Making Critical Making

GARNET HERTZ

November 30th 2012

Hackerspaces in China

Geert Lovink asked me last week what's the point of printing, binding and making this project by hand – and with 3,000 zines on my studio floor that need to be stapled and trimmed – I'm starting to wonder the same thing. For anybody that knows Ann Hamilton's artwork, the production feels like being stuck under an "Indigo Blue" mountain of paper.[1] It's a good question: Why do things the hard way? What's the value of doing something yourself as an amateur?

The first seed of this project began in talking to Silvia Lindtner – who I work with at UC Irvine – about writing an article for Make Magazine about hackerspaces in China. I've written for Make before and generally know Mark Frauenenfelder from around Los Angeles, and Silvia was in the process of finishing her PhD dissertation on the topic of hackerspaces in China – she had a mountain of brilliant work already done on the topic.

I think I sent a Facebook message to Mark about the concept for the article and he was supportive of us writing something. However, it seemed that an article that looked at the political aspects of DIY culture didn't really have a place in the standard Make table of contents.

I asked Mark about the article because I was en route to do and electronics workshop at Maker Carnival 2012 in Beijing – where I ended up chatting with Mitch Altman about his decision to pull out of Maker Faire because of their DARPA grant. Mitch was visibly upset about this whole situation, like a kid that had just been told that Christmas had been cancelled. I half-jokingly proposed to Mitch that we should just create a new publication that could discuss social or cultural aspects of maker culture – something that could comfortably include an article on hackerspaces in China or the dynamics of DARPA funding hackerspaces in the United States. While brainstorming the idea, we also talked about a format that incorporated a DIY-style publishing model, something that

[1] Indigo Blue (1991/2007) is an artwork by Ann Hamilton that features an enormous 14,000 pound pile of denim work clothing: http://www.annhamiltonstudio.com/projects/indigoblue.html

returned to the zine-ish roots of punk or skater publications and wasn't focused on selling products.

After heading back to California, the idea of launching a publication took a bit stronger hold. It seemed obvious that the electronic DIY scene was aligning with larger institutions – the American military, the Chinese government, business and educational institutions – but there was generally a vacuum of thoughtful discussion around the topic. The discussion was much larger than the military and Make, and Facebook threads with Tim O'Reilly ranting about how DARPA created the internet wasn't really the dialog I was looking for.[2]

Extending the Owner's Manifesto

There is obviously a lot more to electronic DIY culture that what is found in the pages of Make. Make has done a lot of amazing work in popularizing the field, but it's been sanitized into a consumer-friendly format in the process. With the exception of a few articles – such as Mister Jalopy's "The Maker's Bill of Rights" (AKA: "Owner's Manifesto") – Make has avoided things that are at the core of how I envision this field. Things such as hacker work that circumvents infrastructures, tactical media that is political, circuit bending work that is interested in opening up and messing around with the sealed black boxes of consumer electronics, media archaeological work that is interested in history and intervening and playing with it, or people that are into making custom "bespoke" things like lowrider cars or bikes.

I spent time growing up on a farm in Clemenceau, Saskatchewan, and draw a lot of energy in my studio work out of rural kludging: creatively using things because you don't have money or resources. Make doesn't really speak to this, or any of these topics.

The publication may have started by interviewing Jeremijenko, but it's lost any sort of edge it might have had: in gaining popularity, it's leaned

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[2] http://www.facebook.com/photo.php?fbid=10150649823645918

Ken Wark — Hackers vs. Makers
Dale Dougherty — Why DARPA money is good
Mitch Altman — Why DARPA money is bad
Matt Ratto — Critical Making
Phoebe Sengers — Making & Critical Technical Practice
Dunne & Raby — What has happened to
                     Critical Design
Carl DiSalvo — Adversarial Design
Benjamin Gaulon — Recyclism
Tom Igoe — Before the Arduino
Natalie Jeremijenko — Experimental Design
Amanda Williams — Thai Street Hacks
Daniel Jolliffe — Make's Colonialization /
                     Whirligigs of doom
Chris Csikszentmihalyi — Engineering Schools
Reed Ghazala — Bending vs. Making
David Forbes — How I built the video coat
                   (in some level of detail technically)
Tom Jennings — Analog Computing Howto (or Homocore)
Tim Durfee / Alison Powell — Best of new student work

toward a DIY culture fixated on 3D printing, $20 kits and short term gadget projects. It's as if "hacking" has been sanitized and transformed into "making" – with politics, activism, tactics, history, economics and social issues removed in the process.

Back of Envelope Table of Contents

The project started out as a Facebook post asking people to submit short two page zine-like pieces that responded to the concept of critical making, a term that Matt Ratto coined several years ago.[3] I was interested in bringing together a cluster of things under that banner: maker culture, critical technical practice, hacking, tactical media, art and technology, critical design, zines and experimental publishing. I drew up a "dream team" table of contents on the back of an envelope, took a photo of it, and tagged/posted it Facebook.

I had initially thought of the project as a zine, but it soon grew beyond this: after a few key people – like Ken Wark – confirmed on Facebook that they'd submit content, it quickly grew. It was like starting a Kickstarter campaign, but instead of money the currency was content. At the start of the project, I thought that I'd have 50 pages at most, so didn't really think much of committing to giving away 300 free copies... although as content continued to stream in, I soon realized that it may actually take some labor to produce the project. I ended up with sixty people submitting over 300 pages of original content that ranged from academic essays, highly technical descriptions of projects, documentation of artwork, interviews, physically cut-up layouts and pages dripping with ink. Because so much content was submitted I decided to split the project into multiple booklets around specific topic areas: Manifestoes, Projects, Science, Terms, Conversations, Make, Places, History, Childhood and an Introduction.

[3] http://criticalmaking.com. See Matt Ratto, Critical Making: Conceptual and Material Studies in Technology and Social Life. The Information Society, 27: 252–260, 2011

Garnet Hertz
June ? at 11:32am

CALL FOR SUBMISSIONS – HANDMADE ZINE ON CRITICALLY-ENGAGED MAKING

I am starting up a new handmade zine-style publication tentatively titled (after Ratto) "Critical Making" in the field of critical technical practice and critically-engaged maker culture. I am looking for interesting people that would like to be involved in the project.

To begin, here's a list of suggested authors and topic concepts to give you an idea of the topic area:

* Matt Ratto – Defining Critical Making
* Ken Wark – Hackers vs. Makers
* Dale Dougherty (or Tim O'Reilly) and Mitch Altman – A Conversation about DARPA funding and DIY Culture
* Phoebe Sengers – Making & Critical Technical Practice
* Anthony Dunne & Fiona Raby – What has happened to Critical Design
* Carl DiSalvo – Introducing Adversarial Design
* Benjamin Gaulon – Recyclism Howto
* Tom Igoe – Before (or after) the Arduino
* Natalie Jeremijenko – Experimental Design
* Amanda Williams – Hacking for Survival vs. Hacking for Hedonism / Thai Street Hacks
* Daniel Jolliffe – Make's Colonialization / Whirligigs of Doom
* Chris Csikszentmihalyi – Edgy Products
* Reed Ghazala – Bending vs. Making
* Alex Galloway – Thoughts on Occupiers and/vs. Makers
* Simon Penny – The Intelligence of Handwork
* Silvia Lindtner – Hackerspaces in China
* Daniel Rehn – Making Software for the Developing World on a $10 TV-Computer
* Molly Steenson – The MIT Media Lab Newsletter and DIY Culture
* David Forbes – How I Built the Video Coat (in some level of technical detail)
* Tom Jennings – Analog Computing Howto
* Rafael Lozano-Hemmer – How to Make Very Large Projects
* Kaiton Williams – Jamaican DIY Cultures
* Ilya Shipilovskikh – Russian Folk Inventions / Kludges (photos)
* Tim Durfee / Alison Powell – Best of New Student Work (w photos)

The Materiality of Making

The design of the project went through several versions, from being envisioned as a slim zine, to being thought of as a book covered with recycled keyboard keys, to having a riveted binding with a aluminum spine something like Pontus-Hulten's "The Machine." The physical printing and construction of the project turned into a mountain of work, with about 350 pages of content the 300 copies of ten booklets are roughly a stack of booklets 18 feet tall weighing about 300 pounds. Just the staples cost $160.

A quote on just getting the black and white photocopying done was nearly $5,000. I hacked around this cost, managing to talk my way into getting a malfunctioning photocopier for free and spending a couple of days bypassing the security on it and fixing it: as it turns out, Konica Minolta bizhub C40 hacking starts by hitting STOP-0-0-STOP-0-1. All 3,000 booklets were folded by hand, resulting in about 100,000 pages. This was (and is – remember, I still have to staple and trim) a painful amount of work.

The Value of DIY Production

So... back to Geert's question about why it's useful for me to print, fold, staple, and ship this myself – or maybe to extend his question a bit further: Why DIY?

During the production process, I think three things became apparent.

