** 5-9-15 Kitashinagawa, Shinagawa-ku, Tokyo, Not Available(Japan), Japan, 141-0001, **Phone:** +81-3-5791-7526, **Fax:** +81-3-5791-7527, **Email:** NA	Commercial
ACM-R3H	This Active-Chord Mechanism (ACM) is a wireless-controlled snake-like robot. It is composed of several modules with passive wheels and active joints; it moves smoothly as it reproduces the motion of a snake. ACM-R3H can generate tri-dimensional motions. Ideal for research, for entertainment and advertisement. It is fully reprogrammable with adding sensors based on the user's needs. ACM-R3n in each unit is powered by one Titech SH2 Tiny controller controlling one servo motor; all SH2 Tiny controllers are connected by CAN bus., , Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Characterization and Inspection	www.hibot.co.jp		HiBot, **Address:** 5-9-15 Kitashinagawa, Shinagawa-ku, Tokyo, Not Available(Japan), Japan, 141-0001, **Phone:** +81-3-5791-7526, **Fax:** +81-3-5791-7527, **Email:** NA	Commercial
ACM-R5H Amphibious Snake Robot	The modular ACM-R5H snake robot from HiBot, a Japanese company that specializes in robots for extreme environments, features detachable sections and payload compartments able to hold custom sensors or cameras. It is a snake-like robot with extra dust sealing, waterproofing and a rigid structure that allows operation under any sever condition. It is composed of several modules with small passive wheels that allow the robot to move smoothly on surfaces. ACM-R5 can also move sinuously in underwater environments. In the front unit a wireless camera is mounted on a special mechanism that keeps the view orientation always horizontal. ACM-R5 is ideal for inspection and search operations in underwater environments., , Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Characterization and Inspection	www.hibot.co.jp		HiBot, **Address:** 5-9-15 Kitashinagawa, Shinagawa-ku, Tokyo, Not Available(Japan), Japan, 141-0001, **Phone:** +81-3-5791-7526, **Fax:** +81-3-5791-7527, **Email:** NA	Commercial
AC-ROV 100	A complete underwater inspection system comes in a waterproof hand carry case. Total weight is 18 kg. It is CE marked and certified for all “feet wet” applications, offshore, onshore or down pipes, it is a a safe and quick tool for underwater inspection. The AC-ROV is a single operator system and a benchmark in ROV design., , Site:Sellafield, Industry:Oil & Gas, Energy, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), TRL2:Development (4-6),	Characterization and Inspection	www.ac-cess.com		AC-CESS Co UK Limited, **Address:** Tyrebagger Works, Kinellar, Aberdeen, Not Available(UK), United Kingdom, AB21 0TT, **Phone:** +44 (0) 1224 790100, **Fax:** NA, **Email:** info@ac-cess.com	Commercial
Aibot X6	Hexacopter. The newly developed Aibot X6 V2 enables a complete array of new and improved functions that make the copter easier to control and safer. Moreover the new hard- and software technology offers a broad spectrum of adjustment and expansion possibilities. Industry:Oil & Gas, Energy, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9), Tether:No tether - Endurance 0-30 minutes, Waterproof:Not Rated or Unknown, Payload:0-5kg/0lb-10lb, Reach:Not Applicable, Manipulator:Unknown	Characterization and Inspection	www.aibotix.com/en/		Aibotix GmbH, **Address:** Ludwig-Erhard Strasse 14, Kassel, Not Available(Germany), Germany, 34131, **Phone:** 49 (0) 561 4739490, **Fax:** N/A, **Email:** info@aibotix.com	Commercial

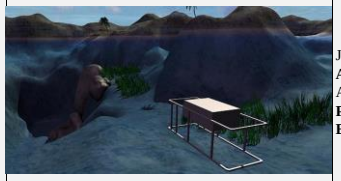
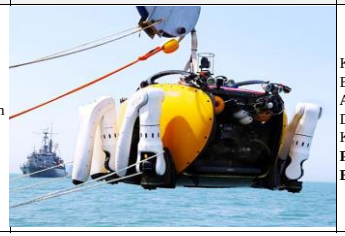
AirBurr	This robot is capable of flight in cramped and cluttered environments and is robust to collision, and even takes advantage of contact with its environment. It is designed specifically to study the physical interaction between flying robots and their environment. Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Research (1-3),	Characterization and Inspection	lis.epfl.ch/		Laboratory of Intelligent Systems (LIS), **Address:** EPFL-STI-IMT-LIS, Lausanne, Not Available(Switzerland), Switzerland, CH-1015, **Phone:** +41 21 693 59 66, **Fax:** +41 21 693 58 5, **Email:** webmaster@epfl.ch	Commercial
Airobots	The goal of the AIRobots project is to develop a new generation of aerial service robots capable to support human beings in all those activities which require the ability to interact actively and safely with environments not constrained on ground but, indeed, freely in air. The step forward with respect to the "classical" field of aerial robotics is to realize aerial vehicles able to accomplish a large variety of applications, such as inspection of buildings and large infrastructures, sample picking, aerial remote manipulation, and so forth. The aerial platform will be remotely supervised by the operator with the use of haptic devices and will be like a flying hand for the human, thanks to force and visual feedback strategies. Industry:Research, Size:Unknown, TRL:Research (1-3),	Characterization and Inspection	airobots.ing.unibo.it/Home.php		AIRobots, **Address:** CASY-DEIS University of Bologna, Bologna, Not Available(Italy), Italy, 40136, **Phone:** +39 051 2093788, **Fax:** NA, **Email:** lorenzo.marconi@unibo.it	Research
Anchor Diver	An underwater system equipped with sonar and cameras. It is tethered and dragged behind a boat at a constant depth thereby providing a consistent mapping of the sea bed. Thrusters can be used in case of entanglement. Industry:Maritime, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Demonstration (7-8),	Characterization and Inspection	www.3mech.titech.ac.jp/ma_hirose/ma_hirose_e.html		Fukushima Laboratory (Tokyo Institute of Technology), **Address:** Dept. of Mechanical and Aerospace Engineering, , Tokyo, Not Available(Japan), Japan, 152-8552, **Phone:** n/a, **Fax:** n/a, **Email:** n/a	Commercial
APID 60	CybAero's APID 60 is an autonomous, unmanned helicopter (VTOL UAV). The APID 60 system comprises of three main components:, Helicopter platform, including avionics and data links., Payload, usually in the form of one or more sensors, from partners., Ground station with control unit, including video monitors and data links. Examples of sensors:, Video camera., IR camera (thermal imaging camera)., Jammer., Microwave radio equipment., Biochemical sensors., Laser scanner., Ground radar., Magnetometers., , Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), Tether:No tether - Endurance more than an hour,	Characterization and Inspection	www.cybaero.se/en/products-applications/apid-60		CybAero AB, **Address:** Tekknikringen 7 Mjärdevi Science Park SE-583 30, Linköping, Not Available(Sweden), Sweden, not available, **Phone:** 46-13-465-29-00, **Fax:** 46-(0)-775-707-158, **Email:** info@cybaero.se	Commercial
AR Drone 2.0	Small consumer quadrocopter with HD video and GPS capability built in. Industry:Consumer, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:No tether - Endurance 0-30 minutes,	Characterization and Inspection	www.parrot.com		Parrot SA, **Address:** 174 Quai de Jemmapes, N/A, Paris, France, 75010, **Phone:** +33 (0)1 48 03 60 60, **Fax:** +33 (0)1 48 03, **Email:**	Commercial

Areva ROV	This new invention is a mini submarine capable of measuring radioactivity at the bottom of lakes and rivers with a probe and transmits the readings to be processed and used to create a map of hot spots to help authorities know where to focus efforts to remove contaminated sediment. This robot will be used by teams from the Japan Atomic Energy Authority to map the bottom of lakes in Fukushima Prefecture. Site:Fukushima, Industry:Nuclear, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Development (4-6), TRL2:Development (4-6),	Characterization and Inspection	us.areva.com		AREVA , **Address:** 7207 IBM Drive, Charlotte, North Carolina, United States, 28262, **Phone:** 704-805-2000, **Fax:** not available, **Email:**	Commercial
ARM Project	The Autonomous Radiation Monitoring (ARM) system is a low altitude aerial radiation detection device. Integrating lightweight galla spectrometers with an unmanned aerial vehicle it allows the operator to accurately asses a radiological hazard at a remote safe distance, providing real-time information on the source isotopes, intensity and location of the radiation. This uses the same platform as Project Riser (hexacopter) but is for outdoor use. Here they're looking at flying low and slow and with great accuracy to produce highly accurate maps of radiation levels (you can't get accuracy with current high level and fast drones)., , Site:Fukushima, Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Development (4-6), TRL2:Development (4-6),	Characterization and Inspection	bristol.ac.uk/		University of Bristol, **Address:** University of Bristol,, Bristol, Not Available(UK), United Kingdom, BS8 1TH, **Phone:** 440-117-928-9000, **Fax:** NA, **Email:** red-office@bristol.ac.uk	Research
AscTec Hummingbird	The AscTec Hummingbird is our most mature UAV designed for aggressive and fast flight maneuvers. The robust frame and the flexible propellers tolerate harder landings and the simple structure makes it easy to repair. Industry:Other, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Demonstration (7-8),	Characterization and Inspection	www.asctec.de/en/		Ascending Technologies, **Address:** Konrad-Zuse-Bogen 4 , Krailling, Not Available(Germany), Germany, 82152 , **Phone:** +49 89 89556079-0, **Fax:** +49 89 89556079-19, **Email:** team@asctec.de	Commercial
ASTACO-SoRa	The plan called for a robot powerful enough to lift 150 kg (330 pounds) in each arm, but thin enough to move through tight passages. Measuring 98 cm (3 feet, 2 inches) across with its arms tucked in, the robot is small enough to enter most areas. Site:Fukushima, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	www.hitachi.co.jp		Hitachi , **Address:** 6-6, Marunouchi 1-chome, Tokyo, Not Available(Japan), Japan, 100-8280 , **Phone:** +81-3-3258-1111, **Fax:** N/A, **Email:** N/A	Commercial
Autonomous Platform Demonstrator (APD)	The APD project will continue the development and maturation of UGV core mobility technologies. This effort will benefit all unmanned platform mobility, subsystem and control development. APD will ultimately be used as a highly-mobile UGV platform demonstrator for the RVCA program, replacing the Crusher UGV. APD's key performance parameters include a top speed of 80 kilometers per hour and the ability to autonomously perform a single lane change. Its size requirements include the ability to deploy two vehicles on a C-130 transport plane. Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Characterization and Inspection	www.nrec.ri.cmu.edu		National Robotics Engineering Center (NREC) at Carnegie Mellon, **Address:** Ten 40th Street, Pittsburg, Pennsylvania, United States, 15201, **Phone:** 412-681-6900, **Fax:** 412-681-6961, **Email:**	Commercial

Autonomous Soft Robot	The Massachusetts Institute of Technology (MIT) has unveiled a robot fish that it claims can change direction almost as fast as the real thing. The fish – or "autonomous soft robot" as it's described by MIT – can perform escape manoeuvres through rapid convulsions of its body, powered by carbon dioxide released from a canister in its abdomen. Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Research (1-3),	Characterization and Inspection	web.mit.edu/		Massachusetts Institute of Technology (MIT), **Address:** 77 Massachusetts Avenue, Cambridge, Massachusetts, United States, 02139, **Phone:** 617-253-2700, **Fax:** not applicable, **Email:** tele-info@mit.edu	Commercial
Autosub Long Range (ALR)	Autosub Long Range is a new type of AUV developed at the National Oceanography Centre (NOC) in Southampton, UK. By travelling slowly (0.4 metres per second), and keeping a tight rein on the power available to its sensors, it will be capable of missions of up to six months duration and ranges of 6,000 kilometres. It can dive to a depth of 6,000 metres. It is fitted with the latest oceanographic sensors, battery technology and advanced satellite communication. The sensors include dual 600 kHz Acoustic Doppler Current Profilers (ADCPs) which measure the water velocities above and below the submarine to a range of 50 metres; a microstructure turbulence probe used to measure small scale turbulence in the undisturbed water in front of the AUV; a fluorometer which provides information on the turbidity of the water; and a standard CTD (conductivity, temperature and pressure) sensor used to calculate water salinity and to identify different water masses. This comprehensive sensor suite will provide data about the mixing processes which occur around the shelf edge. Industry:Maritime, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), Tether:No tether - Endurance more than an hour,	Characterization and Inspection	noc.ac.uk/		National Oceanography Centre (NOC), **Address:** University of Southampton Waterfront Campus European Way Southampton SO14 3ZH, Southampton , Not Available(UK), United Kingdom, not available, **Phone:** 44-(0)23 8059-6666, **Fax:** not available, **Email:** not available	Research
Avatar III	The Avatar III Security Robot can be used for long-range surveillance, even hundreds of miles away from a central operations center. The robot's capabilities use existing WiFi networks, and can recharge at remote docking stations, using existing power outlets. Control software installs on a PC or Mac and uses a handheld controller for patrol and reconnaissance. Multiple incidents, simultaneous patrols, and remote communications can all be facilitated. Industry:Defense/Homeland Security, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9),	Characterization and Inspection	robotex.com/avatar-security-robot/		RoboteX, Inc., **Address:** 433 Lakeside Dr., Sunnyvale, California, United States, 94085, **Phone:** 650-838-9191, **Fax:** not available, **Email:** info@robotex.com	Commercial
BeamPro	Texai was a remote telepresence system prototype developed at Willow Garage. Based on the interest in Texai, Suitable Technologies, Inc. was spun out of Willow Garage to bring the technology to market. The resulting BeamPro product for the enterprise was launched in November, 2012 followed by the Beam+ for the home in January, 2014. Industry:Other, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Characterization and Inspection	www.suitabletech.com		Suitable Technologies, Inc., **Address:** 921 E Charleston Rd, Palo Alto, California, United States, 94303, **Phone:** 855-200-2326, **Fax:** N/A, **Email:** info@suitabletech.com	Commercial
Bebop Drone	Quadrocopter equipped with camera and flight stabilisation technology. Industry:Consumer, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:No tether - Endurance 0-30 minutes,	Characterization and Inspection	www.parrot.com		Parrot SA, **Address:** 174 Quai de Jemmapes, N/A, Paris, France, 75010, **Phone:** +33 (0)1 48 03 60 60, **Fax:** +33 (0)1 48 03, **Email:**	Commercial

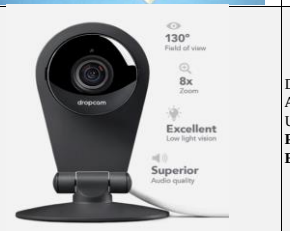
Bio Argo Float	The 'Bio Argo' floats, are used to measure large-scale changes in the chemistry and biology of marine ecosystems below the Indian Ocean's surface. The Argo floats are a network of 3600 free-floating sensors, operating in open ocean areas that provide real-time data on ocean temperature and salinity. They include additional sensors for dissolved oxygen, nitrate, chlorophyll, dissolved organic matter, and particle scattering. They will target specific gaps in the understanding of Indian Ocean ecosystems of immediate concern to India and Australia, such as the Bay of Bengal and the waters of north Western Australia. Industry:Maritime, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Characterization and Inspection	www.argo.net/		ARGO, **Address:** 8-10, Rue Hermes Parc Technologique du Canal 31526 Ramonville Cedex, Ramonville, Not Available(France), France, not available, **Phone:** not available, **Fax:** not available, **Email:** support@argo.net	Commercial
BionicKangaroo	BionicKangaroo is able to realistically emulate the jumping behavior of real kangaroos, which means that it can efficiently recover energy from one jump to help it make another jump. Without this capability, kangaroos (real ones) would get very very tired very very quickly, but by using their tendons like elastic springs, the animals can bound at high speeds efficiently for substantial periods of time. Industry:Research, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Demonstration (7-8),	Characterization and Inspection	www.festo.com		Festo Corporation, **Address:** Ruiter Straße 82, Esslingen/Berkheim, Not Available(Germany), Germany, 73734, **Phone:** +49 (0) 711-347-0, **Fax:** NA, **Email:** info_de@festo.com	Commercial
Bluefin HAUV	HAUV is a two-man-portable hovering AUV designed for ship hull inspection. Equipped with a high-resolution imaging sonar, it surveys ship hulls and other structures with minimal prior knowledge. While surveys are executed autonomously, the operator can manually control the vehicle to further observe features of interest identified in the real-time data. Industry:Oil & Gas, Energy, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9),	Characterization and Inspection	www.bluefinrobotics.com		Bluefin Robotics Corporation, **Address:** 553 South Street, Quincy, Massachusetts, United States, 02169, **Phone:** 617-715-7000, **Fax:** 617-498-0067, **Email:** NA	Commercial
Bluefin Spray Glider	The Bluefin Spray Glider is a deep-diving, buoyancy-driven autonomous underwater vehicle. The Spray collects water column data profiles using a pumped, conductivity-temperature-depth (CTD) sensor and other instruments. Deployments of up to 6 months can be achieved with a single set of batteries. Industry:Maritime, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9),	Characterization and Inspection	www.bluefinrobotics.com		Bluefin Robotics Corporation, **Address:** 553 South Street, Quincy, Massachusetts, United States, 02169, **Phone:** 617-715-7000, **Fax:** 617-498-0067, **Email:** NA	Commercial
Bluefin-21	The Bluefin-21 is a highly modular autonomous underwater vehicle able to carry multiple sensors and payloads at once. It boasts a high energy capacity that enables extended operations even at the greatest depths. The Bluefin-21 has immense capability but is also flexible enough to operate from various ships of opportunity worldwide. This is the UAV being used to search for the Malaysian Airliner in the Indian Ocean. The Bluefin 21 has a built-in safety feature which forces it to return to the surface once its limit is exceeded. Industry:Maritime, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Characterization and Inspection	www.bluefinrobotics.com		Bluefin Robotics Corporation, **Address:** 553 South Street, Quincy, Massachusetts, United States, 02169, **Phone:** 617-715-7000, **Fax:** 617-498-0067, **Email:** NA	Commercial

Bracelet Scanner	Small bore weld scanner for ultrasonic inspection. Industry:Engineering, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9),	Characterization and Inspection	www.phoenixisl.com		Phoenix ISL, **Address:** Dalton House 40 Hardwick Grange Warrington Cheshire, Warrington, Warrington, United Kingdom, not available, **Phone:** 44-(0)-1925-826000, **Fax:** 44-(0)-1925-838, **Email:** office@phoenixisl.co.uk	Commercial
Camera system for visual inspection of graphite fuel channels	The concept is a radical new design of inspection system, incorporating a conical mirror to provide a full 360 degree circumferential view of the internal bore of a fuel (or control rod) channel 100 mm diameter and 8 m high in a hazardous and highly radioactive environment. Site:Magnox, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	www.magnoxsites.co.uk/		Magnox Ltd, **Address:** Berkeley Site, Berkeley, Gloucestershire, Not Available(UK), United Kingdom, GL13 9PA, **Phone:** 01453 814000, **Fax:** N/A, **Email:**	Commercial
Cannonball	d'Arbeloff Laboratory are working on small, egg-sized robots designed to dive into nuclear reactors and swim through underground pipes, checking for signs of corrosion. The underwater patrollers, equipped with cameras, are able to withstand a reactor's extreme, radioactive environment, transmitting images in real-time from within. Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Research (1-3),	Characterization and Inspection	web.mit.edu/		Massachusetts Institute of Technology (MIT), **Address:** 77 Massachusetts Avenue, Cambridge, Massachusetts, United States, 02139, **Phone:** 617-253-2700, **Fax:** not applicable, **Email:** tele-info@mit.edu	Commercial
Canyon Disposition Initiative Remote Characterization System	The Canyon Disposition Initiative (CDI) Remote Characterization System is a robotic characterization platform for use in the 221-U facility (U-Plant) at Hanford. It is designed for fully remote collection of characterization data such as gross gamma readings, video, and smear samples. Site:Oak Ridge, Industry:Nuclear, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	www.ornl.gov		Oak Ridge National Laboratory, **Address:** P.O. Box 2008, Oak Ridge, Tennessee , United States, 37831, **Phone:** 865-576-7658, **Fax:** 865-576-2081, **Email:** partnerships@ornl.gov	Commercial
Carlisle ISAAC HVAC Remediation Robotic System	The Inspection, Sealing, and Advanced Cleaning robot, or ISAAC, is created specifically for the inspection and repair of ductwork. The ISAAC HVAC Robotic System is capable of hard-to-reach remediation that would otherwise result in much more costly renovations. It is a robotic vehicle integrated with a digital video recorder that is speci?cally designed to clean, coat, and seal ductwork of all types. The robot uses lightweight rotary flails to remove contamination and rotary spray nozzles to apply a sealant coating. ISAAC can:, Inspect, coat, and seal ductwork from the inside., Effectively remove debris in a single pass., Provide video footage of interior conditions., , Industry:Other, Size:Unknown, TRL:Operational (9),	Characterization and Inspection	carlislehvac.com		Carlisle HVAC, **Address:** 900 Hensley Lane, Wylie, Texas, United States, 75098, **Phone:** 877-495-4822, **Fax:** N/A, **Email:**	Commercial

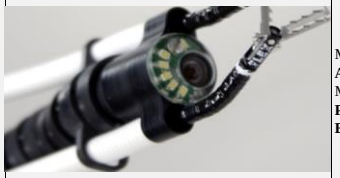
Clarifying Climber	The Clarifying Climber is a remote controlled (R/C) robot. The Climber can scale many smooth and uneven vertical surfaces – wall board, plaster, brick, cinder block, and siding are negotiable for this versatile robot. It can go across sturdy ceilings if placed there first – although it can transition from a horizontal (ground) surface to a vertical one, and back, it can not go from a vertical to an inverted surface or directly around corners unassisted. The climber uses patented VRAM technology from Vortex HC, LLC (formerly Avionic Instruments) to pull itself to surfaces (US and international patents apply). By combining the VRAM with a versatile multi-wheeled posi-traction drive train, the robot can travel and maneuver on horizontal, vertical, and even inverted surfaces with ease. The nature of the vortex effect also makes it forgiving of changing surface types. Industry:Defense/Homeland Security, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Demonstration (7-8),	Characterization and Inspection			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Co3-AUVs	The aim of the Co3-AUVs project is to develop, implement and test advanced cognitive systems for coordination and cooperative control of multiple AUVs. Several aspects will be investigated including 3D perception and mapping, cooperative situation awareness, deliberation and navigation as well as behavioral control strictly linked with the underwater communication challenges. As a result, the team of AUVs will cooperate in challenging scenarios in the execution of missions where all data is processed online. In doing so, the team will be robust with respect to failures and environmental changes. These key features will be tested in a harbor scenario where additional difficulties with respect to open sea applications arise and in a human diver assistance scenario that also illustrates human robot interaction issues. Industry:Research, Size:Not Applicable, TRL:Research (1-3),	Characterization and Inspection	www.jacobs-university.de/		Jacobs University Bremen, **Address:** Campus Ring 1, Bremen, Not Available(Germany), Germany, 28759, **Phone:** 49 421 200-40, **Fax:** N/A, **Email:** info@jacobs-university.de	Research
CoBot	CoBot robots follow a novel symbiotic autonomy, in which the robots are aware of their perceptual, physical, and reasoning limitations and proactively ask for help from humans, for example for object manipulation actions. (The CoBot robots, at this time, do not have arms.) Industry:Research, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Characterization and Inspection	ri.cmu.edu		The Robotics Institute (Carnegie Mellon University), **Address:** 5000 Forbes Avenue, Pittsburgh, Pennsylvania, United States, 15213, **Phone:** 412-268-3818, **Fax:** 412-268-6436, **Email:** robotics@ri.cmu.edu	Research
Continuous Wave Peristaltic Locomotion	Earthworms travel by contracting their body segments sequentially. This method of locomotion is particularly effective in constrained spaces. Soft worm robots may eventually have application in pipe inspection, burrowing, or exploration., The robot uses peristalsis, the same method of locomotion earthworms use., , Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Characterization and Inspection	case.edu		Case Western Reserve University, **Address:** 10900 Euclid Ave, Cleveland, Ohio, United States, 44106, **Phone:** 216-368-2000, **Fax:** N/A, **Email:** N/A	Research
Crabster	Crabster was designed by the Korea Research Institute of Ship and Ocean Engineering (KRISO) as a huge, six-legged robot capable of scuttling along the ocean floor. The robot can withstand strong tidal currents and carries both sonar and acoustic cameras capable of seeing through murky underwater conditions. Industry:Maritime, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Characterization and Inspection	eng.kiost.ac/kordi_eng/main/		Korea Research Institute of Ship and Ocean Engineering (KRISO), **Address:** 104 Shinseong-ro, Yuseong-gu, Daejeon, Not Available(South Korea), South Korea, N/A, **Phone:** (+82) 31-400-6000, **Fax:** 031-408-5820, **Email:**	Commercial

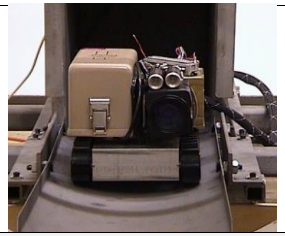
Crawler	Dimensions: 535 mm x 370 mm x 163 mm;, Mass: 10 kg, Motors: Brushless DC 40W (x2);, Electronics: Basic model power by TITech M4 Controller and 1BLDC Power Module (x2);, Battery: Lion 25V 8.9Ah 212Wh;, Control: wireless and/or wired;, Protection: basic model IP64, possibility to further increase its protections;, Possible sensors: CCD cameras, thermal image cameras, microphone, gas sensors, GPS positioning device;, Software: source code available;, Other: Completely customisable on request., , Industry:Defense/Homeland Security, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Demonstration (7-8), Tether:No tether - Endurance Unknown, Manipulator:No	Characterization and Inspection	www.hibot.co.jp		HiBot, **Address:** 5-9-15 Kitashinagawa, Shinagawa-ku, Tokyo, Not Available(Japan), Japan, 141-0001, **Phone:** +81-3-5791-7526, **Fax:** +81-3-5791-7527, **Email:** NA	Commercial
Crawler Modules	Result of the HiBot-Topy project. A novel concept of crawler robot, combining for the first time compact dimensions, ultra light weight and mobility to overcome high obstacles. Being easily operated by wireless LAN, it is an ideal platform for research and delicate operations This HiBot-Topy project is a collaboration between HiBot Corp., a spin-off from Hirose and Fukushima Lab of the Tokyo Institute of Technology, and Topy Industries, Ltd. Hirose and Fukushima Lab. is well known for the research and development of rescue and mobile robots, while Topy Industries has acquired a great deal of knowledge over the years with the manufacture of virtually every sort of crawlers for construction machines., , Industry:Emergency Response, Size:Unknown, TRL:Development (4-6),	Characterization and Inspection	www.hibot.co.jp		HiBot, **Address:** 5-9-15 Kitashinagawa, Shinagawa-ku, Tokyo, Not Available(Japan), Japan, 141-0001, **Phone:** +81-3-5791-7526, **Fax:** +81-3-5791-7527, **Email:** NA	Commercial
C-Talon	The C-TALON robotic crawler is designed for use in rivers, surf zone, and limited access harbor areas. Based on QinetiQ North America's bestselling TALON EOD robot, used every day by militaries, law enforcement and first responders around the world to save the lives of soldiers and first responders, the C-TALON robot brings a unique set of capabilities to the difficult and harsh operating environments of the ocean, rivers and harbor areas. Industry:Defense/Homeland Security, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Demonstration (7-8), Tether:No tether - Endurance more than an hour, Waterproof:IP68 - Protected against prolonged effects of immersion under pressure, Manipulator:No	Characterization and Inspection	www.qinetiq-na.com		QinetiQ North America, **Address:** 350 Second Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 781-684-4000, **Fax:** NA, **Email:** TSGInfo@QinetiQ-NA.com	Commercial
Cyberhawk	Remotely Operated Aerial Vehicles (ROAVs)/UAV can inspect assets live, capturing high resolution stills, HD video and infrared images. Suitable for flare stacks, flare tips and other industrial structures. Industry:Oil & Gas, Energy, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9),	Characterization and Inspection	www.albainnovationcentre.co.uk		Alba Innovation Centre, **Address:** Alba Campus, Livingston, Not Available(UK), United Kingdom, EH54 7GA, **Phone:** +44 1506 592100, **Fax:** 01506 592 101, **Email:** alba@innovationcentre.org	Commercial
D40 Camera	The D40 offers high resolution, small size, and high radiation tolerance. It is compact (1.58") and suited for inspection of confined areas and in reactor components. Its modular design and range of attachments makes it a "utility camera", in which a single camera system can be reconfigured to support a number of plant operations and maintenance. The D40 is also offered as an integrated system solution, complete with camera, processing system and user interface. Industry:Nuclear, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9),	Characterization and Inspection	www.diakont.com		Diakont, **Address:** 3821 Calle Fortunada, San Diego, California, United States, 92123, **Phone:** (858) 551- 5551, **Fax:** (858) 504-7065, **Email:** support@diakont.us.com	Commercial

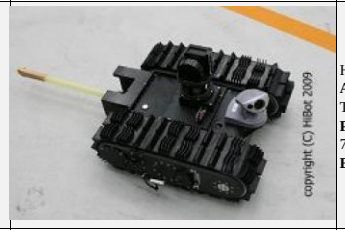
D70 Camera	CCTV cameras which are radiation hardened. (100 megaRad). Industry:Nuclear, Size:Unknown, TRL:Operational (9),	Characterization and Inspection	www.diakont.com		Diakont, **Address:** 3821 Calle Fortunada, San Diego, California, United States, 92123, **Phone:** (858) 551- 5551, **Fax:** (858) 504-7065, **Email:** support@diakont.us.com	Commercial
Daler	Named DALER (Deployable Air Land Exploration Robot) after lead researcher, Ludovic Daler, the robotic platform is uniquely capable of both flight and ground locomotion. What's novel about the DALER platform is that it uses one set of limbs for both modes of transportation. To accomplish this, researchers applied "adaptive morphology" to their robot design. The robot's wings—termed "whegs"—transform into walking legs after landing. Industry:Research, Size:Unknown, TRL:Development (4-6),	Characterization and Inspection	lis.epfl.ch/		Laboratory of Intelligent Systems (LIS), **Address:** EPFL-STI-IMT-LIS, Lausanne, Not Available(Switzerland), Switzerland, CH-1015, **Phone:** +41 21 693 59 66, **Fax:** +41 21 693 58 5, **Email:** webmaster@epfl.ch	Commercial
DelFly Explorer	The MAV has a 28-cm (11-in) wingspan and weighs just 20 grams, but can pack in a 4-gram stereo vision system consisting of two cameras and a processor, along with a 1-gram autopilot that incorporates a barometer, accelerometers and gyroscopes. It also has motors and a battery, the latter of which allows for flight times of about nine minutes. It is able to take off, maintain altitude and avoid obstacles without any human assistance, and with all sensing and processing taking place onboard the aircraft. Its vision system is sufficient for identifying obstacles and determining how far away they are – algorithms built into that system compensate for distortions caused by the flapping motion and the rolling shutter cameras. Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Research (1-3),	Characterization and Inspection	delfly.nl		Delft University of Technology, **Address:** 2629 HS Delft, The Netherlands, Not Available(Netherlands), Netherlands, N/A, **Phone:** 310-15-278-80-12, **Fax:** 310-15-278-56-9, **Email:** info@tudelft.nl	Research
DepthX	DepthX (DEep Phreatic THermal eXplorer) is a NASA Astrobiology Science and Technology for Exploring Planets (ASTEP) project to design, develop, and field-test a robotic vehicle to explore extreme aqueous environments. The principal astrobiological science objective of DepthX is to develop an advanced methodology and protocol for the discrimination of microbial life in a sub-aqueous environment. The methodology and protocol might be used in exploration and search for life in locations such as Europa, the sixth moon of Jupiter. This exploration required the design, development, and demonstration of a fully autonomous architecture for intelligent biological sample detection and collection. Southwest Research Institute (SwRI) designed, assembled, and tested the science package capable of performing the following functions: * Acquiring data from a hierarchical suite of on-board microbial life detection sensors and processors and analyzing the data to determine whether life is present, * Aseptically collecting samples and returning them for ex-situ laboratory analysis, * Autonomously searching for life and returning samples. This capability will be tested in El Zacatón, an unexplored, water-filled sinkhole in Mexico., , Industry:Space, Size:Unknown, TRL:Demonstration (7-8),	Characterization and Inspection	www.swri.org/		Southwest Research Institute (SwRI), **Address:** 6220 Culebra Rd, San Antonio, Texas, United States, 78238, **Phone:** 1-210-684-5111, **Fax:** 1-210-522-3547, **Email:** not available	Commercial

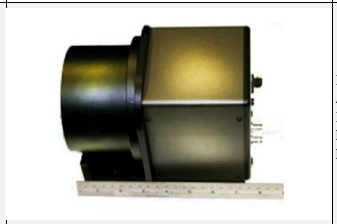
Dji Phantom	This powerful, easy to fly quadcopter sports not only a built-in anti-vibration camera, but also smartphone compatibility. That means you can view, in real time, what the camera's looking at when it's soaring 300 feet above your head. Industry:Consumer, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:No tether - Endurance 0-30 minutes,	Characterization and Inspection	www.dji.com/		DJI, **Address:** 14th Floor, West Wing, Skyworth Semiconductor Design Building,, Shenzhen, Not Available(China), China, 518057, **Phone:** +86 0755 26656677, **Fax:** N/A, **Email:** info@dji.com	Commercial
Dragon Runner	Small tracked robot with manipulator developed for military applications. It is a small unmanned ground vehicle (it can be carried in a standard issue pack) enables users to see round corners in urban environments and can be easily customised by field personnel Dragon Runner 10 (DR10) Micro Unmanned Ground Vehicle (MUGV) is a lightweight, compact, multi-mission remote platform developed for supporting small unit, dismounted operations, , Industry:Defense/Homeland Security, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), Tether:No tether - Endurance Unknown, Manipulator:Yes - optional	Characterization and Inspection	www.qinetiq-na.com		QinetiQ North America, **Address:** 350 Second Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 781-684-4000, **Fax:** NA, **Email:** TSGInfo@QinetiQ-NA.com	Commercial
DragonEye 3D Flash LIDAR	The DragonEye Space Camera is a lightweight, small form-factor (11.2 x 11.9 x 12.2 cm) integrated 3D FLC, capable of capturing a full array of 128x128 independently triggered pixels per each frame up to 10 frames per second, allowing 16,300 3D range data and intensity points to be generated as 3D point cloud images or video streams in real-time. Industry:Space, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9),	Characterization and Inspection	www.advancedscientificconcepts.com/index.html		Advanced Scientific Concepts, Inc. , **Address:** 135 East Ortega Street, Santa Barbara, California, United States, 93101, **Phone:** 805-966-3331, **Fax:** N/A, **Email:** N/A	Commercial
Dropcam Pro	Dropcam is a cloud-based Wi-Fi video monitoring service with free live streaming, two-way talk and remote viewing that makes it easy to stay connected, no matter where you are. Industry:Consumer, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9),	Characterization and Inspection	www.dropcam.com/		Dropcam, Inc., **Address:** 900 Hansen Way , Palo Alto, California, United States, 94304, **Phone:** 888-279-9421, **Fax:** N/A, **Email:** N/A	Commercial
eBee	Collects aerial photography of 1-10sqkm in a single flight at down to 5cm precision. The eBee has a flight time of up to 45 minutes allowing to cover areas of up to 10sqkm in a single flight. With its 16MP camera it can shoot aerial imagery at down to 3cm/pixel resolution. The images can then be used to create maps and elevation models with a precision of 5cm., , Site:Fukushima, Industry:Airborne, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9), TRL2:Operational (9), Tether:No tether - Endurance 30-60 minutes,	Characterization and Inspection	www.sensefly.com		SenseFly Ltd., **Address:** Route de Genève 38, Cheseaux-Lausanne, Not Available(Switzerland), Switzerland, 1033 , **Phone:** +41 21 552 04 40, **Fax:** NA, **Email:** support@sensefly.com	Commercial

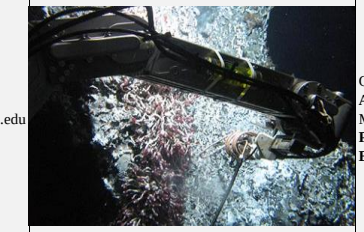
Electroadhesive Surface-Climbing Robots	SRI has demonstrated robust clamping on materials that include glass, wood, metal and concrete. Used for remote surveillance or inspection of concrete pillars or other structures (such as bridges and tunnels), the robots use SRI's patented electroadhesion technology to enable wall climbing. They can also be used to carry payloads such as cameras, wireless network nodes, and other sensors., , Industry:Defense/Homeland Security, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Demonstration (7-8),	Characterization and Inspection	www.sri.com		SRI International , **Address:** 333 Ravenswood Avenue, Menlo Park, California, United States, 94025, **Phone:** 650-859-2000, **Fax:** N/A, **Email:** N/A	Commercial
Elios	Elios is a collision-tolerant flying robot, designed for industrial inspection. This technology allows for access to complex, cluttered or indoor places. Elios can be used in a number of applications where it was previously too dangerous.	Characterization and Inspection	www.flyability.com		Flyability, **Address:** Flyability SA, Lausanne, Not Available(Switzerland), Switzerland, n/a, **Phone:** +41 21 311 55 00, **Fax:** N/A, **Email:** info@flyability.com	Commercial
Expliner	An inspection robot, called Expliner, is designed to roll along a typical high-voltage cables with a diameter between 24mm and 64mm (0.94 to 2.51 inches). On one of its sides the robot dangles a manipulator arm, which also serves as a counterweight for balance. It weights 80kg (176 pounds) and its dimensions are 1.5 x 0.6 x 1.5 meters (5 x 2 x 5 feet) when it's in its compact posture. In order to inspect the cables, Expliner uses four sets of laser sensors (one set for each of the four cables in a bundle) which give the robot the ability to see the whole surface of each cable, to spot corrosion or scratches, and to discern tiny changes in cable diameter that could indicate damage inside the cable, such as a broken steel strand. The robot also has a high-definition, high-zoom camera that can record the details of bolts and spacers from its close range, , Industry:Other, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Characterization and Inspection	www.hibot.co.jp		HiBot, **Address:** 5-9-15 Kitashinagawa, Shinagawa-ku, Tokyo, Not Available(Japan), Japan, 141-0001, **Phone:** +81-3-5791-7526, **Fax:** +81-3-5791-7527, **Email:** NA	Commercial
Explosive Ordinance Disposal Robots	Family of platforms currently used by military and police to provide stan-off capability in tactical situations. Cable of carrying loads up to 200 lbs and operating specialized EOD remote tools. Platforms include manipulators, cameras, speakers and microphones. Industry:Defense/Homeland Security, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9), Manipulator:Yes - standard	Characterization and Inspection	www.abprecision.co.uk		AB Precision (Poole) Ltd, **Address:** 1 Fleets Lane, Dorset, Not Available(UK), Australia, BH15 3BZ, **Phone:** +44 (0)1202 665000, **Fax:** NA, **Email:** enquiries@abprecision.co.uk	Commercial
Filose	FILOSE (Robotic FIsh LOcomotion and SEnsing) is a research project financed by 7th Framework Program and including the following collaborators: Tallinn University of Technology, Center for Biorobotics; University of Verona, Altair Lab; Italian Institute of Technology; University of Bath; and Riga Technical University. We investigate how fish sense the flow around them and react to the changes in the flow patter. Then we want to build robots that act in the same way. Industry:Research, Size:Unknown, TRL:Development (4-6),	Characterization and Inspection	www.ttu.ee/en		Tallinn University of Technology, **Address:** Ehitajate tee 5, Tallinn, Estonia, Not Available, Australia, 19086, **Phone:** 372 620 2002, **Fax:** 620 2020, **Email:** info@ttu.ee	Research

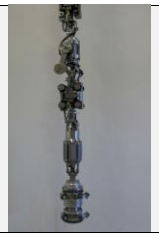
Firefly	The AscTec Firefly is the latest and most advanced UAV in the AscTec fleet. It was engineered for highest security and easy handling, hence it´s perfect for autonomous flight experiments. Besides the small nonhazardous propellers and low take-off weight, it comes with a patented redundant propulsion system, which allows a controlled flight with only 5 rotors. Selectable emergency modes allow difficult flight missions. The modular structure enables fast component exchanges in case of a crash or modification during integration and testing. The "frame in frame" concept was designed to decouple the fixed connection of payload and IMU from the vibration inducing motors. This concept raises the quality of the sensor and camera data and avoids dynamic misalignments. Optional propeller types tune the AscTec Firefly to either maximum security or maximum performance., , Industry:Other, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9), Tether:No tether - Endurance Unknown,	Characterization and Inspection	www.asctec.de/en/		Ascending Technologies, **Address:** Konrad-Zuse-Bogen 4 , Krailling, Not Available(Germany), Germany, 82152 , **Phone:** +49 89 89556079-0, **Fax:** +49 89 89556079-19, **Email:** team@asctec.de	Commercial
Flex System	A surgical version of the snake robot developed by Choset and two partners through Medrobotics Corp, a Carnegie Mellon spin-off venture. The Flex System enables surgical procedures where conventional line-of-sight technologies are either not feasible or sub-optimal. Surgeons can navigate the Flex Endoscope around anatomical structures to hard-to-reach locations through a single access site, then use the onboard high-definition vision system to precisely deploy a range of third party flexible surgical instruments. The uniquely "wristed" 3mm Flex Instruments enable the surgeon to operate in confined spaces, further extending his or her reach to important and often challenging areas of the anatomy. Industry:Healthcare/Medical, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Demonstration (7-8),	Characterization and Inspection	www.medrobotics.com/		Medrobotics Corp, **Address:** 475 Paramount Dr., Raynham, Massachusetts, United States, 02767, **Phone:** 508-823-1547, **Fax:** not available, **Email:** not available	Commercial
FriGeo	Sellafield are working with a Swedish company called FriGeo to develop a self-sinking probe to sample radioactive sludge from the bottom of a five-metre-deep legacy fuel storage pond. The challenge posed was how to remotely collect samples of radioactive sludge up to 100cm deep from the bottom of the First Generation Magnox Storage Pond (FGMSP) at Sellafield, without disturbing the thick sludge bed or destroying the sample's characteristics. The answer involved the development of a probe that could be remotely lowered into the sludge where it could pick up a sample from a predefined depth without disturbing the material. FriGeo specialises in artificial freezing/stabilisation of sediment or ground, a technology which uses rapid freezing to solidify/stabilise an area of sediment for both dredging and salvage of objects, and from this was born the idea of freeze sampling., , Site:Sellafield, Industry:Maritime, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Development (4-6),	Characterization and Inspection	www.frigeo.se/		FriGeo AB, **Address:** Smedjegatan 19, Luleå, Not Available(Sweden), Sweden, 97232, **Phone:** +46 70 571 00 65, **Fax:** NA, **Email:** NA	Commercial
Fukushima Drone	Drones used to measure radiation in Fukushima nuclear plant. A drone manufactured to measure radiation levels has been developed by the Japanese Atomic Energy Agency and the Japanese Space Exploration Agency. It is operated using a remote control and unlike manned aircrafts, it has the option to fly lower, with a minimum of 300 meters in altitude., , Site:Fukushima, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8), Tether:No tether - Endurance 30-60 minutes, Waterproof:Not Rated or Unknown, Payload:Unknown,	Characterization and Inspection	www.jaea.go.jp/english/index.html		Japanese Atomic Energy Agency, **Address:** 4-49 Muramatsu, Tokai-mura, Naka-gun, Not Available(Japan), Japan, 319-1184, **Phone:** (+81)-29-282-1122, **Fax:** NA, **Email:** NA	Commercial