First, doing something yourself, as a non-expert, is a crash course in understanding how something actually works, and it is the fastest way to unpack and learn about the things that would normally remain invisible and taken for granted. The process of being humiliated by things that you think are easy or mindless is a valuable experience – I generally think that innovation occurs out of porting your ideas and processes into a field that you're not familiar with, and actually doing this on a regular basis is a crucial part of practicing inventiveness.
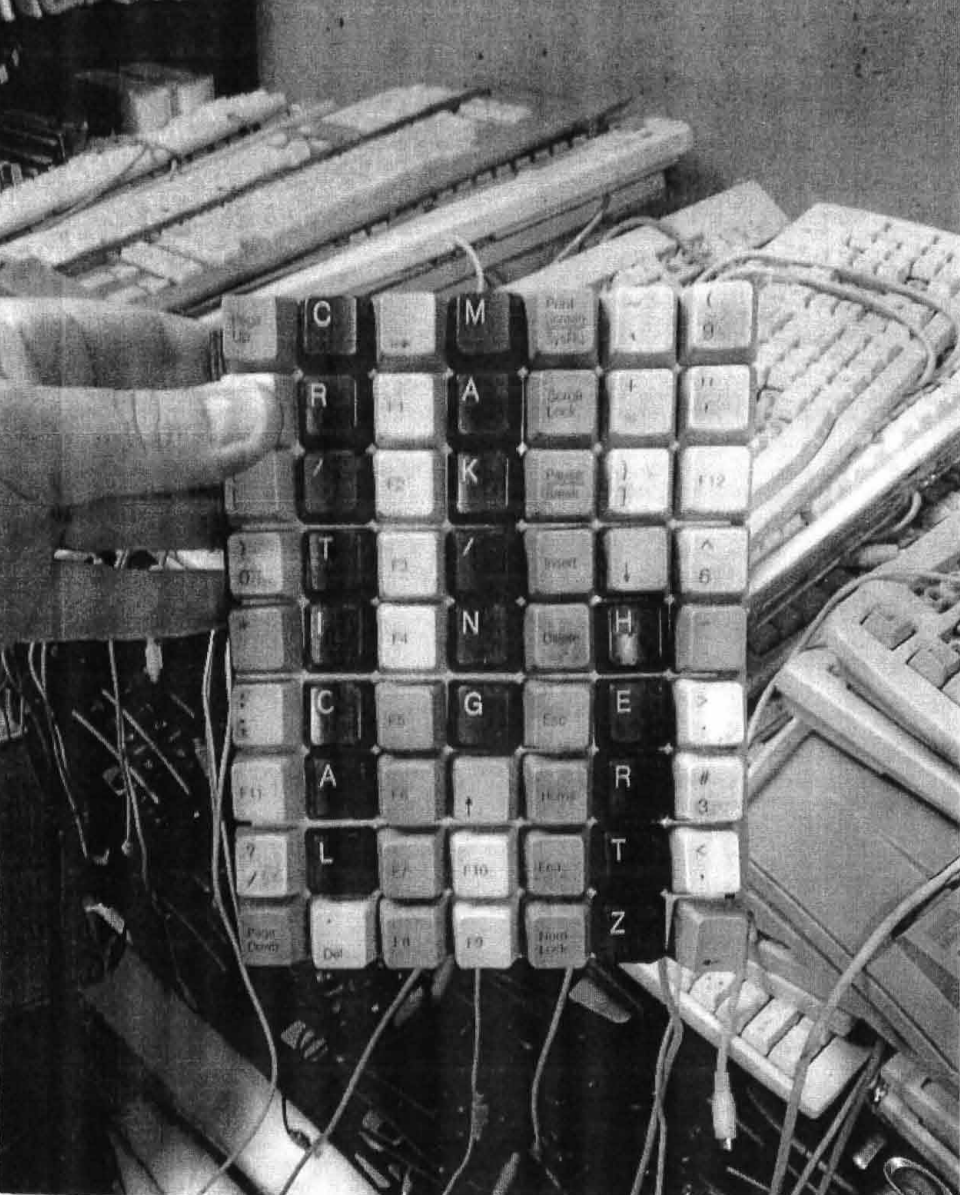
The second thing that became apparent is that there is a push against e-readers occurring, and the momentum of the project was partially fueled by its format as a photocopied and handmade zine. I see this as part of new wave of post-digital print – like McSweeney's or Visual Editions – that is vigorously exploring the value of the printed page. It is clear that the printed page is far from dead: it is important to remember that technologies that are pronounced obsolete continually take on alternative "zombie" forms that are resurrected into new uses, contexts and adaptations.[4]

The third thing that became clear is that there is a large community of people involved in "making" that have little in common with Make. In my case, a flood of people came out from academia and the arts that had something in common with the concepts of critical making, critical design or critical technical practice – and a belief that hands-on physical work has a clear place in enhancing and extending the process of critical reflection.

At the core of it, though, I'm a fan of doing things myself because of the satisfaction of my work and the customized thing I produced at the end of the painful process: in this case, a small mountain of books that nobody else could have produced.[5]

In conclusion – and I need to conclude because I need to print, bind, and trim this booklet before I can start shipping things off – I hope you enjoy what I've made by hand and what a lot of brilliant people have contributed to: bringing together this "Indigo Blue" pile of content and paper has been an enjoyable process.
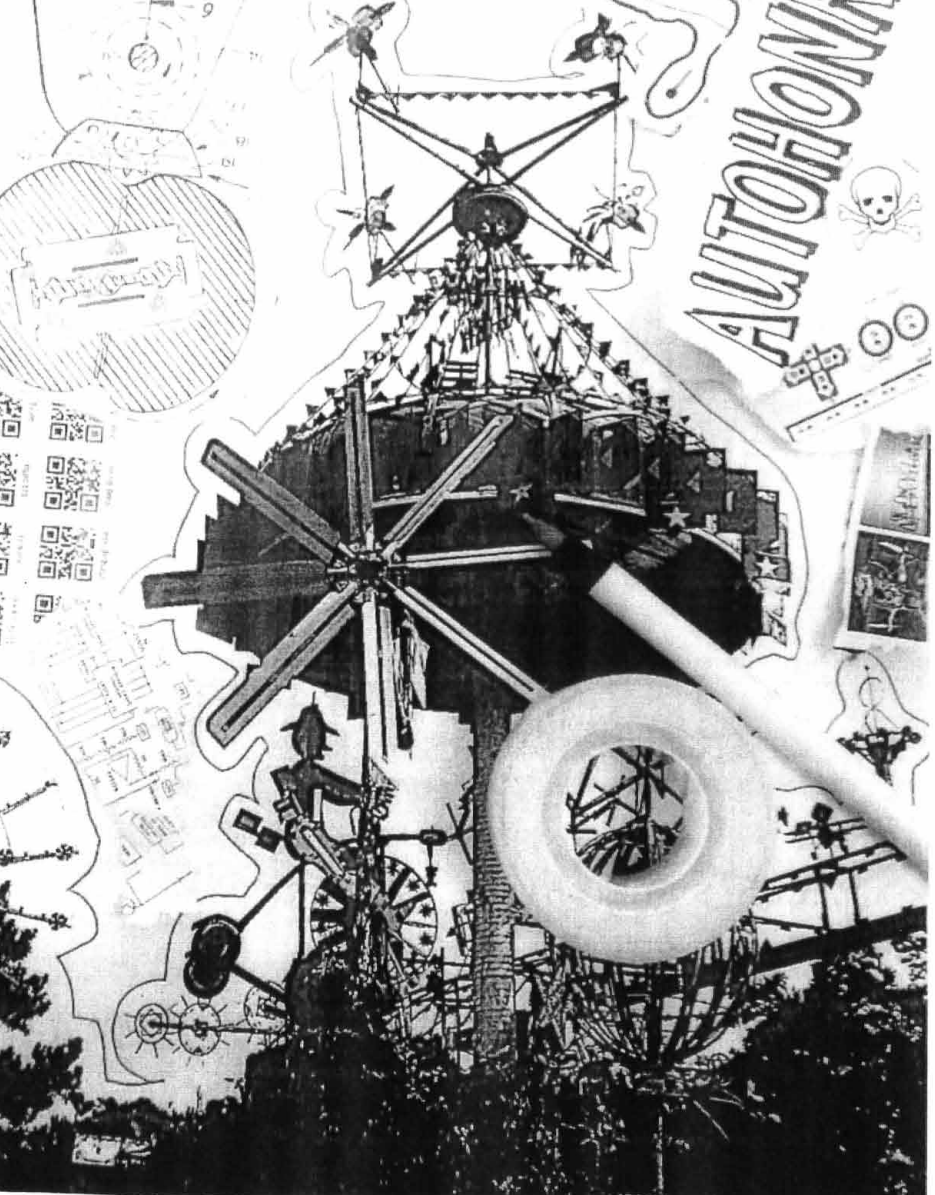
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[4] Hertz & Parikka, Zombie Media. Leonardo 45:5. MIT Press, 2012.

[5] In particular, Matthew Crawford provides a useful discussion on the joy of manual labor in Shop Class as Soulcraft: An Inquiry Into the Value of Work. Penguin, 2011.

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MAKING IS THE UNIVERSAL INFRASTRUCTURE OF PRODUCTION

Power of Making

It seems we are in the midst of a great awakening of making, or even as some have declared the dawn of the next (maker driven!) industrial revolution. The reality is that although most people can make, most people don't. In fact fewer and fewer, especially those who live in cities, actually know how to make the things they use, need or want; or even how these things are made. This is one of the most dramatic and unfortunate legacies of the Industrial Revolution which has shaped the world we live in. The distance between the maker and the user is growing and, with it, knowledge, understanding and appreciation are diminishing. This is true in all walks of life, and increasingly in many professional disciplines. Distance and lack of understanding are impacting also on governments and educational institutions, which are failing to see that making is very much part of the future – that the power of making lies far beyond thoughtless production and supporting the vision of those who manage. Nor is making the exclusive domain of the arts. Making is the universal infrastructure of production – be it technical or artistic, scientific or cultural. Making is a type of applied thinking that sits at the core of creating new knowledge of all kinds, and the sensibilities of making should actively be made a part of our future.

Many would say we have passed the point of no return. But making itself holds the potential to overcome mechanization's anti-human effects while reaping the very human benefits of technological progress. 'The future of making is in hacking the post-industrial milieu' wrote perceptive author and critic Bruce Sterling in his article for the publication of the V&A exhibition Power of Making*.

So how will this happen? Will the change driven by massive computational powers and social movements be able to reinstate the value and humanity of making? Will the new networks for sharing knowledge create new types of makers and fuel new communities of practice? Will the unprecedented way crafts are mixing with digital practices and finding new audiences change education and markets? Will emerging alterna-

* Power of Making ed. by Daniel Charny, London:
V&A Publishing and the Crafts Council, 2011

Lives models of fabrication, production and distribution, being eagerly developed by few, become viable alternatives? Can communities that see making as central to their values get industry to serve society? Or can the advocates promoting making over buying, in order to take care of the planet's limited resources, reach enough people to have an impact? Could the growing number of people interested in where their food, clothing, furniture, building materials and cultural products are coming from influence priorities? Is it conceivable that through all these forces there may be a shift to re-engage masses in the value of making?