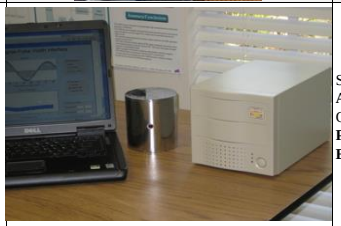
Gamma Rover	The Gamma-Rover (GRover) is an electrically powered crawler designed to visually inspect and characterize the radiological conditions within the B-Cell and D-Cell ventilation ducting in support of the Hanford Site's 324 Building Stabilization/Deactivation Project. Site:Hanford, Industry:Nuclear, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	www.pnl.gov		Pacific Northwest National Laboratory (PNNL), **Address:** P.O. Box 999, Richland, Washington, United States, 99352, **Phone:** (509)375-2121, **Fax:** n/a, **Email:** webmaster@pnl.gov	Commercial
GI Joe	G.I. Joe is SRR's latest sampling robot. An enhancement of Frankie, G.I. Joe was a commercially available design and was modified by SRR in order to obtain better samples of residual waste. The arm grips a scoop that is dragged along the tank floor. Once the scoop is filled with material, an engineer uses cameras and remote controls to maneuver the robot to another area within the tank where the scoop is placed into a basket. The basket is then lifted out of the tank and sent to the laboratory for analysis of the sample Site:Savannah River, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	srnl.doe.gov/		Savannah River National Laboratory, **Address:** Savannah River National Laboratory, Aiken, South Carolina, United States, 29808, **Phone:** 803-725-6211, **Fax:** N/A, **Email:** rosalind.blocker@srs.gov	Commercial
Gimball	Gimball, a flying robot that takes crashing into obstacles in its stride. The Gimball bounces off, rather than avoids obstacles. Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Research (1-3),	Characterization and Inspection	lis.epfl.ch/		Laboratory of Intelligent Systems (LIS), **Address:** EPFL-STI-IMT-LIS, Lausanne, Not Available(Switzerland), Switzerland, CH-1015, **Phone:** +41 21 693 59 66, **Fax:** +41 21 693 58 5, **Email:** webmaster@epfl.ch	Commercial
Glaucus	A quadruped with no hard moving parts that walks using only two input lines. Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Development (4-6),	Characterization and Inspection	superreleaser.com/		Super Releaser, **Address:** not available, Brooklyn, New York , United States, 11207, **Phone:** 646-397-5633, **Fax:** not available, **Email:** touch@superreleaser.com	Commercial
GoPro Hero 3	Widely used consumer camera. Features video resolutions up to 1080p30, 5MP photos up to 3 frames per second, an ultra wide angle lens and built-in Wi-Fi. Waterproof to 131 ft (40 m). Industry:Consumer, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9), Tether:No tether - Endurance more than an hour, Waterproof:IP68 - Protected against prolonged effects of immersion under pressure, Payload:Not Applicable, Reach:Not Applicable,	Characterization and Inspection	gopro.com		GoPro, **Address:** 2111 Eastridge Avenue, Riverside, California, United States, 92507, **Phone:** 650-980-0252, **Fax:** n/a, **Email:** n/a	Commercial

GrayQb	GrayQb is able to locate, identify and generate a map of radioactive contamination within an enclosed area. Site:Savannah River, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	srnl.doe.gov/		Savannah River National Laboratory, **Address:** Savannah River National Laboratory, Aiken, South Carolina, United States, 29808, **Phone:** 803-725-6211, **Fax:** N/A, **Email:** rosalind.blocker@srs.gov	Commercial
Groundhog Detection System	Using banks of detectors, Groundhog provides a high density of survey measurements, automatically records all data, uses GIS to aid analysis and is suitable for areas of all sizes. With a range of options available, particles of radioactive material the size of a grain of sand or smaller can be detected, with survey results used to support remediation strategies based on in-situ selective sentencing of waste., , Site:Dounreay, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Characterization and Inspection	www.nuvia.co.uk		Nuvia Limited, **Address:** Morven House, Caithness, Not Available(UK), United Kingdom, KW14 7QU, **Phone:** +44(0)1847 808800, **Fax:** NA, **Email:** info@nuvia.co.uk	Commercial
Grundosteer	A steerable impact mole device. Like conventional piercing tools, the Grundosteer is pneumatically powered and driven by a piston in a casing. It features Teflon seals and tapes, as well as all modular construction for durability and long life. The tool can be surface launched or launched from a cradle in a pit. The tool is 3 inches in diameter, weighs 85 pounds and is 87 inches long. In all respects it operates and functions like a regular piercing with the big exception of its steering capabilities. The Grundosteer can bore up to 200 feet. Sensors on the tool provide pitch and roll information to the operator and an above ground locator is used to track the tool's position and movement. Depending on soil conditions, the tool can be steered at a maximum 85-foot radius. The operator can make adjustments to the tool's course by rotating the air hose with a hydraulic tensioning unit called a torquer. The wire reinforced air hose is placed in a specially developed torque frame where rotation takes place. The hydraulic torquer clamps down on the hose and allows the operator to turn it. A specially designed tapered steering head rotates accordingly then sets the tool's course. Industry:Construction, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9),	Characterization and Inspection	www.tttechnologies.com/index.html		TT Technologies, **Address:** 2020 E New York Street, Aurora, Illinois , United States, 60502, **Phone:** 1-800-533-2078, **Fax:** N/A, **Email:** info@tttechnologies.com	Commercial
Helios 9	When large urban areas are stricken by natural disasters, the rescue teams may need to overcome dangerous and irregular obstacles to reach the victims. Helios-IX was designed for such applications. It is a powerful tracked vehicle with center of mass control, which allows it to perform several different motions on stairs and uneven terrain. Helios-IX is equipped with a manipulator that can be used to remove obstacles, carry tools and also to overcome obstacles., , Industry:Emergency Response, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Demonstration (7-8), Payload:5-10kg/10lb-20lb, Reach:600mm-1200mm/24in-48in, Manipulator:Yes - standard	Characterization and Inspection	www.hibot.co.jp		HiBot, **Address:** 5-9-15 Kitashinagawa, Shinagawa-ku, Tokyo, Not Available(Japan), Japan, 141-0001, **Phone:** +81-3-5791-7526, **Fax:** +81-3-5791-7527, **Email:** NA	Commercial
Helios Carrier	The Helios Carrier is a robust auxiliary platform, commonly employed in support missions. It may be equipped with cameras and other sensors, such as laser range finders, thermal imaging devices, chemical compound sensors and more. The Helios Carrier is equipped with a tail device that stabilizes it even in steep, uneven terrain, therefore increasing the mobility of the platform., , Industry:Emergency Response, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Development (4-6), Tether:No tether - Endurance Unknown, Manipulator:No	Characterization and Inspection	www.hibot.co.jp		HiBot, **Address:** 5-9-15 Kitashinagawa, Shinagawa-ku, Tokyo, Not Available(Japan), Japan, 141-0001, **Phone:** +81-3-5791-7526, **Fax:** +81-3-5791-7527, **Email:** NA	Commercial

High Access Survey Robot	The survey robot consists of a mobile platform developed by AIST that carries a robot arm developed by Honda which can be extended up to 7 meters (23 ft). It is remotely controlled via a 400 meter (1300 ft) fiber-optic LAN cable and wireless LAN workstation from inside a separate building. The 1,100 kg (2425 lb) robot travels at up to 2 km/h (1.24 mph) and can overcome 6 cm (2.3 in) bumps. The two groups also co-developed the remote control interface used by the operators. Using a combination of cameras, laser range finders, and dosimeters on the tip of the extendable arm, operators can see detailed video images, collect 3D structural data, and identify sources of radiation from areas that would be otherwise inaccessible. The arm has 11 joints, allowing it to curl up while the robot is moving to stay out of the way, and snake between pipes during inspection., , Site:Fukushima, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	world.honda.com/ASIMO/		Honda, **Address:** 2-1-1 Minamiaoyama, Minato, Tokyo 107-0062, Tokyo, Not Available(Japan), Japan, not available, **Phone:** 81-3-3423-4118, **Fax:** not available, **Email:** not available	Commercial
High Performance X-ray Camera	RMD has developed an advanced high frame rate, large-area, modular X-ray detector capable of acquiring high-speed, high-resolution, high-contrast images of dynamic phenomena, for use in hypervelocity projectile tracking, impact analysis, and other important applications such as high-speed medical X-ray CT and time-resolved X-ray analysis. Industry:Healthcare/Medical, Size:Unknown, TRL:Demonstration (7-8),	Characterization and Inspection	rmdinc.com/		Radiation Monitoring Devices, Inc, **Address:** 44 Hunt Street, Watertown, Massachusetts, United States, 02472, **Phone:** (617) 668-6900, **Fax:** 617-668-6890, **Email:** info@rmdinc.com	Commercial
Hitachi Submersible	The submersible crawling swimming robot is for investigating submersed environments within Fukushima, and can be used to investigate underwater leakage points of the retained water. A feature of this robot is the use of six thrusters (4 vertical, 2 horizontal) to enhance free movement in water, and one set of crawlers to achieve both crawling and swimming movement. Through the crawling movement, the robot can not only run along the bottom of a water pool but can also change posture to avoid obstacles while swimming and after swimming, to move along a wall through suction., , Site:Fukushima, Industry:Nuclear, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8), Tether:Yes, Waterproof:IP68 - Protected against prolonged effects of immersion under pressure,	Characterization and Inspection	www.hitachi.co.jp		Hitachi , **Address:** 6-6, Marunouchi 1-chome, Tokyo, Not Available(Japan), Japan, 100-8280 , **Phone:** +81-3-3258-1111, **Fax:** N/A, **Email:** N/A	Commercial
HR-MP20 Wall climbing robot	Light Weight Magnetic Climbing Robot Features HR-MP20 is a single man portable, climbing robot, rated to lift 20 lbs (9kg). Mecanum wheel drive system offers best in class maneuverability. Magnetic adhesion system does not touch the work surface. Works on surfaces from 7" diameter to flat plate. Full wireless operation allows for expanded work environment. Optional integration with other devices such as cameras, sensors, inspection equipment (e.g. ultrasound)., , Industry:Renewables, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9),	Characterization and Inspection	www.helicalrobotics.com/		Helical Robotics, LLC., **Address:** 423 N Burr Oak Avenue,, Oregon, Wisconsin , United States, 53575, **Phone:** 608-819-7727, **Fax:** NA, **Email:** info@helicalrobotics.com	Commercial
Hull Crawler	An unmanned underwater vehicle (UUV) with an imaging sensor payload, crawler and operator control unit that performs EOD hull inspections. It provides operators with high-quality sonar imagery (tagged with appropriate target localization information) coupled with up-close video to minimize false detections. Industry:Maritime, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:Yes,	Characterization and Inspection	www.qinetiq-na.com		QinetiQ North America, **Address:** 350 Second Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 781-684-4000, **Fax:** NA, **Email:** TSGInfo@QinetiQ-NA.com	Commercial

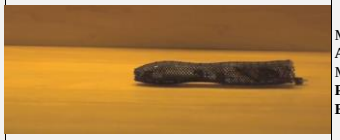
Hyball	The Hyball all electric ROV was introduced by Hydrovision Ltd of Aberdeen in the 1990's and has been used for many years in a variety of roles including offshore inspection in the oil and gas industry, harbour, dam and ship maintenance, ROV pilot training and biological and environmental survey. An upgrade "offshore" version was introduced and in total around 200 systems have been manufactured. Although manufacturing stopped in 2003, a strong customer base remains committed to the Hyball ROV systems. Site:Magnox, Industry:Oil & Gas, Energy, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Characterization and Inspection	www.sonavision.co.uk		Sonavision Ltd, **Address:** Unit 13, Robert Leonard Centre, Aberdeen, Not Available(UK), United Kingdom, AB21 0GG, **Phone:** +44 1224 707737, **Fax:** NA, **Email:** info@sonavision.co.uk	Commercial
IC - Carrier Stair Climbing Robot	The IC-Carrier robotic system, from RVT Engineering, is a reasonably priced, fully integrated, remotely operated mobile platform with navigation and mast mounted TV cameras & lights, a 500-ft tether, optional wireless operation, and a multi-function console that can remotely control a wide variety of user payloads including robotic arms and your own equipment. Its top plate has two mounting rails for fixing payload devices. Depending on the terrain, over 200 lbs can be carried on the top mounting rails. Industry:Nuclear, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9),	Characterization and Inspection	www.rvtengineering.com		RVT Engineering, **Address:** Not available, Chicago, Illinois , United States, 60612, **Phone:** 815-641-2198, **Fax:** N/A, **Email:** info@rvtengineering.com	Commercial
IC - MiniWorker Stair Climbing Robot	The IC-MiniWorker is a reduced-width version of our IC-Worker, with a different manipulator arm that can reach farther and has several options that make it more practical in constrained spaces. It has the same 2-speed transmission as the IC-Worker, but less space on its top plate's rails for custom payloads. Industry:Nuclear, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9),	Characterization and Inspection	www.rvtengineering.com		RVT Engineering, **Address:** Not available, Chicago, Illinois , United States, 60612, **Phone:** 815-641-2198, **Fax:** N/A, **Email:** info@rvtengineering.com	Commercial
iMobot	iMobot is an intelligent reconfigurable modular robot, with four controllable degrees of freedom. iMobot is designed for search and rescue operations, rapid prototyping of complex robotic systems, and research and teaching. iMobot has versatile locomotion including a unique feature of driving as though with wheels and lifting itself into a camera platform. You can join multiple modules together to create a new robot for a specific need. Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Characterization and Inspection	iel.ucdavis.edu		Integration Engineering Laboratory, **Address:** 1 Shields Avenue Bainer Hall, Davis, California, United States, 95616, **Phone:** 530-752-5020, **Fax:** 530-752-4158 , **Email:** hhcheng@ucdavis.edu	Commercial
In Situ Mass Spectrometer	An essential component of ecosystems research is characterizing and quantifying the chemical mileu within and around habitats. To date, there is a paucity of chemical sensors that are capable of measuring a wide range of compounds, and be left in situ for longer term investigations. Mass spectrometers are among the instruments that can detect the broadest range of compounds with a single detector, and are capable of high sensitivity and throughput. Recently, we developed an in situ mass spectrometer (or ISMS) based around a commercially available 24 VDC mass spectrometer that can detect and quantify volatiles up to 200 daltons. It is capable of deployments down to 4500 meters, and has been laboratory-tested to 6000 meters. During a recent expedition in the Gulf of Mexico, the ISMS was deployed 7 times, including three dives to a 2900-meter coral and seep sites in the Gulf of Mexico. Industry:Maritime, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Development (4-6),	Characterization and Inspection	www.oeb.harvard.edu		Girguis Laboratory, **Address:** Harvard University , Cambridge, Massachusetts, United States, 02138-2020, **Phone:** 617-495-9156, **Fax:** (617) 495-8848, **Email:** shillsgrove@oeb.harvard.edu	Research

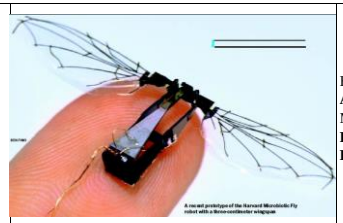
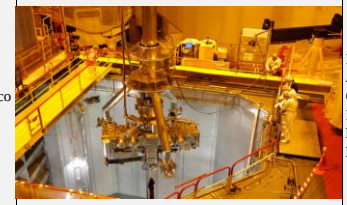
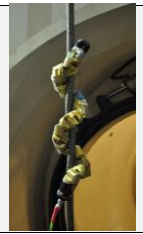
InGaAs SWIR camera	Image sensing in the short wave infrared (SWIR) portion of the light spectrum. Cameras that enable users to "see" beyond what the naked eye can detect. It provides real-time daylight to low-light imaging in the Short Wave Infrared (SWIR) wavelength spectrum for persistent surveillance, laser detection, and penetration through fog, dust, and smoke. Industry:Defense/Homeland Security, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9),	Characterization and Inspection	www.sensorsinc.com		Sensors Unlimited, Inc., **Address:** 330 Carter Road, Princeton, New Jersey, United States, 08540, **Phone:** 609-333-8000, **Fax:** 609-333-8103, **Email:** sui_info@utas.utc.com.	Commercial
Inspector Systems Pipe Crawler Robots	INSPECTOR SYSTEMS' with flexible construction, the robots are able to travel through pipe systems with bends or vertical sections and can be operated by remote control to make interior inspections and maintenance work, such as grinding or milling.products Can detect problems within pipe systems, such as failures at welding seams, corrosion, erosion, breakages, deposits, loose parts, faulty interior coatings, etc. Industry:Engineering, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9),	Characterization and Inspection	www.inspectorsystems.de		INSPECTOR SYSTEMS Rainer Hitzel GmbH, **Address:** Johann Friedrich Böttgerstr., 19, Rödermark, Not Available(Germany), United States, 63322 , **Phone:** (+49) 6074 / 917 123-0, **Fax:** NA, **Email:** info@inspectorsystems.de	Commercial
Invert Robotics Silo Crack Testing	Wall climbing robot for stainless steel silo inspections, originally based on technology developed at the University of Canterbury NZ., , Industry:Agriculture, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9),	Characterization and Inspection	invertrobotics.com/		Invert Robotics, **Address:** 487 Tancreds Road, Lincoln, Not Available(New Zealand), New Zealand, 7672, **Phone:** +64 3 325 7134, **Fax:** NA, **Email:** contact@invertrobotics.com	Commercial
Iris Multicopter	A quadrocopter with an integrated brushless gimbal and flight controller, IRIS is used for capturing quality aerial imagery – right out of the box. $750 excluding camera and other accessories. Industry:Agriculture, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Demonstration (7-8), Tether:No tether - Endurance 0-30 minutes, Payload:0-5kg/0lb-10lb,	Characterization and Inspection	3drobotics.com		3D Robotics Inc., **Address:** 1608 4th Street, Suite 410, Berkeley, California, United States, 94710, **Phone:** 858-225-1414, **Fax:** N/A, **Email:** N/A	Commercial
iRobot 110 FirstLook	The iRobot 110 FirstLook is a small, light, throwable robot that provides hasty situational awareness, performs persistent observation and investigates confined spaces. iRobot's combat-proven robots protect those in harm's way and save lives every day. The robots perform multiple missions for troops and public safety professionals, enhancing situational awareness, reducing risk and increasing mission success. More than 5,000 have been delivered to military and civil defense forces worldwide. Industry:Defense/Homeland Security, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9),	Characterization and Inspection	www.irobot.com		iRobot, **Address:** 8 Crosby Drive, Bedford, Massachusetts, United States, 01730, **Phone:** 781-430-3000, **Fax:** 781-430-3001, **Email:** NA	Commercial

iRobot 310 SUGV	The iRobot SUGV (Small Unmanned Ground Vehicle) is a tactical mobile robot that gathers situational awareness in dangerous conditions for warfighters and public safety professionals. The iRobot 310 SUGV is a man-portable robot with dexterous manipulator and wearable controller for dismounted mobile operations. It is a smaller and lighter version of the combat-proven iRobot PackBot. Industry:Defense/Homeland Security, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), Tether:No tether - Endurance more than an hour, Payload:5-10kg/10lb-20lb, Reach:0mm-600mm/0in-24in, Manipulator:Yes - standard	Characterization and Inspection	www.irobot.com		iRobot, **Address:** 8 Crosby Drive, Bedford, Massachusetts, United States, 01730, **Phone:** 781-430-3000, **Fax:** 781-430-3001, **Email:** NA	Commercial
iRobot 710 Warrior	The 710 Warrior, a rugged, gear-footed prototype went into damaged buildings at Fukushima and surveyed high-dose areas within turbines, sucking up radioactive dust into a vacuum cleaner taped to its arm. (That cleaner could also extend to pick up small objects.) The 710 Warrior is designed for explosive ordnance disposal on the battlefield, can lift up to 220 pounds (20 pounds more than the original) and carry loads of 150 pounds over rough terrain. Built with an electric motor strong enough to pull a car, the hulking 710 Warrior weighs 346 pounds and can travel at 8 miles per hour. The 710 Warrior can be outfitted with a compass, GPS, and obstacle-avoidance sensors to dodge chunks of radioactive debris. And its cameras beam what they see to operators who watch in real time., , Site:Fukushima, Industry:Defense/Homeland Security, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9), TRL2:Operational (9), Tether:No tether - Endurance more than an hour, Waterproof:Not Rated or Unknown, Payload:50-100kg/100-200lb, Reach:1800mm-2400mm/72in-96in, Manipulator:Yes - standard	Characterization and Inspection	www.irobot.com		iRobot, **Address:** 8 Crosby Drive, Bedford, Massachusetts, United States, 01730, **Phone:** 781-430-3000, **Fax:** 781-430-3001, **Email:** NA	Commercial
iSMASH	In-Situ Sample Homogenizer. It has been designed for collecting RNA samples from deep ocean organisms. The in-situ mRNA Sample Homogenizer (or iSMASH) is a hydraulically-powered custom blender systems that quickly homogenizes samples in an RNA preservative solution at the seafloor. The entire process takes very little time, one the order of three to five minutes, yielding high-quality transcriptomic data that are likely to be much more representative of the conditions experienced by the organisms in nature. Industry:Maritime, Size:Unknown, TRL:Development (4-6),	Characterization and Inspection	www.oeb.harvard.edu		Girguis Laboratory, **Address:** Harvard University , Cambridge, Massachusetts, United States, 02138-2020, **Phone:** 617-495-9156, **Fax:** (617) 495-8848, **Email:** shillsgrove@oeb.harvard.edu	Research
iSpin NMR	A low field NMR relaxometer used for insitu measurement of viscosity of high viscous oils and bitumen. Industry:Oil & Gas, Energy, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9),	Characterization and Inspection	www.spincore.com/		SpinCore Technologies, Inc., **Address:** 4631 NW 53rd Avenue, Suite 103 , Gainesville, Florida , United States, 32653 , **Phone:** 352-271-7383 , **Fax:** 352-371-8679, **Email:** not available	Commercial
Jumping Sumo	Jumping Sumo has two wheels and it can zip around and spin in place, and a spring lets it jump about 80 centimeters into the air (it uses Wi-Fi for communication and can record and stream video) Industry:Consumer, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:No tether - Endurance 0-30 minutes,	Characterization and Inspection	www.parrot.com		Parrot SA, **Address:** 174 Quai de Jemmapes, N/A, Paris, France, 75010, **Phone:** +33 (0)1 48 03 60 60, **Fax:** +33 (0)1 48 03, **Email:**	Commercial

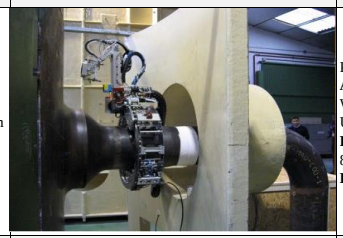
Kilobot	Kilobot is a low-cost, easy-to-use robotic system for advancing development of "swarms" of robots that can be programmed to perform useful functions by coordinating interactions among many individuals. These swarms are inspired by social insects, such as ant colonies, that can efficiently search for and find food sources in large complex environments, collectively transport large objects, and coordinate the building of nests and bridges in such environments. Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL2:Development (4-6), Tether:No tether - Endurance Unknown,	Characterization and Inspection	www.k-team.com/		K-Team Corporation, **Address:** Chemin des Plans-Praz 28, Vallorbe, Not Available(Switzerland), Switzerland, N/A, **Phone:** +41 (24) 423 89 50, **Fax:** +41 (24) 423 89, **Email:** info@k-team.com	Commercial
Knightscope K5	Robotic Security Guards. The Knightscope K5 Autonomous Data Machine utilizes a combination of autonomous robots and predictive analytics to provide a commanding but friendly physical presence while gathering important real-time on-site data with numerous sensors. Data collected through these sensors is processed through our predictive analytics engine, combined with existing business, government and crowdsourced social data sets, and subsequently assigned an alert level that determines when the community and the authorities should be notified of a concern. If an alert is pushed, the K5 machine will turn on all of its sensors to allow the entire community to review everything and also contribute important real-time information. The approach alleviates any privacy concerns, engages the community on a social level to effectively crowdsource security, and provides an important feedback loop to the prediction engine., , Industry:Retail, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6),	Characterization and Inspection	knightscope.com		Knightscope Inc., **Address:** 1070 Terra Bella Ave, Mountain View, California, United States, 94043, **Phone:** (650) 924-1025, **Fax:** NA, **Email:** contact@knightscope.com	Commercial
KORYU-II (KR-II)	Large body robots are not maneuverable enough to negotiate turns in a cramped environment such as inside a nuclear reactor, on a fire location, or in ravine areas. On the other hand, small robots cannot transport the operational equipment that will be needed, nor even the energy sources for their own operation. It is in this kind of situation that manifests the power of an articulated body, which can distribute loads and carry them, much like a train does. Industry:Research, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6),	Characterization and Inspection	www.3mech.titech.ac.jp/ma_hirose/ma_hirose_e.html		Fukushima Laboratory (Tokyo Institute of Technology), **Address:** Dept. of Mechanical and Aerospace Engineering, , Tokyo, Not Available(Japan), Japan, 152-8552, **Phone:** n/a, **Fax:** n/a, **Email:** n/a	Commercial
LEMUSV	The Long Endurance Marine Unmanned Surface Vehicle (LEMUSV) is an autonomous vehicle to gather data from the ocean over several months. Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Characterization and Inspection	www.asvglobal.com		Autonomous Surface Vehicles Ltd, **Address:** 10615 Shadow Wood Drive #100, Houston, Texas, United States, 77043, **Phone:** 02392 382573, **Fax:** N/A, **Email:** sales@asvglobal.com	Commercial
LIBS Down-Hole System	Laser-induced breakdown spectroscopy (LIBS) is a powerful form of atomic emission spectroscopy. Used on the Mars Science Laboratory rover for planetary exploration, Honeybee is developing a system to deploy this technology in a down-hole application to improve exploration in the mining sector. LIBS uses a laser pulse to excite molecules, and can detect elemental composition based on the emission spectra. By taking in-situ LIBS measurements for mining exploration or geotechnical analysis, Honeybee can help surveyors create a detailed map of the borehole stratigraphy. This technology can provide more information about the mineralogy of a formation earlier in the process, enhancing efforts to understand the strength, ore quality, and economic value of a given formation., , Industry:Space, Size:Unknown, TRL:Development (4-6),	Characterization and Inspection	www.honeybeeroboticscs.com/		Honeybee Robotics , **Address:** Honeybee Robotics, Ltd Building 3 Suite 1005, Brooklyn, New York , United States, 11205, **Phone:** 212-966-0661, **Fax:** N/A, **Email:** info@-HoneybeeRobotics.com	Commercial

LIDAR	Honeybee Robotics' 3D Miniature LIDAR (3DML) is a groundbreaking sensor system that provides real-time 3D "pictures" for robotic applications such as navigation, short-range mapping, and situational awareness. Using a lens-based scanning mechanism, 3DML gets the best of two worlds, achieving the small form factor and real-time frame rates associated with solid-state "flash" LIDAR, while maintaining the high resolution and wide field-of-view of a scanning system. Its scanning mechanism, 3DML attains a 90° horizontal x 60° vertical field-of-view (FOV) while maintaining a large aperture and small package size. This is useful in robotic navigation applications, where a wide FOV is needed to obtain adequate near-field vision., , Industry:Space, Size:Unknown, TRL:Development (4-6),	Characterization and Inspection	www.honeybeerobotics.com/		Honeybee Robotics , **Address:** Honeybee Robotics, Ltd Building 3 Suite 1005, Brooklyn, New York , United States, 11205, **Phone:** 212-966-0661, **Fax:** N/A, **Email:** info@-HoneybeeRobotics.com	Commercial
LIDAR-Lite	LIDAR-Lite is a low-cost optical distance measurement solution that matches the performance of sensors costing hundreds of dollars. With a proven 40 meter operating range, low power consumption, and small form factor, LIDAR-Lite is ideally suited for autonomous vehicles and robotics projects. Industry: *, Size:Tiny (<1kg/2lb, <10cm/4in useable length),	Characterization and Inspection	pulsedlight3d.com		Pulsed Light, **Address:** N/A, Bend, Oregon, United States, N/A, **Phone:** 541-639-8842, **Fax:** N/A, **Email:** sensors@pulsedlight3d.com	Commercial
Little Dog	LittleDog is a quadruped robot designed for research on learning locomotion. Scientists at leading institutions use LittleDog to probe the fundamental relationships among motor learning, dynamic control, perception of the environment, and rough-terrain locomotion. LittleDog is used at MIT, Stanford, Carnegie Mellon, USC, Univ. Pennsylvania and IHMC as part of a DARPA-funded program on advanced robotics. Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Demonstration (7-8), Tether:No tether - Endurance 0-30 minutes,	Characterization and Inspection	www.bostondynamics.com		Boston Dynamics, **Address:** 78 Fourth Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 617-868-5600, **Fax:** 617-868-5907, **Email:** info@BostonDynamics.com	Commercial
LT2/F "Bulldog"	The LT2 and LT2-F robots are used for surveillance. They include a custom remote, a front-tilt camera, and a battery charging station. The LT2 is capable of climbing "normal" stairs and obstacles, while the LT2-F can tackle more unconventional stairs or obstacles. The LT2 can be upgraded with an arm. Both units are weather resistant. The company's heavy-duty/large robots include the HD2-S treaded robot, and the HD2-S with a multi-axis arm. The units feature aircraft-grade aluminum and custom treads with aggressive, all-terrain patterning. A heavy-duty frame serves as a roll cage. Included with these robots is a choice of controller, battery charger and complete assembly and testing. Industry:Defense/Homeland Security, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9), Tether:No tether - Endurance more than an hour, Manipulator:Yes - optional	Characterization and Inspection	sdrtactical.com/default.aspx		SDR Tactical, **Address:** 224 Technology Park Lane, Fuquay-Varina, North Carolina, United States, 27526, **Phone:** 919-557-9162, **Fax:** not available, **Email:** not available	Commercial
MAARS	The Modular Advanced Armed Robotic System (MAARS®) is an unmanned ground vehicle (UGV) designed for reconnaissance, surveillance, and target acquisition (RSTA) missions to increase the security of personnel manning forward locations. MAARS can be positioned in remote areas where personnel are currently unable to monitor their security, and can also carry either a direct or indirect fire weapon system. Remotely controlled by an operator equipped with a lightweight, wearable control unit, MAARS features multiple onboard day and night cameras, motion detectors, an acoustic microphone, a hostile fire detection system, and a speaker system with a siren to provide optimum situational awareness and alarm., , Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Characterization and Inspection	www.qinetiq-na.com		QinetiQ North America, **Address:** 350 Second Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 781-684-4000, **Fax:** NA, **Email:** TSGInfo@QinetiQ-NA.com	Commercial

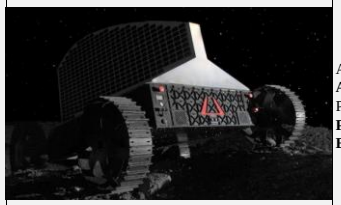
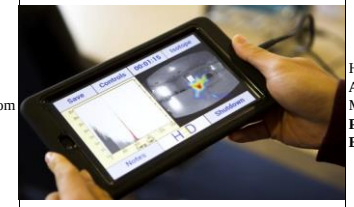
ManiPur	The German Bundeswehr and other authorities with responsibility for security assignments, share the important responsibility of safeguarding against CBRNE risks (detection of chemical, biological, radiological, nuclear and explosive risks). The release of chemicals or radioactive substances during major catastrophes represents a serious threat to the military as well as to the civilian population. However, automation and the deployment of robots make it possible to offer the armed forces a higher degree of protection when monitoring security-endangered installations, during reconnaissance of suspicious circumstances or defending against terrorist attacks. Typical tasks would include detecting and inspecting suspicious objects in buildings and in major industrial plants. Industry:Defense/Homeland Security, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Development (4-6),	Characterization and Inspection	www.fkie.fraunhofer.de/en.html		Fraunhofer Institute for Communication, **Address:** Fraunhofer Institute for Communication, , Wachtberg, Not Available(Germany), Germany, 53343, **Phone:** +49 (0)228 9435-217, **Fax:** N/A, **Email:** N/A	Commercial
Mars Rover	The Mars Exploration Rovers act as robot geologists while they are on the surface of Mars. The Mars rover is powered by radioactive thermoelectric generator (dark cylinder on rear). Radioisotope thermoelectric generators work by converting the heat generated by a radioactive isotope to electricity using an array of thermocouples. In particular, Pu-238 fuel, which generates about half a kilowatt of heat per kilogram of isotope, has been used to power space missions and remote military installations since the early 1960s. It has Autonomous Planetary Mobility for enabling the rovers to make decisions and avoid hazards on their own - for instance its new path-planning software has helped the rovers avoid mission barriers. When rocks are unavoidable, the inherited suspension system allows for easier maneuverability. It has technologies for severe environments including heaters for batteries to cope with the extreme cold., , Industry:Space, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Characterization and Inspection	jpl.nasa.gov		Jet Propulsion Laboratory, **Address:** 4800 Oak Grove Drive, Pasadena, California, United States, 91011, **Phone:** 818-354-4321, **Fax:** N/A, **Email:** N/A	Commercial
MCC Cased Pipeline Inspection Crawler	The Micro-Magnetic Casing Crawler (MCC) is a remotely controlled robotic inspection tool capable of inspecting and collecting data from within the annular space of cased pipe. Federal pipeline integrity rules require cased pipeline operators evaluate their pipeline on a regular basis. Since much of this pipeline is buried under highways, railroad tracks and even airport runways, the pipeline is very difficult to access without the possibility of disruption to the public. It was developed to provide a remote inspection of cased pipeline. The ultra-compact crawler magnetically attaches to the inside of the casing pipe and is small enough to travel past the spacers, accessing several hundred feet of cased pipeline from just one point of access. Industry:Oil & Gas, Energy, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9),	Characterization and Inspection			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Meshworm - soft autonomous earthworm	Earthworms creep along the ground by alternately squeezing and stretching muscles along the length of their bodies, inching forward with each wave of contractions. Snails and sea cucumbers also use this mechanism, called peristalsis, to get around, and our own gastrointestinal tracts operate by a similar action, squeezing muscles along the esophagus to push food to the stomach. Researchers at MIT, Harvard University and Seoul National University have engineered a soft autonomous robot that moves via peristalsis, crawling across surfaces by contracting segments of its body, much like an earthworm. The robot, made almost entirely of soft materials, is remarkably resilient: Even when stepped upon or bludgeoned with a hammer, the robot is able to inch away, unscathed. Industry: *, Size:Tiny (<1kg/2lb, <10cm/4in useable length),	Characterization and Inspection	web.mit.edu/		Massachusetts Institute of Technology (MIT), **Address:** 77 Massachusetts Avenue, Cambridge, Massachusetts, United States, 02139, **Phone:** 617-253-2700, **Fax:** not applicable, **Email:** tele-info@mit.edu	Commercial

Microrobotic Fly	Harvard has been perfecting a robotic fly whose eventual applications might include locating survivors trapped in mines and spying in wartime. (The research is funded by the Defense Advanced Research Projects Agency, within the Department of Defense.) Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Characterization and Inspection	www.harvard.edu		Harvard University, **Address:** Massachusetts Hall, Cambridge, Massachusetts, United States, 02138, **Phone:** 617-495-1000, **Fax:** NA, **Email:** NA	Research
MIS (Inspection Machine in Service)	This machine inspects the inside of the reactor's tank during programmed servicing and maintenance at the Bugey nuclear power plant in Saint-Vulbas, near Lyon, France. Site:France, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Characterization and Inspection	www.intercontrole.com/		INTERCONTROLE, **Address:** Parc d'Affaires SILIC, 76 rue des Gémeaux, Rungis Cedex, Not Available(France), France, 94583, **Phone:** +33 (0) 1-49-78-40-40, **Fax:** n/a, **Email:** n/a	Commercial
MLT "Jack Russell"	The MLT Complete Surveillance Robot that weighs less than 8 pounds and is drop resistant up to 10 feet. A throwable robot, it has a flipper arm stabilizer to climb over objects up to 10 inches high. The unit comes with a matching remote and is weather resistant. An IR camera in the nose of the robot displays a color image with ambient light. Industry:Defense/Homeland Security, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:No tether - Endurance more than an hour,	Characterization and Inspection	sdrtactical.com/default.aspx		SDR Tactical, **Address:** 224 Technology Park Lane, Fuquay-Varina, North Carolina, United States, 27526, **Phone:** 919-557-9162, **Fax:** not available, **Email:** not available	Commercial
Modular Snake Robot	Mobile self-propelled 16-DOF snake-type robot, 37" long, 2" diameter. Can crawl and climb to destination. Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Development (4-6),	Characterization and Inspection	ri.cmu.edu		The Robotics Institute (Carnegie Mellon University), **Address:** 5000 Forbes Avenue, Pittsburgh, Pennsylvania, United States, 15213, **Phone:** 412-268-3818, **Fax:** 412-268-6436, **Email:** robotics@ri.cmu.edu	Research
MoniRobo	A 1.5-meter tracked robot with a manipulator arm for removing obstacles and collecting samples. It features a 3D camera, radiation detector, and heat and humidity sensors. MoniRobo weighs 600 kilos and is limited to a speed of 2.4 kilometers per hour. It is heavily shielded to harden the electronics from radiation. It can be remotely operated from a portable control room that was designed to fit inside a C-130 cargo aircraft for rapid deployment. The control center remains in a safe area and communicates with the robot via radio. Repeater stations can extend the range of the radio link if required. Site:Japan Other, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	www.nustec.or.jp		NUSTEC, **Address:** Tokyo Toyama Kaikan Building 4th floor, Tokyo , Not Available(Japan), Japan, 112-8604, **Phone:** (03) 3814-7600 , **Fax:** NA, **Email:** Webmaster@nustec.or.Jp	Commercial

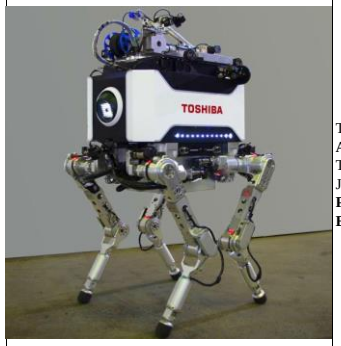
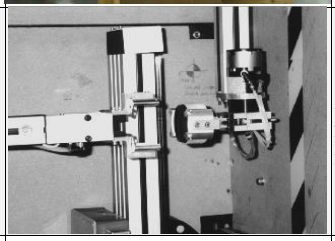
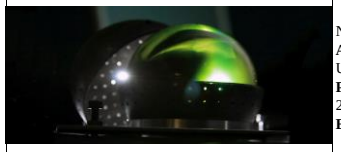
MorpHex	A research project. It's a remotely operated robot to be used as a transforming robot. Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Development (4-6),	Characterization and Inspection	www.robotee.com/index.php/robot-projects/morphex-project-morphing-hexapod-by-kare-halvorsen-part-2/		Zenta Robotic Creations, **Address:** Not available., Not available, Not Available(Norway), Norway, n/a, **Phone:** n/a, **Fax:** n/a, **Email:** n/a	Commercial
MultiSense Vision System	MultiSense S7 is a high-resolution, high-data-rate, and high-accuracy 3D range sensor. Unlike many 3D sensors, MultiSense S7 provides instantaneous vertical and horizontal fields of view (FOV) along with color information for every range point found. It is the first commercially available stereo camera in which all of the stereo processing happens inside the sensor itself. No powerful external computer is needed, and no knowledge of stereo processing or calibration is either as the MultiSense S7 ships calibrated from Carnegie Robotics. Industry:Defense/Homeland Security, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Demonstration (7-8),	Characterization and Inspection	carnegierobotics.com/		Carnegie Robotics LLC, **Address:** Carnegie Robotics LLC , Pittsburgh, Pennsylvania, United States, 15201, **Phone:** (412) 251-0321, **Fax:** (412) 251-0319, **Email:** info@carnegierobotics.com	Commercial
Muon Tomography	Muon tomography enables safe viewing inside the cores of the Fukushima Daiichi reactors and create high-resolution images of the damaged nuclear material inside without ever breaching the cores themselves. The initiative could reduce the time required to clean up the disabled complex by at least a decade and greatly reduce radiation exposure to personnel working at the plant. Site:US Other, Industry:Nuclear, Size: *, TRL:Development (4-6), TRL2:Development (4-6),	Characterization and Inspection	lanl.gov/		Los Alamos National Laboratory (LANL), **Address:** Los Alamos Natl. Lab P.O. Box 1663, Los Alamos, New Mexico, United States, 87545, **Phone:** (505) 667-5061, **Fax:** N/A, **Email:** N/A	Commercial
Murphy	A snakelike robot designed for search and rescue. The narrow, mobile robot is capable of slithering into tight spaces between blocks of rubble in a collapsed building. It has a light, a camera and a two-way microphone and speaker that allows the human controller to not only see what the snake sees but also communicate with people trapped in rubble. The robot would enter a pile of debris, crawl through the spaces and find people trapped below. A trained dog has been shown capable of carrying the robot into places where humans can't reach, dropping the robot off in the desired location. Industry:Emergency Response, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Development (4-6),	Characterization and Inspection	ri.cmu.edu		The Robotics Institute (Carnegie Mellon University), **Address:** 5000 Forbes Avenue, Pittsburgh, Pennsylvania, United States, 15213, **Phone:** 412-268-3818, **Fax:** 412-268-6436, **Email:** robotics@ri.cmu.edu	Research
NanoMag	The NanoMag is a miniature crawler system with built-in rare earth magnets, allowing it to travel vertically, horizontally and even upside down on ferrous metal surfaces. Industry:Nuclear, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9), Tether:Yes, Waterproof:IP60 - No protection, Payload:0-5kg/0lb-10lb, Reach:0mm-600mm/0in-24in, Manipulator:No	Characterization and Inspection	www.inuktun.com		Inuktun Services Ltd., **Address:** 2569 Kenworth Road, Suite C, Nanaimo, British Columbia(CA), Canada, V9T 3M4, **Phone:** 250-729-8080, **Fax:** 250-729-8077, **Email:** inuktun@inuktun.com	Commercial

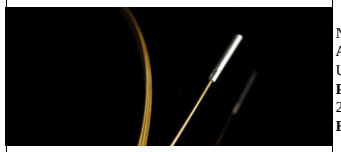
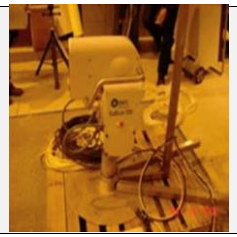
Nighthawk	The Nighthawk/Micro UAV is a hand- or tube-launched aerial vehicle using GPS and an autopilot to assist in situational awareness and/or search and rescue. The Federal Aviation Administration now deems the unit “airworthy.” Industry:Defense/Homeland Security, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), Tether:No tether - Endurance 30-60 minutes, Waterproof:Not Rated or Unknown,	Characterization and Inspection	forcepro.ara.com/		Ara Robotics, **Address:** Applied Research Associates, Inc. 4300 San Mateo Blvd. NE, Suite A-220, Albuquerque, New Mexico, United States, 87110, **Phone:** 505-881-8074, **Fax:** 505-881-8074, **Email:** seasinfo@ara.com	Commercial
Noptilus	NOPTILUS main objective is to determine – fully-autonomously & in real-time – the AUVs’ trajectories/behavior that maximize situation awareness subject to the severe communication, sensing & environmental limitations NOPTILUS is funded by European Community's Seventh Framework Programme ICT-FP7, Cognitive Systems and Robotics programme: Cognitive Systems Industry:Research, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6),	Characterization and Inspection	www.noptilus-fp7.eu/		Center for Research and Technology - Hellas, **Address:** 6th Km Harilaou - Thermis, Thessaloniki , Not Available(Greece), Greece, N/A, **Phone:** +30 2310 498210, **Fax:** +30 2310 498110, **Email:** certh@certh.gr	Commercial
NozzleInspect	A robotic arm scanner for the automated inspection of nozzle welds in nuclear reactors. Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8),	Characterization and Inspection	www.phoenixisl.com		Phoenix ISL, **Address:** Dalton House 40 Hardwick Grange Warrington Cheshire, Warrington, Warrington, United Kingdom, not available, **Phone:** 44-(0)-1925-826000, **Fax:** 44-(0)-1925-838, **Email:** office@phoenixisl.co.uk	Commercial
NREC Pipeline Explorer	Untethered, remotely-controlled robot for inspecting live underground natural gas distribution pipelines. The battery-powered Explorer can perform long-range, extended duration visual inspections of cast-iron and steel gas mains. Unlike older, tethered systems, Explorer can inspect thousands of feet of pipeline from a single excavation point. An operator controls Explorer through a wireless link and can monitor pipeline images in real time. Each locomotor has its own camera, the system and provides views at either end to allow observation during travel in both directions. The image management system allows for the operator to observe either of the two views or both of them simultaneously on his or her screen., , Industry:Oil & Gas, Energy, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9), Tether:No tether - Endurance 0-30 minutes,	Characterization and Inspection	www.nrec.ri.cmu.edu		National Robotics Engineering Center (NREC) at Carnegie Mellon, **Address:** Ten 40th Street, Pittsburg, Pennsylvania, United States, 15201, **Phone:** 412-681-6900, **Fax:** 412-681-6961, **Email:**	Commercial
NREC Sensabot Inspection Robot	A remotely-operated mobile robot remotely inspects and monitors industrial facilities. The Sensabot performs a wide variety of inspection and monitoring tasks. It is designed to carry out on-site inspections in hazardous environments, isolated facilities, and other places that are difficult or dangerous for personnel to access. Benefits include reduced risk and improved efficiency of operation. Sensabot features a mobile robotic base with a sensor boom tipped with inspection sensors. It can operate in extreme temperatures and explosive and toxic atmospheres. A human operator remotely drives Sensabot and uses its sensors to inspect pipes, fittings, and valves., , Industry:Emergency Response, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), Reach:1200mm-1800mm/48in-72in, Manipulator:Yes - standard	Characterization and Inspection	www.nrec.ri.cmu.edu		National Robotics Engineering Center (NREC) at Carnegie Mellon, **Address:** Ten 40th Street, Pittsburg, Pennsylvania, United States, 15201, **Phone:** 412-681-6900, **Fax:** 412-681-6961, **Email:**	Commercial

PackBot EOD 510	The iRobot 510 PackBot is battle-tested and performs bomb disposal and other dangerous missions for troops and first responders. Site:Savannah River, Industry:Defense/Homeland Security, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), TRL2:Demonstration (7-8), Tether:No tether - Endurance more than an hour, Manipulator:Yes - optional	Characterization and Inspection	www.irobot.com		iRobot, **Address:** 8 Crosby Drive, Bedford, Massachusetts, United States, 01730, **Phone:** 781-430-3000, **Fax:** 781-430-3001, **Email:** NA	Commercial
Pelican	The well proven AscTec Pelican was designed for maximum power combined with plenty of room to use its complete capacity. The light weight tower structure lets you mount diverse payloads and easily access all electronics. Therefore we offer high performance onboard processors, fix or actively stabilized camera options and precise laser scanners. Furthermore you can easily integrate your own individual sensors and process the gathered data directly onboard of the flight vehicle. All in all this flight system is the most flexible and powerful of the AscTec fleet. Industry:Other, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9),	Characterization and Inspection	www.asctec.de/en/		Ascending Technologies, **Address:** Konrad-Zuse-Bogen 4 , Krailling, Not Available(Germany), Germany, 82152 , **Phone:** +49 89 89556079-0, **Fax:** +49 89 89556079-19, **Email:** team@asctec.de	Commercial
PetriJet	This is aimed at small-to-medium size laboratories looking for an affordable way to automate processes such as quality assurance screening campaigns and active agent developments. Industry:Healthcare/Medical, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9),	Characterization and Inspection	tu-dresden.de/		TU Dresden, **Address:** TU Dresden Pressestelle 01062 Dresden, Dresden, Not Available(Germany), Germany, not available, **Phone:** 49-351-463-32398, **Fax:** 49 351 463-3716, **Email:** pressestelle@tu-dresden.de	Commercial
Pipe inspection crawler	Visatec's compact pipe inspection crawler. Modular design to fit all customers requirements. Industry:Oil & Gas, Energy, Size:Unknown, TRL:Operational (9),	Characterization and Inspection	www.visatec.net		Visatec GmbH, **Address:** Gewerbepark 7, Sulzberg, Not Available(Sweden), Germany, NA, **Phone:** + 49 (0) 83 76 / 92 15-0, **Fax:** NA, **Email:** info@visatec.net	Commercial
Pipetron	PIPETRON was developed in order to move inside small pipes (from 75 mm in diameter), equipped with cameras that acquire detailed images, allowing a level of inspection that was not possible until now. It can pull specific sensors inside the pipes based on the type of inspection that is needed. Due to its particular structure PIPETRON can change its posture while moving thus negotiating elbow and T-joints as well., , Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Characterization and Inspection	www.hibot.co.jp		HiBot, **Address:** 5-9-15 Kitashinagawa, Shinagawa-ku, Tokyo, Not Available(Japan), Japan, 141-0001, **Phone:** +81-3-5791-7526, **Fax:** +81-3-5791-7527, **Email:** NA	Commercial

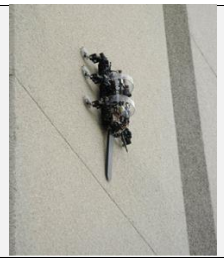
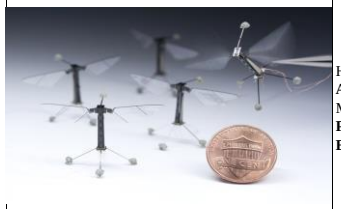
Pluto Mole	The Planetary Underground Tool (Pluto) is a ground-penetrating, tethered "Mole" intended for acquisition of several subsurface soil samples from depths between about 10 cm and approximately 1.5 m. These samples will then be analysed by the Gas Analysis Package (GAP) instrument on the lander, primarily with regard to isotopic composition and organic molecules. Industry:Space, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Development (4-6), Tether:Yes,	Characterization and Inspection	www.aber.ac.uk/		Aberystwyth University, **Address:** Reception, Penglais, Ceredigion, Not Available(UK), United Kingdom, SY23 3FL , **Phone:** +44 (0)1970 623111, **Fax:** N/A, **Email:** N/A	Research
Polaris	The Polaris Rover is a mobile explorer that prospects for water at the lunar poles. Polaris carries up to 120kg of payload, such as a drill to take core samples and science instruments to identify water content. Polaris has three vertical solar panels to generate 250W of power and two radiator panels to reject excess heat. Stereo cameras and laser guide Polaris and generate 3-D video and models of the lunar surface. The robot communicates directly with Earth using a pointed S-band antenna to receive commands and send video and data. Polaris is capable of driving and avoiding obstacles autonomously, including traverses into dark regions in the lunar pole's long shadows. Polaris suspension maintains four-wheel ground contact over sloped and rocky lunar terrain without the use of springs., , Industry:Space, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Characterization and Inspection	www.astrobotic.com		Astrobotic Technology, **Address:** 2515 Liberty Ave, Pittsburgh, Pennsylvania, United States, 15222, **Phone:** 412-682-3282, **Fax:** N/A, **Email:** contact@astrobotic.com	Commercial
Polaris-H	The Polaris-H is a handheld radiation camera containing a cadmium-zinc-tellurium, room-temperature gamma ray detector of unprecedented precision that's much lighter and half the cost of cryogenic devices that lays a gamma-ray map over an image of an area. Site:US Other, Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Development (4-6), TRL2:Development (4-6), Tether:No tether - Endurance Unknown, Waterproof:IP68 - Protected against prolonged effects of immersion under pressure, Payload:Not Applicable, Reach:Not Applicable,	Characterization and Inspection	www.h3dgamma.com		H3D, **Address:** 3250 Plymouth Rd , Ann Arbor, Michigan , United States, 48105 , **Phone:** 734 661 6416 x101, **Fax:** N/A, **Email:** willy@h3dgamma.com	Commercial
Possum	Off-Riser Sampling System. Possum scoops up samples with its bulldozerlike blade so engineers can tell exactly what, and how much, is left inside. The Possum comes equipped with a camera so operators can locate target waste and control the device. Site:Hanford, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	wrpstoc.com/		Washington River Protection Solutions (WRPS), **Address:** Washington River Protection Solutions, Richland, Washington, United States, 54494 , **Phone:** (509) 376-8103, **Fax:** N/A, **Email:** N/A	Commercial
Project Riser	Blue Bear and their partners Createc and Bristol University recently completed successful trials at Bristol Robotics Lab. All objectives were achieved, resulting in Createc's N-Visage and Blue Bear's SNAP software working together to achieve autonomous control, search and exploration of a UAV in a nuclear environment. This software updates a contamination map based on readings and sends new waypoints for the UAV to provide more data and improve the model. Obviously the radiation data was all simulated. This system is for flying indoors without the ability to use GPS signals. Site:Sellafield, Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Development (4-6), TRL2:Development (4-6),	Characterization and Inspection	www.bbsr.co.uk		Blue Bear Systems Research Ltd, **Address:** Building 32, Twinwoods Business Park, Bedford, Bedfordshire, Not Available(UK), United Kingdom, MK44 1FD, **Phone:** +44 (0) 1234 212001, **Fax:** NA, **Email:** enquiries@bbsr.co.uk	Commercial

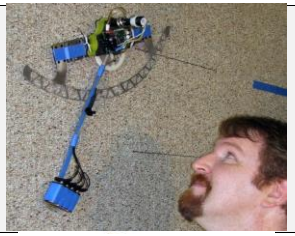
Proto X nano quadcopter	A tiny quadcopter. The company claims it's one of the lightest quadcopters in the world with a weight of 0.4 oz (11.3 g). Measuring from the tip of the rotor blades, each of its four sides is approximately 2.5 in (6.4 cm) long. Industry:Consumer, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9), Tether:No tether - Endurance 0-30 minutes,	Characterization and Inspection	www.estesrockets.com/contact-us		Estes, **Address:** PO Box 227, Penrose, Colorado , United States, 81240, **Phone:** (719)-372-6565, **Fax:** not available, **Email:** webcs@centurims.com.	Commercial
PRoVisG	PRoVisG (short for "Planetary Robotics Vision Ground Processing") is a Collaborative Project in the frame of FP7-SPACE -2007-1 that was carried out from October 2008 to June 2012 (45 months total duration). The EC FP7-SPACE Project PRoVisG brought together major EU and US research institutions and stakeholders involved in space robotic vision and navigation to develop a unified approach to robotic vision ground processing. The aim of PRoVisG is to build a unified European framework for Robotic Vision Ground Processing. State-of-the-art computer vision technology was collected inside and outside Europe to better exploit the image data gathered during future robotic space missions to the Moon and the Planets, leading to a significant enhancement of the scientific, technologic and educational outcome of such missions. The underpinning platform is called Indie. This has the capability of complex object detection, identifying areas of interest in any given environment. Localisation can be achieved through 3D mapping techniques available from the stereo camera system, as used on the martian Aerobot project. Sensor fusion between wheel odometry, GPS and stereo cameras provides accurate positioning on 3D terrain. Industry:Space, Size:Unknown, TRL:Research (1-3),	Characterization and Inspection	www.aber.ac.uk/		Aberystwyth University, **Address:** Reception, Penglais, Ceredigion, Not Available(UK), United Kingdom, SY23 3FL , **Phone:** +44 (0)1970 623111, **Fax:** N/A, **Email:** N/A	Research
Puppet	Autonomous video conferencing system. Industry:Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Characterization and Inspection	www.ctrlworks.com/		CtrlWorks, **Address:** 79 Ayer Rajah Crescent #01-04, not available, Not Available(Singapore), Singapore, not available, **Phone:** not available, **Fax:** not available, **Email:** kaisim@ctrlworks.com	Commercial
Q-4	The Q-4 drone is unlike other drones, in being capable of working 24 hours a day and operating at speeds over 45 mph even in all but the most extreme weather conditions. No piloting is needed because the drone requires no operator to manage it. The drone can recognize objects and work with visual data received during a mission. Lightweight and aerodynamic, the Q-4 has a simple design so that most repairs can be done without the need for complicated work or high cost. Industry:Defense/Homeland Security, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), Tether:No tether - Endurance more than an hour,	Characterization and Inspection	www.surveillancegrid.com		SurveillanceGrid, **Address:** 18434 Technology Drive, Morgan Hill, California, United States, 95037, **Phone:** 800-528-8184, **Fax:** not available, **Email:** sales@surveillancegrid.com	Commercial
Quadruped - smaller inspection robot	The four legged robot by Toshiba has a smaller inspection robot that it can deploy when the larger robot can go no further. It weighs 4pk and can fold to get into small spaces. Site:Fukushima, Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Demonstration (7-8), TRL2:Demonstration (7-8), Tether:No tether - Endurance 30-60 minutes,	Characterization and Inspection	www.toshiba.co.jp/		Toshiba, **Address:** 1-1, Shibaura 1-chome, Minato-ku, Tokyo 105-8001, Tokyo, Not Available(Japan), Japan, not available, **Phone:** 81-3-3457-4511, **Fax:** 81-3-3456-1631, **Email:** not available	Commercial

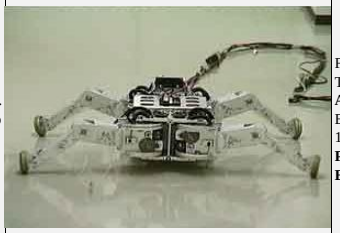
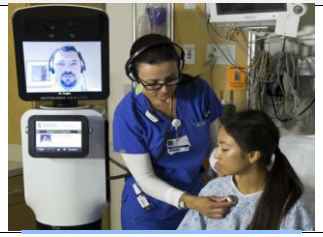
Quadruped walking robot	A four-legged inspection robot, can carry out work where people cannot go. The robot can be deployed to navigate hard-to-reach areas. The legged robot can negotiate stairs, uneven terrain, and is able to avoid low-lying obstacles. It carries a smaller robot which it can then deploy for additional remote inspection. The larger of the two robots weighs 143 pounds (65 kg) and stands 3 feet, 5 inches (106 cm) tall. It can operate for up to two hours on its battery, and has a walking speed of 1 km/h (0.6 mph). The smaller inspection robot weighs 4.4 pounds (2 kg), and has a battery life of about one hour. Both robots will be operated over a wireless network. The four-legged robot can climb over debris and venture into radiated areas off-limits to human workers. Its wireless network can be controlled in high radiation, automatically seeking better transmission when reception becomes weak. It can access places that rolling bots cannot. But rolling is still a useful skill, so it carries a second robot on its back that can go off on its own after being lowered down on a little crane. Site:Fukushima, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6), TRL2:Development (4-6), Tether:No tether - Endurance more than an hour,	Characterization and Inspection	www.toshiba.co.jp/		Toshiba, **Address:** 1-1, Shibaura 1-chome, Minato-ku, Tokyo 105-8001, Tokyo, Not Available(Japan), Japan, not available, **Phone:** 81-3-3457-4511, **Fax:** 81-3-3456-1631, **Email:** not available	Commercial
Quartz Crystal Microbalance (QCM) Probe	This is being used by Leeds University to track yield stress changes in magnesium hydroxide sludges. Here, changes to the vibrational frequency and electric resistance of a piezoelectric crystal inserted into sludges of various concentrations and at a fixed concentration undergoing consolidation (aging) were measured. Increases to both vibrational frequency and resistance were associated with increases in the sludge matrix yield-stress. Site:Sellafield, Industry:Maritime, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9), TRL2:Development (4-6),	Characterization and Inspection	www.icmfg.com		International Crystal Manufacturing, **Address:** 10 North Lee Avenue , Oklahoma City, Oklahoma , United States, 73102, **Phone:** 1-405-236-3741, **Fax:** 1-405-235-1904, **Email:** customerservice@icmfg.com	Commercial
Quince 2	A rescue robot developed by Japan's Chiba Institute of Technology, the Quince 2 can be controlled from nearly a mile and a half away to monitor radiation levels and collect samples. The waterproof robot is also equipped with a camera that has pan, tilt, and zoom capabilities, and it can move comfortably over uneven surfaces and debris in reactor buildings. Site:Fukushima, Industry:Nuclear, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), TRL2:Operational (9),	Characterization and Inspection	www.it-chiba.ac.jp/		Chiba Institute of Technology, **Address:** 2-17-1 Tsudanuma, Chiba Prefecture, Not Available(Japan), Japan, 275-0016, **Phone:** +81 47-475-2111, **Fax:** N/A, **Email:** N/A	Commercial
R15	Built-to-order autonomous cartesian robot based on standard extruded aluminum structural members for swabbing glovebox exteriors prior to dismantling, with minimal space requirement. Site:Magnox, Industry:Nuclear, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Characterization and Inspection	www.strobotics.com		ST Robotics, **Address:** 103 Carnegie Center, Princeton, New Jersey, Australia, 08540, **Phone:** 609-584-7522, **Fax:** N/A, **Email:** sales1@strobotics.com	Commercial
RadBall	RadBall is a novel, passive, radiation detection device which provides 3D visualisation of radiation from areas where effective measurements have not been previously possible. Site:Savannah River, Industry:Nuclear, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9), TRL2:Demonstration (7-8),	Characterization and Inspection	www.nnl.co.uk		National Nuclear Laboratory (UK), **Address:** Chadwick House, Risley, Warrington, United Kingdom, WA3 , **Phone:** (+44) 01925 289960, **Fax:** (+44) 01925 289989, **Email:** customers@nnl.co.uk	Commercial

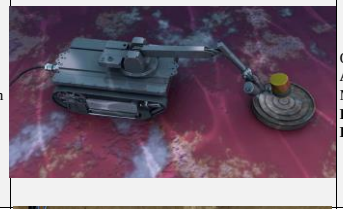
RadCam	The Dynasil RadCam precisely and rapidly locates gamma radiation sources by acquiring and superimposing a color-coded nuclear image over a video image of the interrogated area. RadCam gamma manages radioactive source contamination in research reactors, test reactors, and nuclear power generation. It also monitors all phases of the nuclear materials fuel cycle, including refinement, fuel storage, decommissioning, site characterization, and storage of nuclear waste. RadCam features include:, • Precise location of radiation sources, • Energy and intensity level detection,with spectroscopic capability from 50-1500 KeV, • Rapid detection over a wide area, • Pan and Tilt, • Remote Operation The system is designed for harsh-environment field use., , Industry:Defense/Homeland Security, Size:Unknown, TRL:Operational (9),	Characterization and Inspection			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
RadLine	RadLine™ is a small, novel, remotely operated radiation detector which uses a scintillating crystal and fibre optic cable to obtain radiation measurements from difficult to access or large process areas over a wide radiation range. Site:Sellafield, Industry:Nuclear, Size:Unknown, TRL:Development (4-6), TRL2:Development (4-6),	Characterization and Inspection	www.nnl.co.uk		National Nuclear Laboratory (UK), **Address:** Chadwick House, Risley, Warrington, United Kingdom, WA3 , **Phone:** (+44) 01925 289960, **Fax:** (+44) 01925 289989, **Email:** customers@nnl.co.uk	Commercial
Radscan 700	RadScan 700 is a gamma spectroscopy unit. It can be deployed from overhead crane or robotic platform. Site:US Other, Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), TRL2:Operational (9),	Characterization and Inspection	www.babcocktarget.com/		Babcock International Group Plc, **Address:** 33 Wigmore Street, Babcock, London, United Kingdom, W1U 1QX, **Phone:** +44 (0)20 7355 5300, **Fax:** NA, **Email:** N/A	Commercial
Recon Scout	A range of small robots. The Recon Scout IR can “see” in complete darkness. Lightweight and affordable, it can be thrown through a window or doorway to move through an environment and transmit real-time video to a video screen or command post. The Recon Scout Throwbot LE is an affordable police robot that weighs 1.1 pounds. It can survive horizontal throws of 50 feet and drops of 15 feet. Operating at 20 decibels, it can transmit video up to 100 feet indoors and up to 300 feet outdoors, providing clear video even in low-light environments. The unit can be converted into a versatile pole camera. The Recon Scout XL is a micro-robot for varied terrain, providing both video and audio reconnaissance. It can climb over 4-inch obstacles, but weighs only 1.4 pounds. The unit can be thrown 30 feet and dropped 15 feet. It features infrared optics and water resistance. The Recon Scout UVI robot visually inspects undercarriages of vehicles and can operate in low light. Clear video is transmitted up to 1,000 feet to a command station, or 300 feet to a handheld control unit. It has auto-focus optics and a 60-degree field of view, and provides a direct, not reflected, view of the vehicle undercarriage. Industry:Defense/Homeland Security, Size:Tiny (<1kg/2lb, <10cm/4in useable	Characterization and Inspection	www.reconrobotics.com		Recon Robotics, **Address:** 7620 W 78th St, Edina, Minnesota , United States, 55439-2518, **Phone:** 866-398-1921, **Fax:** not available, **Email:** support@reconrobotics.com	Commercial

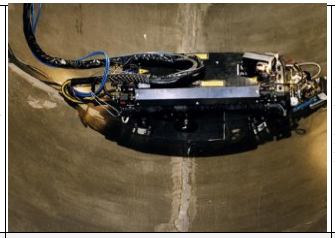
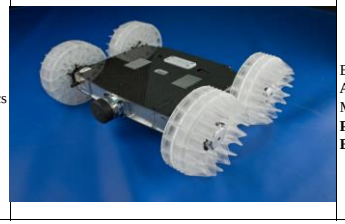
Red Rover	Red Rover is a mobile explorer that scouts the Moon's mid-latitudes near the equator with cameras and science payloads. The pyramidal shape regulates heat during hot lunar days. The rover navigates to keep its solar panels in the sun. The broad white radiator rejects excess heat to the cold black sky. The rover's batteries survive and hold charge at cryogenic temperatures, enabling the rover to hibernate through two-week lunar nights and resume activities the next day. The rover's carbon composite structure is lightweight, strong, and stiff. Red Rover's wheels are driven by two motors, which are chassis mounted to isolate from thermal extremes and dust. Each motor drives the two wheels on one side and steering is by skidding. Passive suspension maintains four-wheel ground contact over sloped and rocky lunar terrain without the use of springs. Chain drives to the wheels enable a simple two-motor design. Red Rover is equipped with a pair of stereo cameras and a camera with a telephoto lens. It navigates, detects obstacles, and captures 3D video footage and maps. Industry:Space, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Development (4-6),	Characterization and Inspection	www.astrobotic.com		Astrobotic Technology, **Address:** 2515 Liberty Ave, Pittsburgh, Pennsylvania, United States, 15222, **Phone:** 412-682-3282, **Fax:** N/A, **Email:** contact@astrobotic.com	Commercial
Remora ROV	The Remora has a depth rating of 6,000 meters and are purpose-built for deep water work. However they can compete with significantly larger ROVs for shallow water work as well. Remora's small footprint is one of its greatest advantages. It has the ability to work in spaces that other work class vehicles cannot. Industry:Oil & Gas, Energy, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), Manipulator:Yes - standard	Characterization and Inspection	www.phnx-international.com/index.html		Phoenix International Holdings, Inc., **Address:** 9301 Largo Drive West, Largo, Maryland , United States, 20774, **Phone:** +1 (301) 341-7800 , **Fax:** +1 (301) 499-00, **Email:**	Commercial
Remote Characterization System (RCS)	The RCS consisted of a Remotec Andros Mark VITM with cameras and lights, modified to incorporate a gamma detector, a smear sample pad, and a deployment station, which was designed to manage deployment of the Andros hardware as it was lowered into the tunnels. The specific tasks for the Andros hardware included traversing the entire length of the tunnels to be inspected, collecting video footage, documenting the physical condition of the tunnel, collecting gross gamma readings during the entire survey, collecting limited smear samples, and returning safely for extraction from the tunnel. Site:Hanford, Industry:Nuclear, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9), TRL2:Operational (9), Tether:Yes,	Characterization and Inspection			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Remote Representative Sampler for Tank Waste	Sampler providing more-representative sample and reduced operator dose by use of fluidic mixing and sampling collection combined with shielded sample vial handling system., , Site:Savannah River, Industry:Nuclear, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Characterization and Inspection	www.nuvisioneng.com		NuVision Engineering, **Address:** 2403 Sidney Street Suite 700, Pittsburgh, Pennsylvania, United States, 15203, **Phone:** 412-586-1810, **Fax:** 412-586-1811, **Email:** info@nuvisioneng.com	Commercial
Remote Underwater Characterization System (RUCS)	The RUCS is a small, remotely operated submersible vehicle intended to serve multiple purposes in underwater D&D operations. The RUCS is designed to perform visual inspection and gamma radiation characterization, even in confined or limited access areas. It utilizes a forward-looking tilt color camera and a GM tube radiation detector to get "on-the-spot" information needed to perform D&D intelligently and safely., , Site:Idaho, Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Development (4-6), TRL2:Development (4-6),	Characterization and Inspection	www.inuktun.com		Inuktun Services Ltd., **Address:** 2569 Kenworth Road, Suite C, Nanaimo, British Columbia(CA), Canada, V9T 3M4, **Phone:** 250-729-8080, **Fax:** 250-729-8077, **Email:** inuktun@inuktun.com	Commercial

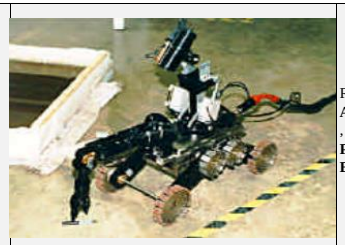
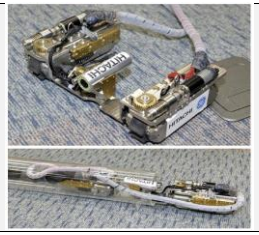
RHex	RHex is a six-legged robot with inherently high mobility. Powerful, independently controlled legs produce specialized gaits that devour rough terrain with minimal operator input. RHex climbs in rock fields, mud, sand, vegetation, railroad tracks, telephone poles and up slopes and stairways. Industry:Defense/Homeland Security, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Demonstration (7-8), Tether:No tether - Endurance more than an hour, Waterproof:IP67 - Protected against temporary immersion, Payload:Not Applicable, Reach:Not Applicable, Manipulator:No	Characterization and Inspection	www.bostondynamics.com		Boston Dynamics, **Address:** 78 Fourth Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 617-868-5600, **Fax:** 617-868-5907, **Email:** info@BostonDynamics.com	Commercial
RiSE	RiSE is a robot that climbs vertical terrain such as walls, trees and fences. RiSE uses feet with micro-claws to climb on textured surfaces. RiSE changes posture to conform to the curvature of the climbing surface and its tail helps RiSE balance on steep ascents. RiSE is 0.25 m long, weighs 2 kg, and travels 0.3 m/s. Each of RiSE's six legs is powered by a pair of electric motors. An onboard computer controls leg motion, manages communications, and services a variety of sensors, including joint position sensors, leg strain sensors and foot contact sensors. Industry:Defense/Homeland Security, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Development (4-6),	Characterization and Inspection	www.bostondynamics.com		Boston Dynamics, **Address:** 78 Fourth Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 617-868-5600, **Fax:** 617-868-5907, **Email:** info@BostonDynamics.com	Commercial
Robobees	Harvard University reseachers have designed, manufactured, and flown a tiny, fly-inspired aerial robot that could be the forerunner of swarms of drosophilistic drones. Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Characterization and Inspection	www.harvard.edu		Harvard University, **Address:** Massachusetts Hall, Cambridge, Massachusetts, United States, 02138, **Phone:** 617-495-1000, **Fax:** NA, **Email:** NA	Research
RoboCrab	Based on a horseshoe crab this amphibious robot can walk on sand and get through surf zones. Industry:Research, Size:Unknown, TRL:Research (1-3),	Characterization and Inspection	www.robotics.umd.edu/		University of Maryland, **Address:** 2147 A.V. Williams Bldg. College Park, Washington, Maryland , United States, 20742, **Phone:** 301-405-5306, **Fax:** not available, **Email:** skgupta@umd.edu	Research
RoboPipe	RoboPipe was built to inspect petrochemical platforms pipes for cracks or corrosion. It can pass between two pipes, through a space of 88 millimeters; also, and grips magnetically to climb up a vertical pipe passing welded joints. It carries a camera and sensors. The camera RoboPipe carries operates under humid conditions, has high resolution which allows it to provide enough details via photos and video. RoboPipe performs corrosion inspection with ultrasound in order to locate and measure the inner pipe damage. Use of ultrasound technology allows it to measure the thickness of the pipe and pinpointing variations which occur due to damage. After detecting damage, the camera is used to visually verify external corrosion., , Industry:Oil & Gas, Energy, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Development (4-6), Tether:Yes,	Characterization and Inspection	www.comimsa.com		Mexican Corporation of Material Research, **Address:** No 790 Col., Saltillo, Not Available(Mexico), Mexico, 25290 , **Phone:** +52 (844) 411-3200, **Fax:** N/A, **Email:**	Commercial

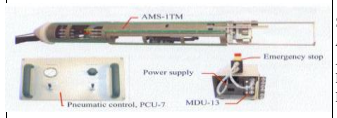
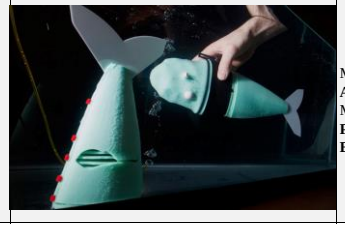
RoboSimian	Competitor in the DARPA Robotics Challenge. A simian-inspired limbed robot, RoboSimian uses deliberate and stable operations to complete challenging tasks under supervised tele-operation while in a degraded human environment. This emphasis on stability over dynamics and deliberation over reaction will result in faster and more robust overall operations by decreasing missteps for both robot and human operator. To accomplish this end, the team will employ design methods, system elements, and software algorithms that have already demonstrated success. Industry:Defense/Homeland Security, Size:Unknown, TRL:Research (1-3),	Characterization and Inspection	jpl.nasa.gov		Jet Propulsion Laboratory, **Address:** 4800 Oak Grove Drive, Pasadena, California, United States, 91011, **Phone:** 818-354-4321, **Fax:** N/A, **Email:** N/A	Commercial
Robotic Mole	A wheeled mole for surveillance. Industry:Defense/Homeland Security, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Demonstration (7-8),	Characterization and Inspection	www.hitechroboticsystemz.com/		Hi-Tech Robotic Systemz, **Address:** No. 12, Jambulingam street, opp canara bank, Chennai,TN, Not Available(India), India, 600034, **Phone:** 919445241562, **Fax:** N/A, **Email:** ganesh.ramalingam@hitechroboticsystemz.com	Commercial
Robotics Crawler	The Robotics Crawler with manipulator arm and gripper. Used to retrieve splintered fuel and tidy up in the shear cave (Thorp). The ROV is currently in storage in Thorp. Deployed Sep 2011 and operated very successfully for 8h after which one of the track gearboxes failed. It has been recovered from the shear cave and washed/decontaminated to the point enabling hands-on access to fix. However, it has been left in its current condition. Also being tested for use in B30 for sludge suction via eductor and pick and place by arm., , Site:Sellafield, Industry:Mining, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Characterization and Inspection	smd.co.uk		Soil Machine Dynamics Ltd, **Address:** Turbinia Works Davy Bank, Wallsend, Not Available(UK), United Kingdom, NE28 6UZ, **Phone:** +44 (0) 191 234 2222, **Fax:** NA, **Email:** info@smd.co.uk	Commercial
robuROC 4	The robuROC are modular outdoor robots, developed for defense and research applications, existing in 4 and 6 wheels. Each wheel has its own motor, leading to optimized clearance capabilities, in any type of terrain. The 6 wheels version is articulated, allowing all-terrain capabilities. Both can be equipped with equipment on top, including manipulator (robuARM), cameras, transmission devices. They are generally customized, and come ready-to-use with adequate software tools for developers. Industry:Defense/Homeland Security, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Demonstration (7-8), Manipulator:Yes - optional	Characterization and Inspection	www.robosoft.com		Robosoft, **Address:** 45 Allee Theodore Monod, Technopole d'Izarbel, Not Available(France), France, F-64210, **Phone:** 33-559-415-360, **Fax:** 33-559-415-379, **Email:**	Commercial
ROCR Oscillating Climbing Robot	It is small and lightweight – only 12.2-inches wide, 18-inches long from top to bottom and weighing only 1.2 pounds – and is designed to climb efficiently by moving like human rock climbers or apes swinging through trees. This mimicry allows ROCR to scramble up a carpeted eight-foot wall in just over 15 seconds., Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Research (1-3),	Characterization and Inspection	www.utah.edu		University of Utah , **Address:** 201 S 1460 E, Salt Lake City, Utah, United States, 84112, **Phone:** 801-581-7281, **Fax:** 999-999-9999, **Email:**	Research

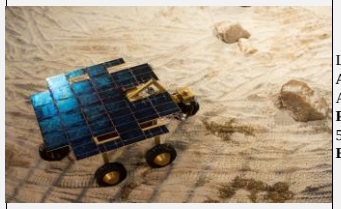
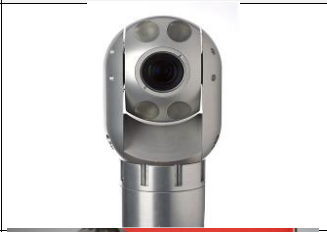
RODiS-TST	The LST-TST is a multi-robot system that performs inspection and intervention of RBMK fuel tubes. Going past the ring-reflector screen inside the reactor, one of the robots performs high precision laser alignment measurements at distances up to 12 meters. The robot's radiation-tolerance and compact size allow it access into the critical core area, through a 570 mm entrance diameter. On fuel tubes that are misaligned, the intervention robot then installs a collar, works with the inspection robot to align it properly, and then welds the collar in place. Site:Other, Industry:Nuclear, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), TRL2:Operational (9),	Characterization and Inspection	www.diakont.com		Diakont, **Address:** 3821 Calle Fortunada, San Diego, California, United States, 92123, **Phone:** (858) 551- 5551, **Fax:** (858) 504-7065, **Email:** support@diakont.us.com	Commercial
Roller Walker	This technology is a leg-wheel hybrid walking vehicle. A leg-wheel hybrid mobile robot is of interest because a walking robot has high terrain adaptability on irregular ground but a wheeled robot takes advantage of moving speed on smooth terrain. In the past, active wheels were often used for wheeled locomotion. However installation of active wheels restricted the walking machine's ability because active wheels need actuators, brake mechanism and a steering mechanism. This equipment is heavy and bulky and is not a practical solution for a walking robot which has many degrees of freedom. The hybrid mobile robot is a vehicle with a special foot mechanism which changes between feet soles for the walking mode and passive wheels for the wheel. Industry:Research, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Development (4-6),	Characterization and Inspection	www.3mech.titech.ac.jp/ma_hirose/ma_hirose_e.html		Fukushima Laboratory (Tokyo Institute of Technology), **Address:** Dept. of Mechanical and Aerospace Engineering, , Tokyo, Not Available(Japan), Japan, 152-8552, **Phone:** n/a, **Fax:** n/a, **Email:** n/a	Commercial
Rolling Spider	Rolling Spider can fly and hover around, and even flip in midair, and it can also roll on the floor, walls, or ceiling using two optional wheels (the robot uses Bluetooth Smart to communicate with a phone or tablet and can take photos but not stream video) Industry:Consumer, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:No tether - Endurance 0-30 minutes,	Characterization and Inspection	www.parrot.com		Parrot SA, **Address:** 174 Quai de Jemmapes, N/A, Paris, France, 75010, **Phone:** +33 (0)1 48 03 60 60, **Fax:** +33 (0)1 48 03, **Email:**	Commercial
Rover VT 100 DAR	A compact, manoeuvrable rover with camera holder for remote visual inspections of pipelines and reactor pressure vessels. Modular design for all customer requirements. Features:, Modular design to fit all customer requirements, Robust construction (stainless steel),, Watertight up to 5 bar (optional 20 bar),, Adapter for visatec camera systems,, Adapter for visatec recovery tools,, 3D positioning of camera / tool with movable arm,, Steerable over 2 motors,, Magnetic chain-drive available. Applications: Pipe inspections and Pressure vessel inspections., , Industry:Oil & Gas, Energy, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Waterproof:IP68 - Protected against prolonged effects of immersion under pressure, Manipulator:No	Characterization and Inspection	www.visatec.net		Visatec GmbH, **Address:** Gewerbepark 7, Sulzberg, Not Available(Sweden), Germany, NA, **Phone:** + 49 (0) 83 76 / 92 15-0, **Fax:** NA, **Email:** info@visatec.net	Commercial
RP-VITA	Remote Presence Virtual + Independent Telemedicine Assistant, or RP-VITA, combines iRobot's AVA telepresence units with InTouch health's distance education tools, creating a system that allows physicians to care for patients remotely. Industry:Healthcare/Medical, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Characterization and Inspection	www.irobot.com		iRobot, **Address:** 8 Crosby Drive, Bedford, Massachusetts, United States, 01730, **Phone:** 781-430-3000, **Fax:** 781-430-3001, **Email:** NA	Commercial

RQ-16 T-Hawk	Ducted-fan Micro Unmanned Aerial Vehicle serving as a camera platform. Developed for military applications including inspection of suspect IEDs. Photographic surveillance at Fukushima Daiichi NPP., , Site:Fukushima, Industry:Defense/Homeland Security, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), TRL2:Operational (9),	Characterization and Inspection	www.honeywellsafety.com/Americas/Home.aspx		Honeywell International Inc., **Address:** 900 Douglas Pike, Smithfield, Rhode Island, United States, 02917, **Phone:** 800-343-3411, **Fax:** NA, **Email:** information@sperian.com	Commercial
RQ-4 – GLOBAL Hawk	A remotely piloted aircraft, the RQ-4 Global Hawk provided surveillance in Fukushima, it was able to capture images and temperatures to identify the boundaries of the radioactive plume. Site:Fukushima, Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Characterization and Inspection	www.northropgrumman.com/		Northrop Grumman Corporation, **Address:** 2980 Fairview Park Drive , Falls Church, Virginia , United States, 22042 , **Phone:** (703) 280-2900, **Fax:** N/A, **Email:** N/A	Commercial
RQ-7 Shadow	The RQ-7 Shadow unmanned aerial vehicle is used by the United States Army, Marine Corps, Australian Army and Swedish Army for reconnaissance, surveillance, target acquisition and battle damage assessment. Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Characterization and Inspection	www.textrondefense.com/		Textron Inc./ Textron System Corporation., **Address:** 201 Lowell Street, Wilmington, Massachusetts, United States, 01887, **Phone:** 978-657-2100, **Fax:** NA, **Email:** bboucher@systems.textron.com	Commercial
RS1 Robotic Solution Base	Howe and Howe Technologies' RS1 is a modular platform to which can be added components to make up a full system. Examples include: RBS1: Ballitic Shield (SWAT Teams), T2: Thermite (firefighters), G2: Guardian (robotic arm), E2: Eagle Eye (camera system), TM1: Terra Max (plow), PM1: Prime Mover (towing), DR1: Raker (IED rake) Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Characterization and Inspection	www.howeandhowe.com		Howe & Howe Technologies, Inc., **Address:** 661 Main Street, Waterboro, Maine, United States, 04087, **Phone:** 207-247-2777, **Fax:** 207-247-2755, **Email:** info@howeandhowe.com	Commercial
Sabretooth	Sabretooth is an autonomous, submersible, miniature ferromagnetic wall crawling robot. This minimally invasive robot offers improved safety for a wide range of shipboard inspection and maintenance needs. Sabretooth helps keep personnel out of harm's way while performing critical and often dangerous maintenance and inspection tasks., , Industry:Maritime, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:Yes,	Characterization and Inspection	www.qinetiq-na.com		QinetiQ North America, **Address:** 350 Second Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 781-684-4000, **Fax:** NA, **Email:** TSGInfo@QinetiQ-NA.com	Commercial

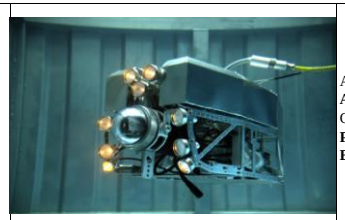
SADIE	Ultrasonic inspection of welds using a remotely operated vehicle - SADIE. Used for remote inspection of weldments in the top gas ducts at Sizewell 'A' . Site:Magnox, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	www.magnoxsites.co.uk/		Magnox Ltd, **Address:** Berkeley Site, Berkeley, Gloucestershire, Not Available(UK), United Kingdom, GL13 9PA, **Phone:** 01453 814000, **Fax:** N/A, **Email:**	Commercial
Salamandra Robotica II	Developed by the Biorobotics Laboratory, member of the NCCR Robotics, Salamandra robotica II paves the way for a new generation of amphibious robots that are capable of changing their speed, direction or locomotion mode by the transmission of simple commands from a remote station. Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Characterization and Inspection	www.nccr-robotics.ch/		NCCR Robotics, **Address:** Office ELG 231, Station 11, EPFL CH-1015, Lausanne, Not Available(Switzerland), Switzerland, not available, **Phone:** 41-(0)-21-693-6939, **Fax:** not available, **Email:** nccr-robotics@edfl.ch	Commercial
SAM Climbing Robot	The robot doesn't actually cling to the side of the building, but instead uses a roof-mounted custom rigging system. Wires are sent down the side of the building. SAM is then attached to the wires and climbs up them, it reaches the top of the rigging system and begins its inspection. It takes an image which is then relayed to the operator on the ground. The robot continues to do this until it reaches the bottom of the run. After this is completed the rigging is re-positioned and the process repeated., , Industry:Other, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9),	Characterization and Inspection	ftdhighrise.com		FTD Highrise Inspection, **Address:** 1585 Britannia Rd East, Mississauga, Ontario , United States, L4W 2M4, **Phone:** 416-894-2788, **Fax:** n/a, **Email:** contact@ftdhighrise.com	Commercial
Sample Processing System	Honeybee Robotic's geotechnical work focuses on the entire sample acquisition and analysis chain. Sample preparation is at the heart of this process: a well-prepared sample is essential for accurate geotechnical analysis. Automated sample processing and sample preparation systems must be rugged enough to withstand vibration and harsh environments, but also low-power and lightweight for mobile applications. Industry:Space, Size:Unknown, TRL:Development (4-6),	Characterization and Inspection	www.honeybeerobotics.com/		Honeybee Robotics , **Address:** Honeybee Robotics, Ltd Building 3 Suite 1005, Brooklyn, New York , United States, 11205, **Phone:** 212-966-0661, **Fax:** N/A, **Email:** info@-HoneybeeRobotics.com	Commercial
SandFlea	Sand Flea is an 11 pound robot that drives like an RC car on flat terrain, but can jump 30 ft into the air to overcome obstacles. The robot uses gyro stabilization to stay level during flight, to provide a clear view from the onboard camera, and to ensure a smooth landing. Sand Flea can jump about 25 times on one charge. Boston Dynamics is developing Sand Flea with funding from the US Army's Rapid Equipping Force (REF). Industry:Defense/Homeland Security, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Development (4-6), Tether:No tether - Endurance Unknown, Manipulator:No	Characterization and Inspection	www.bostondynamics.com		Boston Dynamics, **Address:** 78 Fourth Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 617-868-5600, **Fax:** 617-868-5907, **Email:** info@BostonDynamics.com	Commercial

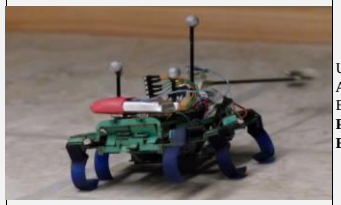
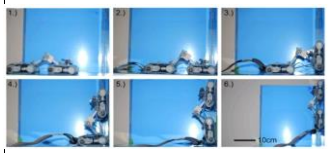
Scarab Crawler	At ORNL, the Scarab III remote vehicle, built by ROV Technologies, Inc., is designed to operate either submerged under water or in several inches of waste material. The vehicle has four rubber-treaded wheels for traction on slick surfaces and four metal wheels for biting into thin layers of waste material. Articulated drives permit climbing over 8-in. obstacles. There is a manipulator arm that can grasp objects up to 2-in. in diameter and has a wrist capable of 360° rotation and an elbow capable of moving 90° up or down. The manipulator arm is used to grasp the sample collection device and maneuver it to collect the sample. The manipulator gripper end-effector has a payload limit of 5 lb. Site:Oak Ridge, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	www.rovtech.com		ROV Technologies, Inc., **Address:** 49 Bennett Drive, Brattleboro, Vermont , United States, 05301, **Phone:** 802-254-9353, **Fax:** 802-254-9354, **Email:** mail@rovtech.com	Commercial
Sea Snake	The next generation snakebot from CMU incorporates series elastic actuators into every joint. The actuators allow for torque control and compliant motions, giving the snake a gravity compensation mode. Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3), Tether:Yes,	Characterization and Inspection	ri.cmu.edu		The Robotics Institute (Carnegie Mellon University), **Address:** 5000 Forbes Avenue, Pittsburgh, Pennsylvania, United States, 15213, **Phone:** 412-268-3818, **Fax:** 412-268-6436, **Email:** robotics@ri.cmu.edu	Research
Self-assembling multi-copter	Self-assembling multi-copter demonstrates networked flight control. Small hexagonal pods that assemble into flying rafts. The true accomplishment of this research is that there is not one robot in control – each unit in itself decides what actions to take to keep the group in the air in what's known as Distributed Flight Array., , Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Research (1-3),	Characterization and Inspection	www.ethz.ch/en/		ETH Zurich, **Address:** Rämistrasse 101 8092 , Zurich, Not Available(Switzerland), Switzerland, not available, **Phone:** 41-44-632-11-11, **Fax:** NA, **Email:** not available	Commercial
sFly	The objective of the sFly project is to develop several small and safe helicopters which can fly autonomously in city-like enviroments and which can be used to assist humans in tasks like rescue and monitoring. sFly is funded by the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement 231855. All the platforms are provided by Ascending Technologies. Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3), Tether:No tether - Endurance Unknown,	Characterization and Inspection	www.sfly.org/		sFly Project, **Address:** Autonomous Systems Laboratory, Zurich, Not Available(Switzerland), Switzerland, 8092, **Phone:** NA, **Fax:** NA, **Email:** davide.scaramuzza@ieee.org	Commercial
Shape Changing Robot	This shape-changing robot is capable of changing its shape to pass through narrow spaces was developed based on crawling equipment which can stably run using two compact crawlers., , Site:Fukushima, Industry:Nuclear, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8), Tether:Yes,	Characterization and Inspection	www.hitachi.co.jp		Hitachi , **Address:** 6-6, Marunouchi 1-chome, Tokyo, Not Available(Japan), Japan, 100-8280 , **Phone:** +81-3-3258-1111, **Fax:** N/A, **Email:** N/A	Commercial