My first step in answering these questions is to remind myself that almost all of us can make. That the power of making, from the height of luxurious freedom to the depth of deprivation, is that it is something people can do. That it is one of the strongest of human impulses and one of the most significant means of human expression. That it not only releases creative ideas but for many, is about participating in society and defining personal identity. And while it is true that for many making is a non creative means for survival, for others it is a way of learning, of defying conventions, enjoying life or solving its problems. A way of exercising (free) will.
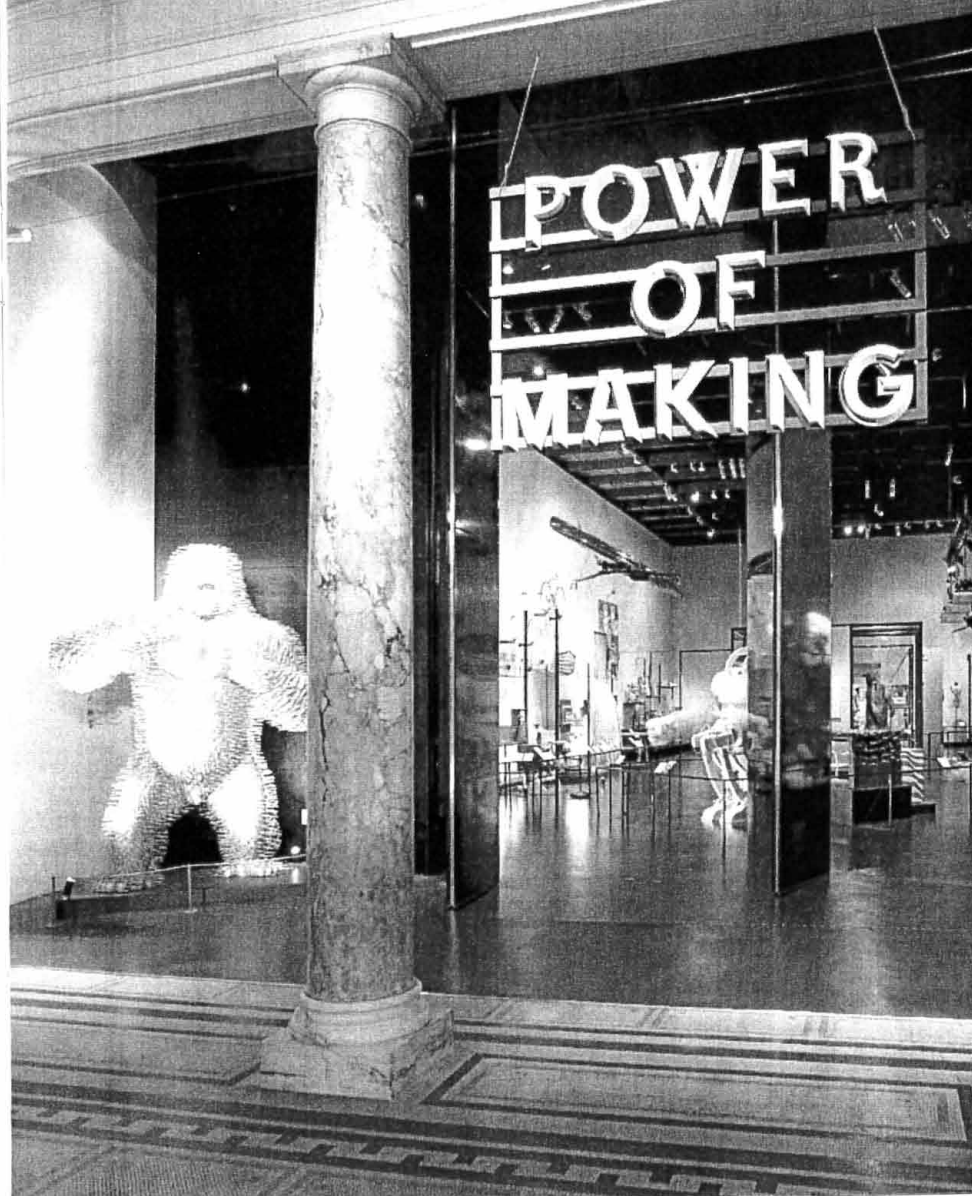
Power of Making

Making is the most powerful way that we solve problems, express ideas and shape our world. What and how we make defines who we are, and communicates who we want to be.

For many people, making is critical for survival. For others, it is a chosen vocation: a way of thinking, inventing and innovating. And for some, it is simply a delight to be able to shape a material and say 'I made that'. The power of making is that it fulfills each of these essential human needs.

Those whose craft and ingenuity reaches the very highest levels can create amazing things. But making is something that everyone can do. The knowledge of how to make - both everyday objects and highly - skilled creations - is one of humanity's most precious resources.

Power of Making by Daniel Charny | POM font by Oscar & Ewan
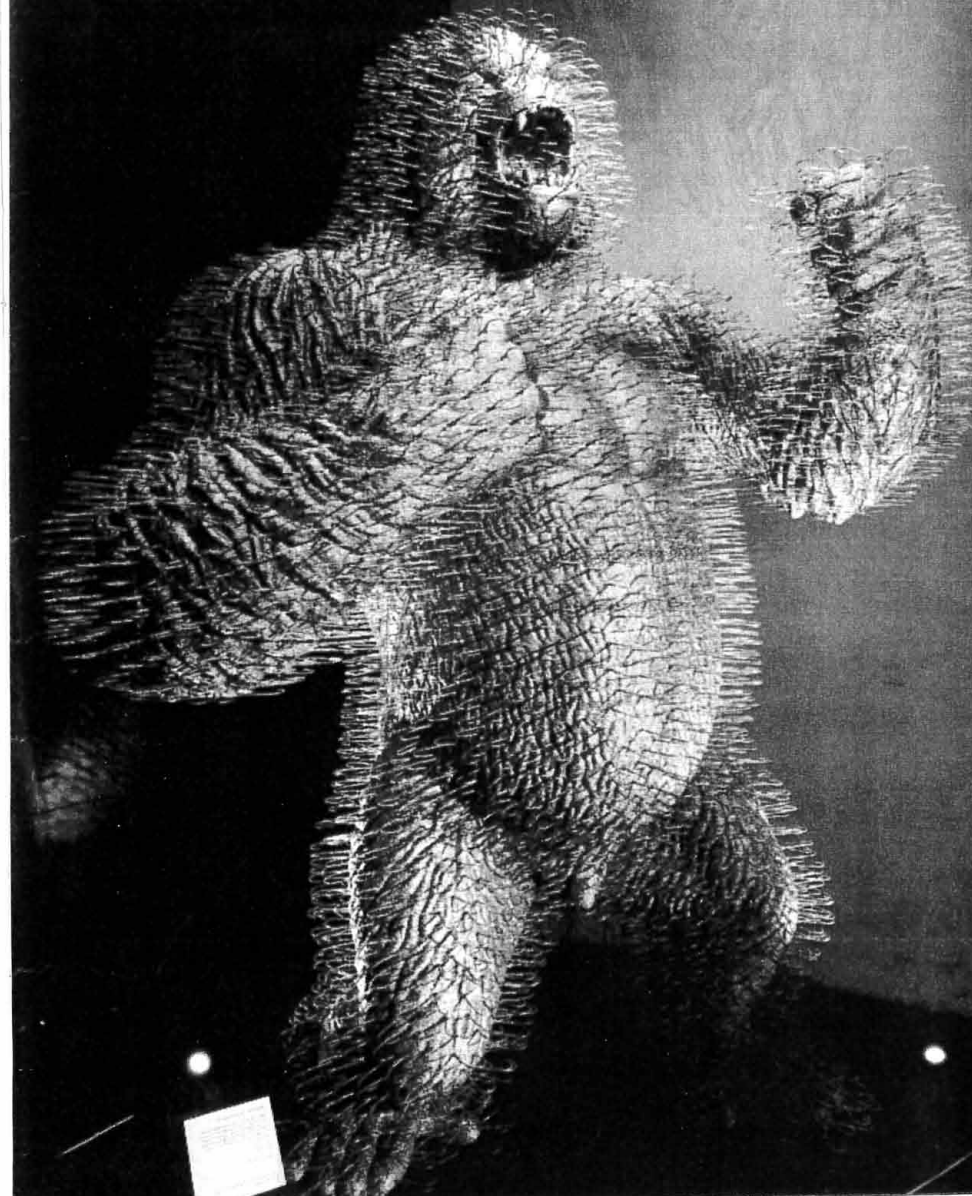
TO IS TO TO MAKE KNOW

Norman White

A Summary of My Work
Modes and Objectives

1. Essentially, incurably, and unashamedly, I am a tinker.

2. Originality, if it occurs in my work at all, is a casual by-product of my particular kind of tinkering.

3. Tinkering is a form of reading and writing, concerned with the literature of humankind's machines.

4. Articulation is a keyword for the understanding of this literature. Machines can be thought of as compositions of smaller articulating devices or as devices that articulate within a larger context. At the most abstract level, machines articulate human aesthetics, fears, needs and aspirations.

5. The most elegant articulations do not necessarily derive from recent technological advances, nor do they claim greater efficiency. It seems to me that efficiency is something that can never be completely grasped by anyone – much less by a civilization. What seems to work just fine here and now may well be screwing things up elsewhere in time/space.

6. I am *least* impressed by machines that express themselves in weightless, frictionless ways, through shifting images on the face of a television screen, contrived less to inform than impress.

7. If I could, I would build a working computer out of rubber bands and paper clips.

Here's an idea that I first presented to at a 1991 Banff conference entitled "Bioapparatus". Summarizing my work and objectives I ended with, "If I could, I would build a working computer out of rubber bands and paper clips." One of the attendees responded that it had already been done... with Mecanno parts. However, for me this is cheating... Mecanno is already very structured, whereas paper clips and rubber bands have minimal structure and maximal flexibility.

7. If I could, I would build a working computer out of rubber bands and paper clips.

A friend, Rob Erlich, and I have already embarked on this project but we haven't got very far... we've been able to assemble logic inverters and simple logic gates. However, I'd like to throw this out as a challenge to all those people out there who understand the difference between hi-tech hardware and cutting-edge ideas... that you don't need one to have the other.

Oh yeah, and it's OK to use thumbtacks.

Best,
Norm

Theses on Making in the Digital Age

By Michael Dieter & Geert Lovink

"Ernstfall, es ist schon längst so weit, Ernstfall, Normalzustand seit langer Zeit." Fehlfarben

0. In our world, the maker is the true believer. We want to be self-made, and to make ourselves over. It is no exaggeration to claim that the maker-as-individual is a key figure of today's neoliberal ontotheology. Forget about the fact that you're following some basic instructions, just read the fucking manual and bend reality to your will.

1. The philosophy of making emerges at a time when the theoretical project of '68 transitions from the work of negation ('unmaking') to embrace a vitalist position. Our goal now is to move beyond the conventional teardown. Instead, we prefer the positive contribution of the many. Small is the new big, as the advertisement for the Dutch Triodos Bank says. The System may be rotten, but it no longer needs to be taken apart. Stop those pathetic punk gestures. It's sufficient to build new things, show me yours! We want to know how to make history from a thousand small steps. This is crowdsourcing of the general will. Tell us how to improve the world. We passionately try to create Events and make a difference - even if we don't know how. Meanwhile, we attend spectacles for entertainment. Making is a pragmatist resolution for the crisis in rhetoric. It is no longer cool to disagree. In this post-ideological era, it is no longer sufficient to have an idea. Who cares about your argument, your anger, we want your vision!

2. It is tempting to reduce the cult of making to the so-called reality of working with our hands. But the subversive aspect of manual work is overrated. Let's stop placing it contrast with the lazy anti-sports attitude of brainpower. Richard Sennett's The Craftman embodies the aspiration for quality, the attempt to overcome primitive contradictions. Sennett emphasizes the aimless and useless goal of the craftman who represents the desire to do something well, for its own sake. But he warns also: "the reality on the ground is that people who aspire to be good craftsmen are depressed, ignored or misunderstood." Craftsmen suffer from mistreatment. Before we start to celebrate the making of things, this is something to keep in mind.

3. Despite the apparent significance of the maker, this figure is still an outsider position within the academic context. There is a strong interest in supporting creative practitioners, but we should acknowledge the confusion around this emphasis institutionally. Professional recognition and practice-based qualifications are still relatively unsettled, while scholarly output remains mainly calculated by articles, books and citations. This is also expressed at the level of funding that either supports the problematic space of art-science collaborations, or budgets that are geared toward those projects that generate recognizable outcomes for intellectual markets. This is precisely why alternative perspectives and critical dialogue is required on the status of the maker at this moment, if only to keep in check an inadequate audit culture for experimental research.

4. The maker is always plural. We all know that we never make things alone, however, our experiences are not easily reconciled with current institutional models that rely so heavily on individual achievements. There is a real sense that collaboration remains a problem for these contexts and settings. Let's not forget, moreover, that collective processes of making things are often full of conflicts, miscommunications and difficult compromises. What infrastructures are needed for the makers? Certainly, anonymous offers a new model of some kind of collaboration, but we need to be very cautious about the sustainability of such formations. We feel a constant pressure to invent and discover new tools to support collaboration effectively.

5. Maker culture clearly goes hand in hand with the promotion of the positive theory of things as formulated by Actor-Network-Theory and its spiritual leader Bruno Latour. Putting aside his weary anti-leftist provocations, however, Latour's way of thinking actually struggles to explain how historical change occurs. In the rush toward endorsing the acritical attitude, we are told that entities are fully defined by their relations, and that's just the way things are! Recognize nonhuman agencies seems like a noble endeavor, especially if this might open up avenues for other ways of acting - for instance, what Ian Bogost calls carpentry for philosophical artifacts - but what about the enigma of the creative critical thing? Where is the difference that makes a difference? Or to put this question another way, how can certain disastrous realities now be unmade?

6. Things fall apart. Is it possible that stuff stops being productive? This is a difficult and urgent concern for the vitalist position. We are constantly told that there are more resources to be found, appropriated or re-used. Like capital, making never stops, it is irreducible, however, is there a moment when all this waste is simply remains too toxic for the makers, too unproductive for life?

7. To stop making things is part of doing politics, but this strategy no longer works. Striking is definitely not popular. There are indeed complex questions of agency here. We have moved from the strike to the occupation. People regularly stop making things due to unemployment. In this way, let's acknowledge that affirmative maker culture is situated within a project-led and precarious economy.

8. The critique of things may or may not be justified, but this should not be mixed up with the urge to do stuff. The critique of society doesn't have to materialize itself in material objects (not even in software). Beyond the tired dialectics of real and virtual there is eternal demand for beauty. Nothing is real but design. We cannot discuss 'things' outside of their shape (Flusser). The perfect object in capitalism is the prototype: the pornography of concept design. The commodity fetish is more true than true, and the not yet realized laboratory version is more real than the desired purchase. This is the pure thing.

9. We are missing a critical theory of the prototype. There is an obvious risk that maker culture is ultimately reducible to a slow fabrication movement, or a kind of home science kit ala MAKE Magazine. This is the general intellect as a lifestyle choice. Should pure tinkering just be celebrated as such, or should it be positioned within a clear socio-political agenda? This is important since the prototype implies a question of scale distinct from the autonomous tweaking of technology. The prototype offers a model or ideal type for many, it exists in between the workshop and factory.

10. We cannot reduce making to the moment of creation. What is the distinction the prototypical and the protocological? There are crucial questions of universality that face the maker, but these scenes constantly withdraw from the circuits of global capital. The prototype, however, is never a first form, but always the next stage. Let's imagine a movement from demo-design to prototypes to protocols. These should be taken as the new conditions of possibility after the creative industries.

Introducing Adversarial Design

Carl DiSalvo

We say design isn't political. We say design is political. But we rarely seem to talk about what we mean by "political." What does it mean for design to be political? And if design is political, what kinds of politics does it do?

Ok, so let's be clear. Design *can be* political.

There, that's done. Now let's get on to it.

Adversarial design is an attempt to provide one answer to the question of "What does it mean for design to be political?" Adversarial design is design that does the work of agonism. What is agonism? It is a political theory that emphasizes the potentially positive aspects of certain forms of political conflict. Adversarial design does the work of agonism in multiple ways: it expresses bias and divisive positions; it provides opportunities to participate in disputes over values, beliefs, and desires; and it models alternate socio-material configurations that demonstrate possible futures.

Why would we want this?

Let's assume that we want democracy. The first question to then ask is, "What kind of democracy do we want?" Democracy is not a single thing. The character of democracy is pluralistic. Democracy is not only deliberation and consensus. Democracy is not restricted to the rational discourse of a smooth public sphere. Democracy is also – and necessarily – contention, dissensus, and passion. This is crux of agonism as a theory of democracy — democracy is the capacity dispute and act against, the democratic endeavor is constant and ongoing questioning and controversy.

Agonism, however, it not just a theory of democracy. It is also a practice of democracy. Adversarial design is the practice of agonism through design. Adversarial design is not just thought about, it is made.

It's really a simple premise. When we make the world we put in place and set in motion certain affects, which both reflect and shape our lives and the lives of others. This is a political act because some values, beliefs, and desires are privileged, while others are obscured or dismissed. The task of adversarial design is to design things (goods, services, events, systems) that reveal the political qualities and implications of made world, and also offer new material conditions and experiences that enable divergent political affairs.

The difficult aspect of adversarial design is that the work is never done. If the democratic endeavor is constant and ongoing questioning and controversy, then adversarial design is also constant and ongoing remaking of the world — revealing, articulating, and re-configuring over and again. There is no utopia to be achieved. There is just the need to never be at rest in our pursuit and enactment of pluralism.

Five Questions to Ask and Act On (in regard to Adversarial Design)

1. How does adversarial design fit into broader field of historical and contemporary political design practices? How does it fit into political practices outside of design proper? If one purpose of adversarial design is to foster new forms of political action and expression, how does it do this in concert with existing formal and informal social movements?

2. Much adversarial design comes in the form of objects that we consider, for example visualizations of hegemonic networks or speculative products. How do we to an adversarial design of objects to act with? For that matter, how do we move beyond objects, to develop an adversarial design of services, environments, and even organizations?

3. Is adversarial design a practice of experts only? Can we imagine and enact a kind of participatory adversarial design? Can adversarial design be a cooperative or collective endeavor, pursued by more diverse publics than is currently the case?

4. If agonism is radically pluralistic, how can we take better account of non-humans in our designs? Yes, actor-network theory provides a start, but mostly as an analytic perspective after the fact. How can we be pre-emptive in our consideration of non-humans? Put another way, how can we more effectively de-center the human in design?

The adversarial stance can never settle. Therefore, neither agonism nor even democracy can be considered as the ends of an inquiry into design and political. This, then, shapes the final question.

5. What are the limits of adversarial design? And for that matter, what are the limits of agonism? What new forms of democracy must be discovered? What new forms of democracy can design do the work of? And how?
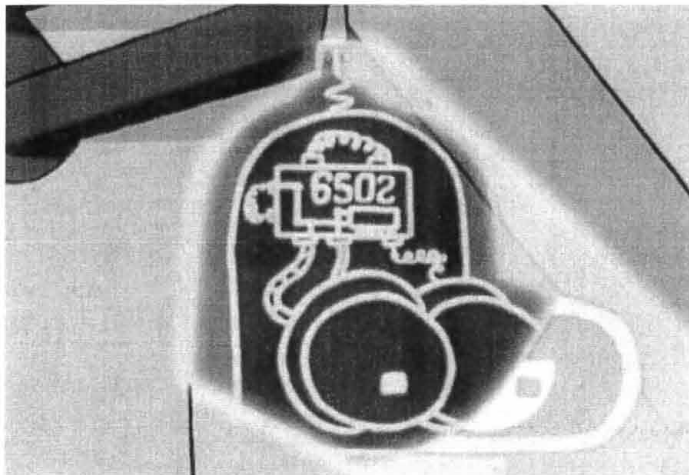
Hey Garnet! You rock for making this zine. This is the 22nd year of my engagement with a critical technical practice. I feel old! Please find, attached, 16 refelective bits about the "maker movement" in North America and Europe.

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I have never used the word "maker" without "air quotes" expressing extreme ambivalence. Ambivalence, unlike disinterest, means two strongly held feelings. I love the idea of a "maker movement" because of its potential to reform the banal, corporatized material world in a positive way. I revile the "maker movement" because it is ineffectual at best, if not fatuous.

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If we are honest with ourselves, nothing particularly significant has come out of the "maker movement", for anyone beyond its practicioners. As critical dialog among practitioners, it has added and expanded STS and design theory. And it certainly is a pleasure to make things. But the word 'movement' implies a rising wave, a social movement. Making is also necessarily in dialog with mass production and industry. The "maker movement" must be accountable along those vectors, in the same way that we might judge the results of the free software movement by judging its success in contrast to commercial software. Or the Occupy/Indignants movement by its ability not simply to offer succor to its participants, but to inject the topic of income inequality into national dialog. In contrast to these, the "maker movement" has effected very little.
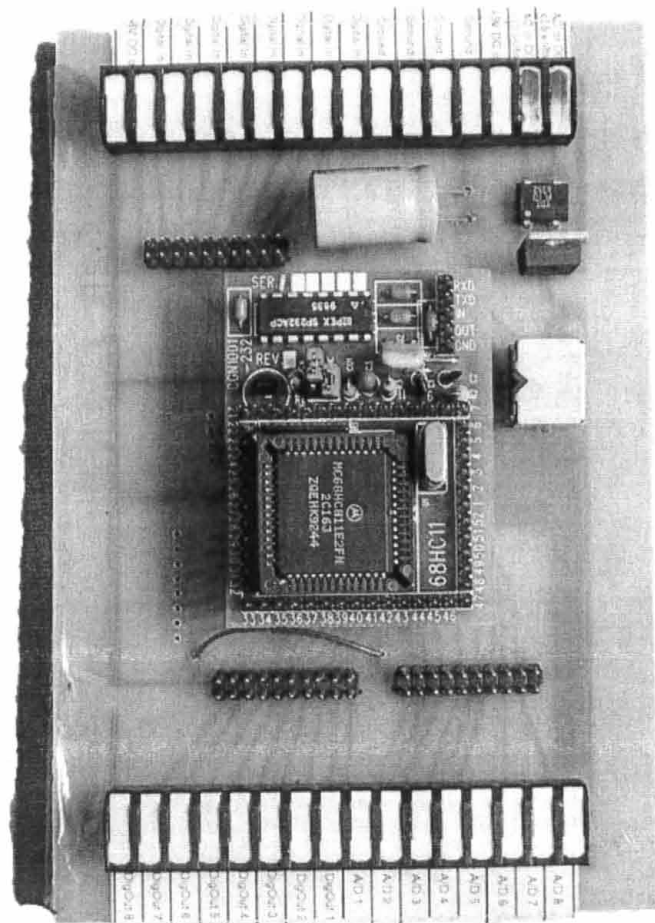
Above: Author's Art Institute of Chicago "shield," circa 1993. Unit combined 68hc11 firmware with a Hypercard cookbook, an early scripting environment, allowing for visual and functional integration between circuit design, coding, and testing. Right: Indian project books.