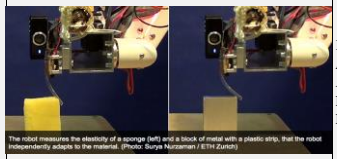
SHARC	Defense and National Security applications have unique requirements that the SHARC (Sensor Hosting Autonomous Remote Craft) Wave Glider is designed to meet and exceed. This versatile platform is acoustically silent and with a low visual and radar signature, SHARC harvests all of its energy for propulsion mechanically from the ocean waves. Power for onboard computing, sensors, and secure satellite communication links is provided by solar energy. Two networked payload boxes and various mounting points provide flexibility for user-integrated sensor and communications payloads., , Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6),	Characterization and Inspection	www.liquidr.com		Liquid Robotics, **Address:** 1329 Moffett Park Drive, Sunnyvale, California, United States, 94089, **Phone:** 408-636-4200, **Fax:** 408-747-1923, **Email:**	Commercial
Shoal	Shoal is a European Research Project Managed by BMT funded under the Seventh Framework Programme for ICT. SHOAL aims to develop number of robotic fish that will work together in order to monitor and search for pollution in ports and other aquatic areas. Traditional methods of monitoring pollution involve getting samples in some way (divers) and then sending the samples back to the lab to be tested, the whole process takes time and makes real-time pollution information far from a reality. Shoal aims to make this process real-time. By having autonomously controlled fish with chemical sensors attached we aim to do these tests in-situ. Further to this the fish will also be given an intelligence so that if they do find significant amounts of pollution and they deduce it's coming from a source they will all work together to find the source of the pollution so that the port can stop the problem early before more pollution occurs., , Industry:Maritime, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Research (1-3),	Characterization and Inspection	www.bmt.org		BMT Group Ltd, **Address:** Waldegrave Road, Teddington, Not Available(UK), United Kingdom, N/A, **Phone:** +44 (0)20 8943 5544, **Fax:** +44 (0)20 8943 , **Email:** enquiries@bmtmail.com	Commercial
Small Roving Annulus Inspection Vehicle (SRAIV)	This is a modified, commercially available wall crawler designed to supplement the In-Service Inspection (ISI) of waste tanks. The SRAIV provides an improved capability to achieve a more complete inspection of the tank walls than existing methods. The SRAIV is deployed through annulus risers in the tank to gain access to tank walls requiring inspection. The SRAIV is deployed using a manually operated deployment pole and is coupled to the wall using permanent magnet wheels. Navigation is performed from the remote console where pictorial views can be displayed from the on-board cameras. The unit incorporates multiple ultrasonic inspection (JUT) transducers for traditional weld examination. These visual surveillances are performed on all accessible surfaces in the annulus in a systematic manner. Remotely controlled magnetic wall crawlers equipped with cameras and ultrasonic transducers integrated with commercially available "P-scan" data analysis equipment have been used to visually and ultrasonically inspect tank walls, weld areas, and leak sites. Site:Savannah River, Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	srnl.doe.gov/		Savannah River National Laboratory, **Address:** Savannah River National Laboratory, Aiken, South Carolina, United States, 29808, **Phone:** 803-725-6211, **Fax:** N/A, **Email:** rosalind.blocker@srs.gov	Commercial
Soft Bodied Robotic Fish	Soft robots don't just have soft exteriors but are also powered by fluid flowing through flexible channels. MIT researchers report the first self-contained autonomous soft robot capable of rapid body motion: a "fish" that can execute an escape maneuver, convulsing its body to change direction in just a fraction of a second, or almost as quickly as a real fish can. Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Research (1-3),	Characterization and Inspection	web.mit.edu/		Massachusetts Institute of Technology (MIT), **Address:** 77 Massachusetts Avenue, Cambridge, Massachusetts, United States, 02139, **Phone:** 617-253-2700, **Fax:** not applicable, **Email:** tele-info@mit.edu	Commercial

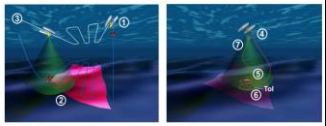
Solara 50	Titan Aerospace has unveiled designs for the world's first solar-powered atmospheric satellite. The craft, which resembles a large drone, would be completely powered by the sun, allowing it to stay in the air for five years with a mission range of over 4 million kilometers., , Industry:Airborne, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), Tether:No tether - Endurance more than an hour, Payload:20-50kg/40-100lb,	Characterization and Inspection			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Solero	The Solar-Powered Exploration Rover (SOLERO) is designed for exploration on Mars. The most prominent feature of SOLERO is its ability to operate relying on just-generated solar power, i.e. with minimal use of batteries (only for contingency or peak power demands). On Earth, there are a number of solar-powered vehicles operating in this mode. However, as Mars is further from the sun than Earth, the power available from sunlight is significantly reduced and thus to design a working and reliable system is much more difficult. Industry:Space, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Research (1-3), Tether:No tether - Endurance Unknown, Payload:0-5kg/0lb-10lb, Reach:Not Applicable, Manipulator:No	Characterization and Inspection	lis.epfl.ch/		Laboratory of Intelligent Systems (LIS), **Address:** EPFL-STI-IMT-LIS, Lausanne, Not Available(Switzerland), Switzerland, CH-1015, **Phone:** +41 21 693 59 66, **Fax:** +41 21 693 58 5, **Email:** webmaster@epfl.ch	Commercial
SOLO unmanned inspection robot	Solo is an unmanned sewer inspection robot that is radically changing the way collection system managers approach operations and management. Solo enables better, timelier decision-making by providing the most useful high volume, small pipe information quickly. Typical daily production rates far outpace conventional methods. Solo is lightweight and can be transported and hand-carried anywhere that an inspection is desired., , Industry:Construction, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9),	Characterization and Inspection	redzone.com		RedZone Robotic System, **Address:** 9143 Street, Pittsburgh, Pennsylvania, United States, 15201, **Phone:** 412-476-8980, **Fax:** 412-476-8981, **Email:** partners@redzone.com	Commercial
SORYU 4	Soryu-4 is a modular robot developed to move in narrow and unstructured environments. It consists of dust/water-proof modules covered with crawler belts, and can adapt its posture in order to overcome obstacles such as stairs, ditches, ducts, debris and more. The modules can be configured to bring different sensors, devices and cameras, thus extending its applicability to urban, industrial, outdoor or unstructured scenarios. In addition, Soryu-4 requires practically no set-up time, making it an ideal robot for fast-response search & rescue missions in disaster-stricken areas, or remote inspection in potentially hazardous sites., , Industry:Research, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Research (1-3),	Characterization and Inspection	www.hibot.co.jp		HiBot, **Address:** 5-9-15 Kitashinagawa, Shinagawa-ku, Tokyo, Not Available(Japan), Japan, 141-0001, **Phone:** +81-3-5791-7526, **Fax:** +81-3-5791-7527, **Email:** NA	Commercial
Spectrum 120HD Camera System	The Spectrum 120 HD pan, tilt and zoom camera provides crystal clear video in air or underwater. It packs a High Definition (HD), 2MP imager (1080i resolution) with 120x zoom in a robust package only 4.75in / 120mm diameter. As a standalone unit or part of a complete robotic system, Inuktun offers a complete line of remotely operated camera systems for use in air or underwater. Industry:Nuclear, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9),	Characterization and Inspection	www.inuktun.com		Inuktun Services Ltd., **Address:** 2569 Kenworth Road, Suite C, Nanaimo, British Columbia(CA), Canada, V9T 3M4, **Phone:** 250-729-8080, **Fax:** 250-729-8077, **Email:** inuktun@inuktun.com	Commercial

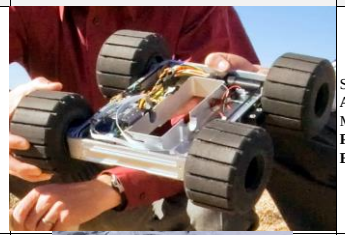
Spherical Flying Machine	The spherical air vehicle could be deployed in search and rescue operations deemed unsuitable for traditional aircraft. As for other possible uses, the sky just may be the limit. Because the exterior is round, this machine can land in all kinds of attitudes, and move along the ground. It can also keep in contact with a wall while flying. It can also just roll along the ground, controlled by numerous control surfaces. Three onboard gyro sensors, the device effectively maintains its orientation and altitude, even after collisions. , , Industry:Defense/Homeland Security, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Research (1-3),	Characterization and Inspection	www.mod.go.jp		Japan Ministry of Defense, **Address:** 5-1 Honmura-cho, Ichigaya, Tokyo , Not Available(Japan), Japan, 162-8801, **Phone:** +81-03-5366-3111, **Fax:** NA, **Email:** infomod@mod.go.jp	Commercial
StarlETH	StarlETH is a quadruped robot fast, efficient, and versatile locomotion on four legs. Using the same leg design but with one additional degree of freedom per leg, it is able to move highly dynamically using different gaits, such as bounding, trotting, or running. Industry:Research, Size:Unknown, TRL:Research (1-3),	Characterization and Inspection	www.nccr-robotics.ch/		NCCR Robotics, **Address:** Office ELG 231, Station 11, EPFL CH-1015, Lausanne, Not Available(Switzerland), Switzerland, not available, **Phone:** 41-(0)-21-693-6939, **Fax:** not available, **Email:** nccr-robotics@edfl.ch	Commercial
Stickybot Wall Climber	The biology of a gecko's foot that gives the lizard its remarkable climbing ability has been used by engineers at Stanford University to create a robot that can climb smooth surfaces including a wall of slick glass. With feet modeled on the intricate design of gecko toes, the Stickybot could lead to the development of robots that can scale vertical surfaces to access dangerous or hard to reach places., Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Research (1-3),	Characterization and Inspection	www.stanford.edu		Stanford University, **Address:** 450 Serra Mall, Stanford, California, United States, 94305, **Phone:** 650-723-2300, **Fax:** 999-999-9999, **Email:**	Research
Strontium Iodide Scintillators	Strontium Iodide (SrI2:Eu) scintillators enable high resolution gamma-ray spectroscopy, because of its high light output and exceptional linearity. SrI2:Eu performs well at both high and low energies. SrI2:Eu can be used in a range of hand-held radiation detection instruments, as well as medical, industrial, environmental applications. Packaged SrI2:Eu scintillators can easily be incorporated into hand-held radiation detectors and should enhance their performance considerably when compared to a NaI:Tl scintillator. Industry:Healthcare/Medical, Size:Unknown, TRL:Operational (9),	Characterization and Inspection	rmdinc.com/		Radiation Monitoring Devices, Inc, **Address:** 44 Hunt Street, Watertown, Massachusetts, United States, 02472, **Phone:** (617) 668-6900, **Fax:** 617-668-6890, **Email:** info@rmdinc.com	Commercial
Super Giraffe	The Super Giraffe (Global Innovative Robot Arm For Future Evolution) weighs 4 tons and moves at a maximum speed of 6 km/h (3.7 mph) on flat ground. Though not the most agile robot, it can handle up to 15 degree slopes. It's powered by a rechargeable Lithium-Ion battery adapted from Mitsubishi Motor Company's electric vehicles and can work up to 5 hours on a single charge. It can be equipped with modular tools weighing up to 20 kg (44 lb) to perform different tasks inside the plant. Operators will be able to open or close valves, inspect pipes for leaks, cut through metal given direction., , Site:Fukushima, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	www.mhi-global.com		Mitsubishi Heavy Industries, **Address:** 16-5 Konan 2-chrome, Minato-ku Tokyo, Not Available(Japan), United States, 108-8215, **Phone:** n/a, **Fax:** n/a, **Email:**	Commercial

Susi	An underwater robot developed by Areva that can be maneuvered through a reactor's primary system has been used at a US nuclear power plant for the first time. Site:US Other, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	us.areva.com		AREVA , **Address:** 7207 IBM Drive, Charlotte, North Carolina, United States, 28262, **Phone:** 704-805-2000, **Fax:** not available, **Email:**	Commercial
Swinglet CAM	Collects aerial imagery up to1.5-6sqkm in a single flight. The swinglet CAM has a flight time of up to 30 minutes allowing to cover areas of up to 4sqkm in a single flight. With its 16MP camera it can shoot aerial imagery at down to 3cm/pixel resolution. The images can then be used to create maps and elevation models with a precision of 5cm. This is a slightly smaller and less spec'd eBee. Industry:Other, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9), Tether:No tether - Endurance 0-30 minutes,	Characterization and Inspection	www.sensefly.com		SenseFly Ltd., **Address:** Route de Genève 38, Cheseaux-Lausanne, Not Available(Switzerland), Switzerland, 1033 , **Phone:** +41 21 552 04 40, **Fax:** NA, **Email:** support@sensefly.com	Commercial
TacBot	The TacBot is an all-weather robot that can be delivered, deployed and controlled by one person from a position of cover. It carries out reconnaissance using a boom-mounted 32X camera to stream to the command center from up to a mile line-of-sight (or farther with a Sentinel RSD acting as a digital repeater). It sends still photos and video playback and is a WiFi hotspot/digital radio repeater. An LED illuminator is built in and the unit works with other Sentinels or TacBot Remote Infiltrator units deployed by a robot or person. Industry:Defense/Homeland Security, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9),	Characterization and Inspection	www.lithosrobotics.com/robots.html		Lithos Robotics Corporation, **Address:** 25 Hazelwood Drive | Suite 113, Amherst, New York , United States, 14228, **Phone:** 716-832-4600, **Fax:** 716-832-4610, **Email:** support@lithosrobotics.com	Commercial
Tactical Surveillance Systems	Suite of surveillance robots that can be tossed into a dangerous environment and operated remotely to provide video and audio information to the user. Light weight wheeled platforms., , Industry:Defense/Homeland Security, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:No tether - Endurance Unknown,	Characterization and Inspection	www.reconrobotics.com		Recon Robotics, **Address:** 7620 W 78th St, Edina, Minnesota , United States, 55439-2518, **Phone:** 866-398-1921, **Fax:** not available, **Email:** support@reconrobotics.com	Commercial
Talon	TALON is powerful and man-portable, TALON is the fastest robot on the market (easily keeping pace with a running soldier). It can cope with virtually any terrain and has a very high payload capacity for all-weather day/night sensor packages., Developed for military applications. Site:Fukushima, Industry:Defense/Homeland Security, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9), TRL2:Operational (9), Tether:No tether - Endurance more than an hour, Waterproof:IP65 - Protection against low pressure water jets (all directions), Payload:10-20kg/20lb-40lb, Reach:1200mm-1800mm/48in-72in, Manipulator:Yes - standard	Characterization and Inspection	www.qinetiq-na.com		QinetiQ North America, **Address:** 350 Second Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 781-684-4000, **Fax:** NA, **Email:** TSGInfo@QinetiQ-NA.com	Commercial

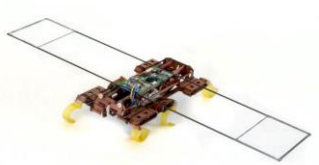
Tank Crawler	Tandem Synthetic Aperture Focusing Technique (T-SAFT), aka "Tank Crawler." This robot creeps on magnetic feet to look for cracks or corrosion. Each robotic foot can demagnetize to step, then remagnetize to affix itself to the wall. It scans the tanks with ultrasonic and electrical conductivity sensors. Site:Hanford, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Tartaruga	This robot uses three-dimensional fin propulsion as a bio-inspired locomotion concept and a set of sensors for autonomous missions. It is part of the naro project. Industry:Research, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Characterization and Inspection	lis.epfl.ch/		Laboratory of Intelligent Systems (LIS), **Address:** EPFL-STI-IMT-LIS, Lausanne, Not Available(Switzerland), Switzerland, CH-1015, **Phone:** +41 21 693 59 66, **Fax:** +41 21 693 58 5, **Email:** webmaster@epfl.ch	Commercial
TAYLRoACH	Tail Actuated Yaw Locomotion Robotic Autonomous Crawling Hexapod is a fast turning robot. Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Development (4-6),	Characterization and Inspection	www.berkeley.edu/index.html		University of California, Berkeley, **Address:** University of California Berkeley, Berkeley, California, United States, 94720, **Phone:** (510) 642-6000, **Fax:** N/A, **Email:** N/A	Research
TBCP-II Wall Climbing Robot	Using adhesives that mimic the dry, but sticky toe pads of the gecko, by using a material called polydimethylsiloxane (PDMS) that was manufactured to contain very small mushroom cap shapes. The thin, flexible overhang provided by the mushroom cap ensures that the area of contact between the robot and the surface is maximized. Here the adhesive is applied to tank-like robots driven by belts. Tank-like robots have a simplified mechanical design and control architecture and also boast increased mobility and can be easily expanded if there is the need to increase the load a robot is carrying. The 240 g (8.46 oz) robot developed by the SFU researchers, which has been given the catchy name of the Timeless Belt Climbing Platform (TBCP-II) has been fitted with a multitude of sensors that allow it to detect its surroundings and change its course accordingly. It is also able to transfer from a flat horizontal surface to a flat vertical surface over both inside and outside corners at speeds of up to 3.4 cm/s (1.34 in/s)., , Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Characterization and Inspection	www.sfu.ca		Simon Fraser University, **Address:** 8888 University Drive, Burnaby, British Columbia(CA), Canada, V5A 1S6, **Phone:** 778-782-3210, **Fax:** 999-999-9999, **Email:** sfu_comms@sfu.ca	Research
Telemax Explosive Ordnance (EOD) Robot	The telemax robot is a versatile EOD / Hazmat robot. It is small enough to fit in the back of a small SUV but is able to reach over 2,4m tall. A four-track running gear is used, which means that it can handle gradients of 45° or 100% without difficulty. It can overcome obstacles of up to half a meter in height without problems and also trenches of 60 cm in width. The basic principle of 'less is more' applies with special forces if the situation involves working in confined spaces; in all cases where the big EOD robot cannot be used its little brother can provide distance between the bomb disposal engineer and the explosive device (IED, EOD, Bomb). Telemax has two tool magazines incorporated into the chassis. This means two additional tools / firing systems can be used on an operation without needing to go back to the starting point., , Industry:Defense/Homeland Security, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9), Payload:0-5kg/0lb-10lb, Reach:1800mm-2400mm/72in-96in, Manipulator:Yes - standard	Characterization and Inspection	www.cobham.com		Cobham PLC, **Address:** Brook Road, Wimborne, Dorset, Not Available(UK), England, BH21 2BJ, **Phone:** +44 (0) 1202 882020, **Fax:** NA, **Email:** info@cobham.com	Commercial

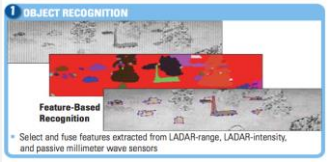
TeodorPrime Robot	Tracked robot for IED's. Competed at EuRathlon 2013. Industry:Defense/Homeland Security, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Demonstration (7-8), Manipulator:Yes - standard	Characterization and Inspection	www.fkie.fraunhofer.de/en.html		Fraunhofer Institute for Communication, **Address:** Fraunhofer Institute for Communication, , Wachtberg, Not Available(Germany), Germany, 53343, **Phone:** +49 (0)228 9435-217, **Fax:** N/A, **Email:** N/A	Commercial
The Adaptive Robot	ETH researchers have developed a robot that can ascertain the temperature and elasticity of objects – and adapt independently to various ranges in the process. Industry:Research, Size:Unknown, TRL:Research (1-3),	Characterization and Inspection	www.ethz.ch/en/		ETH Zurich, **Address:** Rämistrasse 101 8092 , Zurich, Not Available(Switzerland), Switzerland, not available, **Phone:** 41-44-632-11-11, **Fax:** NA, **Email:** not available	Commercial
The Climber	The Climber can scale walls, ceilings or rounded surfaces and can overcome rough surfaces, contours and obstacles as big as 1 inch off the surface. It is a portable, remote-controlled device that has been deployed in remote measuring and climbing the surfaces of C-5 and C-137 airplanes, decontaminating a vessel in a Nuclear Power Plant, and has demonstrated it's ability to climb and remove paint from concrete walls for the Department Of Energy (DoE). The Climber uses a vacuum system to stick to walls – or overhead surfaces. Since even a smooth wall may contain obstacles, bolts, sills, or dirt, the robot needed to have some ability to deal with rough surfaces. ICM developed a thick foam rubber pad that forms a "rolling pressure seal" for the vacuum and acts as tank treads. The foam is able to handle 3/4-in (20 mm) bumps, which gives it the ability to climb brick walls, steel plates, and aircraft exteriors., , Industry:Maritime, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9),	Characterization and Inspection	www.icm.cc		International Climbing Machines (ICM), **Address:** 630 Elmira Road, Ithaca, New York , United States, 14850, **Phone:** 607-288-4001, **Fax:** 607-288-4004, **Email:** info@icm.cc	Commercial
Three Dimensional Object Recognition	Energid has developed powerful new methods for identifying and tracking three-dimensional objects for the US Air Force and the Missile Defense Agency. They use CAD models of objects to automatically build tailored algorithms. The approach is flexible and extendible and can be used with many types of imaging sensors-gray scale, two channel infrared, ladar, imaging radar, and hyperspectral intensity sensors. The algorithms are implemented as a C++ software toolkit. The toolkit implements support for single, dual, and multichannel images, support for the representation of general bifurcating articulated models, support for rendering of those models using a PC graphics card, and support for the top-level identification framework. Every module can be configured using the Extensible Markup Language (XML) to exchange run time for accuracy., , Industry:Defense/Homeland Security, Size:Not Applicable, TRL:Demonstration (7-8),	Characterization and Inspection	www.energid.com/		Energid Technologies, **Address:** One Mifflin Place,, Cambridge, Massachusetts, United States, 02138, **Phone:** 02138, **Fax:** N/A, **Email:** N/A	Commercial
ThrowBot	The Throwbot XT with audio capabilities is a versatile and robust robot that is easily deployed by tactical operators. It weighs 1.2 pounds and can be thrown up to 120 feet. This personal sensor system is water and dust resistant and operates quietly at 22 decibels. An infrared optical system activates automatically in low light. Industry:Defense/Homeland Security, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9), Tether:No tether - Endurance 30-60 minutes,	Characterization and Inspection	www.reconrobotics.com		Recon Robotics, **Address:** 7620 W 78th St, Edina, Minnesota , United States, 55439-2518, **Phone:** 866-398-1921, **Fax:** not available, **Email:** support@reconrobotics.com	Commercial

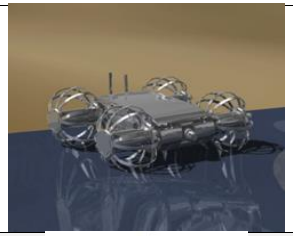
Titan Bluey ROV	The TITAN Bluey is a small, low cost underwater video systems. These include systems for recreational and industrial purposes. Site:Sellafield, Industry:Oil & Gas, Energy, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Characterization and Inspection	NA		Newcoast Corporation Pty Ltd, **Address:** PO Box 1070, Osborne Park , Not Available, Australia, 6916, **Phone:** 61-89244-3772, **Fax:** 61-89244-4463, **Email:** NA	Commercial
Trident	TRIDENT proposes a new methodology for multipurpose underwater intervention tasks with diverse potential applications like underwater archaeology,oceanography and offshore industries, and goes beyond present-day methods typically based on manned and / or purpose-built systems. Trident is based on new forms of cooperation between an Autonomous Surface Craft and an Intervention Autonomous Underwater Vehicle. EU FP-7, ICT Challenge 2: Cognitive Systems, Interaction, Robotics, Collaborative Project (STREP), Grant agreement No: ICT-248497, EU Website Cognition Industry:Research, Size:Not Applicable, TRL:Development (4-6),	Characterization and Inspection	www.irs.uji.es/trident/index.html		Universitat Jaume I - Interactive & Robotic Systems Lab, **Address:** Av. de Vicent Sos Baynat, Castelló, Not Available(Spain), Spain, 12071, **Phone:** 34 964 728 291, **Fax:** N/A, **Email:** N/A	Commercial
Triton XLS-46	The Triton XLS is a 100 hp work class ROV system, with up to 150 hp availability. The XLS' 3,000 kg of through-frame lift provides a platform for a wide variety of tooling modules and custom intervention work skids. The Triton XLS is a highly dependable vehicle designed for extreme water depths and demanding subsea construction tasks. This is the ROV that is due to be deployed in the search for the missing Malaysian Airliner MH370. Industry:Oil & Gas, Energy, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), Tether:Yes, Manipulator:Yes - standard	Characterization and Inspection	www.helixesg.com/		Helix Energy Solutions, **Address:** 3505 West Sam Houston Parkway North Suite 400, Houston, Texas, United States, 77043, **Phone:** 281-618-0400, **Fax:** 281-618-0500, **Email:** not available	Commercial
Trunk Snake	A snake robot on a wheeled platform., , Industry:Research, Size:Unknown, TRL:Development (4-6),	Characterization and Inspection	ri.cmu.edu		The Robotics Institute (Carnegie Mellon University), **Address:** 5000 Forbes Avenue, Pittsburgh, Pennsylvania, United States, 15213, **Phone:** 412-268-3818, **Fax:** 412-268-6436, **Email:** robotics@ri.cmu.edu	Research
UAS: RQ-11B Raven	The Raven is an unmanned aircraft syste. The Raven B DDL system, an enhanced version of the battle proven Raven B system, is a lightweight solution designed for rapid deployment and high mobility for military applications requiring low-altitude surveillance and reconnaissance intelligence. Raven can be operated manually or programmed for autonomous operation, utilizing the system's advanced avionics and precise GPS navigation. With a wingspan of 4.5 feet and a weight of 4.2 pounds, the hand-launched Raven provides aerial observation, day or night, at line-of-sight ranges up to 10 kilometers. The Raven, is available with an optional stabilized gimbaled payload, delivers real-time color or infrared imagery to the ground control and remote viewing stations. AeroVironment's common GCS interfaces with all of its tactical ISR air vehicles reducing the level of training required and decreasing the time and cost involved., , Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Characterization and Inspection	avinc.com		AeroVironment, **Address:** 181 W Huntington Drive, Monrovia, California, United States, 91016, **Phone:** 626-357-9983, **Fax:** 626-359-9628, **Email:** N/A	Commercial

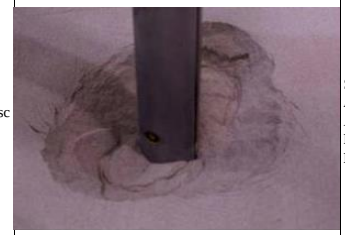
U-CAT Robotic Sea Turtle	A very small highly maneuverable ROV. U-CAT is a prototype robotic sunken-ship-exploring sea turtle. U-CAT has four independently-driven flippers that allow it to move up and down, forward and backward, and to pivot on the spot. Propellers would let it do those same things, although they'd also churn up much more visibility-limiting silt in the process. U-CAT is autonomous, so it doesn't require a control cable that could get snagged or tangled. It also has an onboard video camera, which records video that can later be used to visually map out the inside of the shipwreck., , Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Research (1-3),	Characterization and Inspection	www.ttu.ee/en		Tallinn University of Technology, **Address:** Ehitajate tee 5, Tallinn, Estonia, Not Available, Australia, 19086, **Phone:** 372 620 2002, **Fax:** 620 2020, **Email:** info@ttu.ee	Research
ULC Robotics Variable Geometry Crawler (VGC)	The ULC Robotics Variable Geometry Crawler (VGC) provides gas companies with live, high-resolution video inspection of gas mains. Using the VGC, gas companies can assess the conditions of their mains as well as locate cracks, damaged pipe, unknown branches, service tees, valves, fittings and water intrusion or debris. This inspection is performed while the main remains live without any interruptions in service. Industry:Oil & Gas, Energy, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9), Tether:Yes,	Characterization and Inspection	www.ulcrobotics.com/		ULC Robotics, **Address:** 88 Arkay Drive , Hauppauge, New York , United States, 11788, **Phone:** 1-631-667-9200, **Fax:** N/A, **Email:** N/A	Commercial
UM4 "Retriever"	The UM4 Surveillance Robot weighs 14 pounds and features four wheels that are driven by independent gear motors. It is a completely enclosed chassis integrated with a pan and tilt camera system. Video is displayed real time on an included, 7-inch-wide color LCD screen. Industry:Defense/Homeland Security, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), Tether:No tether - Endurance more than an hour,	Characterization and Inspection	sdrtactical.com/default.aspx		SDR Tactical, **Address:** 224 Technology Park Lane, Fuquay-Varina, North Carolina, United States, 27526, **Phone:** 919-557-9162, **Fax:** not available, **Email:** not available	Commercial
Underwater Vacuum Robot	This is a relatively low weight underwater vacuum robot that could be hand carried to a tank. To keep the weight down (they achieved 63 lbs, and provided additional removable weights for greater traction), containers are incorporated on both sides of the robot, each with three weight slots, and with covers that can be latched/unlatched from above using a modular pole and simple hook. Furthermore, the height of the vacuum head can be adjusted from above with the same pole. The pan/tilt/zoom/light camera is positioned at an angle to meet the client's maximum height requirements. A vertically mounted camera would be preferable if no such height limit were imposed. The power supply and controller are incorporated in a portable Pelican case. Industry:Nuclear, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9),	Characterization and Inspection			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Urban Hopper	As part of an ongoing Defense Advanced Research Projects Agency (DARPA) project, Sandia has developed a small, shoebox-sized, GPS-guided, unmanned ground vehicle that can jump over and/or onto obstacles over 6 meters high. With an estimated range of 2 kilometers, the robot can drive using motor-driven wheels or it can hop using a rotatable combustion-driven piston actuator. Industry:Defense/Homeland Security, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Development (4-6),	Characterization and Inspection	www.sandia.gov/		Sandia National Laboratories, **Address:** 1515 Eubank SE, Albuquerque, New Mexico, United States, 87123, **Phone:** 505-845-0011, **Fax:** N/A, **Email:** N/A	Commercial

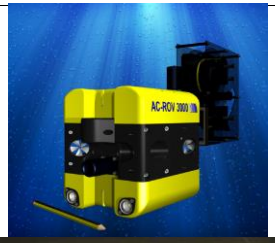
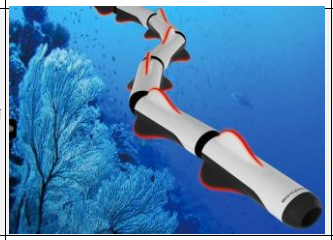
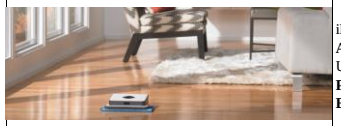
UVP-DUO	Ultrasound Doppler Velocity Profiling (UVP) method features a line measurement obtaining several 1D aligned velocity points away from the measuring probe, thus non-intrusive. Leeds University (as part of the DIAMOND university consortium) is testing an ultrasonic velocity profiler (UVP). It was used to the measure the settling rates of aggregated glass dispersions as well as the build up and compression of the sediment bed. Industry:Other, Size:Unknown, TRL:Operational (9),	Characterization and Inspection	www.met-flow.com		MET-FLOW , **Address:** MET-FLOW S.A. , Lausanne, Not Available(Switzerland), Switzerland, 8 1007 , **Phone:** +41 (21) 313 4050, **Fax:** NA, **Email:** info@met-flow.com	Commercial
Vacuum Wall Climber	A vacuum-powered model called VORTEX that can climb any smooth surface by employing a household vacuum cleaner motor to hold it to the wall. It works a little like an inverse hovercraft, using a skirt to stop air leakage and a carefully designed rotary turbine to create negative pressure below the unit and keep it stuck to whatever it's climbing. When the robot hits a wall and continues to move forwards, it begins to tilt up. At an angle of about 30-35 degrees, a tilt switch activates and the vacuum motor is switched on, pulling it closer to the wall and allowing the skirt surrounding the rotor to be more effective in creating the negative pressure., , Industry:Other, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Research (1-3),	Characterization and Inspection	www.lsbu.ac.uk		London South Bank University, **Address:** 103 Borough Road, SE1, London, Not Available(UK), United States, 0AA, **Phone:** 020 7815 7815, **Fax:** NA, **Email:** NA	Research
Variable Geometry Tracked Vehicle (VGTV)	Submerged or on land, the Variable Geometry Tracked Vehicle (VGTV) is a miniature inspection system designed to access confined spaces and challenging terrain in a variety of applications, including search and rescue, nuclear and duct inspection. Industry:Emergency Response, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Demonstration (7-8), Manipulator:No	Characterization and Inspection	www.inuktun.com		Inuktun Services Ltd., **Address:** 2569 Kenworth Road, Suite C, Nanaimo, British Columbia(CA), Canada, V9T 3M4, **Phone:** 250-729-8080, **Fax:** 250-729-8077, **Email:** inuktun@inuktun.com	Commercial
Vasteras Giraff	The Vasteras Giraff is a mobile communication tool that enables the elderly to communicate with the outside world. It's remote controlled, and it has wheels, a camera and a monitor. Essentially, the Giraff is a robot that provides two-way video calling similar to Skype. A caregiver can control the robot using a typical PC. Industry:Healthcare/Medical, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Characterization and Inspection	www.giraff.org/?lang=en		Giraff Technologies AB, **Address:** Sintervägen 14 721 30 , Västerås, Not Available(Sweden), Sweden, N/A, **Phone:** +46 (0) 21 124 500, **Fax:** N/A, **Email:** info@giraff.org	Commercial
Vault Characterization - 325 Building	325 Building High Level Vault Characterization Mission: Establish the radiological conditions of 3 underground vaults:, - Dose rates, - Removable contamination levels, - Types and distribution of radioisotopes located on the surfaces of the vaults and their tanks Site:Hanford, Industry:Nuclear, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8), Tether:Yes,	Characterization and Inspection	www.pnl.gov		Pacific Northwest National Laboratory (PNNL), **Address:** P.O. Box 999, Richland, Washington, United States, 99352, **Phone:** (509)375-2121, **Fax:** n/a, **Email:** webmaster@pnl.gov	Commercial

VelociRoACH	A tiny legged robot that can scuttle around very fast. The wings are for stability. Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Development (4-6),	Characterization and Inspection	www.berkeley.edu/index.html		University of California, Berkeley, **Address:** University of California Berkeley, Berkeley, California, United States, 94720, **Phone:** (510) 642-6000, **Fax:** N/A, **Email:** N/A	Research
Versatrax 100	The Versatrax 100 is a miniature crawler system capable of inspecting pipe and ducts as small as 4in / 10cm in diameter. Just like the Versatrax 150, this crawler offers an in-line and parallel configuration for different pipe sizes. The Versatrax 100 is extremely portable - the entire system fits into two Pelican cases (including the tether cable and hand reel). Despite its compact size, this system has the power to penetrate up to 600ft / 180m of pipe and overcome obstacles and offset joints. Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:Yes, Waterproof:IP68 - Protected against prolonged effects of immersion under pressure, Payload:Unknown, Reach:Not Applicable, Manipulator:No	Characterization and Inspection	www.inuktun.com		Inuktun Services Ltd., **Address:** 2569 Kenworth Road, Suite C, Nanaimo, British Columbia(CA), Canada, V9T 3M4, **Phone:** 250-729-8080, **Fax:** 250-729-8077, **Email:** inuktun@inuktun.com	Commercial
Versatrax 100 MicroMag	The MicroMag™ mobile robotic inspection vehicle is compact, waterproof and magnetic. It can be rapidly deployed for many applications that exclude most ordinary ROV's. The MicroMag™ visual inspection system has been engineered to deliver vivid color video footage in real-time while travelling almost any direction on ferrous metal surfaces. This unique remotely operated device is steerable on vertical, horizontal and inverted plains even when piloted underwater. Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:Yes, Waterproof:IP68 - Protected against prolonged effects of immersion under pressure, Payload:0-5kg/0lb-10lb, Manipulator:No	Characterization and Inspection	www.inuktun.com		Inuktun Services Ltd., **Address:** 2569 Kenworth Road, Suite C, Nanaimo, British Columbia(CA), Canada, V9T 3M4, **Phone:** 250-729-8080, **Fax:** 250-729-8077, **Email:** inuktun@inuktun.com	Commercial
Versatrax 150	The Versatrax 150 is a modular, long range (1,500ft / 450m) internal pipe inspection system capable of operation within a variety of pipe sizes. The in-line chassis system is designed for operation in pipe with a minimum internal diameter of 6in / 150mm up to 12in / 300mm. In the parallel configuration, the crawler is steerable and can operate in 12in / 300mm and larger pipe. The standard Spectrum 90 camera provides a high quality video image with pan, tilt and zoom capability. Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:Yes, Waterproof:IP68 - Protected against prolonged effects of immersion under pressure, Payload:0-5kg/0lb-10lb, Reach:0mm-600mm/0in-24in, Manipulator:No	Characterization and Inspection	www.inuktun.com		Inuktun Services Ltd., **Address:** 2569 Kenworth Road, Suite C, Nanaimo, British Columbia(CA), Canada, V9T 3M4, **Phone:** 250-729-8080, **Fax:** 250-729-8077, **Email:** inuktun@inuktun.com	Commercial
Versatrax 200	The Versatrax 200™ crawler has been designed specifically for small-diameter remote entry into tunnels, tanks, and bunkers for exploration and inspection. This new addition to the Inuktun crawler line is available with up to 1,500 feet (450 meters) of tether cable and can be deployed from the back of a small van or pickup truck. The unique chassis design allows the system to be lowered into a storage tank or underground structure through a borehole or riser as small as 8 inches (20cm) in diameter. An air hose is included in the umbilical cable to drive pneumatic actuators on the vehicle (air compressor required at control station), allowing it to be remotely reconfigured into a standard crawler arrangement. The operator can then drive the system normally and position the camera as needed to complete the required survey. Industry:Nuclear, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), Tether:Yes, Waterproof:Not Rated or Unknown, Payload:0-5kg/0lb-10lb, Reach:0mm-600mm/0in-24in, Manipulator:No	Characterization and Inspection	www.inuktun.com		Inuktun Services Ltd., **Address:** 2569 Kenworth Road, Suite C, Nanaimo, British Columbia(CA), Canada, V9T 3M4, **Phone:** 250-729-8080, **Fax:** 250-729-8077, **Email:** inuktun@inuktun.com	Commercial

Versatrax 300 VLR	The Versatrax 300 is the solution to long-range pipe inspection challenges. Able to inspect more than two kilometers of pipe in a single run, the VT300 includes 3 onboard video cameras, multiple sensor options, and is operable in pipe as small as 12in /300mm internal diameter. Industry:Nuclear, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), Tether:Yes, Waterproof:IP68 - Protected against prolonged effects of immersion under pressure, Payload:0-5kg/0lb-10lb, Reach:0mm-600mm/0in-24in, Manipulator:No	Characterization and Inspection	www.inuktun.com		Inuktun Services Ltd., **Address:** 2569 Kenworth Road, Suite C, Nanaimo, British Columbia(CA), Canada, V9T 3M4, **Phone:** 250-729-8080, **Fax:** 250-729-8077, **Email:** inuktun@inuktun.com	Commercial
Versatrax 450TTC	Designed specifically for hazardous environments, the Versatrax 450™ TTC is perfectly suited for a wide range of applications where remote handling and inspection are required. With the crawler, tether reel and system controller all integrated into Pelican® cases, the portable Versatrax 450™ TTC can be deployed in a matter of minutes, allowing you to inspect, capture, and safely remove dangerous materials from any site faster than by conventional means. Site:Hanford, Industry:Nuclear, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), TRL2:Demonstration (7-8), Tether:Yes, Payload:5-10kg/10lb-20lb, Reach:0mm-600mm/0in-24in, Manipulator:Yes - standard	Characterization and Inspection	www.inuktun.com		Inuktun Services Ltd., **Address:** 2569 Kenworth Road, Suite C, Nanaimo, British Columbia(CA), Canada, V9T 3M4, **Phone:** 250-729-8080, **Fax:** 250-729-8077, **Email:** inuktun@inuktun.com	Commercial
Video Ray ROV	The VideoRay Pro 4, with updated electronics and software, increased thruster power and improved depth rating, the Pro 4 is a versatile inspection ROV available. A depth rating of 300 meters is standard, and improvements in the electronics allow for greater total tether length (up to 500 meters) and good power transmission over long tethers. New sensors, including a 3D compass and MEMS gyro give improved navigational capabilities. A video camera & high intensity LED lighting allow for very clear video and stills to be recorded. Site:Magnox, Industry:Oil & Gas, Energy, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), TRL2:Demonstration (7-8),	Characterization and Inspection	www.atlantasmarine.com/		Atlantas Marine Ltd, **Address:** Telstar House, Yeovil, Somerset, Not Available(UK), United Kingdom, BA22 8RT, **Phone:** +44 (0)1935 414100, **Fax:** NA, **Email:** info@atlantasmarine.com	Commercial
Vigilus MCP	The Vigilus Mobile Camera Platform is an autonomous multi-sensor mobile platform. Standard equipment includes a digital camera, SONARs, PIR and an 8-band thermal sensor. It is designed for security use in data centers, warehouses, retail and convention centers. Anywhere you would normally have a physical presence. Industry:Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Characterization and Inspection	www.vigilantrobots.com/		Vigilant Robots, **Address:** 209 Kalamath St, Unit 13, Denver, Colorado , United States, 80223, **Phone:** 303 778-7400, **Fax:** not available, **Email:** info@gamma2robotics.com	Commercial
VisionKit	VisionKit is a tool suite for developing real-time computer vision applications. It supports video acquisition, image analysis, and a broad array of other algorithm needs. VisionKit greatly accelerates system prototyping and development, reducing time and cost. Includes full documentation. Use for developing object recognition systems, security & surveillance, navigation, video enhancement and 3D reconstructions. Industry:Defense/Homeland Security, Size:Not Applicable, TRL:Operational (9),, Waterproof:Not Applicable, Payload:Not Applicable, Reach:Not Applicable,	Characterization and Inspection	www.cra.com/index.asp		Charles River Analytics Inc., **Address:** 625 Mt. Auburn St., Cambridge, Massachusetts, United States, 02138, **Phone:** 617-491-3474, **Fax:** 617-868-0780, **Email:** N/A	Commercial

Volant	Volant, a multi-modal vehicle concept, is a design created by ISRC that would enable a single unmanned system to fly, swim, drive, and hop across a variety of terrains and obstacles. The concept may not be too far from reality, and ISRC is interested in teaming arrangements to help move this concept forward. Industry:Defense/Homeland Security, Size:Unknown, TRL:Research (1-3),	Characterization and Inspection	www.sandia.gov/		Sandia National Laboratories, **Address:** 1515 Eubank SE, Albuquerque, New Mexico, United States, 87123, **Phone:** 505-845-0011, **Fax:** N/A, **Email:** N/A	Commercial
VT 29 GA	A universal manipulator for carbon rods used for height positioning of cameras and other devices. Features text insertion of height coordinates via our control unit VT 300-3. Features:, Quiet running,, Low weight,, Secure rod lock with locking status flag,, Upgradeable to meet various mounting requirements, e.g. tripod,, Modular design for maximum flexibility,, Upgradeable with rotary drive and arm., , Industry:Nuclear, Size:Unknown, TRL:Research (1-3),	Characterization and Inspection	www.visatec.net		Visatec GmbH, **Address:** Gewerbepark 7, Sulzberg, Not Available(Sweden), Germany, NA, **Phone:** + 49 (0) 83 76 / 92 15-0, **Fax:** NA, **Email:** info@visatec.net	Commercial
VT 34 FW	Compact, watertight and manoeuvrable rover with magnetic wheels / chain drive. Built-in pan-tilt front camera VT 34 PT and rear camera. Has integrated lighting on both sides of the vehicle and built-in rare earth magnets allow the vehicle to travel vertically, horizontally and upside down on all ferrous metal surfaces. Ideal for pressure vessel inspections, pipe inspections and air ducts., , Industry:Oil & Gas, Energy, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Waterproof:IP68 - Protected against prolonged effects of immersion under pressure,	Characterization and Inspection	www.visatec.net		Visatec GmbH, **Address:** Gewerbepark 7, Sulzberg, Not Available(Sweden), Germany, NA, **Phone:** + 49 (0) 83 76 / 92 15-0, **Fax:** NA, **Email:** info@visatec.net	Commercial
VT 610 ICMCL	A climbing rover VT 610 ICMCL with vacuum force, enabling it to climb any hard surface. It can carry a payload of 50 lb, climbs virtually any vertical or inverted surface, overcomes surface obstacle, making it ideal for any application in dangerous heights or areas exposed to toxins or contamination. Applications: , All inspections tasks, e.g. tanks, nuclear facilities, wind turbine blade inspection;, Coating thickness (dry film thickness gauge);, Wall thickness measuring / corrosion inspections;, Radiological testing and surveys;, Crack and surface flaw detection;, Ultrasonic testing;, Sand and water blasting., , Site:Sellafield, Industry:Renewables, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), TRL2:Development (4-6), Waterproof:IP68 - Protected against prolonged effects of immersion under pressure, Manipulator:No	Characterization and Inspection	www.visatec.net		Visatec GmbH, **Address:** Gewerbepark 7, Sulzberg, Not Available(Sweden), Germany, NA, **Phone:** + 49 (0) 83 76 / 92 15-0, **Fax:** NA, **Email:** info@visatec.net	Commercial
Wallrover A	The WallRover A offers an alternative to scaffolding or cherry-pickers, without the limitations and cost of visual inspection methods, such as hand-held bore/ video/fiberscopes. The open architecture WallRover A gives the user unlimited freedom to customise and adapt the vehicle to their unique application, thanks to the embedded Raspberry Pi and Arduino control system. With a mission endurance of +15 minutes on vertical surfaces and +60 minutes on horizontal surfaces, difficult remote visual inspection tasks, such as crack width measurement, can be carried out whilst the operator is kept at a safe stand-off distance on the ground. Site:Sellafield, Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Development (4-6), TRL2:Development (4-6), Tether:No tether - Endurance Unknown, Waterproof:Not Rated or Unknown, Manipulator:No	Characterization and Inspection	www.wallrover.com/		Wallrover Ltd, **Address:** C/O Smith Engineering Ltd, MaryportCumbria, Not Available(UK), England, CA15 8NF, **Phone:** +44 (0) 1900 819444, **Fax:** NA, **Email:** info@wallrover.com	Commercial