0010

Much of the "maker movement" is a form of self-expression, about the joy of producing something. That is fine, but many subcultures enjoyed these pleasures in an organized way long before the "maker movement," whether HeathKit enthusiasts and jalopy builders, graffiti artists and moonshine distillers, cooks and gardeners, model train buffs and home machinists, and others. To the degree that the "maker movement" was unique, it was because of its explicit relationship to corporate material culture. The Maker's Bill of Rights was specifically positioned against the interests of private mass producers. It is in reference to this, the core of what differentiates the "maker movement" that the rest of my points are offered.

0011

I was standing in line in a farm equipment shop in Montana once, buying parts for a project, when I noticed that of seven people in the line I was the only one who had two working pairs of hands, eyes, ears or legs. Until then, I had flattered myself that I worked with my hands.

0100

Socially engaged making, of necessity, is engaged in a dialectic with its alternatives: commercial and corporate mass production on the one hand, and craft on the other. Even when making is about self-expression, practitioners choose this form because they are attracted to the technological

product as a genre. The frisson of the made object's contrast to mass production, or the reassurance of its continuity with idealized craft practices, give it valence. Model train buffs are not considered makers, perhaps because of historical reasons, but also because they focus on a 19th Century technology, not contemporary product. Making is tied up with the same kind of implied utility as experiments and products, even when it is criticizing utility.

0101

The historian Charles Tilly defined a few key features of successful social movements, of which one is collective identity formation. The "maker movement" has been successful in this arena. Self-identified makers and maker spaces are certainly more common than they used to be, and people from many antecedent sectors like arts, design, and engineering have also cross-identified as makers.

0110

For a social movement to grow and continue to have impact on the larger culture, it must "write" its values into legislation, the legal system, business, and other technological and sociopolitical practices, as well as impact the identity of the broader culture. The sociologist David Hess identified the ways in which social movements create lasting impacts though material culture, calling them "Technology- and Product-Oriented Movements." One example might be how the gay activist community in the
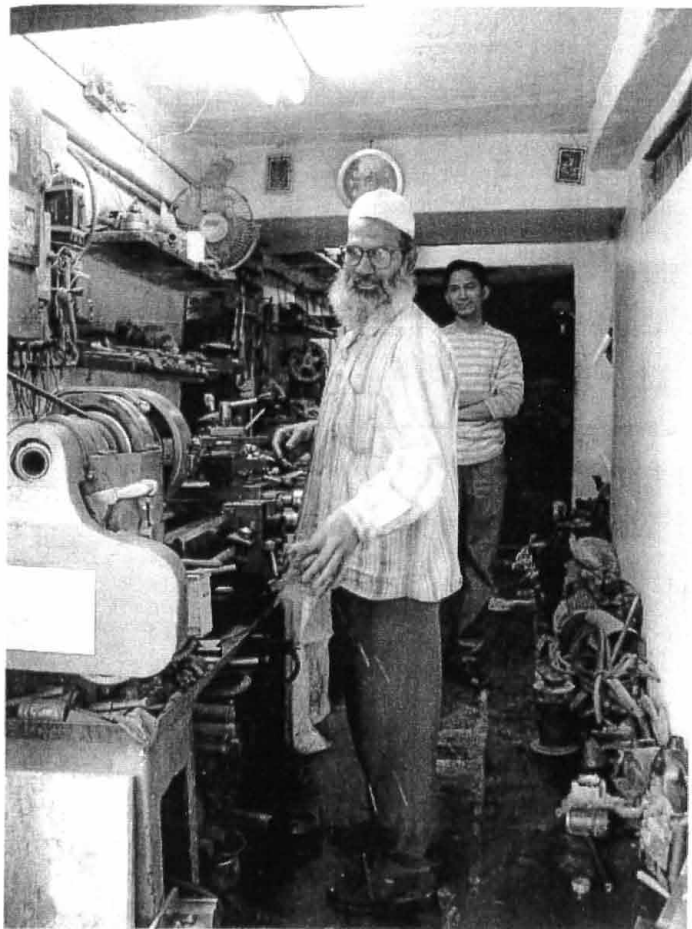
Makers in Udaipur

Digikey near the Red Fort, Delhi

1980s successfully changed medical and legal practice to hasten the development of HIV drugs. The "maker movement" has been less successful in this regard, perhaps with the exception of having been identified as a market by businesses like electronics distributors and publishers. To date, model aircraft enthusiasts have a far more powerful lobby, sewing enthusiasts and model train makers more commercial choices, Radio Shack is still fucking Radio Shack. Products are still serving the interest of Acer or Apple. Had any of our work in more specifically socially (or even psychologically) engaged technical practice been influential enough to challenge the identity of the broader culture -- had the "maker movement" been a departure from the status quo -- DARPA would not be co-opting it directly.

0111

Making is always a political act, even if the denotative utility of the thing made is not political. The average 'northern/developed' individual consumes 32 times the resources of the average 'southern' citizen. Making anything, spending those northern hours, driving to those northern Home Depots, ordering those northern magazines and SparkFun packages, is a geopolitical act.

1000

It was a bit more easy in the early 90s, fresh off of Reagan's renewed military budgets, to know where things came from. Since the beginning of the 20th Century the

US has always had a single-payer system for technology development, spelled DOD. It has been a travesty on many levels. But the tracks are increasingly hidden. Back in 1990 I had to buy raw parts from American Science and Surplus, Herebach and Rademan, and C&H (long live C&H!). The stepper motors were right next to the bombardier sighting optics. The used oscilloscopes all had US NAVY stenciled on them. The playful red of SparkFun didn't yet exist, so there was a lot more olive green and corporate blue.

1001

My first robot, in 1991, rehearsed the military heritage of technology, the ethics of drones, and surveillance. It was a product that could literally kill you if you got on the wrong side of its algorithm. By the late 1990s an earnest friend tried to patiently explain to me that maybe all that stuff wasn't so important anymore, that technology had many more functions. I would be popping champagne corks if surveillance, drones, and military technology stopped being an important topic.

1010

First I called my work products for dystopic futures. Then I called them experimental product designs. Then I called them edgy product. Then I heard the phrase "physical computing," which I had thought was just micro controllers, sensors, and interfacing. Then others started calling my work tactical media interventions, which

it wasn't quite, because it was also product. Then it was called critical design, which it was. Then came "making," but that term missed the critical discourse, so I had to use quotes. Then, oddly, I heard the phrase "critical making", which reminded me of "up down."

I have given up attempting to brand technology production with an eye toward the sociopolitical. These brandings are often associated with some productive critical insights, but also often reflect the interests of the brander. For those of us in academia, design, and the arts, it is necessary to be identified with a strong personal brand, which in turn leads to namespace pollution. In the initial call for this journal, we saw Experimental Design, Recyclism, Adversarial Design, Critical Design, Critical Technical Practice, Critical Making, Bending, Edgy Products, Handwork, DIY, and Folk Invention. Most of these could easily be exchanged with a particular surname. Frankly, socially engaged makers message as poorly as the US Democratic Party.

The prize clearly goes to O'Reilly for Making, in part because he controls a small media empire, but also because the Make formulation follows engineering's intentional dissimulation of the politics of technology, which makes it easier to digest. I am happy with one of the earliest and best, and not my own: Critical Technical Practice.

1011

Technically, there is little difference in what is possible since the designs published in 1970's editions of Circuit Cellar magazine. Sure, mediocre desktop 3D printers now exist, but fewer of our neighbors have machine tools with reasonable tolerance in their garage. Even ease of development has not substantively changed, in the way that laser printers or non-linear editing have more fully realized their promethean potential. It is certainly more easy to blink an LED, but it is only fractionally more easy to do sophisticated things. Atmegas have more functions built into their dies than 6502s, but 98% of most special registers in Arduini are never used. Laser cutters have given us a world of awkward cubes with terrible joinery. The Internet alone is responsible for most of the gains: online resources, conversations, and files.

1100

The best model for making, that might realize its political possibilities, is the free software movement and its techniques of collaboration, sharing, development, and distribution. Free software is powering the most important businesses in the world, allowing the lowliest teenager in Zambia or Mississippi the exact same development environment as a military contractor or a Microsoft product team. And they are making things we use every day. This is unequivocal success. This scale of impact is what making should envision.

1101

The successes of the GPL and free software collaboration to reformulate tools, labor, and industry have not transferred to material construction. Instructables.com, like its inspiration ThinkCycle, counted on the hope that cheap open CAD would make the sharing of designs more easy, similar to Sourceforge or Github. This has not yet proven to be the case. It is a wonderful cookbook, it is not Github. Open licenses, like OHANDA and the Creative Commons hardware license, have been created with the hope they might grow teeth even a fraction as long and sharp as the GPL. This has not yet proven to be the case. The biggest open question of making is how to translate the legal, informational, and social techniques of free software development and distribution; without that, it will remain a fringe practice.

1110

What is called 'making' in North America and Europe is, frankly, a luxurious pastime of wealthy people who rightly recognize that their lives are less full because they are alienated from material culture, almost all of which is products produced by corporate interests. Sadly, rather than address the problem, makers develop a hobby that solves the symptom for them, but if anything slightly strengthens the disease.

All over what is called the Global South there are makers everywhere, only they are not called

makers. There are fab labs everywhere, only they are not called fab labs. It is frankly hilarious when people go to India, all White Jesus, with their tiny cnc mills and chinese-made laser cutters, looking to earn souls.

1111

Lastly, a positive example of making that resembles the impact of a free software project: Jeff Warren's Grassrootsmapping, now a larger collaboration called Public Laboratory of Technology and Science [PLOTS.org]. Make magazine's first cover story, in 2005, promised that "Kite Aerial Photography Puts Your Eye in the Sky." (Yes, just like the big boys, you can have your own Global Hawk!) Grassrootsmapping used similar techniques at first, but for community mapping. With help from communities, they developed a series of innovations that made their systems cheaper, more easily reproduced, and more powerful. Matching the act of capture with the online tools to create a community of photographers, filterers, and stitchers, the project increased the ways that people could engage, and teams of community self-mappers formed in many locales. The web programming was technically sophisticated, complementing increasingly cheap hardware hacks. By the time of the BP oil spill, Grassrootsmapping had a strong community and environmental engagement, multiple collaborative authors, and impact that resembled nothing market models could rival: it was a significant critical

technical practice. Google admitted that the Grassrootsmapping/ PLOTS aerial photos were better than those captured by its own satellites, and has incorporated parts of the PLOTS image database into its base layers.

Cool, I hope I didn't bore you!

./configure
make
make it funky,

Csik.
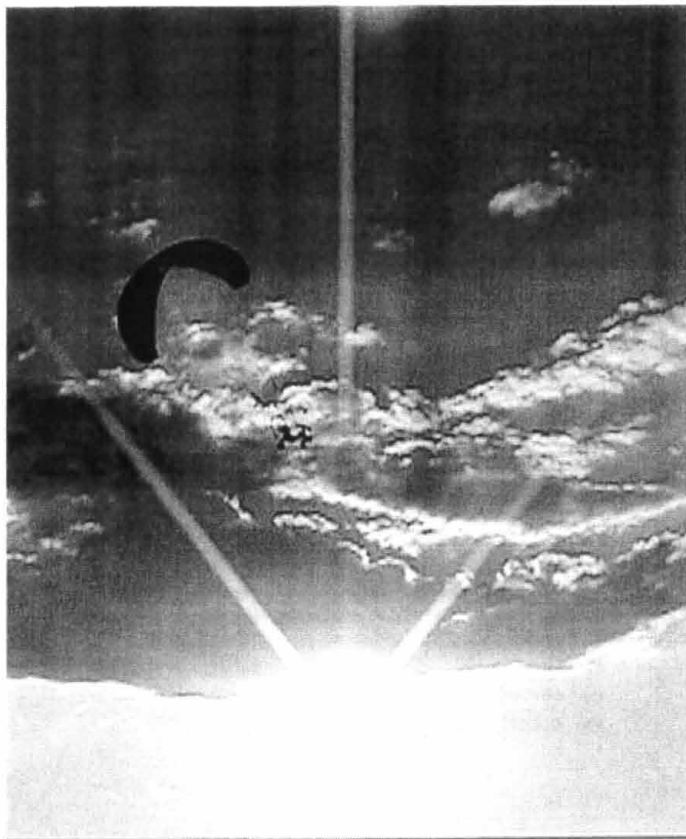
A DESIGN METHODOLOGY FOR
DECONSTRUCTING NETWORKS

By Jonah Brucker-Cohen

This methodology is presented as a roadmap that others could follow in pursuing their own projects along the theme of *Deconstructing Networks* which includes projects that critically challenge and subvert accepted perceptions of network interaction and experience.

Crank The Web: System
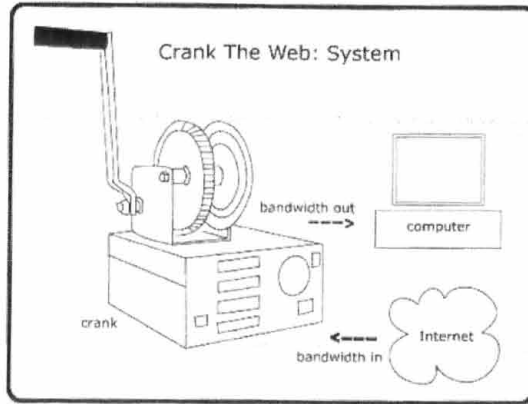
1. Emphasize Multiple Methods of Connectivity

By emphasizing multiple methods of connectivity through multiple networked devices and interfaces the opportunity to subvert and challenge existing

forms of networked interaction and experience increases. An example of this approach is a project by the author entitled *Crank The Web* (2001) [1]. *Crank The Web* allowed for a tangible connection between the user and the data itself by adjusting bandwidth speed to the physicality of using a hand crank. This emphasized a novel way of connecting physical movement to bandwidth acceleration and thus a new way of thinking about connectivity.

2. Challenge Factors of Networked Interaction

Networked interaction can be subverted by creating projects that emphasize the surrounding factors of networked interaction such as the location, physical proximity, connected data streams, and mindset of users in order to challenge the overall user experience of these experiments. This detail of adding the surrounding aspects and contexts of networked interaction weighs far more than merely changing their interface design or implementation. This can be seen specifically in the author's *WiFi-Hog* [1] project that allows a third party to gain complete control over a publicly accessible wireless network. Since wireless networks are deployed in public spaces and effect people inhabiting those spaces with their mobile devices, the project focused on the social and political factors of network access among the general population and the conflicts that existed in these spaces among community groups and corporate entities. By emphasizing these surrounding frictions through the deployment of the project, there

WIFI-HOGGER

OPENNODE
0 bps

BLOCKED WIFI-USERS

device

Prototype 2.0

with card

was an opportunity to engage with people involved in these scenarios and propose alternatives of use that might help to resolve these clashes.

3. Amplify Metaphors to Deconstruct Conventions

When examining the connections between physical and online worlds, there is evidence that the naming conventions and metaphors associated with online systems are often misleading as they relate back to what they were named. Examples of these misconceptions range from Gore's interpretation of the Internet as an "Information Superhighway" to software names such as "Search Engine" that consists of a piece of software designed to allow users to search the Internet for specific queries, these naming conventions have often less to do with the action or function of the object or software in question, and are more consistent with branding and "hype" associated with the introduction of new technologies. Metaphors change the way we relate objects and locations to imposed and implied meanings and can often lead to new understandings and relationships with these objects. The author's suite of software applications, *Desktop Subversibles* [1], integrated connectivity into daily computer activities such as copy/paste, mouse movements, and clicking. By augmenting these daily activities with connectivity, the metaphors used to characterize their use changed since the desktop metaphor of applications solely existing and running on a users local machine, especially those tied to the operating system itself such as copy/paste were no longer private and now globally accessible.

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4. Alter The Rules of Networked Interaction

Since its beginnings, the Internet has relied on protocols and rules that control its use and users. [1] This possibility of a fundamental change in the structures of "legacy" Internet systems in order to shift the emphasis away from interface and focus on social patterns of network design directly relates with the author's *BumpList* [1] project. *BumpList* examined the consequences of disrupting and changing (or altering) specified rule-sets associated with online communication, in particular, email lists and other forms of turn-based systems. Where traditional email lists adhere to open or invited subscription rules, *BumpList* was created to specifically challenge this "status quo" subscription policy by placing a limitation on subscriber amounts and automatically unsubscribing existing members when new users joined the list. It was meant to challenge and disrupt existing rule sets associated with email lists in order to provide another viewpoint of how simple changes to the structures of these forms of online communication could alter not only the behavior of the users subscribed but also the perception of how these lists could or should function. By changing characteristics of networked systems the potential for causing social rifts reaches even further in shaping the fundamental rules of engagement and involvement amongst groups and individuals in these social systems and organizations.

Bibliography

1. Crank The Web, BumpList, WiFi-Hog, Desktop Subversibles, all on http://www.coin-operated.com
2. Rochlin, Gene, I. 1997, Trapped In The Net: The Unanticipated Consequences of Computerization, Princeton, N.J., Princeton University Press, p.44.

Links: http://www.coin-operated.com, http://www.scrapyardchallenge.com

Twitter: @coinop29

Design Fiction's Odd Present vs. Science Fiction's Near Future

JULIAN BLEECKER

If there is anything to be gained from the Design Fiction practice it is the playful optimism that comes from "making things up." Making things up is playful and serious at the same time. It's playful in that one can speculate and imagine without the "yeah, but.." constraints that often come from the dour sensitivities of the way-too-grown-up pragmatists. It's serious because the ideas that are "made up" as little designed fictions — formed into props or little films or speculative objects — are materialized things that hold within them the story of the world they inhabit. There is the kernel of a near future, or a different now, or an un-history that begins the mind reeling at the possibilities of what could be. When an idea is struck into form we have learned to accept that as proof — a demonstration that this could be possible. The translation from an idea into its material form begins the proof of possibility. Props help. Things to think with and things to help us imagine what could be.

This is how the world around us is made, by people who imagine what could be and then go forth and make it material. Wheels did not suddenly appear on luggage, but there they are and its hard to imagine that it didn't happen sooner.

Playfully, seriously making things up is how the world around us comes to be. Don't sit around and wait. Make up the world you want. Believe it. Tell its story. Inhabit it and it will become.

Design Fiction strides alongside of Science Fiction, obligating itself to fashion representation of what could be — whether that's a different present, a reassessment of the recent past, or a future likely to be obtained. It may be a reaction to a sense that Science Fiction has given up on the future, or ceded its remit to imagine the future. Perhaps Science Fiction has shifted to envisioning the differently present or the recently past. Ridley Scott recently said, "We have done all we can do for Science-Fiction. After 2001: A Space Odyssey, Science-Fiction is dead."

Design Fiction mucks around in this odd present in which we live. Every year the future is held aloft in the hand at widely publicized consumer electronics trade shows. The press eats it up. It's the new science fiction. This is how we imagine the future. Through 100 million dollar trade shows. Through the trade's hand-held technologies and their odd mash-ups of telephone fitness devices brain wave TV remote controls. (No wonder the science-fiction literary has thrown in the towel. They'd do better as consulting engineers. What a great idea.) Out future is shown to us as made things — prototypes, or evocative objects that suggest, MacGuffin like, what they do. Objects that take batteries and have screens that goad us to massage them. Objects that cycle every 12-18 months and thence end up in a discard drawer or in a closet under last years crap. Or on the Internet's closet, Craigslist.

Design Fiction's commitment is to create a legible, tangible, material representation of alternatives. It uses designed objects — props, prototypes, fakes, punks, speculative consumer electronics objects, evocative ingots of color, material and precision manufacturing, prompts, provocations, little films, atmospheres and visual moments — to start conversations about the future. Design Fiction embraces the cycles of obsolescence, the banal next-new-thing — but it does so in order to find chinks in the iron-clad cycle and find innovative alternatives to the mediocre experiences they inevitably deliver.

The emphasis of Design Fiction is on alternative worlds as represented through the things. These props are called "diegetic prototypes." They are objects that test an idea. The fact that they exist as material objects imply their existence in the same way an object's existence in a movie or play makes the object come to life. In some cases, those props spread ideas more effectively than could a laboratory prototype. Diegetic prototypes serve to tell a story about an object and start conversations, sometimes even before technical possibility has been considered. Diegetic prototypes implicate themselves as things that people would live with, rather than operating solely as technological, scientific or engineering possibility. They are designed, evocative, desirable, ineffable and imbued with a sense of imminent possibility, even necessity. They come across as things that actually make sense.

Design Fiction creates these things because they can help tell the stories about the worlds they occupy, without the stories being told in a typical narrative — and because telling good stories is hard. Making suggestive, evocative, compelling, curious objects is a designer's way of telling stories about worlds that could or should become.

The Critical Engineering Working Group
Berlin, October 2011

Julian Oliver
Gordan Savičić
Danja Vasiliev

THE CRITICAL ENGINEERING MANIFESTO

0. The Critical Engineer considers Engineering to be the most transformative language of our time, shaping the way we move, communicate and think. It is the work of the Critical Engineer to study and exploit this language, exposing its influence.