Wallrover A Squared	Articulated variant based on the Wallrover B. Currently in prototype - it is designed to go round corners (e.g. for checking waste boxes, etc)., , Site:Sellafield, Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Development (4-6), TRL2:Development (4-6), Tether:Yes,	Characterization and Inspection	www.wallrover.com/		Wallrover Ltd, **Address:** C/O Smith Engineering Ltd, MaryportCumbria, Not Available(UK), England, CA15 8NF, **Phone:** +44 (0) 1900 819444, **Fax:** NA, **Email:** info@wallrover.com	Commercial
WallRover B	A wall climbing ROV. The WallRover does not rely on a physical seal to a surface to climb, the only contact between a WallRover and the wall are its tracks which enable it to traverse uneven, wetted, dirty surfaces including: brick walls, windows, stainless steel. The tracks confer precision manoeuvrability in restricted spaces so allowing payloads to be accurately positioned. Benefits include:, - Operator kept safely on the ground, out of harms way;, - Fast delivery of 5kg payloads up diverse vertical surfaces;, - Excellent visual inspection thanks to on-board cameras;, - Real-time gamma-spectrometry with on-board Kromek GR1;, - DVR and Multi-Spect software enable post mission analysis;, - Very reliable, no pre-fixed safety line required;, - Easy to operate thanks to game-pad hand controller;, - Rapid deployment, no scaffolding required;, - Long mission endurance. Site:Sellafield, Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Development (4-6), TRL2:Development (4-6),	Characterization and Inspection	www.wallrover.com/		Wallrover Ltd, **Address:** C/O Smith Engineering Ltd, MaryportCumbria, Not Available(UK), England, CA15 8NF, **Phone:** +44 (0) 1900 819444, **Fax:** NA, **Email:** info@wallrover.com	Commercial
WallRover B DrillRover	The Wallrover B platform and control systems were modified to incorporate a hammer action drill and a sampling function. The primary purpose was to prove that concrete and brick could be sampled for variable depth contamination profiling. Site:Sellafield, Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	www.wallrover.com/		Wallrover Ltd, **Address:** C/O Smith Engineering Ltd, MaryportCumbria, Not Available(UK), England, CA15 8NF, **Phone:** +44 (0) 1900 819444, **Fax:** NA, **Email:** info@wallrover.com	Commercial
Wasp Drill	This is a novel drill system taking inspiration from the timber-boring wood wasp. Apollo astronauts wielded rotary drills to penetrate beneath lunar terrain, but the close-packed regolith proved extremely resistant. Similarly future robotic landers will need to drill into planetary surfaces, but the total force available will be small, dictated by limited mass and power as well as low local gravity fields. The team's analysis showed the wood wasp's egg-laying 'ovipositor' to be divided into two elements, one side possessing cutting teeth and the other side equipped with pockets to remove the resulting debris. Applying this lesson in natural engineering, they have so far developed a double-drill bit able to penetrate metres underground using a few watts of power, providing more competitive performance compared to static penetration., , Industry:Space, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Characterization and Inspection	www.surrey.ac.uk/ssc/		Surrey Space Centre, **Address:** University of Surrey, Guildford, Not Available(UK), United Kingdom, GU2 7XH, **Phone:** 01483-683417, **Fax:** NA, **Email:** g.aglietti@surrey.ac.uk	Research
WVP Swabbing Robot	The robot swabs vitrified waste containers to ensure they are free from surface contamination before they are put into store. Site:Sellafield, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Characterization and Inspection	www.ricardo-aea.com/cms/		AEA Technology Engineering Services, **Address:** 329 Harwell IBC, Didcot, Oxon, United Kingdom, OX11 0QJ, **Phone:** 870-190-1900, **Fax:** 44(0)870-190-8109, **Email:** enquiry@aeat.co.uk	Commercial

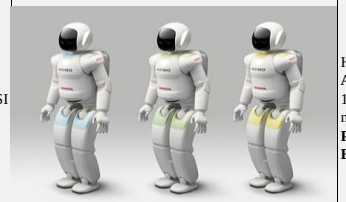
xBot	Phoenix International's xBot III is a specialized third-generation vehicle that builds off the experience gained with its predecessor xBot micro-ROVs. Characterized by its small footprint, high maneuverability, and low cost, this inspection and video documentation ROV was specifically designed and built by Phoenix engineers to penetrate hard-to-access or dangerous areas, such as the interior spaces of sunken shipwrecks. The xBot II series was made famous by James Cameron, who tasked Phoenix to build four xBots for a documentary he produced for Discovery Channel called "The Last Mysteries of Titanic". Industry:Maritime, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9),	Characterization and Inspection	www.phnx-international.com/index.html		Phoenix International Holdings, Inc., **Address:** 9301 Largo Drive West, Largo, Maryland , United States, 20774, **Phone:** +1 (301) 341-7800 , **Fax:** +1 (301) 499-00, **Email:**	Commercial
Z9 Crib Inspection	This is an unlined soil disposal site for liquid waste east of PFP. The mission was to verify the structural integrity of crib. Site:Hanford, Industry:Nuclear, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Characterization and Inspection	www.pnl.gov		Pacific Northwest National Laboratory (PNNL), **Address:** P.O. Box 999, Richland, Washington, United States, 99352, **Phone:** (509)375-2121, **Fax:** n/a, **Email:** webmaster@pnl.gov	Commercial
Atmobot	Autonomous air purifier. Air pollutants vary at different heights. Atmobot analyzes the air in your home and automatically raises and lowers itself to clean more efficiently. Using HACM technology, Atmobot breaks down harmful airborne pollutants such as formaldehyde, ethanol, second hand smoke, TVOC and ammonia. Industry:Consumer, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), Tether:No tether - Endurance more than an hour,	Decontamination	www.ecovacs.com/home.html		Ecovacs Robotics, Inc. , **Address:** 220 Market Ave. S. Suite 1120, Canton, Ohio, United States, 44702, **Phone:** 888-966-0895 , **Fax:** N/A, **Email:** daniel.chen@ecovacs.com	Commercial
Biocleaner 2	A snake robot that swims through water and uses bacteria to clean out toxic metals. The bacteria, Shewanella oneidensis, disintegrates the toxins. The chemical process of absorbing metals also generates electricity to power the robot. The mechanical creature is made of segments that can be strung together to make the robot longer for big jobs. Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Decontamination	www.fotech.edu.tw/NewEnglish/		Fortune Institute of Technology, **Address:** No. 1-10, nongchang Rd., Neighbourhood 28, Lyouciyou Village,, n/a, Not Available(Taiwan), Taiwan, n/a, **Phone:** +886 7 7889888, **Fax:** 886-7-7889777, **Email:** infocenter@center.fotech.edu.tw	Commercial
Braava	Autonomous floor mop. With the cleaning cloth attached, just press the Sweep button for dry mopping or Mop button for damp mopping. When Braava is done cleaning, it returns to where it started and powers down automatically. Industry:Consumer, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:No tether - Endurance more than an hour,	Decontamination	www.irobot.com		iRobot, **Address:** 8 Crosby Drive, Bedford, Massachusetts, United States, 01730, **Phone:** 781-430-3000, **Fax:** 781-430-3001, **Email:** NA	Commercial

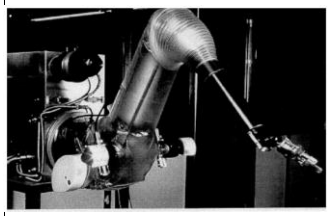
Cecil	CECIL is a steam generator secondary side maintenance system, capable of inspection, sludge removal, and FOSAR operations in previously inaccessible areas deep within the tube bundle. Corrosion products formed throughout the secondary cycle settle on top of the tubesheet and promote degradation of the tube bundle. Also, foreign objects introduced during initial fabrication or maintenance activities impinge on tubes during operation and can eventually wear through tube walls causing primary to secondary leakage. This equipment can access the tube bundle interior, remove sludge without damaging tubes, identify and remove foreign objects, and at the same time reduce personnel exposure to radiation. Site:US Other, Industry:Nuclear, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Decontamination	www.qinetiq-na.com		QinetiQ North America, **Address:** 350 Second Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 781-684-4000, **Fax:** NA, **Email:** TSGInfo@QinetiQ-NA.com	Commercial
Decon Robot	This is essentially a remote controlled vacuum which uses dry ice to blast, evaporate, and remove radioactive materials. The robot is to be deployed at Fukushima Daiichi to decontaminate walls and floors. The robot was originally designed to scrape paint off of airplanes, but this one has been specially equipped with robotic tracks and four cameras which allow operators to monitor the work being performed. Site:Fukushima, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Decontamination	www.toshiba.co.jp/		Toshiba, **Address:** 1-1, Shibaura 1-chome, Minato-ku, Tokyo 105-8001, Tokyo, Not Available(Japan), Japan, not available, **Phone:** 81-3-3457-4511, **Fax:** 81-3-3456-1631, **Email:** not available	Commercial
Deebot	Autonomous vacuum cleaner., , Industry:Consumer, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:No tether - Endurance more than an hour,	Decontamination	www.ecovacs.com/home.html		Ecovacs Robotics, Inc. , **Address:** 220 Market Ave. S. Suite 1120, Canton, Ohio, United States, 44702, **Phone:** 888-966-0895 , **Fax:** N/A, **Email:** daniel.chen@ecovacs.com	Commercial
Directed Spray Mast	Engineers at the Savannah River National Laboratory (SRNL) have developed a remotely-operated tank cleaning device for precise, high-pressure spray for use in limited access areas. The device offers features unavailable in tank cleaning technologies currently on the market, providing for better, faster and cost-effective tank cleaning. The directed spray mast was originally conceived to eliminate the inherent dangers involved with sending workers into storage or process tanks during cleaning operations. The directed spray mast was designed to provide more precise cleaning of problem build-up areas within a tank versus the more global cleaning approach of existing technologies. Site:Savannah River, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Decontamination	srnl.doe.gov/		Savannah River National Laboratory, **Address:** Savannah River National Laboratory, Aiken, South Carolina, United States, 29808, **Phone:** 803-725-6211, **Fax:** N/A, **Email:** rosalind.blocker@srs.gov	Commercial
Foam Squirting Quadrocopter	Inspired by the swiftlet bird, scientists at Imperial College London's Aerial Robotics Lab have created a robotic quadcopter that can extrude polyurethane foam while in flight. By targeting where that foam goes, it can build up simple structures, essentially becoming a flying 3D printer. They could conceivably be used for applications such as performing repairs in areas too remote or dangerous for humans to easily access, such as wind turbines or nuclear reactors. Or potential applying fixative or decontamination gel for decommissioning. Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Development (4-6), Tether:No tether - Endurance Unknown, Manipulator:No	Decontamination	www.imperial.ac.uk/		Imperial College London, **Address:** Imperial College, South Kensington Campus, N/A, London, United Kingdom, SW7 2AZ, **Phone:** +44 (0)20 7589 5111 , **Fax:** N/A, **Email:** N/A	Commercial

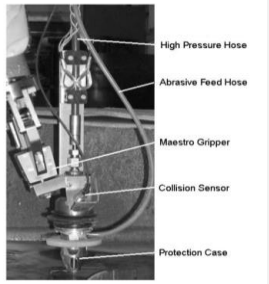
Husqvarna DXR-series demolition robots	Range of remote-operated backhoe-style tracked vehicles with a variety of attachments for demolition and similar heavy-duty applications., , Site:Fukushima, Industry:Construction, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Decontamination	www.husqvarna.com		Husqvarna AB , **Address:** Box 7454, Regeringsgatan , Alabama , Sweden, 28, **Phone:** +46 (0)8 738 90 00, **Fax:** NA, **Email:** NA	Commercial
Hydrobot	Intellibot auto-scrubbers and vacuum allows the operator to quickly switch between manual cleaning and Hands-Free Cleaning. At the push of a button the operator can walk away to clean in other areas while the floor is cleaned. The Operating System uses a touchscreen and requires no programming. It incorporates up to 19 sensors, giving the robot a 360-degree view of its surroundings, and allowing it to operate and clean on its own. Sensors detect obstacles as well as people -- stopping to let them pass before proceeding -- and stairs, to prevent unwanted spills., , Industry:Retail, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9),	Decontamination	www.intellibotrobotics.com/		Intellibot Robotics, **Address:** 5410 SW Macadam Ave, Ste 100, Portland, Oregon, United States, 97239, **Phone:** 503-433-1960, **Fax:** not applicable, **Email:** groe@intellibotrobotics.com	Commercial
Particle Clean Up ROV	ROV designed to detect and collect radioactive particles from the sea. Site:Dounreay, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Decontamination	www.landandmarine.com		Land & Marine Project Engineering Ltd, **Address:** Dock Road North, Wirral, Not Available(UK), United Kingdom, CH62 4LN, **Phone:** + 44 (0)151 641 5600, **Fax:** + 44 (0)151 644, **Email:** mojportal@murphygroup.co.uk	Commercial
Robo Crawler Dumper	The unmanned Robo Crawler Dumber was used in highly contaminated areas at Fukushima for spraying the soil with an anti-scattering agent to prevent the spread of radioactivity. Site:Fukushima, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Decontamination			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Roomba	Autonomous vacuum cleaner. Industry:Consumer, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:No tether - Endurance more than an hour,	Decontamination	www.irobot.com		iRobot, **Address:** 8 Crosby Drive, Bedford, Massachusetts, United States, 01730, **Phone:** 781-430-3000, **Fax:** 781-430-3001, **Email:** NA	Commercial

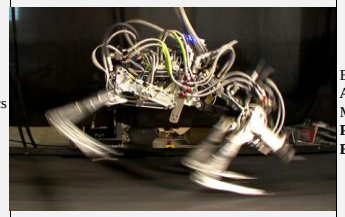
Scooba	Autonomous floor scrubber. Scooba uses a 4 stage cleaning process to wash your floors. As Scooba navigates its way around a room, it preps, washes, scrubs and sucks up the dirty water, covering each part of the floor an average of 5 times to ensure a thorough clean. Industry:Consumer, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:No tether - Endurance more than an hour,	Decontamination	www.irobot.com		iRobot, **Address:** 8 Crosby Drive, Bedford, Massachusetts, United States, 01730, **Phone:** 781-430-3000, **Fax:** 781-430-3001, **Email:** NA	Commercial
SeaSwarm	By autonomously navigating the water's surface, Seaswarm proposes a new system for ocean-skimming and oil removal. Seaswarm uses a photovoltaic powered conveyor belt made of a thin nanowire mesh to propel itself and collect oil. The nanomaterial, patented at MIT, can absorb up to 20 times its weight in oil. The flexible conveyor belt softly rolls over the ocean's surface, absorbing oil while deflecting water because of its hydrophobic properties. Industry:Oil & Gas, Energy, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Decontamination	web.mit.edu/		Massachusetts Institute of Technology (MIT), **Address:** 77 Massachusetts Avenue, Cambridge, Massachusetts, United States, 02139, **Phone:** 617-253-2700, **Fax:** not applicable, **Email:** tele-info@mit.edu	Commercial
Solar Brush	Solar Brush is a robotic cleaning system for solar power plants. Cleaning of solar panels is important as they lose efficiency due to deposits, such as sand and dust. Huge layers of sand on the panels lower the output in many regions, according to studies about 30% of energy is lost in a single month in arid regions. The same problem applies to mirrors used in solar towers CSP technology. The Solar Brush robot walks on solar panels with a high inclination of up to 35 degrees. The robot is light weight and wireless as it carries a rechargeable and replaceable battery. Either one or more robots can be placed on separate arrays to clean the solar panels as they have the capability to move from one panel to another. Industry:Renewables, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:No tether - Endurance more than an hour,	Decontamination	www.solarbrush.de/		SOLARBRUSH, **Address:** Aerial Power Limited 20 Broadwick Street, London, Not Available(UK), United Kingdom, not available, **Phone:** not available, **Fax:** not available, **Email:** contact@solarbrush.co	Commercial
Solids Collection Filter (SCF)	The Solids Collection Filter (SCF), from Diversified Technologies, can be used to support suppression pool/torus diving and desludging activities. A robotic crawler can also be combined with the SCF for desludging equipment pits and sumps. A high-pressure spray on the underside of the crawler removes stubborn film from metal surfaces, and dislodges debris from crevices and drains. Site:US Other, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Decontamination	www.dts9000.com		Diversified Technologies Services, Inc., **Address:** 2680 Westcott Boulevard, Knoxville, Tennessee , United States, 37931, **Phone:** (865) 539-9000, **Fax:** (865) 539- 9001, **Email:** info@dts9000.com	Commercial
Weda Electric Floor Crawler	The cleaner was deployed into the Centre Bay in readiness for underwater cleaning below the scum line prior to drain down. Cleaning the scum line using this method resulted in a significant reduction in contamination levels. Also used in FHP (B311, Pond 5) more than 10 years ago, and Thorp around the same time. , Site:Sellafield, Industry:Consumer, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), TRL2:Operational (9),	Decontamination	www.weda.se		Weda, **Address:** Wedavagen 4A, Sodertalje, Not Available, Sweden, NA, **Phone:** +46 (0)8-550 325 50, **Fax:** N/A, **Email:** info@weda.se	Commercial

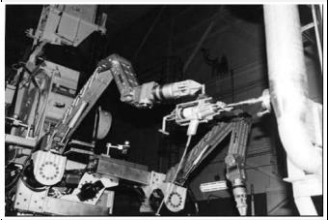
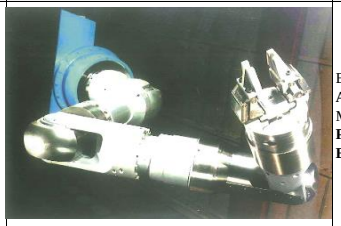
Winbot	Winbot is an autonomous window cleaner. It has a bottle of cleaning solution to dampen the front cleaning pad, a built-in squeegee for wiping, and a second cleaning pad for drying. Industry:Consumer, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Operational (9), Tether:No tether - Endurance Unknown,	Decontamination	www.ecovacs.com/home.html		Ecovacs Robotics, Inc. , **Address:** 220 Market Ave. S. Suite 1120, Canton, Ohio, United States, 44702, **Phone:** 888-966-0895 , **Fax:** N/A, **Email:** daniel.chen@ecovacs.com	Commercial
Brokk 60	Range of remote-operated backhoe-style tracked vehicles with a variety of attachments for demolition and similar heavy-duty applications. Probably the most common robots in use in the UK nuclear industry. They have been used at most Sites across the Estate. Also widely used in the US., , Site:US Other, Industry:Construction, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Demolition	www.brokk.com		Holmhed Systems AB, **Address:** 144 Village Way, Monroe, Washington, United States, 98272, **Phone:** 360-794-1277, **Fax:** 425-487-2963, **Email:**	Commercial
ERO Demolition Robot	Concept design for robot intended to strip concrete from rebar using a waterjet deployed on an articulated arm. The robots will use omnidirectional cyclindircal tracks and operate semiautonomously. Industry:Construction, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), Manipulator:No	Demolition	www.dh.umu.se/		Umeå Institute of Design, **Address:** Umeå University, Umeå, Not Available(Sweden), Sweden, SE-901 87, **Phone:** +46 (0) 90 786 69 96, **Fax:** NA, **Email:**	Research
Cobra s350	The Adept Cobra s350 SCARA robot (4-axis robot) is a high-performance SCARA robot system for mechanical assembly, material handling, packaging, machine tending, screw driving, and other applications that require fast and precise automation. Adept Cobra s-Series robots include the Adept SmartController motion controller. Industry:Industrial Automation, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9),, Payload:0-5kg/0lb-10lb, Reach:0mm-600mm/0in-24in,	Dismantling and Retrieval	www.adept.com		Adept Technology, Inc., **Address:** 5960 Inglewood Drive , Pleasanton, California, United States, 94588, **Phone:** 925-245-3400, **Fax:** 925-960-0590, **Email:**	Commercial
A.F.A Exoskeleton Suit	The A.F.A exoskeleton suit aims to increases firefighters' performance in walking, running and carrying while high-rise fire fighting. It boosts firefighter's strength and allow them to easily climb high buildings. The suit can carry loads up to 91kg and is strapped over the firefighters' clothing. The device transfers its weight and any carried loads load directly to the ground, so firefighters don't bear the weight. The weight of exo-suit is about 23kg, and it measures 1.6meter. Industry:Emergency Response, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6), Tether:No tether - Endurance more than an hour,	Dismantling and Retrieval	www.monash.edu/		Monash University, **Address:** 900 Dandenong Road Caulfield East, Melbourne, Not Available(Australia), Australia, 3145, **Phone:** 61 3 9903 1517, **Fax:** 61 3 9903 1521, **Email:** mada@monash.edu	Research

A1000 System	The Walischmiller Engineering A1000 system is a power manipulator. It has a comfortable remote operation, efficient movements, it is radiation resistance and is designes as a self contained unit with electrical drives. Site:Other, Industry:Engineering, Size:Unknown, TRL:Operational (9), TRL2:Demonstration (7-8),	Dismantling and Retrieval	www.hwm.com		Walischmiller Engineering GmbH, **Address:** Schiessstattweg 16, Markdorf, Baden-Württemberg, Germany, 88677, **Phone:** (49) 7544 9514 0, **Fax:** NA, **Email:** info@hwm.com	Commercial
Adapted Mini-Digger	An adapted mini-digger used in R1 ponds. Bradwell, Chapelcross, Hinkley Point, Hunterston A. Modification of a mini-digger to replace the electrical drive systems with water powered hydraulics, thus enabling underwater operations for such tasks as bulk sludge recovery., , Site:Magnox, Industry:Construction, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.magnoxsites.co.uk/		Magnox Ltd, **Address:** Berkeley Site, Berkeley, Gloucestershire, Not Available(UK), United Kingdom, GL13 9PA, **Phone:** 01453 814000, **Fax:** N/A, **Email:**	Commercial
AGV Standard	Standard Automated Guided Vehicles (AGV) transport pallets. With flexible navigation options and custom-configurable software, these AGVs are efficient in highly complex logistics systems and simple A-to-B scenarios. Industry:Logistics, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Dismantling and Retrieval	www.swisslog.com		Swisslog Holding AG, **Address:** Webereiweg 3 5033, Buchs, Not Available(Switzerland), Switzerland, N/A, **Phone:** +41 62 837 9537, **Fax:** +41 62 837 9510, **Email:** info@swisslog.com	Commercial
Artisan 100	The ARTISAN manipulator system was developed specifically for the nuclear industry as a heavy duty hydraulic manipulator and is ideally suited to the typically arduous decommissioning and size-reduction tasks encountered within the nuclear industry. It is regularly used to assist in such decommissioning tasks as volume reduction, waste retrieval operations and general nuclear processing. Site:Other, Industry:Nuclear, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.nuvisioneng.com		NuVision Engineering, **Address:** 2403 Sidney Street Suite 700, Pittsburgh, Pennsylvania, United States, 15203, **Phone:** 412-586-1810, **Fax:** 412-586-1811, **Email:** info@nuvisioneng.com	Commercial
Asimo	Asimo is Honda's human-type robot. Some of Asimo's technology was used to develop a robotic arm in just six months with the intention of helping at Fukushima. The mechanical arm is designed to open and close valves Site:Fukushima, Industry:Consumer, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6), TRL2:Development (4-6),	Dismantling and Retrieval	world.honda.com/ASIMO/		Honda, **Address:** 2-1-1 Minamiaoyama, Minato, Tokyo 107-0062, Tokyo, Not Available(Japan), Japan, not available, **Phone:** 81-3-3423-4118, **Fax:** not available, **Email:** not available	Commercial

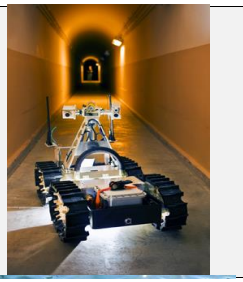
AT1 Pilot Facility ATENA Remote Dismantling Machine	The AT-1 (Atelier de Traitement) pilot facility, situated near Cherbourg on the AREVA NC La Hague site, was built to reprocess fuels from fast breeder reactors. The plant operated for 10 years, from 1969 to 1979. Final closure in 1979 was followed by a 12 month campaign of plant wash out and an 18 month period of systematic decontamination of the circuits. The ATENA machine comprised an 11-metre remote controlled telescopic multi-jointed arm, which could retract into a very thick steel hood. The hood worked both as containment and as biological protection for the operators. The tip of the telescopic arm could be equipped with a cutting tool or with an MA 23 M or RD 500 type remote manipulator. On completion of the project, the ATENA machine was disposed of as waste., , Site:France, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Atlas	Schilling Robotics' ATLAS™ manipulator is a seven function grabber. It provides a high degree of dexterity and strength for a wide variety of work-class ROV applications and is specifically suited to work with today's highest-performing ROVs under the most demanding conditions. It is lightweight and easy to control. With substantial lift capacity, it gives operators the freedom and strength to perform a wider range of heavy-duty jobs in harsh subsea environments. Rate Control with Six Degrees of Freedom,Durable and Reliable in Harsh Subsea Environments,Effective Positioning While Performing Common Grasping Operations on Trees, Tools, Etc.,Extraordinary Lift-to-Weight Ratio,Long Reach Combined with High Dexterity Provides a Large Operating Envelope,Component Commonality with the RigMaster Reduces System Spares and Cost,Depth Rating from 6,500msw Industry:Engineering, Size:Unknown, TRL:Operational (9), Waterproof:IP68 - Protected against prolonged effects of immersion under pressure,	Dismantling and Retrieval	www.fmctechnologies.com/		Schilling Robotics, LLC, **Address:** 260 Cousteau Place , Davis, California, United States, 95618, **Phone:** 530 -753-6718, **Fax:** NA, **Email:** schilling.cs@fmcti.com	Commercial
Avian-Inspired Grasping For Quadrotor Micro Aerial Vehicles	Taking a cue from how eagles work, the researchers believe that diving drones can make for drones that weigh less and use less power, using acceleration velocity gained from diving to quickly regain altitude. It may even be possible to build drones that perch. The drone is lightweight: the quadrotor and the gripper-claw combined weigh less than a pound and a half. The drones could be used in rescue operations where speed and time are critical, and in operations requiring [an unmanned aerial vehicle] to quickly swoop down and pick up an object of interest. Industry:Research, Size:Unknown, TRL:Research (1-3),	Dismantling and Retrieval	www.grasp.upenn.edu/		University of Pennsylvania, **Address:** GRASP Laboratory, University of Pennsylvania, Levine Hall 4th floor 3451 Walnut St, Philadelphia, Pennsylvania, United States, 19104, **Phone:** 215-898-5814, **Fax:** not available, **Email:** not available	Research
B29 - Pile Fuel Storage Pond Sludge Retrieval Hood	Designed and built to suck up radioactive sludge from the pond floor. Radiation levels mean that the Sludge Retrieval Hood has to be deployed and operated remotely at the bottom of the six-metre deep pond, where it sucks up some 25 cubic metres of material per hour. The sludge is then transferred into the Sludge Corral, where it will be stored pending treatment through the Local Sludge Treatment Plant, currently undergoing inactive commissioning. The project is also cleaning sludge from open-topped metal skips stored in the pond. There were around 180 skips and 24 have now been emptied, cleaned and exported to create space., , Site:Sellafield, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Dismantling and Retrieval	www.babcocktarget.com/		Babcock International Group Plc, **Address:** 33 Wigmore Street, Babcock, London, United Kingdom, W1U 1QX, **Phone:** +44 (0)20 7355 5300, **Fax:** NA, **Email:** N/A	Commercial
Baxter	A collaborative humanoid robot capable of safe working next to humans. Teach-and-repeat functionality through direct manipulation. Industry:Industrial Automation, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Dismantling and Retrieval	www.rethinkrobotics.com		Rethink Robotics, **Address:** 27 Wormwood Street, Boston, Massachusetts, United States, 02210, **Phone:** 617-500-2487, **Fax:** NA, **Email:** support@rethinkrobotics.com	Commercial

Belgian Reactor 3 (BR3) Dismantling System	Two main mechanical cutting techniques were selected: the circular saw and the band saw in association with a turntable. The goal was to cut the highly active internals into segments compatible with the final disposal waste package (400 l waste drum). All cutting operations were carried out underwater in the refuelling pool. The decommissioning project for the BR3 pressurized water reactor was also important as a test bench for different dismantling tools and decontamination techniques. After the dismantling of the reactor pressure vessel and its internals, using different mechanical and thermal cutting tools, a new tool, water jet cutting, was used for the dismantling of some large contaminated components inside the reactor building. The equipment was supplied by the consortium CYBERNETIX – AQUARESE., , Site:Other, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.cybernetix.fr		Cybernetix, **Address:** 306 Albert Einstein Street, Marseille, Not Available(France), France, 13013 , **Phone:** +33 4 91 21 77 00, **Fax:** Na, **Email:** NA	Commercial
Big Dog	BigDog is a rough-terrain robot that walks, runs, climbs and carries heavy loads. BigDog is powered by an engine that drives a hydraulic actuation system. BigDog has four legs that are articulated like an animal's, with compliant elements to absorb shock and recycle energy from one step to the next. BigDog is the size of a large dog or small mule; about 3 feet long, 2.5 feet tall and weighs 240 lbs. Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), Payload:100-250kg/200lb-500lb,	Dismantling and Retrieval	www.bostondynamics.com		Boston Dynamics, **Address:** 78 Fourth Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 617-868-5600, **Fax:** 617-868-5907, **Email:** info@BostonDynamics.com	Commercial
Bi-handed Cyton Gamma 1500	With seven degrees of freedom, Robai's Cyton robot arms work like the human arm. Roboticists call robots with more than six axes 'kinematically redundant'. The extra degrees of freedom give fluid motion, better accuracy, and the ability to reach around obstacles. Industry:Industrial Automation, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9),	Dismantling and Retrieval	robai.com/		Robai, **Address:** One Mifflin Place , Cambridge, Massachusetts, United States, 02138, **Phone:** 617.500.2096, **Fax:** N/A, **Email:** N/A	Commercial
Box Opening Gantry Robot (BOGR)	The Box Opening Gantry Robot (BOGR) is a robotic sawing system used to open sealed metal and fibreglass boxes used to contain buried waste at the INL site. In is in a dedicated hot cell on AMWTP., Site:Idaho, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.par.com		PaR Systems, Inc., **Address:** 707 County Road E, West, Shoreview, Minnesota , United States, 55126- 7007, **Phone:** 651-484-7261, **Fax:** 651-483-2689, **Email:** info@par.com	Commercial
Bridge-Transported Dual-Arm Servo-Manipulator (BDSM)	The Bridge-Transported Dual-Arm Servo-Manipulator (BDSM) system has been developed for remote operation and maintenance of the process equipment in the PyRoprocess Integrated inactive DEmonstration facility (PRIDE), which is under construction at the Korea Atomic Energy Research Institute (KAERI). Operations and maintenance of the process equipment must be remotely performed through remote handling equipment such as a mechanical master-slave manipulator (MSM), blister hoist, overhead bridge crane, and BDSM, which are installed in PRIDE. The BDSM is composed of 8 individual modules sized for handling by other remote handling equipment such as the MSM, blister hoist, and overhead bridge crane. A modular design was accomplished by the use of an interface mechanism. Site:Other, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Dismantling and Retrieval	www.kaeri.re.kr/english		Korea Atomic Energy Research Institute (KAERI), **Address:** 111, Daedeok-Daero 989-BEON-GIL, DAEJEON, Not Available(South Korea), South Korea, NA, **Phone:** +82-42-868-2000, **Fax:** +82-42-868-8465, **Email:** webmaster_eng@kaeri.re.kr	Commercial

Caesium Extraction Plant Decommissioning Module	The module is a 900 tonne box mounted on rails to allow entry into 4 areas within B212. The module housed the decommissioning machine (DCM), associated tooling, cask and waste handling equipment and sub change areas. The majority of the decommissioning work was undertaken by a bespoke tool deployment arm. The TDS is capable of a payload of over 250kg and can deliver 200 bar hydraulic supply, 110 volt AC, and several 24 volt DC signals to smaller tooling at the front end. The smaller tooling is connected via an arterial connection system design which can be remotely latched for in-cell tool changes. Site:Sellafield, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.fmctechnologies.com/		Schilling Robotics, LLC, **Address:** 260 Cousteau Place , Davis, California, United States, 95618, **Phone:** 530 -753-6718, **Fax:** NA, **Email:** schilling.cs@fmcti.com	Commercial
Care-O-Bot	Care-O-Bot is a mobile robot assistant to actively support humans in domestic environments. Industry:Other, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Dismantling and Retrieval	www.fkie.fraunhofer.de/en.html		Fraunhofer Institute for Communication, **Address:** Fraunhofer Institute for Communication, , Wachtberg, Not Available(Germany), Germany, 53343, **Phone:** +49 (0)228 9435-217, **Fax:** N/A, **Email:** N/A	Commercial
CHARLI robot (Areva)	CHARLI is a small remote-operated vehicle (ROV) that is equipped with a robotic arm fitted with a laser cutting head and multiple vision cameras. It has been specially designed to move around inside confined pipework structures and to withstand very harsh environments with high levels of radiation and temperatures, as well as the presence of sodium, aerosols, and argon. Industry:Industrial Automation, Size: *, TRL:Research (1-3),	Dismantling and Retrieval	us.areva.com		AREVA , **Address:** 7207 IBM Drive, Charlotte, North Carolina, United States, 28262, **Phone:** 704-805-2000, **Fax:** not available, **Email:**	Commercial
Cheetah	The Cheetah robot is the fastest legged robot in the world, surpassing 29 mph, a new land speed record for legged robots. The previous record was 13.1 mph, set in 1989 at MIT. The Cheetah robot has an articulated back that flexes back and forth on each step, increasing its stride and running speed, much like the animal does. The current version of the Cheetah robot runs on a high-speed treadmill in the laboratory where it is powered by an off-board hydraulic pump and uses a boom-like device to keep it running in the center of the treadmill. Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), Tether:Yes,	Dismantling and Retrieval	www.bostondynamics.com		Boston Dynamics, **Address:** 78 Fourth Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 617-868-5600, **Fax:** 617-868-5907, **Email:** info@BostondDynamics.com	Commercial
Chernobyl Main Cranes System	The main cranes system (MCS) integrates overhead bridge cranes, trolleys, and a remote control and video monitoring system for operating the cranes system in a radioactive area. The MCS will be erected and operated inside the New Safe Confinement (NSC) currently being constructed over the wrecked unit 4 of the Chernobyl nuclear power plant in Ukraine. It is allow for the dismantling and cleanup of the site in a controlled environment., Site:Other, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Dismantling and Retrieval	www.par.com		PaR Systems, Inc., **Address:** 707 County Road E, West, Shoreview, Minnesota , United States, 55126- 7007, **Phone:** 651-484-7261, **Fax:** 651-483-2689, **Email:** info@par.com	Commercial

Chicago Pile 5 DAWP	Bespoke design. Uses Schilling manipulators. The DAWP system was used to perform mechanical dismantlement of the radioactive reactor and bio-shield structures. The DAWP manipulated standard, commercially available tools (i.e., circular saws, jackhammers, etc.) using two Schilling Titan III hydraulic, teleoperated manipulator arms controlled from a remote location into the reactor assembly using the facility's polar crane. The DAWP consists of a platform base, two Schilling Titan III six degrees of freedom (DOF) hydraulically driven manipulators, a remote viewing system, a lighting system, a tool control system, and a tether that supplies the hydraulics, power, and control signals to drive the DAWP functions., , Site:US Other, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.fmctechnologies.com/		Schilling Robotics, LLC, **Address:** 260 Cousteau Place , Davis, California, United States, 95618, **Phone:** 530 -753-6718, **Fax:** NA, **Email:** schilling.cs@fmcti.com	Commercial
Commander Manipulator	Hydraulic manipulator designed for use in the Sellafield ILW plants. Industry:Nuclear, Size:Unknown, TRL:Operational (9),	Dismantling and Retrieval	www.bnfl.com		British Nuclear Fuels Ltd. (BNFL instruments), **Address:** 278 DP Road, Los Alamos, New Mexico, United States, 87544, **Phone:** 505-662-4192, **Fax:** 505-662-2286, **Email:** BII@bnfl-instruments.com	Commercial
Compact Sodium-Cooled Nuclear Reactor Facility (KNK2) Remote Dismantling System	The KNK (Kompakte Natriumgekühlte Kernreaktoranlage) plant was to be decommissioned completely in ten steps (i.e., under the corresponding ten decommissioning permits) to reach green field condition at the end of 2018. To date, nine decommissioning permits have been issued. The decommissioning and demolition activities of steps 1 to 8 have been completed. Under the 9th decommissioning permit, removal of the reactor vessel with its internals was completed in April 2008., , Site:Other, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Conan	The CONAN™ manipulator's strength and low cost have made it the manipulator of choice for medium and heavy work-class ROVs. The CONAN™ is a great choice where strength and capacity are of primary importance. Rugged design with six degrees of freedom. Sophisticated dexterity. Intermediate operating envelope. Component commonality minimizes spare part requirements. Fully self-contained arm for easy mounting to the ROV. Depth rating of 3,000msw., , Industry:Engineering, Size:Unknown, TRL:Operational (9), Waterproof:IP68 - Protected against prolonged effects of immersion under pressure,	Dismantling and Retrieval	www.fmctechnologies.com/		Schilling Robotics, LLC, **Address:** 260 Cousteau Place , Davis, California, United States, 95618, **Phone:** 530 -753-6718, **Fax:** NA, **Email:** schilling.cs@fmcti.com	Commercial
Condor	The Condor is an heavy-arm assistant, sealed, in stainless steel. Its self-balancing system patented gives excellent stability.It is usable in any cell equipped with a lifting unit and an electrical installation. It is a manipulator intended for heavy manipulation of any kind of parts, metallic or not, radiating and/or contaminated. The Condor may handle loads of up to 100kg and tools, with self-balancing of the assembly, regardless of the telescopic arm. But what makes the manipulator arm Condor new generation is its modular nature. The modules are designed for easy easy disassemblies and re-assemblies with a single tool. These interventions are feasible using a single master-slave manipulator., , Site:Magnox, Industry:Nuclear, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.en.s-i-t.com/		Societe d'Innovations Techniques, **Address:** 11 r André Boulle , Châtellerault , Not Available(France), France, 86 108, **Phone:** +33-05-49-20-00-19, **Fax:** NA, **Email:** NA	Commercial

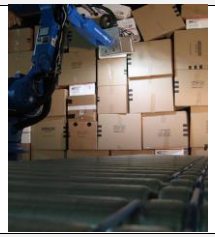
da Vinci	The da Vinci Surgical System enables surgeons to perform delicate and complex operations through a few tiny incisions with increased vision, precision, dexterity and control. The da Vinci Surgical System consists of several key components, including: an ergonomically designed console where the surgeon sits while operating, a patient-side cart where the patient lays during surgery, four interactive robotic arms, a high-definition 3D vision system, and proprietary EndoWrist instruments. da Vinci is powered by state-of-the-art robotic technology that allows the surgeon's hand movements to be scaled, filtered and translated into precise movements of the EndoWrist instruments working inside the patient's body., , Industry:Healthcare/Medical, Size:Not Applicable, TRL:Operational (9),	Dismantling and Retrieval	www.intuitivesurgical.com/		Intuitive Surgical, Inc, **Address:** 1266 Kifer Road, Building 101, Sunnyvale, California, United States, 94086, **Phone:** 408-523-2100, **Fax:** 408-523-1390, **Email:** not available	Commercial
Directional Drilling	Directional drilling has been an integral part of the oil and gas industry since the 1920s. While the technology has improved over the years, the concept of directional drilling remains the same: drilling wells at multiple angles, not just vertically, to better reach and produce oil and gas reserves. Additionally, directional drilling allows for multiple wells from the same vertical well bore, minimizing the wells' environmental impact. Industry:Oil & Gas, Energy, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9), Tether:Yes,	Dismantling and Retrieval	www.allenwatson.com/index.html		Allen Watson Limited, **Address:** Rowhook Manor Estate, Bognor Rd, Horsham, Not Available(UK), United Kingdom, N/A, **Phone:** 01403 790772, **Fax:** 01403 790779, **Email:** enquiries@allenwatson.com	Commercial
Dounreay Shaft Crane	A robotic crane and grabber, which will be lowered inside to collect waste to cope with a challenging environment. Site:Dounreay, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6), TRL2:Development (4-6),	Dismantling and Retrieval	www.scxspecialprojects.co.uk		SCX Special Projects Ltd, **Address:** Roman Ridge Road, Sheffield, Not Available(UK), United Kingdom, S9 1GA, **Phone:** 0114 243 1142, **Fax:** N/A, **Email:** info@scx.co.uk	Commercial
Dual Arm Servo Manipulators	Force-reflecting "servomanipulators" mounted on robotic overhead bridges, combined with a multi-camera viewing system, dexterous handling operations are no longer confined to window work stations., Site:Oak Ridge, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.par.com		PaR Systems, Inc., **Address:** 707 County Road E, West, Shoreview, Minnesota , United States, 55126- 7007, **Phone:** 651-484-7261, **Fax:** 651-483-2689, **Email:** info@par.com	Commercial
Fanuc i Series	The FANUC Robot i series is a series of intelligent robots with the sophisticated advanced controller R-30iB with intelligence and networking for versatile applications. Industry:Industrial Automation, Size:Unknown, TRL:Operational (9),	Dismantling and Retrieval	www.fanuc.co.jp/		FANUC Corporation, **Address:** Oshino-mura, Yamanashi Prefecture, Not Available(Japan), Japan, 401-0597, **Phone:** +81-555-84-5555, **Fax:** +81-555-84-5512, **Email:** NA	Commercial