1. The Critical Engineer considers any technology depended upon to be both a challenge and a threat. The greater the dependence on a technology the greater the need to study and expose its inner workings, regardless of ownership or legal provision.

2. The Critical Engineer raises awareness that with each technological advance our techno-political literacy is challenged.

3. The Critical Engineer deconstructs and incites suspicion of rich user experiences.

4. The Critical Engineer looks beyond the 'awe of implementation' to determine methods of influence and their specific effects.

5. The Critical Engineer recognises that each work of engineering engineers its user, proportional to that user's dependency upon it.

6. The Critical Engineer expands 'machine' to describe interrelationships encompassing devices, bodies, agents, forces and networks.

7. The Critical Engineer observes the space between the production and consumption of technology. Acting rapidly to changes in this space, the Critical Engineer serves to expose moments of imbalance and deception.

8. The Critical Engineer looks to the history of art, architecture, activism, philosophy and invention and finds exemplary works of Critical Engineering. Strategies, ideas and agendas from these disciplines will be adopted, re-purposed and deployed.

9. The Critical Engineer notes that written code expands into social and psychological realms, regulating behaviour between people and the machines they interact with. By understanding this, the Critical Engineer seeks to reconstruct user-constraints and social action through means of digital excavation.

10. The Critical Engineer considers the exploit to be the most desirable form of exposure.
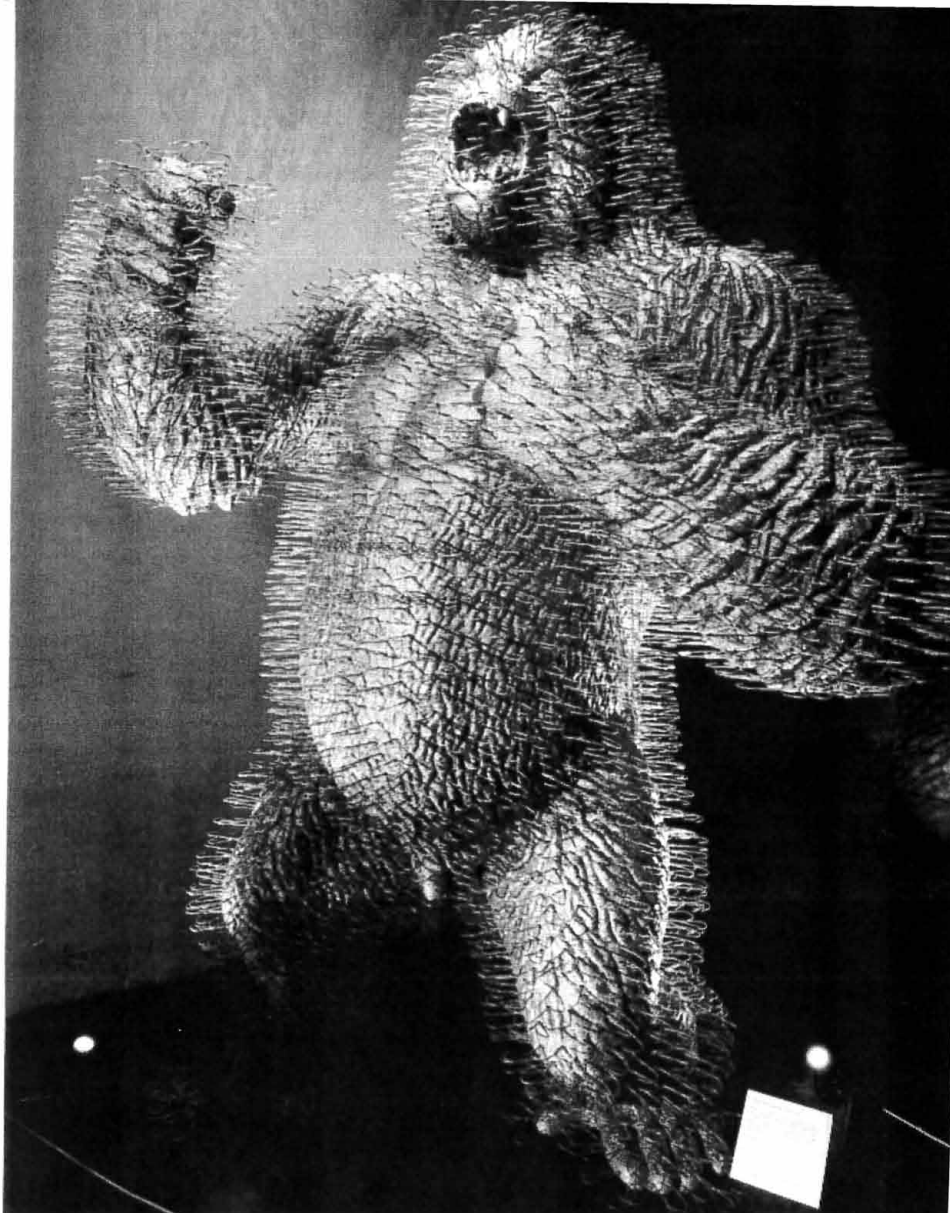
PALETTES, PUNCHCARDS AND POLITICS:
Beyond practicality and hedonism

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Garnet Hertz[1] and Rachel Maines[2] have made a useful distinction between "hacking for survival" and "hacking for hedonism": two contexts of DIY practice that at first glance appear to occupy opposing ends of a hacking spectrum. If we imagine extreme versions of this binary, we get survival oriented hacks on the one hand –William Kamkwamba hacking together a windmill to provide electricity to his village in Malawi[3]– and we get hacking and appropriation primarily as a leisure activity on the other hand – James May enlisting volunteers and artists to build him a house out of legos[4] (that is subsequently demolished when a permanent home cannot be found for it). Our initial impulse was to write about these contexts for making from two very different perspectives within our own communities of practice: Amanda would look at hacking for survival in the context of Thai Street Hacks, while Josh would consider hacking for hedonism from the perspective of the Steampunk making community. However, as our conversation about these practices evolved it became evident that we were not actually working with a binary opposition (survival vs. hedonism) but instead that hacking and DIY practice in both of our communities was driven by a more heterogeneous set of motivations, environmental pressures, and opportunities.

Instead of claiming that these are *types* of DIY practice, we'd argue that both survival and hedonism are *characteristics of **all*** DIY practice, albeit differently emphasized in different projects and different situations. To these we would add that *politics* is also a unifying property of DIY practice. While hacking might be predominantly motivated by any one of these concerns, it is clear to us that even in contexts of hedonism, DIY practitioners are addressing legitimate local needs, and even the most pragmatic of hacks are not divorced from a sense of playfulness with materials and technology. In both contexts, it is important to recognize

[1] Hertz, Garnet. 2011. Arduino Microcontrollers and The Queen's Hamlet: Utilitarian and Hedonized DIY Practices in Contemporary Electronic Culture. Proceedings of the 31st Annual Conference of the Association for Computer Aided Design in Architecture (ACADIA).

[2] Maines, Rachel. 2009. Hedonizing Technologies: Paths to Pleasure in Hobbies and Leisure. The Johns Hopkins University Press.

[3] http://movingwindmills.org/

[4] http://news.bbc.co.uk/2/hi/8269479.stm

how hacking is both implicitly and explicitly a political act, positioned in relationship to authority as encoded within the social and industrial institutions that govern access to material goods and intellectual property.

The more we looked at Thai street hacks, the more evident it became that they most certainly had an element of fun to them. This is highlighted most famously in the "Thai Flood Hacks" that proliferated during the massive floods of Fall 2011[5]. Though a tragic event that killed hundreds and left many thousands more out of work, the makeshift boats, pet life preservers, and elevated vehicles revealed a sense of whimsy even in coping with a natural disaster. An eminently practical project from the King Mongkut Institute of Technology – a floating device meant to save lives by detecting current from submerged electronic devices – was topped with an adorable rubber duck. Because they could. More routine examples of Thai DIY include the many small businesses that unlock mobile phones for a small fee, craftspeople who make miniature tuk-tuks out of beer cans and sell them to tourists, or the independent carpenters near Bangkok's port who make tables and chairs out of discarded shipping palettes. Such hackery is, of course, paying work that allows these entrepreneurs to survive, but it's also (and this is actually
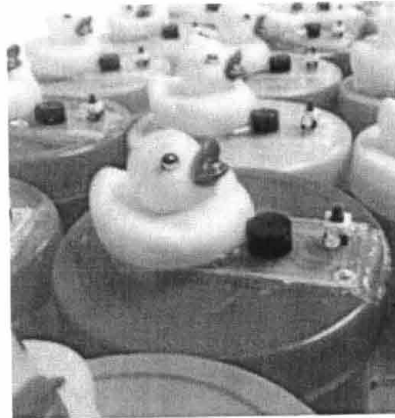
Figure 1: Flood ducks, a project from the King Mongkut Institute of Technology, detect dangerous electrical currents in flooded homes.
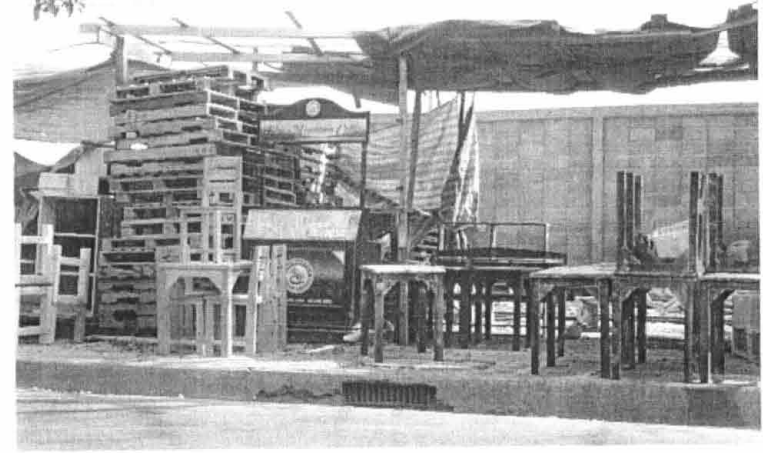
Figure 2: Furniture made in the port of Khlong Toey, Bangkok, from discarded shipping palettes.

really important), a way for them to earn a living in a way that lets them control their schedule, express creativity, and maintain a sense of dignity. More deeply than that, it embodies a tradition of work that intrinsically includes elements of "sanuk" (fun) and sociality.