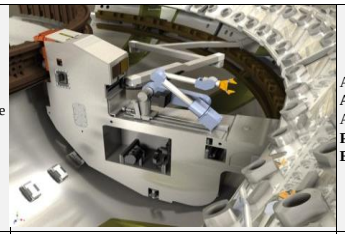
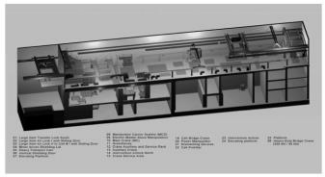
FarmBot	This is a machine that can “thin” a field of lettuce in the time it takes about 20 workers to do the job by hand. The thinner is part of a new generation of machines that target the last frontier of agricultural mechanization – fruits and vegetables destined for the fresh market, not processing, which have thus far resisted mechanization because they’re sensitive to bruising. Researchers are now designing robots for these most delicate crops by integrating advanced sensors, powerful computing, electronics, computer vision, robotic hardware and algorithms, as well as networking and high precision GPS localization technologies. Industry:Agriculture, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Dismantling and Retrieval	www.bluerivert.com/		Blue River Technology, **Address:** 575 N. Pastoria Ave, Sunnyvale, California, United States, 94085, **Phone:** 1 -408-733-2583, **Fax:** 1-888-618-9105, **Email:** info@bluerivert.com	Commercial
Fold Track	The only way in or out of most of the tanks is through foot-wide pipes in their roofs, so engineers at Hanford use this robotic dozer, which opens into a string of pieces that fit through the inlets. Once inside, Foldtrack reassembles a toy Transformer. The robot uses a 3000 psi water stream to blast at sludge from up to 20 ft. away. A remote driver directs the robot as it uses a dozer blade to push the waste toward a pump for transfer to safer, double-shelled tanks. Once its job is done, the $500,000 robot is sealed, forever, in the empty tank, , Site:Hanford, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Dismantling and Retrieval	www.ch2m.com/corporate/		CH2M HILL, **Address:** 9191 S. Jamacia St., Englewood, Colorado , United States, 80112, **Phone:** 720-286-2016, **Fax:** 720-286-9002, **Email:** doren@ch2m.com	Commercial
Frankie	Frankie is a commercially available robot, was modified by SRR and moves across the tank floor on treads that closely resemble the treads on a military tank. Frankie’s primary function is to scoop thin layers of residual material left behind from prior heel removal and cleaning processes. Frankie replaces a custom-built vial that was scraped along the tank floor; Frankie does a better job and with less risk to workers. Site:Savannah River, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Dismantling and Retrieval	srnl.doe.gov/		Savannah River National Laboratory, **Address:** Savannah River National Laboratory, Aiken, South Carolina, United States, 29808, **Phone:** 803-725-6211, **Fax:** N/A, **Email:** rosalind.blocker@srs.gov	Commercial
Fukushima Inspection Manipulator	Long reach manipulator system to inspect the Primary Containment Vessel of Unit 2 at the Fukushima Daiichi Nuclear Power. The device consists of a telescoping carbon-fiber arm to reach down about 12 feet inside the contaminated area. The jointed arm has a manipulator at the end to move the crawler into position, where it can look for damage. The arm extends from and retracts back into a container about the size of refrigerator and must be made to withstand the rigors of the radioactive environment. The arm is equipped with radiation-shielded cameras and capable of lifting 100 pounds. It can also carry cutting tools -- either a set of heavy-duty shears or a high-pressure water jet that can cut steel., , Site:Fukushima, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9), Payload:20-50kg/40-100lb, Reach:>2400mm/96in,	Dismantling and Retrieval	www.kurion.com		Kurion, Inc., **Address:** 2040 Main Street, Irvine, California, United States, 92614-8257, **Phone:** (949) 398-6350, **Fax:** (949) 682- 7028, **Email:** jraymont@kurion.com	Commercial
Gemini-Scout	The Gemini-Scout is a mine-rescue robot that would eliminate some of the unknowns of mine rescue operations and arm first responders with the most valuable tool: information. The Gemini-Scout Mine Rescue Robot was designed to enter hazardous areas and provide relief to trapped miners. It’s able to navigate through 18 inches of water, crawl over boulders and rubble piles, and move in ahead of rescuers to evaluate precarious environments and help plan operations. This robotic scout can haul food, air packs and medicine to those trapped underground. It is equipped with two-way radios and can be configured to drag survivors to safety. The Gemini-Scout can operate in explosive atmospheres and can also operate submerged., , Industry:Mining, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Development (4-6),	Dismantling and Retrieval	www.sandia.gov/		Sandia National Laboratories, **Address:** 1515 Eubank SE, Albuquerque, New Mexico, United States, 87123, **Phone:** 505-845-0011, **Fax:** N/A, **Email:** N/A	Commercial

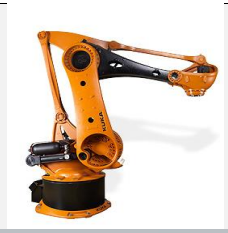
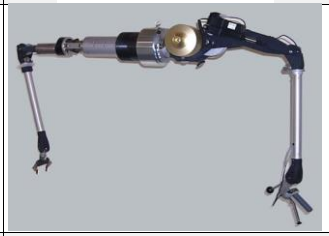
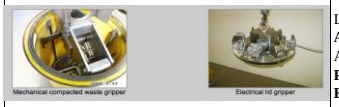
Girona 500 AUV	The GIRONA 500 is a compact and lightweight AUV with hoovering capabilities which can fulfill the particular needs of any application by means of specific payloads and a reconfigurable propulsion system. Industry:Research, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6), Tether:No tether - Endurance Unknown, Waterproof:IP68 - Protected against prolonged effects of immersion under pressure, Payload:Unknown, Reach:Not Applicable, Manipulator:No	Dismantling and Retrieval	vicorob.udg.edu/		Vicorob, **Address:** Campus Montilivi, Edifici P4 17071 Girona, Girona, Not Available(Spain), Spain, not available, **Phone:** 34 972-41-89-05, **Fax:** not available, **Email:** vicorob@eia.udg.edu	Commercial
GMM-1400	Top-mounted heavy-duty manipulator designed for tearing out furnace and ladle linings. Site:US Other, Industry:Other, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.kt-grantinc.com/index.htm		KT-Grant, Inc., **Address:** 3073 Route 66 , Export, Pennsylvania, United States, 15632, **Phone:** 724-468-4700, **Fax:** 724-468-8188, **Email:** sales@kt-grantinc.com	Commercial
Grass Printer	An autonomous lawnmower, called Grass Printer, has been designed to cut shapes and even words into grass. The design uses an autonomous lawnmower with four sensors on its four corners that allow it to selectively trim an area. Using small sized blades for accuracy the Grass Printer's tiny shaft-driving motors move the cutters horizontally and vertically for precision cutting. Grass Printer provides a way for people to decorate their lawn with creative cutting. Graphics can be cut into the grass based on an image that is sketched onto the mower's touchscreen. The mower works within an area framed by sensor markers. Its blades are smaller than those on standard mowers, which allows for more rapid and accurate cutting. After the control system performs a series of calculations based on the sketch, small motors move the cutter shaft horizontally and vertically in accordance with the mower's position within the sensor-defined area. Mowed grass is discharged at the rear. Industry:Research, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Research (1-3),	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Greifswald Nuclear Power Plant (KGR) Dismantling System	Dismantling activities were carried out in the steam generator room, which is situated around the RPV. Cutting (dry and wet), packaging and transfer areas were installed. The complete system was designed to be mobile and was first installed in Unit 5 for inactive testing before installation and commissioning in Unit 2. Inactive testing started mid 1999 and was completed by the end of 2002. Site:Other, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Grizzly	Grizzly is their largest all-terrain robot, offering the performance of a tractor with the precision of an industrial robot. Grizzly was created for military, mining and agricultural research, and can interface with a wide variety of payloads including single-point hitch implements., , Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Dismantling and Retrieval	www.clearpathrobotics.com/		Clearpath Robotics, **Address:** 1425 Strasburg Rd. Suite 2A, Kitchener, Ontario , Canada, N2R1H2, **Phone:** 519-513-2416, **Fax:** 888-301-3863, **Email:** info@clearpathrobotics.com	Commercial

Gryphon	Gryphon is a modified version of a commercially-available off-road buggy. Prepared for operations that require extra power and traction, it can carry a GPS unit, sensors and a manipulator for field works. Gryphon can also be used for operations on very steep slopes, in which one or more units function as anchors to a smaller machine. Gryphon can be applied in several different tasks on uneven terrain, such as forestry works, terrain reconnaissance, remote surveillance, humanitarian de-mining and others., , Industry:Defense/Homeland Security, Size:Unknown, TRL:Demonstration (7-8),	Dismantling and Retrieval	www.hibot.co.jp		HiBot, **Address:** 5-9-15 Kitashinagawa, Shinagawa-ku, Tokyo, Not Available(Japan), Japan, 141-0001, **Phone:** +81-3-5791-7526, **Fax:** +81-3-5791-7527, **Email:** NA	Commercial
Harvey	Harvey robots (aka HV-100), distribute and collect container-grown plants in greenhouses and on large nursery farms. Since their introduction, Harvey robots have moved well over three million plants. Industry:Agriculture, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9), Tether:No tether - Endurance more than an hour, Payload:10-20kg/20lb-40lb,	Dismantling and Retrieval	www.harvestai.com/		Harvest Automation, Inc., **Address:** 85 Rangeway Road Building 3, Suite 210, Billerica, Massachusetts, United States, 01862, **Phone:** 1-(978)-528-4250, **Fax:** not available, **Email:** info@harvestai.com	Commercial
Helios	Wylfa Cells 4 & 5 & Diverse Discharge Route. ALSTEC was responsible for the supply of the Diverse Discharge Facility at Wylfa Power Station. This facility is required to safely discharge irradiated fuel from Wylfa's Dry Stores - Cells 4 & 5. As part of this Contract ALSTEC supplied two Helios Manipulators to carry out the safe transfer of fuel elements into the discharge flasks prior to disposal., , Site:Magnox, Industry:Engineering, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.fmctechnologies.com/		Schilling Robotics, LLC, **Address:** 260 Cousteau Place , Davis, California, United States, 95618, **Phone:** 530 -753-6718, **Fax:** NA, **Email:** schilling.cs@fmcti.com	Commercial
Hiro III	HIRO III is the world's first Opposed-type Multi-Fingered Haptic Interface providing real force feelings including weight perception to operator's five fingertips., , Industry:Industrial Automation, Size:Unknown, TRL:Operational (9),	Dismantling and Retrieval	www.maru-tomi.co.jp		Marutomi Seiko Co, **Address:** Kurachi Aza-Ikuda , Gifu-pref.,, Not Available(Japan), Japan, 3147-7, **Phone:** +81-575-24-5530, **Fax:** +81-575-24-5509, **Email:** Fmarutomi-info@maru-tomi.co.jp	Commercial
HorseFly	The UAV (unmanned aerial vehicle) is known as the HorseFly, as it would be paired to a larger ground-based vehicle in the same way that a horsefly buzzes around one particular horse., , Industry:Logistics, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Development (4-6),	Dismantling and Retrieval	www.uc.edu		University of Cincinnati, **Address:** 2600 Clifton Ave., Cincinnati, Ohio, United States, 45220, **Phone:** 513-556-1100, **Fax:** N/A, **Email:** helpdesk@uc.edu	Research

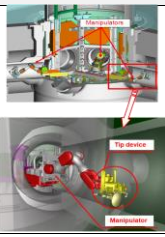
Houdini II	Houdini is a remotely controlled, folding, work platform that can pass through 24-in. openings called risers and then expand to become a 4 x 5-ft mini bulldozer, complete with a plow blade; a dextrous, high-payload manipulator; and remote camera systems. A single-operator control console can be located up to a few hundred feet away. Though training is straightforward with no special qualifications needed, inexperienced operators can easily damage the system; therefore, the need for operators to practice in cold tests is critical to mission success. Houdini can deploy a variety of tools fitted with appropriate grasp points and can manipulate objects up to 250 lb. It can shovel waste or deploy localized sluicing systems for heel removal, cut and remove in-tank debris, deploy tools to obtain core samples, and perform characterization and inspection missions. It has successfully and extensively manipulated a localized sluicer that uses high-pressure water to dislodge and then pump a variety of physical waste forms. Houdini is lowered from an enclosed and shielded deployment package, which houses the tether reel and the robot for stowage and maintenance. Site:Oak Ridge, Industry:Nuclear, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8), Payload:100-250kg/200lb-500lb, Reach:Unknown, Manipulator:Yes - standard	Dismantling and Retrieval	redzone.com		RedZone Robotic System, **Address:** 9143 Street, Pittsburgh, Pennsylvania, United States, 15201, **Phone:** 412-476-8980, **Fax:** 412-476-8981, **Email:** partners@redzone.com	Commercial
HRP-3 Promet MK-II	This was developed as a research and development of platform for the New Energy and Industrial Technology Development Organization (NEDO) funded project of "The Development of a Humanoid Robot Working in an Actual Environment." The following new features were added to the previous model, the HRP-2 "Promet:" - Dust and splash-proof functions for the joint axes and electric devices, such as the gear box unit and the drive unit., - Multi-finger hands for realisation of more sophisticated hand coordination works., - Improved cooling systems for the heat generated inside the robot body., - Prolonged operation time (120 minutes compared to HRP-2's 60 minutes). With the successful incorporation of the above functions, it was successfully demonstrated that HRP-3 could be operated at adverse and harsh environments, such as construction sites. Industry:Research, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3), Tether:No tether - Endurance more than an hour, Waterproof:Not Rated or Unknown,	Dismantling and Retrieval	global.kawada.jp/mechatronics/index.html		KAWADA Industries, Inc., **Address:** 1-3-11 Takinogawa, Kita-Ku, Tokyo, Not Available(Japan), Japan, 114-8562, **Phone:** 81 3 3915 4617, **Fax:** 81 3 3915 4677, **Email:** info@kawada.co.jp	Commercial
Hyundai mini welding robot	Compact design of the welding machine can operate in confined areas inaccessible to human welders. The compact design of the welding machine, measuring 50 cm by 50 cm by 15cm when retracted its welding arm, can operate in confined areas inaccessible to human welders. The robot's six joints enable the machine to carry out almost all types of welding work at a similar speed usually done by a welder. A magnet on its body means the machine can be attached to steel walls or ceilings. Weighing just 15 kg, an operator can control three machines at the same time increasing productivity threefold. With the installation of software for steel cutting, blasting and painting, the robot can perform these other shipbuilding roles., , Industry:Maritime, Size:Unknown, TRL:Demonstration (7-8),	Dismantling and Retrieval	english.hhi.co.kr/main/		Hyundai Heavy Industries , **Address:** 300 Sylvan Avenue, Englewood Cliffs, New Jersey, United States, 07632, **Phone:** 201-816-4080, **Fax:** 201-816-4083, **Email:**	Commercial
IC - Worker stair climbing robot	A totally practical and reasonably priced working robot, especially useful in nuclear plant and HAZMAT applications. This complete system includes robot with multiple cameras, lights & two-way intercom, 65-lb lifting manipulator arm with rotating claw, internal wiring for control and monitoring functions including those of optional & user-equipment, a 500-ft tether, optional wireless operation, and a multi-function battery operated console. Industry:Nuclear, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9),	Dismantling and Retrieval	www.rvtengineering.com		RVT Engineering, **Address:** Not available, Chicago, Illinois , United States, 60612, **Phone:** 815-641-2198, **Fax:** N/A, **Email:** info@rvtengineering.com	Commercial

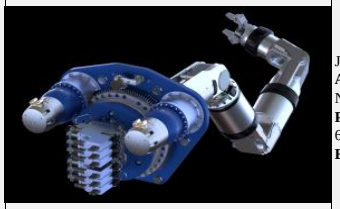
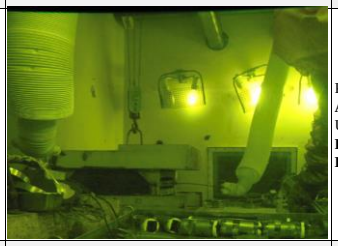
Ice Pigging	A system developed to clean pipework without the use of a traditional pig. Ice pigging uses a pig of ice which can flow around complex pipe configurations (unlike traditional pigs) and can never get stuck (since it eventually melts away).. , Site:Sellafield, Industry:Other, Size:Not Applicable, TRL:Operational (9), TRL2:Development (4-6),	Dismantling and Retrieval	bristol.ac.uk/		University of Bristol, **Address:** University of Bristol,, Bristol, Not Available(UK), United Kingdom, BS8 1TH, **Phone:** 440-117-928-9000, **Fax:** NA, **Email:** red-office@bristol.ac.uk	Research
Impact Moling	Impact moling is an unguided soil displacement technique in which a percussive mole is launched from a small excavation to form a bore through the ground. The new conduit is normally drawn in behind the mole or pulled back into the bore using the hammers reverse action. Industry:Construction, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9), Tether:Yes,	Dismantling and Retrieval	www.trenchlesssolutions.co.uk		Trenchless Solutions, **Address:** 32 Broadcroft Drive, Tingley, Not Available(UK), United Kingdom, N/A, **Phone:** 01132-526-050, **Fax:** N/A, **Email:** enquiries@trenchlesssolutions.co.uk	Commercial
Industrial Perception Robots	Industrial Perception is mostly interested in how robots can see and describe themselves as the "leader in 3D vision-guided robot technology." Their flexible robotic eye-and-arm may be slower than a human worker, but it can sort and move packages tirelessly. Industry:Logistics, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
IPG/Kuka 16kW fibre laser robotic remote cutting system	High-powered fibre laser system. Coupled to a 6-axis Kuka robot and a Precitec laser cutting head. Capable of cutting metallic materials of up to 25mm thickness. Cutting 3D components and pipes. Research is focused on high speed, high quality remote laser cutting of nuclear reactor materials, including pipes for welding preparations. Also investigation of laser cutting of vessels, pipes and concretes for nuclear decommissioning. Site:Sellafield, Industry:Nuclear, Size:Unknown, TRL:Development (4-6), TRL2:Development (4-6),	Dismantling and Retrieval	www.dalton.manchester.ac.uk/		Dalton Nuclear Institute, **Address:** Pariser Building, Manchester, Not Available(UK), United Kingdom, M13 9PL , **Phone:** +44 (0) 161 275 4263 , **Fax:** NA, **Email:** dalton@manchester.ac.uk	Commercial
IRB 6700	This 7th generation of large ABB robots. The IRB 6700 is more robust than its predecessor and maintenance has been simplified. Features:, • Longer uptime—mean time between failures 400,000 hours., • Available with Lean ID for cost effectively increasing dress pack lifetimes., • More robust with a rigid structure and a new generation of motors and compact gearboxes., • Increased speed and shorter cycle times—on average 5 percent faster., • Improved accuracy and higher payloads., • Built to operate in the harshest environments—available with Foundry Plus 2 package., • payload from 150 to 235 kg and reaches of 2.65 to 3.20 meters., , Industry:Industrial Automation, Size:Unknown, TRL:Operational (9), Payload:100-250kg/200lb-500lb, Reach:>2400mm/96in,	Dismantling and Retrieval	www.abb.com/robotics		ABB Limited, **Address:** Affolternstrasse 44, Zurich, Not Available(Switzerland), Switzerland, 8050, **Phone:** +41.43.317.71.11, **Fax:** +41.43.317.44.2, **Email:** NA	Commercial

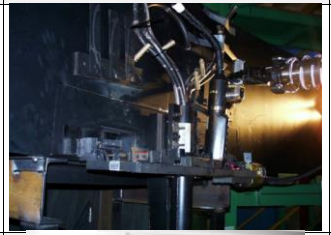
Iter Divertor Remote Handling System	The divertor - a key component of the Iter machine - is located at the bottom of the vacuum vessel and extracts impurities from the superhot plasma. It consists of 54 removable cassettes, each measuring 3.4m long, 1.2m wide and 0.6m thick and weighing 10 tonnes. The remote handling equipment will be used to manipulate and transport these cassettes, which are expected to be replaced three times during the Iter machine's lifetime. Site:France, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6), TRL2:Development (4-6),	Dismantling and Retrieval	www.assystem.com/en/home.html		Assystem, **Address:** 70 Boulevard de Courcelles, Paris, Not Available(France), France, 75017, **Phone:** N/A, **Fax:** N/A, **Email:** N/A	Commercial
Karlsruhe Reprocessing Plant (WAK) Dismantling System	The Karlsruhe Reprocessing Plant (WAK), operated by the WAK–Betriebsgesellschaft (WAK-BG), was built between 1967 and 1971 by the former Nuclear Research Centre Karlsruhe. During its 20 years of hot operation, the WAK-plant processed 208 t of heavy metal, irradiated oxide fuel from research and power reactors. On June 30, 1991, the plant was finally closed down after a half-year nitric acid rinsing campaign. The dismantling of the plant started in 1994 with the decommissioning of obsolete systems and will be finished with a green field status. The dismantling activities were carried out by hands-on techniques, remote techniques, or a mixture of both, depending on radiological conditions. 5500 tons of contaminated solid waste, 3 200 m3 of liquid waste, 130 canisters of HLW glass, and 75 000 tons of rubble were created from dismantling the plant. The dismantling systems were:, - Crane-like manipulator carrier system for two master slave manipulators., - Two electromechanical master slave manipulators with bilateral force feedback., - Manipulator-handled cutting tools and devices such as hydraulic shears, compass saw, disc grinder, etc., - Crane with contamination protection housing to transport material free of contamination into the WAK main cell hall., - Auxiliary crane and crane supported auxiliary manipulators for remote controlled recovery and repair work for the manipulator carrier system and master-slave-manipulators., - Passing and packaging systems, - Control room for remote controlled operation.	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Kawasaki	Robots for most handling or assembly requirements with payload capacities extending from 3Kg payload, for the ultra high speed Y-Series Delta Arm, to the heavyweight 300Kg payload Z-Series. There is a range of application specific robots for welding, palletising, painting sealant application to allow straight-forward integration into existing process areas. Model J30 assessed at Sellafield. Industry:Industrial Automation, Size:Unknown, TRL:Operational (9),	Dismantling and Retrieval	www.kawasakirobot.co.uk/		Kawasaki Robotics, **Address:** Unit 4 Easter Court Europa Boulevard, Warrington, Not Available(UK), United Kingdom, WA5 7ZB, **Phone:** +44 (0)1925 713 000, **Fax:** NA, **Email:** NA	Commercial
Kraft HAZ-TRAK	As the worlds first excavator to incorporate master/slave force feedback control technology, the Kraft HAZ-TRAK system combines the power and mobility of a conventional excavator, with the dexterity and controllability of a Kraft 7-function force feedback manipulator arm. In hazardous environments HAZ-TRAK may be operated by remote control from hundreds of meters away. Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Dismantling and Retrieval	krafttelerobotics.com/industries/nuclear/3.html		Kraft Telerobotics Inc., **Address:** 11667 West 90th Street, Overland Park, Kansas, United States, 66214, **Phone:** 913-894-9022, **Fax:** 913-894-1363, **Email:** Info@KraftTeleRobotics.com	Commercial
Kraft Raptor Arm	Raptor is a 7-function, hydraulically powered robotic manipulator for use in both deep ocean and hazardous inland environments. With 64 inches of reach and a lift capacity of 500 lbs, Raptor delivers powerful manipulator performance in a compact package. Kraft manipulator arms, originally designed for undersea use, are completely sealed and were used in the harshly contaminated environment in the Three Mile Island clean-up. Site:US Other, Industry:Engineering, Size:Unknown, TRL:Operational (9), TRL2:Demonstration (7-8),	Dismantling and Retrieval	krafttelerobotics.com/industries/nuclear/3.html		Kraft Telerobotics Inc., **Address:** 11667 West 90th Street, Overland Park, Kansas, United States, 66214, **Phone:** 913-894-9022, **Fax:** 913-894-1363, **Email:** Info@KraftTeleRobotics.com	Commercial

KT-15 and KT-30	KT-15 and KT-30 are track mounted mobile telescopic boom type machines that can be equipped with a variety of head attachments to perform dismantlement or demolition work. Both equipment can be powered by electricity or diesel fuel. Industry:Construction, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Dismantling and Retrieval	www.kt-grantinc.com/index.htm		KT-Grant, Inc., **Address:** 3073 Route 66 , Export, Pennsylvania, United States, 15632, **Phone:** 724-468-4700, **Fax:** 724-468-8188, **Email:** sales@kt-grantinc.com	Commercial
KUKA Robots	One of the most widely used industrial robots for the nuclear industry. Used (or proposed to be used) at most Sites in the UK. Site:Magnox, Industry:Industrial Automation, Size:Unknown, TRL:Operational (9),	Dismantling and Retrieval	www.kuka-robotics.com		KUKA Robotics, **Address:** Zugspitzstraße 140, Augsburg, Not Available(Germany), Germany, 86165, **Phone:** +49 821 797-50, **Fax:** +49 821 797-525, **Email:**	Commercial
La Calhene TT1000	The company currently has a range of three MSM's (Telemanipulators): MA30, MA11-80 and MT 200 depending on size of active cell (reach) and payload. Used in Cap La Hague. Site:France, Industry:Nuclear, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.lacalhene.com		GETINGE La Calhene, **Address:** 1325 Field Ave. S, Rush City, Minnesota , United States, 55069, **Phone:** 320-358-0604, **Fax:** 320-358-3549, **Email:** scotl@lacalhene.com	Commercial
LaserSnake	This project aimed to demonstrate a system that could perform remote single-sided cutting using a fibre laser, which could ultimately be used in a real-world nuclear environment to dismantle vessels, support structures, flasks and pipe work. Key to achieving this was to show that the snake-arm was capable of repeatedly following the precise tool paths that are required for laser cutting and other processes. The flexibility of the LaserSnake system also allows it to cut access holes in confined spaces through which it can enter., , Site:Magnox, Industry:Nuclear, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Development (4-6), TRL2:Development (4-6),	Dismantling and Retrieval	www.ocrobotics.com/		OC Robotics, **Address:** Unit 5, Abbey Wood Business Park, Bristol, Not Available(UK), United Kingdom, BS34 7JU, **Phone:** +44 (0)117 314 4700, **Fax:** NA, **Email:** contactus@ocrobotics.com	Commercial
Leba GmbH	LEBA continues to manufacture the products that were made by Drath & Schrader. This includes special purpose machines and facilities for the toxic and nuclear waste field with emphasis on waste processing and disposal., , Industry:Engineering, Size:Unknown, TRL:Operational (9),	Dismantling and Retrieval	www.leba-barenburg.de		Leba GmbH, **Address:** Im Gewerbegebiet 2, Barenburg, Not Available(Germany), Germany, 27245 , **Phone:** +49 4273 962930, **Fax:** NA, **Email:** info@leba-barenburg.de	Commercial

Magnox Adapted Hiab	Adapted a Hiab loading crane (normally seen on the back of trucks) for use at Hinkley for remote sorting and retrieval of waste. Uses a remote control pad rather than levers., , Site:Magnox, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.magnoxsites.co.uk/		Magnox Ltd, **Address:** Berkeley Site, Berkeley, Gloucestershire, Not Available(UK), United Kingdom, GL13 9PA, **Phone:** 01453 814000, **Fax:** N/A, **Email:**	Commercial
Marcrist Wall Shaver MWS300	The MWS300 is designed to remove a pre-determined depth of concrete from structures using diamond blades. The diamond blades are mounted on a specially designed drum that rotates during operation. The drum deployment frame is mounted on an ROV such as a Brokk. Designed to remove surface layer of concrete., , Industry:Construction, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Dismantling and Retrieval	www.bluegrassbit.com		Bluegrass BIT, **Address:** 107 Mildred St,, Greenville, Alabama , United States, 36037, **Phone:** (800) 734-2935, **Fax:** (334) 382-9738, **Email:** concreteinfo@concretecutters.com	Commercial
MARS (Mobile Arm Retrieval System)	MARS is a massive, highly sophisticated, swivel-y robotic arm. It's designed to clean radioactive sludge out of house-sized underground tanks. Site:Hanford, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9), Tether:Yes, Waterproof:IP68 - Protected against prolonged effects of immersion under pressure, Payload:>250kg/500lb, Reach:>2400mm/96in, Manipulator:Yes - standard	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Mascot	Used in the Joint European Torus (JET) project, the basic remote maintenance work is undertaken by a dexterous, force-reflecting master-slave servo-manipulator (called the Mascot). The Mascot Slave unit is transported on the end of a 10 metre long articulated robot. The Mascot master station is driven by experienced operators situated in the Remote Handling Control Room. Site:UK Other, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),,	Dismantling and Retrieval	www.euro-fusion.org		EUROfusion, **Address:** Culham Science Centre, , Abingdon, Oxfordshire, Not Available(UK), United Kingdom, n/a, **Phone:** +44(0)1235 52-8822, **Fax:** n/a, **Email:** petra.nieckchen@euro-fusion.org	Commercial
Mayekawa Food Robotics	Mayekawa is the pioneer of robotization of meat processing process which was once thought to be difficult. Meat processing robots must be capable of sensing the subtle differences between each subject such as shape, size and firmness. Mayekawa has developed robots for each process and achieved high quality and efficient automated systems which can be applied to a wide range of product types in low temperature operating conditions. Mayekawa offers deboning machines TORIDAS (poultry) and HAMDAS-R (pork) as well as a unique chicken breast remover YIELDAS-EYE. Industry:Industrial Automation, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Dismantling and Retrieval	www.mayekawa.com		Mayekawa Manufacturing Company, **Address:** 130 Smart Park Drive, Lebanon, Tennessee , United States, 37090, **Phone:** (1) 615-773-2859, **Fax:** (1) 615-444-627, **Email:** customerservice@mayekawausa.com	Commercial

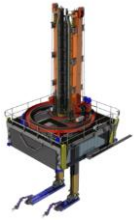
Mechanical Mole	A digging robot which can move aside relatively light objects, such as bricks or furniture. Industry:Research, Size:Unknown, TRL:Development (4-6),	Dismantling and Retrieval	www.manchester.ac.uk/		University of Manchester, **Address:** The University of Manchester Oxford Road, Manchester, Not Available(UK), England, not available, **Phone:** 44 (0) 161 306 6000, **Fax:** not available, **Email:** not available	Research
MedSnake	In order to overcome the limitations of currently available assistive technologies for minimally invasive cardiac surgery (MICS), CMU have developed and tested a first prototype based on an innovative approach of a highly articulated robotic probe (HARP)., , Industry:Healthcare/Medical, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Development (4-6),	Dismantling and Retrieval	ri.cmu.edu		The Robotics Institute (Carnegie Mellon University), **Address:** 5000 Forbes Avenue, Pittsburgh, Pennsylvania, United States, 15213, **Phone:** 412-268-3818, **Fax:** 412-268-6436, **Email:** robotics@ri.cmu.edu	Research
MEISTeR Disaster Recovery Support Robot	MEISTeR (Maintenance Equipment Integrated System of Telecontrol Robot) is a two-armed tracked robot to assist recovery work after disasters or severe accidents by performing light-duty tasks in areas inaccessible by humans. By changing its arms' attachment tools, the robot can perform various tasks such as carrying objects, drilling and opening/closing of valves. Site:Fukushima, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.mhi-global.com		Mitsubishi Heavy Industries, **Address:** 16-5 Konan 2-chrome, Minato-ku Tokyo, Not Available(Japan), United States, 108-8215, **Phone:** n/a, **Fax:** n/a, **Email:**	Commercial
Mesofluidic Manipulator	A high performance dexterous manipulator, enabling tasks that are not currently feasible. Sponsored by ORNL-LDRD and the Department of the U.S. Navy The enabling technology underlying the novel EOD manipulator design is mesofluidics, i.e., miniaturized hydraulics (millimeters to centimeters in size) with low flow (ml/s to 10s ml/s) rates. Features: High payload to weight ratio: =1 (including HPU and batteries), =170° range of motion, =90% efficient, Operate using integrated batteries or platform power, Integrated design – actuators and valves inside arm structure, Anthropomorphic configuration – 7 DOF, Scalable – current design is for a 26-inch manipulator (excluding end-effector) with a 15 kg payload. Design can be scaled up or down to accommodate a variety of applications., Deployable as primary manipulator on small platforms or as secondary manipulator for more dexterous tasks by larger platforms/ manipulator., , Site:Oak Ridge, Industry:Nuclear, Size:Unknown, TRL:Development (4-6), Waterproof:Not Rated or Unknown, Payload:10-20kg/20lb-40lb, Reach:600mm-1200mm/24in-48in,	Dismantling and Retrieval	www.ornl.gov		Oak Ridge National Laboratory, **Address:** P.O. Box 2008, Oak Ridge, Tennessee , United States, 37831, **Phone:** 865-576-7658, **Fax:** 865-576-2081, **Email:** partnerships@ornl.gov	Commercial
MHI Advanced INLAY system	Manipulators used in Primary Water Stress Corrosion Cracking (PWSCC) mitigation. Site:Japan Other, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Dismantling and Retrieval	www.mhi-global.com		Mitsubishi Heavy Industries, **Address:** 16-5 Konan 2-chrome, Minato-ku Tokyo, Not Available(Japan), United States, 108-8215, **Phone:** n/a, **Fax:** n/a, **Email:**	Commercial

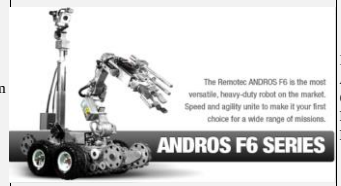
MHI RV Inspection Robot	This robot is applied to the ultrasonic testing as non-destructive examination works to confirm the integrity of the welds of RV in the PWR nuclear power plants. As the inspection is carried out in the RV filled with water, the robot has waterproof structure, consisting of a remotely-operated underwater vehicle, mounting a basic model modified manipulator on the vehicle, which can freely move inside the RV by thruster (propeller). After moving to the vicinity of the weld line of the inspection object location, the robot sticks to the wall surface of the RV. After that, the inspection is carried out by moving the tip tool for inspection with the manipulator., , Site:Japan Other, Industry:Nuclear, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Development (4-6),	Dismantling and Retrieval	www.mhi-global.com		Mitsubishi Heavy Industries, **Address:** 16-5 Konan 2-chrome, Minato-ku Tokyo, Not Available(Japan), United States, 108-8215, **Phone:** n/a, **Fax:** n/a, **Email:**	Commercial
Mighty Mouse (M2)	A 600-pound, five-foot-long robot, now known as M2, rolls on treads, maneuvers around obstacles, and has a long, multi-jointed gripper arm. It has the dexterity to reach into awkward places and apply force to drills and screwdrivers. It remembers positions, important in starting with tools at the right height and depth. Site:US Other, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9), Manipulator:Yes - standard	Dismantling and Retrieval	www.sandia.gov/		Sandia National Laboratories, **Address:** 1515 Eubank SE, Albuquerque, New Mexico, United States, 87123, **Phone:** 505-845-0011, **Fax:** N/A, **Email:** N/A	Commercial
Moduman 100	A manipulator arm that could be launched through standard through-wall tubes. It has been developed as a product that could be subsequently applied to other nuclear facilities in both UK and overseas. The flexibility of the system means it can also be mast mounted or attached to a remotely operated vehicle (ROV) for tasks such as future plant maintenance and inspection duties., , Site:Sellafield, Industry:Nuclear, Size:Unknown, TRL:Development (4-6), TRL2:Development (4-6),	Dismantling and Retrieval	www.jfnl.co.uk		James Fisher Nuclear, **Address:** Gordon House Sceptre Way , Preston, Not Available(UK), United Kingdom, PR5 6AW , **Phone:** 440-1772-622200, **Fax:** 440-1772-622455, **Email:** contactus@jfnl.co.uk	Commercial
MOTA	Materials Open Test Assembly (MOTA) Specimen Retrieval. Mission: Retrieve irradiated MOTA test specimens from east cabinet in 324 South Cell Challenges:, - Specimens in drawers of shielded cabinet bolted to underside of lid, - Cabinet lids weigh 5140 pounds; overhead crane failed, - No cell entry due to high levels of cesium contamination, - 10-in ID port at elevation of 10 ft., - Single circuit 230VAC Site:Hanford, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.pnl.gov		Pacific Northwest National Laboratory (PNNL), **Address:** P.O. Box 999, Richland, Washington, United States, 99352, **Phone:** (509)375-2121, **Fax:** n/a, **Email:** webmaster@pnl.gov	Commercial
MQ-8C Fire Scout Helicopter	A vertical take-off and landing tactical unmanned aerial vehicles (VTUAV), based on the manned Bell 407 helicopter from Bell Helicopter Textron Inc. in Fort Worth, Texas. The manned version of the Bell 407 seats seven, carries a useful load of 2,347 pounds, flies up to 140 knots and has a range of 324 nautical miles. Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Dismantling and Retrieval	www.northropgrumman.com/		Northrop Grumman Corporation, **Address:** 2980 Fairview Park Drive , Falls Church, Virginia , United States, 22042 , **Phone:** (703) 280-2900, **Fax:** N/A, **Email:** N/A	Commercial

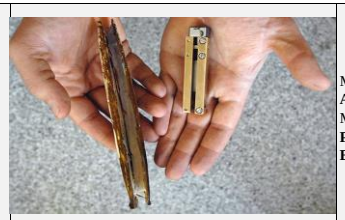
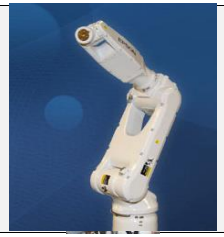
Multi-Arm Robot	This PhD research project concerns the development, integration and control of a two-arm mobile robot system for application within the rapidly expanding field of nuclear decommissioning. A multi-arm robot system has the ability to perform two distinct operations simultaneously or separately, it also has the ability to perform the same processing operation in a coordinated manner, or share a task such as holding and cutting a pipe. In this way multi-arm robots have many advantages over single-arm robots as has been noted by researchers and decommissioning agencies around the world. There is a demand for multi-arm robot systems within decommissioning, sub sea, and in space because of the potentials of their application compared to a 'handicapped' robot system. Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6),	Dismantling and Retrieval	www.engineering.lancs.ac.uk		Lancaster University, **Address:** Bailrigg, Lancaster LA1 4YW, Lancaster, Not Available(UK), United Kingdom, not available, **Phone:** 01524-593812, **Fax:** 01524-381707, **Email:** engineering@lancaster.ac.uk	Research
Nextage	NEXTAGE is a robot designed to work in conjunction with humans. Industry:Industrial Automation, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Dismantling and Retrieval	global.kawada.jp/mechatronics/index.html		KAWADA Industries, Inc., **Address:** 1-3-11 Takinogawa, Kita-Ku, Tokyo, Not Available(Japan), Japan, 114-8562, **Phone:** 81 3 3915 4617, **Fax:** 81 3 3915 4677, **Email:** info@kawada.co.jp	Commercial
Oldbury thermocouple retention project	A remote repair was required to secure the 'Split Tubes' in the Oldbury reactors. The hardware to carry out the repair had to be developed for use in reactor in a relatively short timescale. New innovative design solutions were required and this paper outlines some of the work packages designed, built and tested by Remote Operations (BNFL Magnox) for the Oldbury thermocouple retention project. Work packages included Scanning, Surface Preparation, Welding and Camera packages, the details of which are described in this paper. Site:Magnox, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Dismantling and Retrieval	www.magnoxsites.co.uk/		Magnox Ltd, **Address:** Berkeley Site, Berkeley, Gloucestershire, Not Available(UK), United Kingdom, GL13 9PA, **Phone:** 01453 814000, **Fax:** N/A, **Email:**	Commercial
OmniRob	This mobile assistant is intended to support technicians in the airplane manufacturing industry when applying sealant, measuring, and testing – without putting them at risk. The robots move at walking speed along airplane components; in doing so, it applies a sealant against corrosion in equal measure. The mobile assistant is surrounded by technical workers who install, drill, and test., , Industry:Airborne, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6),	Dismantling and Retrieval	www.kuka-robotics.com		KUKA Robotics, **Address:** Zugspitzstraße 140, Augsburg, Not Available(Germany), Germany, 86165, **Phone:** +49 821 797-50, **Fax:** +49 821 797-525, **Email:**	Commercial
Orangutank	The Pipe Traveler (Orangutank) is a remote controlled, tethered robotic platform for traveling from one pipe to another using a network of vertical pipes for support. The Orangutank is designed to deliver payloads for various applications including, but not limited to; sampling equipment, spray nozzles, radiological analysis equipment, or other equipment for cleanup and remediation activities. Site:Savannah River, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Dismantling and Retrieval	srnl.doe.gov/		Savannah River National Laboratory, **Address:** Savannah River National Laboratory, Aiken, South Carolina, United States, 29808, **Phone:** 803-725-6211, **Fax:** N/A, **Email:** rosalind.blocker@srs.gov	Commercial

Orion	Schilling ORION manipulators are compact, dexterous arms that are available in position-controlled and rate-controlled models, as well as in standard and extended lengths. The light weight and kinematic configuration of these models make them the perfect choice for subsea manipulator applications that require a small stow envelope. • 4-Function and 7-Function Versions Available, • Choice of Standard or Extended Reach (Adds 318mm, 12.5in), • Rotary Forearm Joint Provides an Unparalleled Range of Motion, • Component Commonality Minimizes Spare Part Requirements, • Depth Rating of 6,500msw, , Industry:Engineering, Size:Unknown, TRL:Operational (9),	Dismantling and Retrieval	www.fmctechnologies.com/		Schilling Robotics, LLC, **Address:** 260 Cousteau Place , Davis, California, United States, 95618, **Phone:** 530 -753-6718, **Fax:** NA, **Email:** schilling.cs@fmcti.com	Commercial
PaR Remote Handling System	The PaR Systems solutions are rugged manipulator arms with payloads up to 400 pounds (181 kg). Applications range from hot cell utility and process operation to retrieval and waste packaging. Deployment is mainly by overhead mounting or wall mounting of transporters. Other options are vehicle and pedestal mounting. Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Dismantling and Retrieval	www.par.com		PaR Systems, Inc., **Address:** 707 County Road E, West, Shoreview, Minnesota , United States, 55126- 7007, **Phone:** 651-484-7261, **Fax:** 651-483-2689, **Email:** info@par.com	Commercial
Perry Slingsby	Slingsby manipulators are integrated into manipulator skids for the oil & gas industry. Slingsby manipulators were used on Windscale Pile water duct clean out., , Site:Sellafield, Industry:Oil & Gas, Energy, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.perryslingsbysystems.com		Perry Slingsby Systems Ltd, **Address:** Ings Lane, Kirkbymoorside, North Yorkshire, Not Available(UK), United Kingdom, YO6 6EZ, **Phone:** +44 (0)1751 431751, **Fax:** NA, **Email:** NA	Commercial
Pit Viper	The Pit Viper is a versatile robotic arm and remote video monitoring station that allows workers to rehabilitate contaminated pits at Hanford, reducing dose rates by 75%. Site:Hanford, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8), Tether:No tether - Endurance more than an hour, Waterproof:Not Rated or Unknown, Payload:>250kg/500lb, Reach:>2400mm/96in, Manipulator:Yes - standard	Dismantling and Retrieval	www.pnl.gov		Pacific Northwest National Laboratory (PNNL), **Address:** P.O. Box 999, Richland, Washington, United States, 99352, **Phone:** (509)375-2121, **Fax:** n/a, **Email:** webmaster@pnl.gov	Commercial
Plasma Arc Cutter	Underwater cutting of skips in pond. Site:Sellafield, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Dismantling and Retrieval	www.sellafieldsites.com/		Sellafield Ltd., **Address:** Sellafield, Seascale, Cumbria , Not Available(UK), United Kingdom, CA20 1PG, **Phone:** 440-194-672-8333, **Fax:** 440-194-672-8987, **Email:** mark.dowson@sellafieldsites.com	Commercial

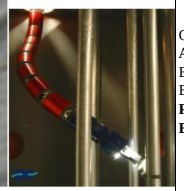
Port-deployed Glovebox Manipulator (Motoman SIA5D)	Nuclear Robotics Group at University of Texas, Austin is using a pair of Motoman SIA5D 7-DOF light-duty industrial robot arms deployed through conventional glovebox ports as a testbed for control strategies for remote handling in hazardous environments. Industry:Research, Size:Unknown, TRL:Research (1-3),	Dismantling and Retrieval	robotics.me.utexas.edu		University of Texas, **Address:** 10100 Burnet Road, Austin, Texas, United States, 78712, **Phone:** 512-471-5182, **Fax:** n/a, **Email:** mpryor@utexas.edu	Research
Powerball Lightweight Arm	A mobile gripping system. The lightweight arm with compact performance with three highly-integrated Powerball modules offers 6 degrees of freedom. Integrated intelligence makes powerful, mobile handling possible. The battery operation makes it mains-independent. Combining it with the SDH 3-finger hand, increases the number of degrees of freedom by another 7, and also permits typical tasks to be accomplished flexibly in the area of service robotics., , Industry:Industrial Automation, Size:Unknown, TRL:Development (4-6),	Dismantling and Retrieval	www.us.schunk.com		SCHUNK, **Address:** 211 Kitty Hawk Drive, Morrisville, North Carolina, United States, 27560, **Phone:** 919-572-2705, **Fax:** 919-572-2818, **Email:** info@us.schunk.com	Commercial
Powered Remote Manipulator	Adaptation of industrial robot arm. SA Technology are no longer in business as of April 2013. Recently a number of their Directors have created a new company called Vista Engineering. They have also acquired the rights to previous SA Technology designs., , Industry:Nuclear, Size:Unknown, TRL:Operational (9),	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
PR2	PR2 is a robotics R&D platform. Industry:Consumer, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Dismantling and Retrieval	www.willowgarage.com/		Willow Garage, Inc., **Address:** 68 Willow Road, Menlo Park, California, United States, 94025, **Phone:** (650) 475-2700, **Fax:** NA, **Email:** info@willowgarage.com	Commercial
Pruning Robot	This robot climbs trees and saws off limbs. At 13 kilograms, the robot can drive straight up trees between 6 and 25 centimeters (2.3-9.8 in) in diameter at 0.25 m/s, while tackling branches with a diameter of less than 5 cm. It can automatically adapt to a variety of tree morphologies, and is relatively energy efficient since it can support itself passively on the tree by using its own weight to securely grip the trunk. Industry:Agriculture, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Development (4-6),	Dismantling and Retrieval	www.maru-tomi.co.jp		Marutomi Seiko Co, **Address:** Kurachi Aza-Ikuda , Gifu-pref.,, Not Available(Japan), Japan, 3147-7, **Phone:** +81-575-24-5530, **Fax:** +81-575-24-5509, **Email:** Fmarutomi-info@maru-tomi.co.jp	Commercial

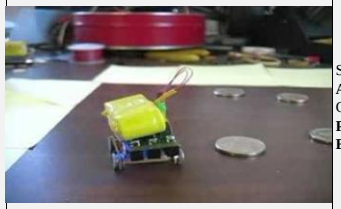
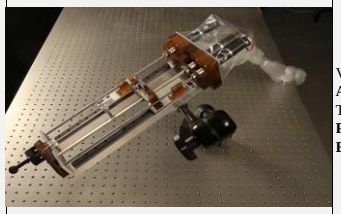
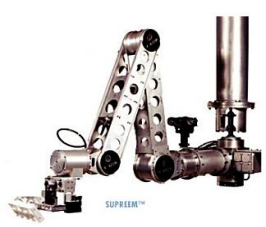
Quattro s650H	The Quattro s650H parallel robot is specifically designed for high-speed applications in packaging, manufacturing, assembly, and material handling. The Adept Quattro robot is the only parallel robot (or "delta robot") in the world that features a patented four-arm design, advanced control algorithms, and large work envelope make the Adept Quattro the ideal overhead-mount robot for smooth motion, high-throughput applications. The Adept Quattro is powered by ultra-compact controls and embedded amplifiers, which reduces the cycle time and improves footprint efficiency. Industry:Industrial Automation, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),, Payload:5-10kg/10lb-20lb, Reach:1200mm-1800mm/48in-72in,	Dismantling and Retrieval	www.adept.com		Adept Technology, Inc., **Address:** 5960 Inglewood Drive , Pleasanton, California, United States, 94588, **Phone:** 925-245-3400, **Fax:** 925-960-0590, **Email:**	Commercial
Raccoon	A robot vacuum cleaner dubbed the Raccoon is to tackle contamination within Fukushima Daiichi 2 in preparation for workers re-entering the building. Water is supplied on the floor surface from the inside of the unit head (jet and brush), and the drainage is sucked inside the head at the same time. Site:Fukushima, Industry:Nuclear, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Dismantling and Retrieval	www.tepco.co.jp		Tokyo Electric Power Company, **Address:** 1-1-3 Uchisaiwai-cho, Chiyoda-ku, Tokyo , Not Available(Japan), Japan, 100-8560, **Phone:** +81-3-4216-1111, **Fax:** NA, **Email:** NA	Commercial
RAPTOR 150	NuVision Engineering's RAPTOR hydraulic manipulator systems have been designed for hazardous duty operations. The RAPTOR is designed for deployment on all-terrain, unmanned ground vehicles (UGVs), robotic combat support systems (RCSS), and all purpose robotic transport systems (ARTS) as well as other heavy-duty equipment such as excavators or in fixed mount applications. The RAPTOR is rugged, reliable and robust, enabling operation in extremely hazardous environments from a safe distance and thereby minimizing risk to the operator. Industry:Emergency Response, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Dismantling and Retrieval	www.nuvisioneng.com		NuVision Engineering, **Address:** 2403 Sidney Street Suite 700, Pittsburgh, Pennsylvania, United States, 15203, **Phone:** 412-586-1810, **Fax:** 412-586-1811, **Email:** info@nuvisioneng.com	Commercial
Reactorsaurus	A robotic system for hazardous work on the Dounreay Prototype Fast Reactor. It is a two-armed machine - which also has ten eyes and four ears. The 75 tonne robot takes the form of a traversing carriage with two 16 metre arms. Operators in a remote control room use binocular cameras on each arm to take apart the highly radioactive internal structures of the 254 MWe reactor. The arms will be able to cut up and reduce the size of reactor components using diamond wire, hydraulic shears, oxy/propane and plasma cutting. Operators will also be able to listen in on the action using two microphones on each of the arms., , Site:Dounreay, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6), TRL2:Development (4-6),	Dismantling and Retrieval	www.dounreay.com		Dounreay Site Restoration Limited (DSRL), **Address:** Dounreay, , Caithness, Scotland, Not Available, United Kingdom, UK KW14 7TZ, **Phone:** +44 (0)1847 802121, **Fax:** N/A, **Email:** communications@dounreay.com	Commercial
Remote repair welding - BNES 99 Paper	A review of the mechanised welding packages which have been developed, over the years, for remote repairs inside the UK's nuclear reactors. In particular, the design and operation of pulsed MIG, TIG and drawn arc stud welding packages are outlined. Site:Magnox, Industry:Nuclear, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial

Remote Welding Robot	The principal component of the system is the SDC Robot, which functions as both the delivery vehicle and the tool. It is a radiation-hardened magnetic crawler, resembling the form factor of a snake. It is umbilical-deployed to nearby the subject position, and then crawls along a horizontal, vertical, or curved surface to the work site. It can navigate through bores as narrow as 2.1", and over bumps at high as 0.4". Once the SDC arrives at the subject position, an onboard radiation-tolerant camera deploys to survey the area, and facilitate operation. Then a grinding wheel preps the surface for welding. Following the automated weld process, an EMAT UT array performs a volumetric exam on the weld to validate results and thickness. Industry:Nuclear, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9), Tether:Yes,	Dismantling and Retrieval	www.diakont.com		Diakont, **Address:** 3821 Calle Fortunada, San Diego, California, United States, 92123, **Phone:** (858) 551- 5551, **Fax:** (858) 504-7065, **Email:** support@diakont.us.com	Commercial
Remotec ANDROS Robots	ANDROS Robots are mobile robot systems for hazardous-duty operations used by military, EOD, first responders and law enforcement agencies. Versatile, with supporting multiple weapons, detectors and/or sensors. Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Dismantling and Retrieval	www.northropgrumman.com/		Northrop Grumman Corporation, **Address:** 2980 Fairview Park Drive , Falls Church, Virginia , United States, 22042 , **Phone:** (703) 280-2900, **Fax:** N/A, **Email:** N/A	Commercial
Return Brick Recycling Robot	A machine that automatically collects rubble from torn-down buildings and transform the material into new bricks. The little robotic machine would search for small fragments of brick and concrete, grind them up, and reform those pieces into new Lego-like bricks, which are easier to stack and build with. Industry:Research, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Research (1-3),	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Rheinsberg Nuclear Power Plant (KKR) Remote Dismantling	The Rheinsberg Nuclear Power Plant (Rheinsberg NPP, KKR) was designed and built in close cooperation between German and Soviet experts, under an agreement between the GDR and the USSR (Union of Soviet Socialist Republics) in 1956. It was equipped with the first Russian pressurized water reactor of the WWER-2 type to be built abroad. The main components of the plant were the reactor with the primary circuit, the turbine with the secondary circuit, the active water treatment system, the final store close to the surface as well as the associated infrastructure (energy, heat and water supply, connection to the traffic system). Site:Other, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Rigmaster	The RigMaster™ is a five-function, rate-controlled, heavy-lift grabber arm that can be mounted on a wide range of ROVs. The grabber arm can be used to grasp and lift heavy objects or to anchor the ROV by clamping the gripper around a structural member at the work site. Constructed primarily of aluminum and titanium, this manipulator delivers the power, performance, and reliability required for such demanding work. It has interchangeable Jaw Configurations, a boom function which extends or retracts the gripper by 305mm (12in) for a maximum reach of 1,300mm (51.2in) and a depth rating of 6,500msw. The system's standard four-finger intermeshing gripper can handle bulky objects by opening to 284mm (11.2in)., , Industry:Engineering, Size:Unknown, TRL:Operational (9),	Dismantling and Retrieval	www.fmctechnologies.com/		Schilling Robotics, LLC, **Address:** 260 Cousteau Place , Davis, California, United States, 95618, **Phone:** 530 -753-6718, **Fax:** NA, **Email:** schilling.cs@fmcti.com	Commercial

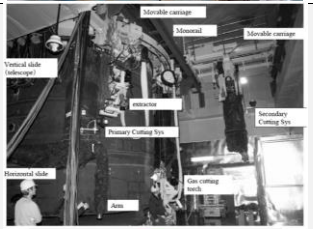
RoboClam	The RoboClam is being developed to explore the performance capabilities of clam-inspired digging. They move their shells back and forth to liquify the sand or mud surrounding them, making it much easier to burrow downwards by reducing drag. Researchers at MIT are interested in duplicating this technique to make underwater anchoring (useful for boats, cable deployment, and mines) much more energy efficient. Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Dismantling and Retrieval	web.mit.edu/		Massachusetts Institute of Technology (MIT), **Address:** 77 Massachusetts Avenue, Cambridge, Massachusetts, United States, 02139, **Phone:** 617-253-2700, **Fax:** not applicable, **Email:** tele-info@mit.edu	Commercial
Robonaut	A Robonaut is a dexterous humanoid robot built and designed at NASA. Their challenge is to build machines that can help humans work and explore in space. Working side by side with humans, or going where the risks are too great for people, it is hoped that Robonauts will expand their ability for construction and discovery. Central to that effort is a capability they call dexterous manipulation, embodied by an ability to use one's hand to do work, and their challenge has been to build machines with dexterity that exceeds that of a suited astronaut. Industry:Space, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6),	Dismantling and Retrieval	www.nasa.gov/centers/johnson/home		NASA, **Address:** 2101 NASA Parkway, Houston, Texas, United States, 77058, **Phone:** 281-483-5111, **Fax:** n/a, **Email:**	Commercial
Robotic Applique Kit	Conversion kit to implement remote control of Bobcat loaders. Site:Fukushima, Industry:Construction, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Demonstration (7-8),	Dismantling and Retrieval	www.qinetiq-na.com		QinetiQ North America, **Address:** 350 Second Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 781-684-4000, **Fax:** NA, **Email:** TSGInfo@QinetiQ-NA.com	Commercial
Rotary Deployment Arm (RDA)	A dexterous long reach manipulator arm has been designed and built to facilitate tank clearance at Trawsfynydd. Site:Magnox, Industry:Nuclear, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
S5	The EPSON S5 Series of 6-axis robots has a rigid arm design combined with advanced EPSON Servo control technology which results in high speed motion and low vibration even when high precision high speed cycles are required. All S5 6-Axis robots feature brakes on all axes and have the flexibility of being mounted in table top, wall or ceiling mount configurations. Industry:Industrial Automation, Size:Unknown, TRL:Operational (9),	Dismantling and Retrieval	www.robots.epson.com		EPSON Robots, **Address:** 18300 Central Avenue, Carson , California, United States, 90746, **Phone:** 562-290-5910, **Fax:** 562-290-5999, **Email:** info@robots.epson.com	Commercial

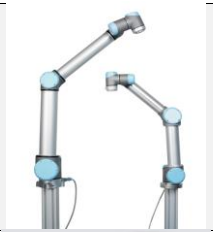
SA Robotics Remote Handling Equipment	SA Robotics provides remote handling equipment that is inserted into a cell through a circular through-wall penetration. Industry:Nuclear, Size: *, TRL:Operational (9),	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Sakura No. 2	Sakura No. 2 is a tracked robot with manipulator, capable of underwater operation 51 centimeters wide, 18 cm high and 104 cm long. It weighs about 48 kilograms, can carry equipment up to 50 kilograms, and its battery life is eight hours. Chiba Institute of Technology (CIT) developed the robot. Mitsubishi Heavy Industries Ltd. (MHI) manufactures and markets Sakura No. 2., , Site:Fukushima, Industry:Nuclear, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9), TRL2:Operational (9), Tether:No tether - Endurance more than an hour, Waterproof:IP68 - Protected against prolonged effects of immersion under pressure, Manipulator:No	Dismantling and Retrieval	www.mhi-global.com		Mitsubishi Heavy Industries, **Address:** 16-5 Konan 2-chrome, Minato-ku Tokyo, Not Available(Japan), United States, 108-8215, **Phone:** n/a, **Fax:** n/a, **Email:**	Commercial
SAMM and MAESTRO hydraulic arms	These are 6-axis hydraulic manipulator arms. Nuclearised to 104 Gray that can carrying a capacity up to 100 kg. Maximum reach 2.3/2.4 m. The tool changer has a wide choice of tools. Designed for clean-up and dismantling of the highly radioactive hot cell in building 324 on the Hanford Site., , Site:Hanford, Industry:Engineering, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.cybernetix.fr	 	Cybernetix, **Address:** 306 Albert Einstein Street, Marseille, Not Available(France), France, 13013 , **Phone:** +33 4 91 21 77 00, **Fax:** Na, **Email:** NA	Commercial
Sand Mantis	The Sand Mantis has been used for reducing residuals using a patented water-jet system that transfers the material to a mill for grinding into smaller particles that can be more easily removed from the waste tanks. It sprays highly-pressurized water from a tiny opening made of gems, including sapphires – specially selected material that can stand up to the water's pressure over time. The complete robot is 8 feet long and weighs approximately 800 pounds. The Sand Mantis cross-shaped body can be collapsed into a straight line for insertion through the small openings in the top of a tank. Once inside, the robot unfolds and is guided by remote control., , Site:Savannah River, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8), Reach:600mm-1200mm/24in-48in,	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Sandia Hand	The Sandia Hand is modular, allowing different types of fingers or attachments to be connected with magnets and quickly plugged into the hand frame. The operator has the flexibility to quickly and easily attach additional fingers or other tools, such as flashlights, screwdrivers or cameras. Aside allowing flexibility of the system, modularity allows easier maintenance and prolongs the durability of the system. The fingers are designed to fall off in case the operator accidentally clashes the hand into a wall or some other object. Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Research (1-3),	Dismantling and Retrieval	www.sandia.gov/		Sandia National Laboratories, **Address:** 1515 Eubank SE, Albuquerque, New Mexico, United States, 87123, **Phone:** 505-845-0011, **Fax:** N/A, **Email:** N/A	Commercial

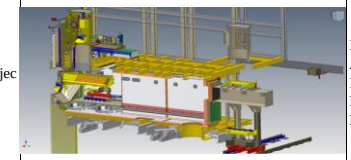
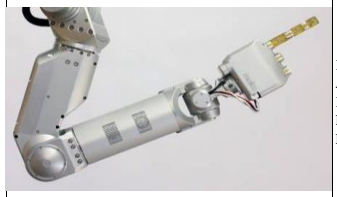
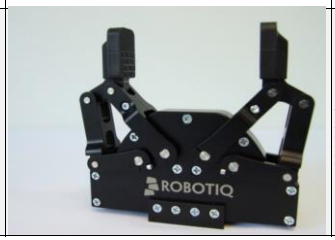
Seaker Nuclear ROV	The Remotely Operated Vehicle is a Nuclear RSL Seaker based on a proven existing design which has operated in the challenging Sellafield environment. It is an open frame structure manufactured in Stainless Steel 316L. Site:Sellafield, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Dismantling and Retrieval	www.rovtechsystems.co.uk/		Rovtech Systems Ltd , **Address:** The Old Brewery, Barrow-in-Furness, Not Available(UK), United Kingdom, LA14 2UB, **Phone:** +44 1229 822121, **Fax:** +44 (0) 1229 87, **Email:** info@rovtechsystems.co.uk	Commercial
Silo Emptying Plant	The 500t SEPs sit on rails installed on the shop floor, enabling them to be positioned above silo charge holes; grabs will be lowered by winch into the silo to extract a waste load. The waste will be loaded in a skip also contained and transferred into a flask at one end. A lid will then be slid into position on the underside of the flask, enabling it to be transported to one of Sellafield's reprocessing plants., , Site:Sellafield, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Dismantling and Retrieval	www.sellafieldsites.com/		Sellafield Ltd., **Address:** Sellafield, Seascale, Cumbria , Not Available(UK), United Kingdom, CA20 1PG, **Phone:** 440-194-672-8333, **Fax:** 440-194-672-8987, **Email:** mark.dowson@sellafieldsites.com	Commercial
Smart 5 NS	Commander/UKR training system. B204 decommissioning development trials. Older versions were considered for WVP (2002).. , Site:Sellafield, Industry:Industrial Automation, Size:Unknown, TRL:Operational (9), TRL2:Demonstration (7-8),	Dismantling and Retrieval	www.comau.com		Comau LLC, **Address:** 21000 Telegraph Road, Southfield, Michigan , United States, 48033 , **Phone:** 248-353-8888, **Fax:** NA, **Email:** warranty.us@comau.com	Commercial
SnakeArm	These robots were designed specifically for hazardous, confined spaces. A snake-arm uses wire ropes to control the arm shape which means that the control system electronics and motors can be located outside of the hazardous area. A snake-arm has many joints and proprietary software which enables an operator to navigate through complex spaces. This is particularly important for many nuclear tasks where the environment is full of pipe work systems, vessels and other structures. Snake-arms are also designed for working underwater or in high temperature areas or in vacuum. It has been demonstrated to Sellafield, Areva and others. This system has the potential to be the basis of a generic toolkit for nuclear remote handling and have been used for gripping handling, sampling liquids and solids, inspection, water-jetting, laser-cutting and delivering a variety of process tools., , Site:Sellafield, Industry:Nuclear, Size:Unknown, TRL:Demonstration (7-8), TRL2:Demonstration (7-8),	Dismantling and Retrieval	www.ocrobotics.com/	 	OC Robotics, **Address:** Unit 5, Abbey Wood Business Park, Bristol, Not Available(UK), United Kingdom, BS34 7JU, **Phone:** +44 (0)117 314 4700, **Fax:** NA, **Email:** contactus@ocrobotics.com	Commercial
Snow Plow	A remote controlled snow plow (plough in English). Industry:Consumer, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9),	Dismantling and Retrieval	www.superdroidrobots.com/shop/item.aspx/new-custom-rc-6wd-robot-with-snow-plow/1612/		Super Droid, **Address:** 224 Technology Park Lane, Fuquay-Varina, North Carolina, United States, 27526, **Phone:** 1-919-557-9162, **Fax:** 775-416-2595, **Email:** info@sdrobots.com	Commercial

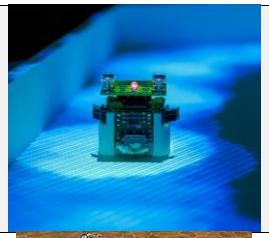
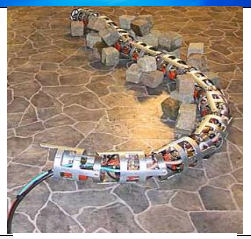
Soil Sorting System	This sorts contaminated soil and separates them at a rate of 100 metric tons per hour. Site:Fukushima, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6), TRL2:Development (4-6),	Dismantling and Retrieval	us.areva.com		AREVA , **Address:** 7207 IBM Drive, Charlotte, North Carolina, United States, 28262, **Phone:** 704-805-2000, **Fax:** not available, **Email:**	Commercial
SRI Microbot	SRI International has been developing construction robots with swarms of magnetically actuated microrobots that can work together to build macro-scale structures. Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Development (4-6),	Dismantling and Retrieval	www.sri.com		SRI International , **Address:** 333 Ravenswood Avenue, Menlo Park, California, United States, 94025, **Phone:** 650-859-2000, **Fax:** N/A, **Email:** N/A	Commercial
Staubli	A complete range of robots. SCARA 4-axis robots and 6-axis robots. Specialized robots (painting, cleanroom, plastics, machine-tools, etc.). Staubli Unimation NEATER was used in WVP and in B220 at Harwell., , Site:UK Other, Industry:Industrial Automation, Size:Unknown, TRL:Operational (9), TRL2:Development (4-6),	Dismantling and Retrieval	www.staubli.com		STAUBLI Corporation, **Address:** 201 Parkway W, Duncan, South Carolina, United States, 29651, **Phone:** 864-486-5472, **Fax:** 864-486-5495, **Email:** c.eason@staubli.com	Commercial
Steerable Needle Robot	This employs steerable needles about the size of those used for biopsies to penetrate the brain with minimal damage and suction away the blood clot that has formed. Industry:Healthcare/Medical, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Development (4-6),	Dismantling and Retrieval	www.vanderbilt.edu		Vanderbilt University , **Address:** 2201 West End Ave, Nashville , Tennessee , United States, 37235, **Phone:** (615) 322-7311, **Fax:** N/A, **Email:** N/A	Research
Sumersible Platform with ROSA End Effector Motion (SUPREEM)	WesDyne uses the Submersible Platform with ROSA End Effector Motion (SUPREEM) to examine PWR vessels. It uses an efficient, compact and lightweight design along with a modular construction to make set up and take down quick and easy. As another benefit, the SUPREEM has minimal impact on other service operations. It does not need a large laydown area and it requires minimal use of the equipment hatch and the polar crane., , Site:US Other, Industry:Nuclear, Size: *, TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.wesdyne.com		WesDyne International, **Address:** 680 Waltz Mill Road, Madison, Pennsylvania, Australia, 15663, **Phone:** NA, **Fax:** NA, **Email:** wesdynesales@westinghouse.com	Commercial

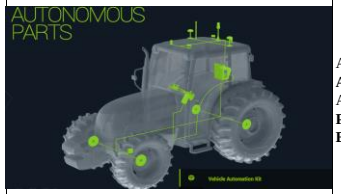
Sunward Intelligent Excavator	This combines the data of multi-sensors amalgamation technology, wireless AP technology, wireless remote control technology, virtual instrument technology, robot control technology, sound, light and electricity etc. Called the Swerob ., , Industry:Construction, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), Tether:No tether - Endurance more than an hour, Payload:>250kg/500lb, Reach:>2400mm/96in, Manipulator:No	Dismantling and Retrieval	www.sunward.com.cn		Sunward, **Address:** Sunward Intelligent Industrial Park, Xingsha, Changsha, Hunan Post:410100 , Changsha, Not Available(China), China, not available, **Phone:** 0086-731-83572828, **Fax:** NA, **Email:** international@sunward.com.cn	Commercial
Supernumerary Robotic Limbs (SRLs)	Supernumerary Robotic Limbs (SRLs) are robotic limbs that, when worn, give you more limbs than you'd normally have. In other words, they're not robotic limbs designed to replace biological limbs that you might be missing, but rather robotic limbs designed to augment the number of limbs that you have already. Industry:Research, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Development (4-6),	Dismantling and Retrieval	web.mit.edu/		Massachusetts Institute of Technology (MIT), **Address:** 77 Massachusetts Avenue, Cambridge, Massachusetts, United States, 02139, **Phone:** 617-253-2700, **Fax:** not applicable, **Email:** tele-info@mit.edu	Commercial
T53 Enryu	The latest in their line of rescue robots is the Enryu T-53 (”Support Dragon”). This is half the size of its older brother the T-52 so that it can move faster in emergency situations. Its arms are more precise when moving towards a target, but aren’t quite as powerful. Still, the T-53 is quite capable of moving heavy objects like rubble at the site of an earthquake with a load bearing of 220 pounds per arm. It can also be used to move dangerous objects like barrels of toxic waste, controlled remotely via the cameras on its head and arms, or directly (so long as the operator wears some protection). The arms are controlled via joysticks (or with true mecha-style controls that mimic the operator’s arm movements. Industry:Emergency Response, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Dismantling and Retrieval	www.tmsuk.co.jp/english/		Tmsuk Co., Ltd, **Address:** 65, Eguchi, , Fukuoka, Not Available(Japan), Japan, 811-3502 , **Phone:** 0940-38-7555, **Fax:** .0940-38-7556, **Email:** pr@tmsuk.co.jp	Commercial
TARM	This is a telescopic articulated remote mast, which is suspended from the main 150 ton gantry crane for ex-vessel work. Site:UK Other, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),,	Dismantling and Retrieval	www.euro-fusion.org		EUROfusion, **Address:** Culham Science Centre, , Abingdon, Oxfordshire, Not Available(UK), United Kingdom, n/a, **Phone:** +44(0)1235 52-8822, **Fax:** n/a, **Email:** petra.nieckchen@euro-fusion.org	Commercial
Tawers	The TAWERS range of robots is a new generation of robot arm and welding technology which is controlled by the same processor to greatly improve your productivity. TAWERS is the first robot with Embedded Arc Control (EAC) technology, soaring beyond conventional digital communication systems, delivering the first generation of fully software-controlled robotic welding solutions. Industry:Industrial Automation, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Dismantling and Retrieval	www.ics-robotics.co.uk/panasonic_tawers_series.html		ICS Robotics and Automation Ltd., **Address:** Units 2&3 Chancerygate Business Centre Manor House Avenue Millbrook Southampton Hampshire, Hampshire, Not Available(UK), United Kingdom, not available, **Phone:** 023-8077-2711, **Fax:** 023-8077-2740, **Email:** info@ics-robotics.co.uk	Commercial

The Body Extender	The Body Extender functions as an exoskeleton into which human beings can be strapped. It can be used to protect and carry humans. It can also be used to move heavy items. Industry:Research, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Dismantling and Retrieval	www.percro.org		Perceptual Robotics Laboratory (PERCRO), **Address:** Via L. Alamanni, 13, Pisa, Not Available(Italy), Italy, N/A, **Phone:** +39 050 882517, **Fax:** N/A, **Email:**	Commercial
TITAN	Seven-DOF manipulator for subsea operations. Titanium construction. Site:US Other, Industry:Oil & Gas, Energy, Size:Unknown, TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval	www.fmctechnologies.com/		Schilling Robotics, LLC, **Address:** 260 Cousteau Place , Davis, California, United States, 95618, **Phone:** 530 -753-6718, **Fax:** NA, **Email:** schilling.cs@fmcti.com	Commercial
Tizzy	Tizzy is a robotic crawler for cleaning waste tanks at SRS. It needs to negotiate the internal maze of cooling pipes, risers and other impediments found in a waste tank. Site:Savannah River, Industry:Nuclear, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Demonstration (7-8), TRL2:Demonstration (7-8), Tether:Yes, Waterproof:Not Rated or Unknown, Payload:0-5kg/0lb-10lb, Reach:1800mm-2400mm/72in-96in, Manipulator:No	Dismantling and Retrieval	srnl.doe.gov/		Savannah River National Laboratory, **Address:** Savannah River National Laboratory, Aiken, South Carolina, United States, 29808, **Phone:** 803-725-6211, **Fax:** N/A, **Email:** rosalind.blocker@srs.gov	Commercial
Tokai 1 Remote Dismantling System	A primary cutting system has been installed on a SRU (Steam Raising Unit) for the remote cutting of the SRU shell and internals. Access to objects, cutting, and transportation are managed by the system. Site:Japan Other, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
UBR-1	Low-cost one-armed mobile robot designed for safe working around people. Industry:Consumer, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Dismantling and Retrieval	unboundedrobotics.com		Unbounded Robotics, **Address:** N/A, Santa Clara, California, United States, N/A, **Phone:** N/A, **Fax:** N/A, **Email:** info@unboundedrobotics.com	Commercial

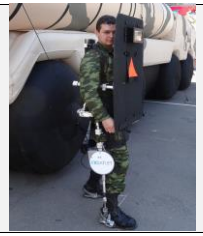
UR5 and UR10	Lightweight industrial robot arms, designed to work safely alongside humans., , Industry:Industrial Automation, Size:Unknown, TRL:Operational (9),	Dismantling and Retrieval	www.universal-robots.com		Universal Robots, **Address:** Energivej 25, Odense S, Not Available(Denmark), Denmark, DK-5260, **Phone:** +45 89 93 89 89, **Fax:** +45 38 79 89 89, **Email:** sales@universal-robots.com	Commercial
Viper s650	The Viper s650 six-axis robot is an articulated robot designed for assembly applications. The six-axis robots are suitable for material handling, packaging, machine tending, and many other operations requiring fast and precise automation. The Adept Viper s650 has a 650 mm reach. Industry:Industrial Automation, Size:Unknown, TRL:Operational (9), Reach:600mm-1200mm/24in-48in,	Dismantling and Retrieval	www.adept.com		Adept Technology, Inc., **Address:** 5960 Inglewood Drive , Pleasanton, California, United States, 94588, **Phone:** 925-245-3400, **Fax:** 925-960-0590, **Email:**	Commercial
VM-G Series	The VM-Series six-axis articulated robots offer high speed and repeatability along with a large, 13-kg maximum payload capacity. Their maximum allowable moment of inertia (0.36 kgm² at J4 and J5, and 0.064 kgm² at J6) is 2.5 times greater than conventional robots, allowing more flexibility in end-effector designs and a wider range of applications. A slim, 130-mm-wide arm and long, 1,000- to 1,300-mm reach make it possible for these robots to reach around tooling or into deep, narrow spaces, such as plastic injection molds, without interfering with peripheral equipment. ANSI and CE compliance allows global deployment. Standard and ISO 5 (class 100) cleanroom models are available., , Industry:Industrial Automation, Size:Unknown, TRL:Operational (9),	Dismantling and Retrieval	www.densorobotics.com		DENSO Robotics, **Address:** 3900 Via Oro Ave, Long Beach , California, United States, 90810, **Phone:** 888-476-2689, **Fax:** 310-952-7502, **Email:** info@densorobotics.com	Commercial
Walk Again Project	Exoskeleton for paraplegics allow them to walk. featured in the opening ceremony for the World Cup in Brazil where users kicked a ball. It uses a wide range of technologies and is controlled through an EEG (Electroencephalography) cap placed over the head – the sensors on the cap read brain activity from the scalp. The cap then deciphers the intention of the user and transmits the instruction to the exoskeleton, which produces the gait movement using a set of hydraulic actuators. Industry:Healthcare/Medical, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Demonstration (7-8),	Dismantling and Retrieval	www.duke.edu/		Duke University, **Address:** 2138 Campus Drive, Durham, North Carolina, United States, 27708, **Phone:** (919) 684-3214, **Fax:** (919) 668-1661, **Email:**	Research
WAM Arm	The WAM Arm is a highly dexterous, naturally backdrivable manipulator., The WAM Arm is available in two main configurations, 4-degree-of-freedom and 7-degree-of-freedom, both with human-like kinematics., , Industry:Industrial Automation, Size:Unknown, TRL:Development (4-6),	Dismantling and Retrieval	www.barrett.com		Barrett Technology, **Address:** 73 Chapel Street, Newton, Massachusetts, United States, 02458, **Phone:** 617-252-9000, **Fax:** 617-244-9001, **Email:** service@barrett.com	Commercial

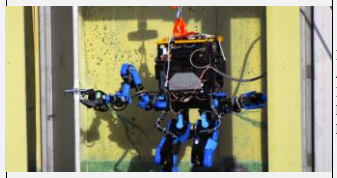
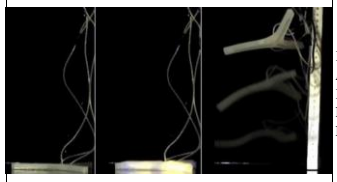
Waste Retrieval Module (WRM)	The Waste Retrieval Module (WRM) consists of two main parts: 1) The Retrieval Module consisting of the Argon inerted shielded containment, which houses the Retrieval Machine and the Cropping system; and 2) The Retrieval Module Maintenance room, which is situated above the Retrieval Module. The WRM retrieval machine incorporates a telescopic boom which extends into the Silo, collects waste in its grab which is raised and returned to the silo threshold, at this stage any retrieved waste protruding from the grab will be trimmed by the cropping system which is located on the west of the module in its containment housing. After cropping, the grab is withdrawn into the WRM, the retrieval machine is turned through 180 degrees and extends to the hoist well allowing the grab/waste to be lowered into the Waste Handling Module. The Maintenance Room houses a hoist unit for recovery and maintenance purposes of Retrieval Module equipment. Site:Sellafield, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6), TRL2:Development (4-6),	Dismantling and Retrieval	www.northwestprojects.co.uk		North West Projects Ltd, **Address:** Rutherford Point, Chorley, Lancashire, Not Available(UK), United Kingdom, PR7 7NA, **Phone:** 01257-231604, **Fax:** 01257-231969, **Email:** info@northwestprojects.co.uk	Commercial
Windscale advanced gas-cooled reactor (WAGR) remote dismantling machine (RDM)	The decommissioning plan encompassed a combination of remote, semi-remote and manual operations. The principle stages foreseen to undertake the remote work included:- a remotely operated remote dismantling machine (RDM) to deploy tools to dismantle the high dose components, a waste route through which to move the components, sort them, assay and grout, an interim storage facility for the grouted containers (boxes). The RDM consisted of two handling systems deployed beneath a turntable mounted at the reactor operating floor level. The first system was an extendable mast from which a remotely controlled manipulator was suspended. The second system consisted of a series of suspended crane rails that enabled a 3 tonne hoist to travel across the reactor vault into the adjacent cells. A two storey building mounted above the turntable provided access for tool changing and maintenance. , Site:Sellafield, Industry:Nuclear, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Dismantling and Retrieval			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
A2 Compliant Arm	The Meka A2 Compliant Arm is a lightweight seven degree-of-freedom force controlled arm. Designed to match the size and shape of a small adult, it is the ideal platform for researchers interested in manipulation for human environments. The A2 nearly matches the scale and workspace of a human arm. It features high-strength force-controlled actuators, intrinsic physical compliance, zero-backlash Harmonic Drive gearheads, and the Meka M3 real-time manipulation control system. The A2 is available as a single arm or as a bimanual manipulator. It provides plug-and-play support for the T2 Humanoid Torso, S2 or S3 head, and the G2 or H2 hand., , Industry:Research, Size:Unknown, TRL:Research (1-3),	Other			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Adaptive Robot Gripper - (2-Finger)	Compact and flexible this 85 mm of stroke 2-Finger Adaptive Robot Gripper has been designed to give industrial automation the flexibility needed to automate processes including a high-mix of parts. Fully programmable, this robotic gripper can handle a wide variety of parts through three distinct gripping modes: parallel grip, encompassing grip and inside pick. Industry:Industrial Automation, Size:Unknown, TRL:Operational (9),	Other	www.robotiq.com		Robotiq , **Address:** 966 Chemin Oliver , St-Nicolas, Not Available(Canada), Canada, G7A 2N1, **Phone:** 888-762-6847, **Fax:** 418-800-0046, **Email:**	Commercial

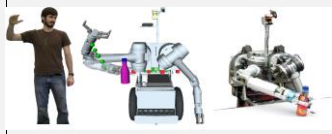
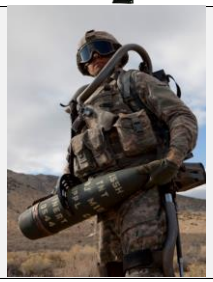
Aero DRC	The Aero DRC is a highly mobile robot with 4 legs that are able to rotate 4 degrees each, 2 arms with 7 degrees of rotation, 2 hands with 2 degrees of rotation, a hip with 3 degrees of rotation, and a neck with 3 degrees of rotation. It weighs 50 kg and has a height of 160 cm.	Other	www.u-tokyo.ac.jp/en		University of Tokyo, **Address:** 7-3-1 Hongo, Tokyo, Not Available(Japan), Japan, 113-8654, **Phone:** +81-3-5452-5382, **Fax:** N/A, **Email:** N/A	Research
Alice	The Alice is a very small "sugarcube" mobile robot (2x2x2cm) developed at the Autonomous Systems Lab (ASL) at the EPFL in Lausanne. It was designed with the following goals:, * Design an intelligent mobile robot as cheap and small as possible, * Study collective behavior with a large quantity of robots, * Acquire knowledge in highly integrated intelligent system, * Provide a hardware platform for further research, , Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Other	lis.epfl.ch/		Laboratory of Intelligent Systems (LIS), **Address:** EPFL-STI-IMT-LIS, Lausanne, Not Available(Switzerland), Switzerland, CH-1015, **Phone:** +41 21 693 59 66, **Fax:** +41 21 693 58 5, **Email:** webmaster@epfl.ch	Commercial
Anna Konda	A snake robot that has hydraulic pumps and nozzles that shoot water from the machine's front end. The robot is designed to fight fires in small space that may be too dangerous for people. Industry:Emergency Response, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Other	www.sintef.no/home/		Sintef, **Address:** Stiftelsen SINTEF , Trondheim, Not Available(Norway), Norway, 4760, **Phone:** +47 73 59 30 00, **Fax:** +47 73 59 33 50, **Email:** info@sintef.no	Commercial
Atlas - The Agile Anthropomorphic Robot	Atlas is a high mobility, humanoid robot designed to negotiate outdoor, rough terrain. Atlas can walk bipedally leaving the upper limbs free to lift, carry, and manipulate the environment. In extremely challenging terrain, Atlas is strong and coordinated enough to climb using hands and feet, to pick its way through congested spaces. Articulated, sensate hands will enable Atlas to use tools designed for human use. Atlas includes 28 hydraulically-actuated degrees of freedom, two hands, arms, legs, feet and a torso. An articulated sensor head includes stereo cameras and a laser range finder. Atlas is powered from an off-board, electric power supply via a flexible tether. Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Other	www.bostondynamics.com		Boston Dynamics, **Address:** 78 Fourth Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 617-868-5600, **Fax:** 617-868-5907, **Email:** info@BostonDynamics.com	Commercial
Autonomous Intelligent Systems (AIS) Project	The Reconfigurable Autonomy Project aims to deliver:, - An open-source rational agent architecture that controls autonomous decision-making, - An architecture that is re-usable and generic, and can be reconfigured for many different autonomous platforms, - A verifiable core that is dynamically reconfigurable for mission goals, capabilities and control sub-systems, - Hardware can be exchanged /removed / added at run time Project started December 2012. Site:Sellafield, Industry:Other, Size:Not Applicable, TRL:Research (1-3), TRL2:Research (1-3),	Other	www.sellafieldsites.com/	BAE SYSTEMS, NATIONAL NUCLEAR LABORATORY, Network Rail, Schlumberger, EPSRC, Sellafield Ltd, [dstl], SCISYS, UK SPACE AGENCY	Sellafield Ltd., **Address:** Sellafield, Seascale, Cumbria , Not Available(UK), United Kingdom, CA20 1PG, **Phone:** 440-194-672-8333, **Fax:** 440-194-672-8987, **Email:** mark.dowson@sellafieldsites.com	Commercial

Autonomous Robotic Manipulation (ARM)	DARPA's four-year, multi-track Autonomous Robotic Manipulation (ARM) program aims to develop software and hardware that enables a robot to autonomously manipulate, grasp, and perform complicated tasks with humans providing only high-level supervision. The ARM robot will be able to adapt to unstructured, dynamic environments. Over the course of the program in the Software Track, funded performers will develop algorithms that enable the DARPA robot to execute these numerous tasks. In the Hardware Track, funded performers will develop robust, low-cost multi-fingered hands to perform these tasks. DARPA is also providing public access to an identical robot in the Outreach Track, allowing anyone the opportunity to write software for the ARM robot to complete similar grasping and manipulation challenges., , Industry:Defense/Homeland Security, Size:Unknown, TRL:Research (1-3),	Other	darpa.mil		DARPA, **Address:** 675 North Randolph Steet, Arlington, Virginia , United States, 22203, **Phone:** 703-526-6630, **Fax:** N/A, **Email:** N/A	Commercial
Autonomous Solutions Unmanned Heavy Equipment	Specializing in unmanned ground systems for automated or remote control farming and mining equipment. Universal components install easily in most vehicle platforms and improve operational safety and productivity. Industry:Agriculture, Size:Not Applicable, TRL:Operational (9),	Other	www.asirobots.com		Autonomous Solutions, Inc, **Address:** 990 North 8000 West, Mendon, Utah, Australia, 84325, **Phone:** 866-881-2171 , **Fax:** NA, **Email:** support@asirobots.com	Commercial
Ava 500 Video Conferencing Robot	The Ava 500 is a telepresence platform that can make maps and navigate around buildings by itself without running over people. It delivers high-definition, industry-standard video and unprecedented ease of use. The remote user schedules and controls Ava 500 using an iPad, selecting the destination by tapping a location on a map or by choosing a location or employee name. At the time of the meeting, the robot autonomously navigates its way to the desired location and initiates the call using a Cisco TelePresence EX60. Industry:Other, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Other	www.irobot.com		iRobot, **Address:** 8 Crosby Drive, Bedford, Massachusetts, United States, 01730, **Phone:** 781-430-3000, **Fax:** 781-430-3001, **Email:** NA	Commercial
Bionic Handling Assistant with FinGripper	Pneumatic "soft" robot that mimics an elephant's trunk. Combined with the FinGripper gripping tool that uses conforming polymer fingers for handling delicate objects. Industry:Research, Size:Unknown, TRL:Research (1-3),	Other	www.festo.com		Festo Corporation, **Address:** Ruiter Straße 82, Esslingen/Berkheim, Not Available(Germany), Germany, 73734, **Phone:** +49 (0) 711-347-0, **Fax:** NA, **Email:** info_de@festo.com	Commercial
CarryPro	Swisslog's CarryPro Automated Guided Vehicle (AGV) systems dynamically store and retrieve SKUs to supply pallets to and from robot layer picking or palletizing systems. Industry:Logistics, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9),	Other	www.swisslog.com		Swisslog Holding AG, **Address:** Webereiweg 3 5033, Buchs, Not Available(Switzerland), Switzerland, N/A, **Phone:** +41 62 837 9537, **Fax:** +41 62 837 9510, **Email:** info@swisslog.com	Commercial

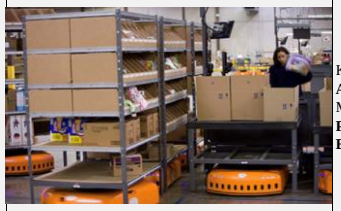
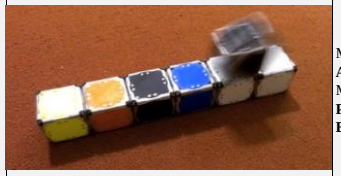
Charli Robot (Virginia Tech)	CHARLI is a full-size autonomous humanoid robot. It's mechanical design has allowed experimentation into the effects of different mechanical configurations, mostly in the legs, on the performance of bipedal walking and balancing. CHARLI is capable of walking in all directions as well as turning, kicking, and performing gestures and simple upper body manipulation tasks. A variety of hands and grippers have been experimented with for various objects or goals., , Industry:Research, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Other	www.me.vt.edu/bmdl/		Virginia Tech, **Address:** 310 Durham Hall, Blacksburg, Virginia , United States, 24061, **Phone:** 540-231-0745, **Fax:** 540-231-2903, **Email:** spriya@vt.edu	Commercial
CHIMP	CHIMP (CMU Highly Intelligent Mobile Plaform) is a semi-autonomous, high degree of freedom robot performing work in a human engineered environment. CHIMP is a humanoid robot but is differentiated by tracks on each of its four limbs. This enables it to travel in varied environments without the control challlenges of bipedal locomotion, while enabling it to interface with elements designed for human use (ladders, valves, door handles, etc.). Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Other	www.nrec.ri.cmu.edu		National Robotics Engineering Center (NREC) at Carnegie Mellon, **Address:** Ten 40th Street, Pittsburg, Pennsylvania, United States, 15201, **Phone:** 412-681-6900, **Fax:** 412-681-6961, **Email:**	Commercial
Cog-Burn	Cog-Burn is an autonomous quadruped robot that was developed to assist first responders in national emergencies. It has 34 electro servo motors that allows the robot to maneuver across difficult terrain as well as use its 2 arms and hands. It weighs 59.5248 lbs (27 kg) and has a height of 122 cm.	Other	www.gritrobotics.co/		Grit Robotics, **Address:** N/A, N/A, Not Available, United States, N/A, **Phone:** (970) 462-7280, **Fax:** N/A, **Email:** karl.castleton@gmail.com	Commercial
DRC - HUBO	DRC-HUBO is the latest version HUBO, the "HUmanoid roBOt." The robot is redesigned to be more powerful and more capable. The walking algorithm for the new design was rewritten. Every joint motor was made more powerful. All motors that handle a higher workload are equipped with air cooling. The hands are stronger to handle various tasks in a disaster situation. It can also transform from a standing position (used for biped walking), to a kneeling pose (used for wheeled and fast motion).	Other	www.kaist.edu		KAIST, **Address:** 291 Daehak-ro, Daejeon, Not Available(South Korea), South Korea, 34141, **Phone:** +82 042-350-2114, **Fax:** +82 042-350-2210, **Email:** N/A	Commercial
Ekso Bionic Suit	Ekso™ is a wearable bionic suit which enables individuals with any amount of lower extremity weakness to stand up and walk over ground with a natural, full weight bearing, reciprocal gait. Walking is achieved by the user's weight shifts to activate sensors in the device which initiate steps. Battery-powered motors drive the legs, replacing deficient neuromuscular function. Industry:Healthcare/Medical, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Other	www.eksobionics.com		Ekso Bionics, **Address:** 1414 Harbour Way South, Richmond, California, United States, 94804, **Phone:** 510-984-1761, **Fax:** 510-927-2647, **Email:** HDarling@eksobionics.com	Commercial

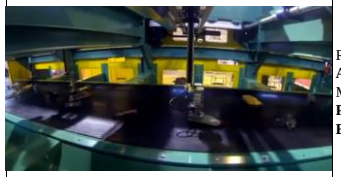
Empire Robotics VERSABALL Gripper	The VERSABALL gripper comprises a bead-filled bladder that conforms to the shape of any object it it pushed against. Once in place, a negative pressure is applied to the bladder that both causes the beads to lock together and the bladder to constrict slightly around the object, thus gripping it. Industry:Other, Size:Unknown, TRL:Research (1-3),	Other	empirerobotics.com		Empire Robotics, Inc., **Address:** 12 Channel St. Suite 202, Boston, Massachusetts, United States, 02210, **Phone:** NA, **Fax:** NA, **Email:** info@empirerobotics.com	Commercial
E-Whiskers	Whiskers are hairlike tactile sensors used by certain mammals and insects to monitor wind and navigate around local obstacles. Here, we demonstrate artificial electronic whiskers that can respond to pressures as low as 1 Pa with high sensitivity. The active component is based on composites of carbon nanotubes and silver nanoparticles that are painted on high-aspect-ratio fibers. The resistivity of the composite films is highly sensitive to mechanical strain and can be readily tuned by changing the composition ratio of the components. As a proof of concept, arrays of electronic whiskers are fabricated for real-time two- and three-dimensional gas-flow mapping with high accuracy. This work may enable a wide range of applications in advanced robotics and human–machine interfacing. Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3),	Other	www.lbl.gov/		Lawrence Berkeley National Laboratory, **Address:** 1 Cyclotron Road Mail Stop , Berkeley, California, United States, 94720, **Phone:** 510-486-4000, **Fax:** N/A, **Email:** N/A	Commercial
Exoatlet P-1 Exoskelton Frame	The Exoatlet P-1 passive exoskeleton, a powered frame that fits around a human, boosting his muscles so that he can carry a load of up to 220 pounds (100kg). It's especially designed for soldiers meant to carry heavy assault shields. Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Other	www.exoatlet.com		Exoatlet, **Address:** Send 9A, Bolshoy Savvinsky lane, , Moscow, Not Available(Russia), Russia, 119435, **Phone:** +7 (495) 374-85-30, **Fax:** NA, **Email:** info@exoatlet.ru	Commercial
ExoHand	Extension of the master-slave manipulator concept, designed to replicate the form and functionality of the human hand, including force feedback. Eight pneumatic actuators move the exoskeleton. Sensors record the forces, angles and distances. Servopneumatic open- and closed loop control algorithms allow precise movement of the individual finger joints. The ExoHand thus supports the various possibilities for gripping and touching which a human hand has. The pneumatic components allow highly flexible and ergonomic control of the individual finger joints. High forces can thus be transmitted precisely in a small space and with a low weight without the system becoming rigid and restrictive. This flexibility is crucial in human-machine interaction, as it minimises the risk of injury., , Industry:Research, Size:Unknown, TRL:Research (1-3),	Other	www.festo.com		Festo Corporation, **Address:** Ruiter Straße 82, Esslingen/Berkheim, Not Available(Germany), Germany, 73734, **Phone:** +49 (0) 711-347-0, **Fax:** NA, **Email:** info_de@festo.com	Commercial
Famibot	As long as you connect your appliances to Famibot's intelligent receptacles, you can control them with your cell phone. With peripherals, every household appliance can be on the command of your cell phone, such as turning ON/OFF your lights, air conditioner, TV, radio, etc. Famibot provides various entertainment functions. Either talk to your cell phone or press the button on the remote control and Famibot will play music, news, weather report, opera, story time, etc. at your command. Industry:Consumer, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Operational (9), Tether:No tether - Endurance Unknown,	Other	www.ecovacs.com/home.html		Ecovacs Robotics, Inc. , **Address:** 220 Market Ave. S. Suite 1120, Canton, Ohio, United States, 44702, **Phone:** 888-966-0895 , **Fax:** N/A, **Email:** daniel.chen@ecovacs.com	Commercial

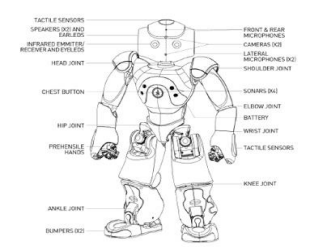
Gamma Programme	The aim of the Growing Autonomous Mission Management Applications (GAMMA) Programme is to develop existing software applications (‘apps’), which may also be supported by sensor integration, for managing autonomous systems for unmanned vehicles. There is £1.7m worth of Regional Growth Funding to support SME Activity in the Programme, with Companies expected to provide around 30% match through in kind contribution. Lead Partners include:- North West Aerospace Alliance (NWAA), BAE Systems, Universities of Manchester, Lancaster, Salford, Liverpool, UCLAN, Liverpool (including the Virtual Engineering Centre), National Nuclear Laboratories Limited and also supported by Lancashire County Council. GAMMA is intended to grow the UK’s industrial base by supporting the development of novel ‘software applications’ for autonomous systems., , Industry:Other, Size:Not Applicable, TRL:Research (1-3),	Other	www.aerospace.co.uk/		North West Aerospace Alliance, **Address:** Units 9 & 10, Preston, Lancashire, Not Available(UK), United Kingdom, PR5 6BL, **Phone:** 01772-648800, **Fax:** NA, **Email:** contactus@aerospace.co.uk	Commercial
Google Schaft S-One	Google’s Schaft humanoid robot scored 27 points and won first place in the 2013 DARPA challenge. It navigated an obstacle course which was made to simulate a disaster area, while carrying out a series of tasks. Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6),	Other			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
GP8 Pallet Truck - Vision-Guided Robotic Pallet Truck	The unmanned GP8 single or double length pallet truck transports palletized goods using Seegrid’s patented vision-guided technology. Position the GP8 forks under the pallets you want to move, input the route on the keypad, and the flexible AGV travels without wire, laser, tape, or magnet. No facility or environment changes are required for Seegrid robots to navigate. The vision-guided technology allows the GP8 pallet truck to use the existing infrastructure to map its guidance path. Industry:Logistics, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Other	www.seegrid.com		Seegrid, **Address:** 216 RIDC Park West Dr., Pittsburgh, Pennsylvania, United States, 15275, **Phone:** 412-379-4500, **Fax:** NA, **Email:** nsales@seegrid.com	Commercial
HAL Robotic Exoskeleton	The Hybrid Assistive Limb (HAL) exoskeleton, developed by the University of Tsukuba spin-off Cyberdyne, is being considered for first responders. For protection, the suit incorporates tungsten shielding which reduces radiation exposure by about 50 percent, as well as a cooling system to prevent heatstroke. Much of the weight of the suit, including tools used for repairing damaged pipes, can be carried by the exoskeleton's legs. Vital signs such as heart rate and body temperature will also be measured in real-time., , Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Other	www.cyberdyne.jp		CYBERDYNE Inc., **Address:** 305-0818, Tsukuba, Not Available(Japan), Japan, 305-0818, **Phone:** +81-29-855-3189, **Fax:** +81-29-855-3181, **Email:** biz@cyberdyne.jp	Commercial
Harvard Soft Bodied Robot	DARPAs initiative to build soft-bodied robots that can squeeze into hard-to-reach places has led to the development of new types of the mechanical marvels. Harvard's Whitesides Research Group is working on a soft-bodied solution and has produced a squishy three-legged bot that can jump 30 times its height using the power of internal explosions. Industry:Research, Size:Unknown, TRL:Research (1-3),	Other	www.harvard.edu		Harvard University, **Address:** Massachusetts Hall, Cambridge, Massachusetts, United States, 02138, **Phone:** 617-495-1000, **Fax:** NA, **Email:** NA	Research

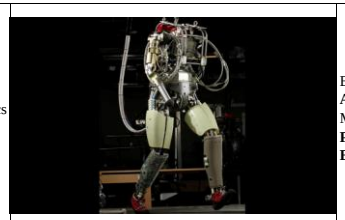
HERB: Assistive Teleoperation / Manipulation Planning Optimization	HERB is a test bed used by Carnegie Mellon University for studying robot control strategies. In assistive teleoperation, the robot helps the user accomplish the desired task, making teleoperation easier and more seamless. The robot attempts to predict the user's intent, and assists in accomplishing it., , Industry:Research, Size:Unknown, TRL:Research (1-3),	Other	ri.cmu.edu		The Robotics Institute (Carnegie Mellon University), **Address:** 5000 Forbes Avenue, Pittsburgh, Pennsylvania, United States, 15213, **Phone:** 412-268-3818, **Fax:** 412-268-6436, **Email:** robotics@ri.cmu.edu	Research
HKU - Atlas	The robot is 187 cm tall and weighs 175 kg. It has following features:,- 2 Fisheye cameras, - Secure wireless network router, - 3.7-kilowatt-hour lithium-ion battery pack, - 30 degrees of freedom (DOF) - 24 hydraulic actuators & 6 electric motors, - Six-axis force/torque sensor, - Multisense head (3D laser scanner & stereo camera), - Perception computer (3 Intel Core i7 Processor), - Robotiq 3-finger adaptive robot gripper, - Software - Linux operating system with ROS (Robot Operating System), - Inertial measurement unit (IMU), - Strain gauge pressure sensor,	Other	www.hku.hk/		University of Hong Kong, **Address:** University of Hong Kong, Pokfulam, Not Available(Hong Kong), Hong Kong, n/a, **Phone:** (852) 2859 2111, **Fax:** (852) 2858 2549, **Email:** robotics@hku.hk	Research
HRP- 2 Promet	HRP-2 is the final robotic platform for the Humanoid Robotics Project. The total robotic system was designed and integrated by Kawada Industries, Inc. together with the Humanoid Research Group of National Institute of Advanced Industrial Science and Technology (AIST). Special Features:,-Many DOF system despite light weight construction: 154 cm Height, 58 kg Mass, and 30 DOF.,-Cantilevered crotch joint structure allows for walking in confined area. -Highly compact electrical system packaging to forgo a "backpack".,-Experiments to realise "walking on uneven surfaces," "tipping-over control," "getting up from a fallen position," and "human-interactive operations in open spaces" are planned.,-Users will be able to develop application software due to open architecture. Specifications:,Dimensions Total Height : 1,540mm, Total Width : 620mm,Mass (including batteries) 58kg,Degrees of Freedom 30 axes,Walking Speed 0~2km/h,Hand Grip 2kgf (per hand) Sensors: Torso - 3-axes vibration gyro 3-axes velocity sensor, Sensors: Arms - 6-axes force sensors, Sensors: Legs - 6-axes force sensors, Motor Drivers: 48V 20A (I max) 2 axes / driver x 16, Power System: NiMH Battery DC 48V 14.8Ah	Other	global.kawada.jp/mechatronics/index.html		KAWADA Industries, Inc., **Address:** 1-3-11 Takinogawa, Kita-Ku, Tokyo, Not Available(Japan), Japan, 114-8562, **Phone:** 81 3 3915 4617, **Fax:** 81 3 3915 4677, **Email:** info@kawada.co.jp	Commercial
HRP2+	HRP2+ is a humanoid robot specifically meant for disaster response tasks and uses biped locomotion for rough terrain. It can manipulate objects while supporting itself with a hand. Its weight is 143.3 lbs (65 kg) and its height is 170 cm.	Other	http://www.aist.go.jp/index_en.html		National Institute of Industrial Science and Technology (AIST), **Address:** 1-3-1 Kasumigaseki, Chiyoda-ku, Tokyo, Not Available(Japan), Japan, 100-0013, **Phone:** 81-3-5501-0900, **Fax:** N/A, **Email:**	Commercial
Hulc	The Human Universal Load Carrier (HULC) is an exoskeleton being developed by Lockheed Martin for dismounted soldiers. The hydraulically-powered HULC enables soldiers to carry heavy loads with minimal strain on their body. The system is expected to reduce musculoskeletal injuries that occur in soldiers due to lifting of loads. The HULC enables soldiers to carry loads up to 200lb (91kg). The weight of the load gets transferred to the ground through the shoes of the exoskeleton. This ensures the weight doesn't shift to the soldier's body, hampering his movement. The exoskeleton is suitable for use on any terrain. Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6),	Other	www.lockheedmartin.com/us.html		Lockheed Martin Corporation, **Address:** 6801 Rockledge Drive, Bethesda, Maryland , United States, 20817, **Phone:** 301-897-6000, **Fax:** N/A, **Email:** N/A	Commercial

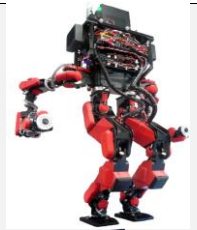
Hydra	Hydra has 41DOF in total: including 30DOF for limbs and waist, 10DOF for two hands, and 1DOF for the neck. Hydra is a new type of humanoid robot actuated by electro-hydraulic actuators (40 of the 41DOF). The actuators were developed to make a force-sensitive robot at the University of Tokyo. The height of Hydra is 180 cm and weight is s 110 kg.	Other	www.u-tokyo.ac.jp/en		University of Tokyo, **Address:** 7-3-1 Hongo, Tokyo, Not Available(Japan), Japan, 113-8654, **Phone:** +81-3-5452-5382, **Fax:** N/A, **Email:** N/A	Research
IHMC Robot	The IHMC robot was designed for the DARPA Robotics Challenge to meet the following challenges: Drive:, 1) getting into the car,, 2) Driving through the first gate just in front of the car where it started,, 3) Driving through the gate at the end of the road, and, 4) Exiting the vehicle and passing through the last gate. Walk: Walk through a gate after level terrain, then a mudpit, hills and a field with many cinder blocks. Hose:, 1) pick up a hose from off a table,, 2) align and insert the hose into the standpipe,, 3) screw the hose into the standpipe, and, 4) turn on the valve.	Other	robots.ihmc.us/		Institute for Human and Machine Cognition (IHMC), **Address:** 40 S Alcaniz Street, Pensacola, Florida , United States, 32502, **Phone:** 850-202-4480, **Fax:** N/A, **Email:** jsheppard@ihmc.us	Commercial
Inveritas	The purpose of the project is to develop technologies for the construction of what are known as servicing robots – spacecraft capable of capturing end-of-life satellites and large pieces of space debris. Once they have been captured, the satellites can either be repaired or guided into a controlled re-entry trajectory. The particular focus is on multimodal sensor data processing which is required to read, process and merge the complex data delivered by diverse sensor systems and correlate this information in a functional context, including 3D image data. There is no single sensor that we can use to manage all of the necessary operations, from locating the satellite to defining the approach path,. This is a task that requires the use of several camera systems, supplemented by a LIDAR laser detection and radar scanner, and possibly a radar system. Industry:Space, Size:Unknown, TRL:Research (1-3),	Other	www.astrium.eads.net		Astrium-EADS, **Address:** 16055, Space Center, Houston, Texas, United States, 77062, **Phone:** n/a, **Fax:** n/a, **Email:** n/a	Commercial
Johnny 05	Johnny 05 is a humanoid disaster response robot known for its advanced legged locomotion and easily removable/repairable hardware parts. The development of its hand allows it to easily grasp objects. Its weight is 121.25 lbs (55 kg) and its height is 147 cm.	Other	www.informatik.tu-darmstadt.de/en/department/		Technische Universität Darmstadt, **Address:** Karolinenpl. 5, Darmstadt, Not Available(Germany), Germany, 64289 , **Phone:** +49 6151 16-3406, **Fax:** +49 6151 16-5550, **Email:** informatik.tu-darmstadt.de	Commercial
Kinova robotic manipulators	Kinova produces the Jaco manipulator arm. JACO rehab edition is an assistive robot arm for upper body disabled persons in power wheelchair. Industry:Engineering, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Demonstration (7-8),	Other	www.kinovarobotics.com/		Kinova Robotics, **Address:** 6110, rue Doris-Lussier, Boisbriand (Quebec), Not Available(Canada), Canada, J7H 0E8, **Phone:** 514-277-3777, **Fax:** NA, **Email:** rehab@kinovarobotics.com	Commercial

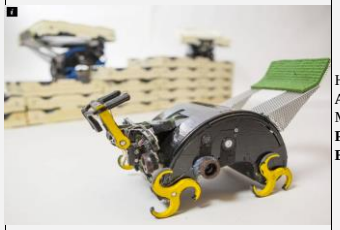
Kiva Robots	Used for warehouse automation (Amazon). Essentially powered caster modules. Kiva has two models of robots. The smaller model is approximately 2 feet by 2.5 feet, and one foot high and capable of lifting 1000 pounds. The larger model can carry pallets and loads as heavy as 3,000 pounds. The maximum velocity of a robot is 1.3 meters per second. The robots navigate around the warehouse using an onboard camera to read barcode stickers on the warehouse floor. They communicate wirelessly to computer servers that run order-processing software and deliver directions. Note: Google have recently acquired a company that provides similar robots (Holomni), , Industry:Logistics, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9),	Other	kivasystems.com		KIVA Systems, **Address:** 300 Riverpark Drive, North Reading , Massachusetts, United States, 01864, **Phone:** 781-221-4640, **Fax:** 781-221-3077, **Email:** info@kivasystems.com	Commercial
LS3 - Legged Squad Support Systems	LS3 is a rough-terrain robot designed to go anywhere Marines and soldiers go on foot, helping carry their load. Each LS3 carries up to 400 lbs of gear and enough fuel for a 20-mile mission lasting 24 hours. LS3 automatically follows its leader using computer vision, so it does not need a dedicated driver. It also travels to designated locations using terrain sensing andGPS. LS3 began a 2-year field testing phase in 2012. LS3 is funded by DARPA and the US Marine Corps. Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Other	www.bostondynamics.com		Boston Dynamics, **Address:** 78 Fourth Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 617-868-5600, **Fax:** 617-868-5907, **Email:** info@BostonDynamics.com	Commercial
M Blocks	Self-propelled robotic cubes that can form into structures. Along with electronics that allow them to orient themselves relative to one another, each cube also contains a motor-driven flywheel, that spins at speeds of up to 20,000 rpm. When that flywheel suddenly brakes, the transfered momentum sends the cube flying in the direction that the wheel was spinning. Because the cubes additionally have magnets on each of their faces, they stick to one another when they make contact, until the flywheel in one sends it on its way again. In their current prototype form, the M-Blocks can roll across the ground, jump into the air, climb over each other, and even move while suspended upside-down., , Industry:Research, Size:Unknown, TRL:Research (1-3),	Other	web.mit.edu/		Massachusetts Institute of Technology (MIT), **Address:** 77 Massachusetts Avenue, Cambridge, Massachusetts, United States, 02139, **Phone:** 617-253-2700, **Fax:** not applicable, **Email:** tele-info@mit.edu	Commercial
M1 Mobile Manipulator	The M1 is an integrated and customizable mobile manipulation platform. It was inspired by the successful design of the Georgia Tech robot named Cody. It features compliant force control throughout its body, a customizable sensor head, durable and strong grippers, and a small footprint omnidirectional base. Industry:Research, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Other			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
Makr Shakr	Makr Shakr is a new robotic bartending system that allows users to create, in real-time, personalized cocktail recipes through a smart phone application and transform them into crowd-sourced drink combinations. The cocktail creation is assembled by three robotic arms, whose movements - visualized on a large display positioned behind the bar - mimic the actions of a bartender, from the shaking of a martini to the thin slicing of a lemon garnish. The system explores the new dynamics of social creation and consumption - 'design, make and enjoy' - and in just the time needed to prepare a new cocktail. Industry:Other, Size:Very Large (>100kg/200lb, >120cm/48in),	Other	web.mit.edu/		Massachusetts Institute of Technology (MIT), **Address:** 77 Massachusetts Avenue, Cambridge, Massachusetts, United States, 02139, **Phone:** 617-253-2700, **Fax:** not applicable, **Email:** tele-info@mit.edu	Commercial

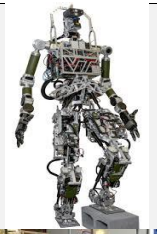
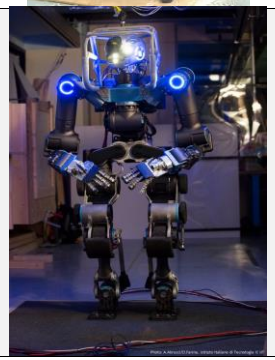
Metal Rebel	Metal Rebel is a full-sized humanoid robot with enhanced limbs for durability. A new feature is a 3-fingered hand, added for stronger grasps.	Other	www.drexel.edu/		Drexel University, **Address:** 3141 Chestnut, St Philadelphia, Pennsylvania, United States, 19104, **Phone:** (215) 895-2000, **Fax:** N/A, **Email:**	Research
MIT DRC	MIT DRC is a robot built by MIT for the Darpa Robotics Challenge. The MIT DRC robot can balance its body in a wide variety of postures and can remain balanced with significant unmodeled disturbances.The robot has a state estimation tool which combines information from the robot's joint position sensors, its onboard accelerometer and gyroscopes, and its laser rangefinder to determine the robot's state with little or no drift. This enables accurate, repeatable foot placement, and even allows the robot to accurately track its state without any contact with the ground. Additional information on the MIT DRC robot.	Other	web.mit.edu/		Massachusetts Institute of Technology (MIT), **Address:** 77 Massachusetts Avenue, Cambridge, Massachusetts, United States, 02139, **Phone:** 617-253-2700, **Fax:** not applicable, **Email:** tele-info@mit.edu	Commercial
Momaro	Momaro consists of an anthropomorphic upper body on a flexible hybrid mobile base. Its locomotion concept is based on four compliant legs which end in pairs of directly driven, steerable wheels. This allows for omnidirectional driving on rugged terrain and for adjusting the height of the upper body. To overcome larger obstacles and to climb stairs, individual legs are lifted and the robot makes steps. The upper body consists of two adult-sized anthropomorphic arms with seven degrees of freedom each. The robot grippers have four individually controllable fingers with two joints each. The robot upper body can be twisted relative to the base, to extend the manipulation work space. Momaro is equipped with a sensor head consisting of a continuously rotating 3D laser scanner, which produces a spherical field-of-view, eight RGB-D cameras with an omnidirectional field-of-view, three full HD color cameras for a panoramic operator view, and a top-down wide angle camera. In addition, the robot can sense joint positions and torques and is equipped with an inertial measurement unit. The operator station supports various 3D visualizations of the robot in its environment, panoramic and top-down video, and the interactive configuration of semi-autonomous locomotion and manipulation skills.	Other	www.ais.uni-bonn.de/nimbro/Rescue/		Autonomous Intelligent Systems, **Address:** Römerstraße 164, Bonn, Not Available(Germany), Germany, 53117 , **Phone:** +49-(0)228-73-4603, **Fax:** +49-(0)228-73-4, **Email:** behnke@cs.uni-bonn.de	Commercial
Moonbuggy	Multipurpose, quiet, surveilance UGV for use in chemical spill incidents, radiation contam incidents, or areas where human intervention is restricted. It can also be used for perimeter fence patrols on airfields etc. All steel construction with design life of 10 years. Component reliability and minimum maintenance requirements are key features. Tele-operation 2 miles +, Thermal imaging, Max speed up to 20mph., Six wheel drive skid steer. Site:Sellafield, Industry:Emergency Response, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9), TRL2:Operational (9),	Other	www.moonbuggy.com		Smith Engineering Ltd, **Address:** Solway Industrial Estate, Maryport, Cumbria , United Kingdom, CA15 8NF , **Phone:** 44 (01) 01900 815831, **Fax:** 44 (0) 1900 815553, **Email:** r.smith@moonbuggy.com	Commercial
Municipal waste sorting machines	Sorting machines in action at RWM 2012 (Resource Efficiency and Waste Management). Industry:Other, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Other			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial

NAO	NAO is a programmable, 58cm tall humanoid robot. Body with 25 degrees of freedom (DOF) whose key elements are electric motors and actuators. Sensor network, including 2 cameras, 4 microphones, sonar rangefinder, 2 IR emitters and receivers, 1 inertial board, 9 tactile sensors, and 8 pressure sensors. Various communication devices, including voice synthesizer, LED lights, and 2 high-fidelity speakers. Intel ATOM 1,6ghz CPU (located in the head) that runs a Linux kernel and supports Aldebaran's proprietary middleware (NAOqi). Second CPU (located in the torso). 27,6-watt-hour battery that provides NAO with 1.5 or more hours of autonomy, depending on usage., , Industry:Research, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Other	www.aldebaran-robotics.com		Aldebaran Robotics, **Address:** 43 rue du Colonel Pierre Avia, Paris, Paris, United States, 75015, **Phone:** 33-177-371-752, **Fax:** N/A, **Email:** N/A	Commercial
NASA JSC R5 "Valkyrie" DRC Robot	Valkyrie (officially designated "R5" by NASA) is a 1.9 meter tall, 125 kilogram, 44 degree of freedom, battery-powered humanoid robot. Valkyrie has seven degree of freedom arms with actuated wrists and hands, each with three fingers and a thumb. It has a head that can tilt and swivel, a waist that can rotate, and six degree of freedom legs complete with feet equipped with six-axis force-torque sensors. A removable battery in its backpack is good for about an hour of activity, and a human can swap in a fresh battery for a spent one in a matter of minutes. Also removable are Valkyrie's limbs: in just a few more minutes, a damaged arm can be swapped out for a new one. Industry:Space, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Other	www.nasa.gov/centers/johnson/home		NASA, **Address:** 2101 NASA Parkway, Houston, Texas, United States, 77058, **Phone:** 281-483-5111, **Fax:** n/a, **Email:**	Commercial
Navia	Navia is an innovative mobility solution: a robotic driverless electric vehicle carrying up to eight passengers. Navia has been designed to complement conventional transport (public or private) by taking care of the "last mile" (and the first). Navia is the ideal companion for those environments that need a simple, safe and environment-friendly mobility solution: pedestrianized city centers, large industrial sites, airports, theme parks, university campuses or hospital complexes. Industry:Transportation, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Other	induct-technology.com/en/products/navia		Induct Technology, **Address:** 103 Chemin de Ronde , Croissy-sur-Seine , Not Available(France), France, 78290, **Phone:** +33 (0)1.39.76.34.39 , **Fax:** N/A, **Email:**	Commercial
NEDO - JSK	NEDO - JSK is 188 cm tall and weighs 110 kg. It was developed as a high power output humanoid robot. Features include the human like shape and kinematics, water cooled and high output motor drive system and a control system developed as open source software.	Other	www.u-tokyo.ac.jp/en		University of Tokyo, **Address:** 7-3-1 Hongo, Tokyo, Not Available(Japan), Japan, 113-8654, **Phone:** +81-3-5452-5382, **Fax:** N/A, **Email:** N/A	Research
Ocean-powered robotic jellyfish	Researchers have created a silicone submarinal robot that gets about by mimicking the motion of a jellyfish. The robot is powered by heat-producing reactions catalyzed by its surface, and using hydrogen and oxygen present in the water as fuel. It's claimed that that the Robojelly, (named by its Virginia Tech creators), could run indefinitely, drawing energy from the water in which it swims. Industry:Research, Size:Small (1-5kg/2lb-20lb, 10-30cm/4in-12in length), TRL:Research (1-3),	Other	www.me.vt.edu/bmdl/		Virginia Tech, **Address:** 310 Durham Hall, Blacksburg, Virginia , United States, 24061, **Phone:** 540-231-0745, **Fax:** 540-231-2903, **Email:** spriya@vt.edu	Commercial

Petman	PETMAN is an anthropomorphic robot designed for testing chemical protection clothing. Natural agile movement is essential for PETMAN to simulate how a soldier stresses protective clothing under realistic conditions. PETMAN balances itself and moves freely; walking, bending and doing a variety of suit-stressing calisthenics during exposure to chemical warfare agents. PETMAN also simulates human physiology within the protective suit by controlling temperature, humidity and sweating, all to provide realistic test conditions., , Industry:Defense/Homeland Security, Size:Unknown, TRL:Research (1-3),	Other	www.bostondynamics.com		Boston Dynamics, **Address:** 78 Fourth Avenue, Waltham, Massachusetts, United States, 02451, **Phone:** 617-868-5600, **Fax:** 617-868-5907, **Email:** info@BostonDynamics.com	Commercial
Prime Air	This robot is capable of shipping orders under five pounds (2.3 kg) after they are packed into small plastic containers and then scooped up by Amazon's custom-built "octocopter." The drone then delivers the package to customers within a 10 mile (16 km) radius of Amazon's fulfillment centers. Industry:Logistics, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Demonstration (7-8),	Other	www.amazon.com		Amazon, **Address:** 410 Terry Ave , N Seattle, Washington, United States, 98109, **Phone:** 206-266-1000, **Fax:** n/a, **Email:**	Commercial
Resyone	Panasonic's Resyone robotic bed transforms into an electric wheelchair Industry:Healthcare/Medical, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Other	www.panasonic.net/		Panasonic Corporation, **Address:** N/A, Kadoma, Osaka, Not Available(Japan), Japan, N/A, **Phone:** N/A, **Fax:** N/A, **Email:** N/A	Commercial
Rex	Exoskeleton designed for those with disabilities. Once fitted, users are able to navigate stairs and slopes, it enables them to get around at home, at work, or at play. Industry:Healthcare/Medical, Size:Large (20-100kg/40lb-200lb, 60cm-120cm/24in-48in), TRL:Operational (9),	Other	www.rexbionics.com/		Rex Bionics Plc., **Address:** 58 Apollo Drive, Auckland, Not Available(New Zealand), New Zealand, 0632, **Phone:** (+64) 9 440 9741, **Fax:** N/A, **Email:** info@rexbionics.com	Commercial
RoboEarth	A network and repository of data, where robots can share and learn from each other about the tasks they perform. The problem right now is that robots are often developed specifically for one task. Everyday changes that happen all the time in our environment make all the programmed actions unusable. RoboEarth lets robots learn new tasks and situations from each other. The system also allows computing to be carried out using its cloud engine, meaning that robots need not necessarily have the required processing power or store the information themselves. Data stored in RoboEarth includes software components, maps for navigation, task instructions and object recognition models., , Industry:Healthcare/Medical, Size:Unknown, TRL:Research (1-3),	Other	www.tue.nl/en/		Eindhoven University of Technology, **Address:** 5612 AJ Eindhoven, N/A, Not Available(Netherlands), Netherlands, N/A, **Phone:** 310-40-247-47-47, **Fax:** N/A, **Email:** N/A	Research

Robotic Hand	A novel, lightweight, low cost fluid powered robotic hand based on an innovative approach combining fluid power (hydraulics and pneumatics) with the structure fabricated using additive manufacturing (AM) technologies developed by Oak Ridge National Laboratory (ORNL) was selected for a 2012 R&D 100 award as one of the most technologically significant products introduced into the marketplace over the past year. The robotic hand is a manifestation of a broader basic technology using additive manufacturing to fabricate complex fluid-powered components and systems. Site:Oak Ridge, Industry:Nuclear, Size:Not Applicable, TRL:Development (4-6), TRL2:Development (4-6), Waterproof:Not Rated or Unknown, Payload:20-50kg/40-100lb, Reach:1800mm-2400mm/72in-96in,	Other	www.ornl.gov		Oak Ridge National Laboratory, **Address:** P.O. Box 2008, Oak Ridge, Tennessee , United States, 37831, **Phone:** 865-576-7658, **Fax:** 865-576-2081, **Email:** partnerships@ornl.gov	Commercial
Robotis - THORMANG	This robot was a finalist in the DARPA Robotics Challenge (driving cars, climbing ladders, turning the valve, etc). The features of Robotis - THORMANG:,- DYNAMIXEL PRO H series x 30 DOF (except gripper).,- LIDAR, Force-Torque sensor for unknown/dynamic environment. - DYNAMIXEL PRO SDK.,- 3D simulation environment. Data:,Height - 1.5m(4.92 ft),Weight - 49kg(108.03 lb),Joint - DYNAMIXEL (30DOF, excluding fingers),Control System - 1.65GHz Computer x 2 ,Recognition System (Sensor) - 6-axis force-torque sensor, FSR sensor, INS sensor, LIDAR, HD Camera,	Other	www.robotis.com/		Robotis, **Address:** 1 Technology Dr., Irvine, California, United States, 92618, **Phone:** 949-333-3635, **Fax:** 949-242-5112, **Email:** america@robotis.com	Commercial
Schaft Robots HRP3L-JSK	The Schaft robot is a 1.48m (4ft 11in) tall, two-legged robot. It makes use of a new high-voltage liquid-cooled motor technology that uses a capacitor, rather a battery, for power, which lets its arms move and pivot at higher speeds than would otherwise be possible, in effect giving it stronger "muscles"., , Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Research (1-3),	Other			Robotics Database, **Address:** 10555 West Flaglar Street Suite 2100, Miami, Florida , United States, 33174, **Phone:** 305-348-6603, **Fax:** n/a, **Email:** upadhyay@fiu.edu	Commercial
SNU - THORMANG	The robot can perform several tasks like driving, egress, operating a valve, opening & closing door, climbing stairs and useful in debris clearance.Data: Height 4ft 10in (1.47m). Weight 108lbs (49kg). Wingspan: 77in (1.95m)	Other	www.useoul.edu/		Seoul National University (SNU), **Address:** 1 Gwanak-ro, Seoul, Not Available(South Korea), South Korea, 151-742, **Phone:** 82-2-880-4447, **Fax:** 82-2-887-8658, **Email:** park73@snu.ac.kr	Research
Sphero	Sphero 2.0 is a remote controlled ball that moves when directed by a Smartphone or Tablet app. It's fast, traveling up to 7 feet per second. It lights up with different colors. It interacts with virtual and real environments and it learns how its user wants to control it. It can even travel across water. Industry:Consumer, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Operational (9),	Other	www.gosphero.com/		Orbotix, **Address:** 4772 Walnut St, Suite 206 , Boulder, Colorado , United States, 80301, **Phone:** 303-502-9466, **Fax:** not available, **Email:** info@orbotix.com.	Commercial

SWAP Pod	The Defence Advance Research Projects Agency (DARPA) plans to extend connectivity for forward military units with the use of small Wi-Fi-hosting drones. The aim of the Mobile Hotspots project is to provide a reliable, mobile source of bandwidth to all echelons of the military on a scale unthinkable using current methods. Industry:Defense/Homeland Security, Size:Medium (5-20kg/20lb-40lb, 30–60cm/12in-24in), TRL:Development (4-6), Tether:No tether - Endurance more than an hour,	Other	www.darpa.mil/default.aspx		Defense Advanced Research Projects Agency (DARPA), **Address:** 675 North Randolph Street, Arlington, Virginia , United States, 22203, **Phone:** 703-526-6630, **Fax:** 703-528-3655 , **Email:**	Commercial
Termes	Mini robots acting independently of one another but cooperating as a group to build the same structure, were inspired by the team effort of termite colonies that build 8-foot mud towers above their nests. The robots, called Termes, are as big as a child's lunchbox and move forward and backwards, and can turn and climb. They carry one brick at a time and drop it directly in front whenever they detect a spare place in the structure. Each robot obeys a predetermined set of "traffic rules" and keeps track on its own location with respect to an original "seed brick" that was used to start the structure. Industry:Research, Size:Tiny (<1kg/2lb, <10cm/4in useable length), TRL:Research (1-3), Tether:Unknown,	Other	www.harvard.edu		Harvard University, **Address:** Massachusetts Hall, Cambridge, Massachusetts, United States, 02138, **Phone:** 617-495-1000, **Fax:** NA, **Email:** NA	Research
THOR	THOR (Tactical Hazardous Operations Robot) was developed with collaboration between two research laboratories: RoMeLa at UCLA and GRASP at UPenn. THOR-RD (Rapid Deployment) is an advanced humanoid robot designed for disaster relief scenarios. A combination of sensors and advanced mechanical design helps THOR-RD to respond optimally to a variety of demanding conditions. The sensor and software package allows THOR-RD to create a virtual environment of its unknown surroundings in order to calculate a safe and efficient path to mitigate the situation. THOR-RD's humanoid form is designed for the human centric environments encountered in disaster areas. This form also allows for the use of human tools and mechanisms to aid in the completion of the objective at hand.	Other	www.romela.org/		Robotics & Mechanisms Laboratory (UCLA) , **Address:** UCLA Mechanical and Aerospace Engineering Department, Los Angeles, California, United States, 90095-1597, **Phone:** 310-825-4321, **Fax:** N/A, **Email:** dhong@vt.edu	Commercial
TRAC Labs Robot	TRAC Labs built this technology for the DARPA Robotics Challenge and reached the finals. Two broad strategies guided its approach through the virtual robotics challenge and trials: (1) rely on human intelligence for high-level decision making, and (2) treat the challenge primarily as a matter of system integration.	Other	traclabs.com/		TRACLabs, Inc., **Address:** 16969 North Texas Ave. Suite 300, Webster, Texas, United States, 77598, **Phone:** 281-461-7886, **Fax:** N/A, **Email:** info@traclabs.com	Commercial
Trooper	The Trooper robot was designed to compete in the DARPA Robotics Challenge with abilities to drive a vehicle, walk across difficult terrain, attach a hose connector to a spigot, turn a valve, remove debris blocking an entryway, climb an industrial ladder, and open a door to enter a building.	Other	www.lockheedmartin.com/us/atl.html		Lockheed Martin Advanced Technology Laboratories, **Address:** 3 Executive Campus, Suite 600, Cherry Hill, New Jersey, United States, 08002, **Phone:** 201-242-4397, **Fax:** N/A, **Email:** hr@atl.lmco.com	Commercial

TUG	TUG is an autonomous mobile robot that has become a common sight in hospitals as it delivers materials and supplies. TUG efficiently delivers medications, lab specimens, food, and linens and removes trash and waste. It has a measurable ROI and provides tangible improvements in care. TUG works around the clock. It is a substitute for the labor needed to haul and transport goods, materials and clinical supplies within the hospital., , Industry:Healthcare/Medical, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Other	www.aethon.com/		Aethon Inc., **Address:** 100 Business Center Drive, Pittsburgh, Pennsylvania, United States, 15205, **Phone:** (412) 322-2975, **Fax:** n/a, **Email:** inquiries@aethon.com	Commercial
TurtleBot	The TurtleBot is a low-cost system that provides an autonomous platform for developing robot applications. It has a Kobuki base, Kinect, and netbook with TurtleBot software installed and integrated together to get the most out of each. Multiple mounting locations allow customization of TurtleBot to meet your own needs., , Industry:Consumer, Size:Unknown, TRL:Operational (9),	Other	www.willowgarage.com/		Willow Garage, Inc., **Address:** 68 Willow Road, Menlo Park, California, United States, 94025, **Phone:** (650) 475-2700, **Fax:** NA, **Email:** info@willowgarage.com	Commercial
VALOR	ESCHER (Electric Series Compliant Humanoid for Emergency Response) is a full sized humanoid robot designed, fabricated, and assembled by students at Virginia Tech. ESCHER is being designed to support a variety of disaster response and search-and-rescue tasks that will allow robots to bear the burden of dangerous environments instead of humans. The robot performs many tasks autonomously while still allowing for human interaction in critical areas.	Other	www.me.vt.edu/bmdl/		Virginia Tech, **Address:** 310 Durham Hall, Blacksburg, Virginia , United States, 24061, **Phone:** 540-231-0745, **Fax:** 540-231-2903, **Email:** spriya@vt.edu	Commercial
ViGIR	ViGIR robots are designed to perform the most hazardous activities in future disaster response operations and to work with their human counterparts to reduce casualties, avoid further destruction, and save lives.	Other	www.torcrobotics.com/		TORC Robotics, **Address:** 405 Partnership Dr., Blacksburg, Virginia , United States, 24060, **Phone:** 540-443-9262, **Fax:** N/A, **Email:** info@torcrobotics.com	Commercial
WALK-MAN	WALK-MAN is a 4-year integrated project funded by the European Commission through the call FP7-ICT-2013-10. The project started in September 2013 with the goal to develop a robotic platform with an anthropomorphic form which can operate outside the laboratory space in unstructured environments and work spaces as a result of natural and man-made disasters. The intended robot skills include: Dexterity - powerful manipulation skills (e.g., turning a heavy valve or lifting collapsed masonry)., Robust balanced locomotion - walking/crawling over uneven terrain surfaces., Physical sturdiness - operating/manipulating conventional hand tools such as pneumatic drills or cutters. Furthermore the robot will have sufficient perception/cognitive ability to permit it to operate autonomously or under reduced tele-operation in case of severe communication limitations or remote control due to limited channel bandwidth and/or reliability. Another goal is for the robot to demonstrate human levels of locomotion, balance and manipulation and be validated in realistic challenge tasks outside the laboratory environment.	Other	www.iit.it/		Italian Institute of Technology and University of Pisa, **Address:** Via Morego, 30,, Genova, Not Available(Italy), Italy, 16163 , **Phone:** +39 010 71781, **Fax:** N/A, **Email:** N/A	Research

WPI-CMU Atlas Humanoid Robot	The WPI-CMU robot is based on the Boston Dynamics built Atlas Humanoid Robot. This robot is 7-foot tall and weighs 400 pounds. The robot is optimized based on full body control for the Atlas Robot and features include 3D walking based on online optimization.	Other	robot.wpi.edu/drc/		Worcester Polytechnic Institute, **Address:** Atlas Lab – Washburn Shops 108, Worcester, Massachusetts, United States, 01609, **Phone:** N/A, **Fax:** N/A, **Email:** vdimitrov@wpi.edu	Commercial
X-47B Unmanned Combat Air System (UCAS)	The X-47B is a tailless, strike fighter-sized unmanned aircraft developed by Northrop Grumman as part of the U.S. Navy's Unmanned Combat Air System (UCAS) Carrier Demonstration program. The strike fighter size unmanned aircraft is currently in its demonstration phase. Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Demonstration (7-8),	Other	www.northropgrumman.com/		Northrop Grumman Corporation, **Address:** 2980 Fairview Park Drive , Falls Church, Virginia , United States, 22042 , **Phone:** (703) 280-2900, **Fax:** N/A, **Email:** N/A	Commercial
Xing Tian	Xing Tian is a humanoid robot inspired by humans. The original mission was to develop a household service robot which can help people to do housework and take care of the aged and children. "Xing Tian" comes from an ancient Chinese myth hero.	Other	www.iamt.cas.cn/		Institute of Advanced Manufacturing Technology (IAMT), **Address:** Hui Hong Building, Changzhou Jiangsu, Not Available(China), China, n/a, **Phone:** 0519-86339079 , **Fax:** 0519-86339709 , **Email:** zhanglihuamouse@163.com	Commercial
X-Motion Autonomous Robots	RoboCV, X-MOTION is an "intellectual pilot system" which replaces a driver with an autopilot system that enables warehouse vehicles to operate autonomously around humans in a warehouse environment. The system is made up of two parts: a "server-side part" which interacts with the warehouse management system, coordinating distribution of tasks among the vehicles, and a "vehicle-side part" which makes the navigation decisions. As well as following pre-defined paths, the vehicles are able to respond dynamically to changes in the environment, such as a person crossing their path or a fallen pallet. A video camera and LIDAR (laser radar) – or LIDARs depending on the type of vehicle – mounted on the vehicle capture data about the environment, which is then processed by an on board industrial-grade computer (based on an Intel Core i5/i7 processor) running RoboCV's custom-built 3D-PATH software. This generates instructions that are sent to the guidance system of the vehicle, which controls the steering, accelerator and braking, and directs the vehicle's movement., , Industry:Logistics, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Operational (9),	Other	robocv.com		RoboCV, **Address:** Bldg 84, House 3, Elektrolitny proezd, Moscow, Not Available(Russia), Russia, 115230, **Phone:** 495-782-162/8, **Fax:** n/a, **Email:** info@robocv.ru	Commercial
XOS2	Raytheon XOS 2 Exoskeleton, Second-Generation Robotics Suit. The wearable robotic suit increases the human strength, agility and endurance capabilities of the soldier inside it. The XOS 2 uses high-pressure hydraulics to allow the wearer to lift heavy objects at a ratio of 17:1 (actual weight to perceived weight). This allows repeated lifting of the load without exhaustion or injury. Industry:Defense/Homeland Security, Size:Very Large (>100kg/200lb, >120cm/48in), TRL:Development (4-6),	Other	www.raytheon.com		Raytheon Company, **Address:** 870 Winter Street, Waltham, Massachusetts, United States, 02451, **Phone:** 781-522-3000, **Fax:** N/A, **Email:** corporatecontributions@raytheon.com	Commercial