Similarly, although Steampunk making is primarily characterized by a drive to re-imagine modern technology through a historical lens, this fundamentally playful practice often undertakes more serious cultural criticism by connecting anachronistic historical revisionism with a science fictional ethos about the nature of technology.[6] Steampunk practice is a highly politicized form of DIY that is explicitly motivated by a desire to reclaim technology from the homogenizing forces of mass production. As such, even the most seemingly frivolous window dressing of the Steampunk aesthetic participates in a culture of critical

[5] A few sources (among many):
http://mkshft.org/2011/11/thai-flood-hacks/
http://www.neatorama.com/2011/11/15/thai-flood-hacks/
http://slashbangkok.com/
http://news.asiaone.com/News/Latest%2BNews/Asia/Story/A1Story20111106-308991.html

[6] See Onion, R. (2008). Reclaiming the Machine: An Introductory Look at Steampunk in Everyday Practice. *The Journal of Neo-Victorian Studies, 1*(1), 138-163 for a much more rigorous discussion of the ways in which Steampunk practices critically engage the relationship between people and technology.

design. Unlike other DIY practice where the critique of industrial processes is often implied but unarticulated, Steampunk often explicitly declares itself as a critical practice: hence the "punk" appellation.

For the moment, then, let's unmake the dichotomy between survival and hedonism, or at least consider the work that it takes to separate joy and necessity, work and play, production and consumption. These learned distinctions come easily to someone who spends their life in an industrial society, and who takes wage-work for others as part of the natural order of things. For people who live in economies with a significant "pre-industrial" sector, those distinctions are not quite so naturalized. The Thai noun for "work", *ngan*, is also used for "festival", and can be traced back to a time when the two concepts were much more synonymous. This reflects a tradition of work that is concerned with communal effort and sociality. Today, agricultural work in Thailand is still characterized by a vibrant sociality and loose schedule (and, no doubt about it, hard physical labor), while "modern" jobs are more about disciplining workers' bodies and hiding their individuality[7]. Workers who take service jobs in the city *can* adjust to the dualism of work and play (especially given financial incentives), but that doesn't mean they perceive it as natural, that they like it, or that they can't conceive of alternative configurations. In fact the *separation* of work and play here is what's remarkable, in contrast to a North American attitude which finds "productive leisure" to be remarkable because it appears to constitute a contradiction in terms.

Thailand's craft-based entrepreneurs also show us that the distinction between "practical" and "strategic" interests is often problematic[8]. "Survival" and "political" strategies can be performed simultaneously – to think otherwise is to believe that poor people don't care about constructing their own identities, or that they don't think critically about the world that they live in. For the poor and the politically disempowered, open resistance can be dangerous, but that doesn't

mean that their consciousness and imaginations have been so completely colonized[9]. Woven through everyday survival strategies are under-the-radar practices of resistance and redefinition, small ways to preserve dignity.

So how does this relate to North-American, "hedonistic" practices? Well, how empowered are we, *really*? Discourse within the Steampunk community frequently addresses issues of empowerment and agency over (and through) technology. Reacting against the "hegemonic grip of modern design"[10] Steampunk practitioners hack and appropriate modern technologies (such as cell phones and personal computers) to fit their own needs.

> "The authoritarian implications of the 'black box' are precisely the ones that Steampunk practitioners seek to undermine through their craft practices. Steampunks see modern technology as offensively impermeable to the everyday person, and desire to return to an age when, they believe, machines were visible, human, fallible, and, above all, accessible." (Onion, 2008, p.145)

Steampunk can be seen as a microcosm of broader DIY motivations; one which employs a narrative of human-machine relations to articulate a desired future. Unlike many "punk" movements, Steampunk adopts a decidedly utopian position on this future, enacting its politics through a design practice that celebrates the technological sublime[11].

DIY practice is political, and yet it is always, also, at the same time, about other things, too. As a corollary to the relationship between practicality and politics[12] we'd suggest that "hedonistic" and "political" activities can also be one and the same. Whether it's North American steampunks or Thai entrepreneurs, DIY as political resistance is actually pretty similar

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[7] See Brody, Alyson. 2006. The Cleaners You Aren't Meant to See: Order, Hygiene and Everyday Politics in a Bangkok Shopping Mall. Antipode 38:3, pp 534-556 to learn a bit about how much work goes into making work separate from play and sociality.

[8] See Escobar, Arturo. 2011. Encountering Development: The Making and Unmaking of the Third World. Princeton University Press. p187, and Brody, ibid..

[9] Scott, James C. 1985. Weapons of the Weak: Everyday Forms of Peasant Resistance. Yale University Press.

[10] Onion 2008.

[11] (Onion 2008) describes Steampunk's fascination with technology in terms of the "sublime": an experience of aesthetic awe at the scale and/or intricacy of a given technological artifact.

[12] As discussed in Escobar 2011.
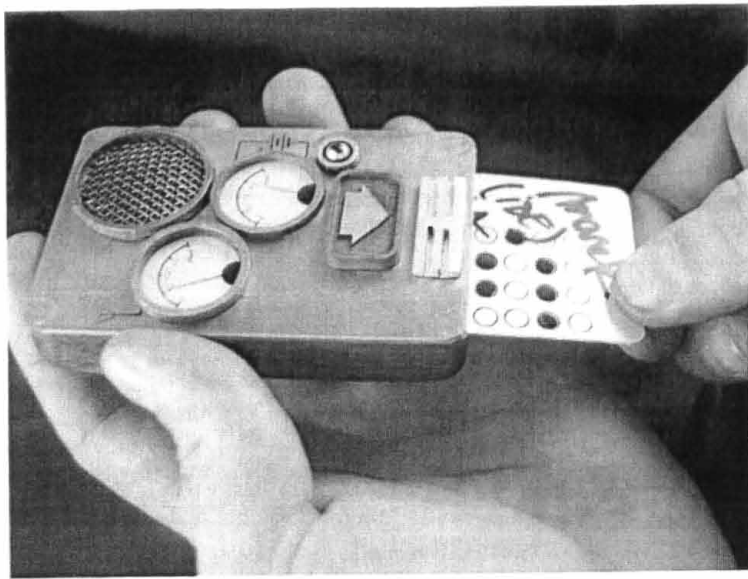
Figure 3: Arthur Schmitt's Steampunk Phone is controlled by binary encoded punchcards. (image source: http://www.tart2000.com/2007/07/steampunk-phone/)

to everyday forms of peasant resistance[13]: decentralized and unorganized practices that mostly happen below the policy radar, and yet affect the success of state policies. This sort of resistance takes the form of desertion rather than conscientious objection, working inefficiently rather than striking, squatting rather than invading. Many practices of making can be considered a sort of "everyday resistance", not just to a consumerist culture but also to a political system increasingly controlled by corporate interests and difficult for normal people to influence directly. The Occupy movement resists this trend overtly: they get arrested, pepper-sprayed, and beaten up, but the Supreme Court's Citizens United decision still stands. In contrast, while DIY has intrinsically political elements, it can also fly under the radar because we can always play up plausible deniability. What, me, political?

Maybe I just like cute robotic dogs[14]. Regardless of the context in which it occurs, DIY practice creates a safe space for people to challenge entrenched political and economic structures. Although this plays out in different ways in different communities, hacking serves a fundamentally liberating function, giving people a greater degree of autonomy, and consequently a greater amount of responsibility over their environment at the level of immediate and local needs. A quiet (or even exuberant) abandonment or reappropriation of black-boxed, cookie-cutter consumer products is a much safer method of resistance to corporate interests than joining an Occupy rally, just as

Figure 4 Richard Nagy's now infamous Steampuk Laptop. (Image source: http://www.datamancer.net/steampunklaptop/steampunklaptop.htm)

a conscript's quiet desertion is safer than trying to overthrow officers, and failing to declare cash income is safer than challenging the state's right to tax you at all. And yet, sometimes, these not-entirely-organized acts, in aggregate, can render existing policies ineffective and maybe even inspire new ones.

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[13] As described in Scott 1985, based on fieldwork subsistence farmers in rural Southeast Asia.

[14] Natalie Jeremijenko's Feral Robotic Dogs, while a noteworthy and effective tool for citizens to track environmental pollution, is also adorable, and deliberately calls up humorous images of a "robot army". http://www.nyu.edu/projects/xdesign/feralrobots/

HUGGABLE ATOMIC MUSHROOM
DESIGNS FOR FRAGILE PERSONALITIES IN ANXIOUS TIMES, 2004/05

DUNNE & RABY
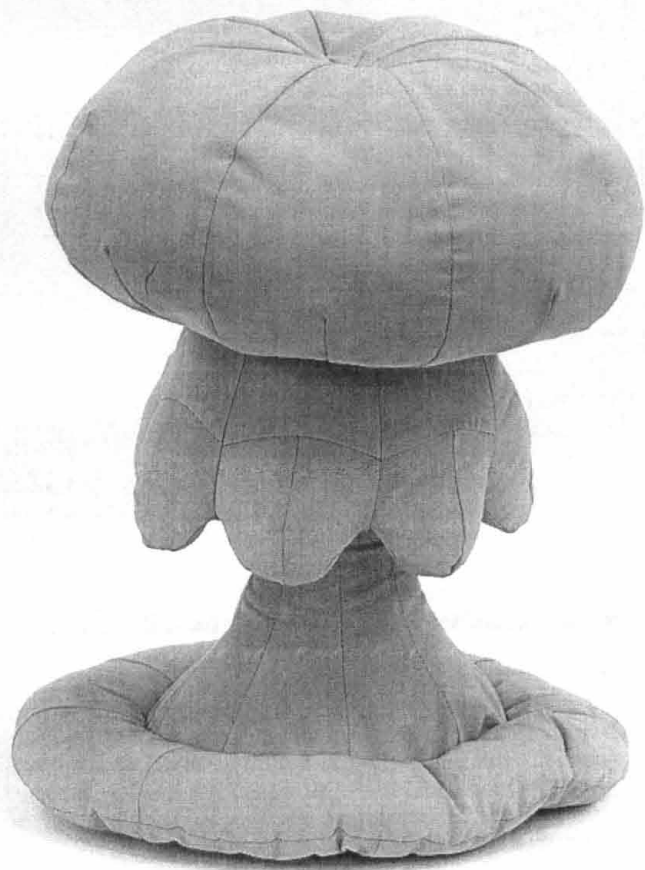
A	B
Affirmative	Critical
Problem solving	Problem finding
Provides answers	Asks questions
Design for production	Design for debate
Design as solution	Design as medium
In the service of industry	In the service of society
Fictional functions	Functional fictions
For how the world is	For how the world could be
Change the world to suit us	Change us to suit the world
Science fiction	Social fiction
Futures	Parallel worlds
The "Real" Real	The "Unreal" Real
Narratives of production	Narratives of consumption
Applications	Implications
Fun	Humour
Innovation	Provocation
Concept design	Conceptual design
Consumer	Citizen
Makes us buy	Makes us think
Ergonomics	Rhetoric
User-friendliness	Ethics
Process	Authorship
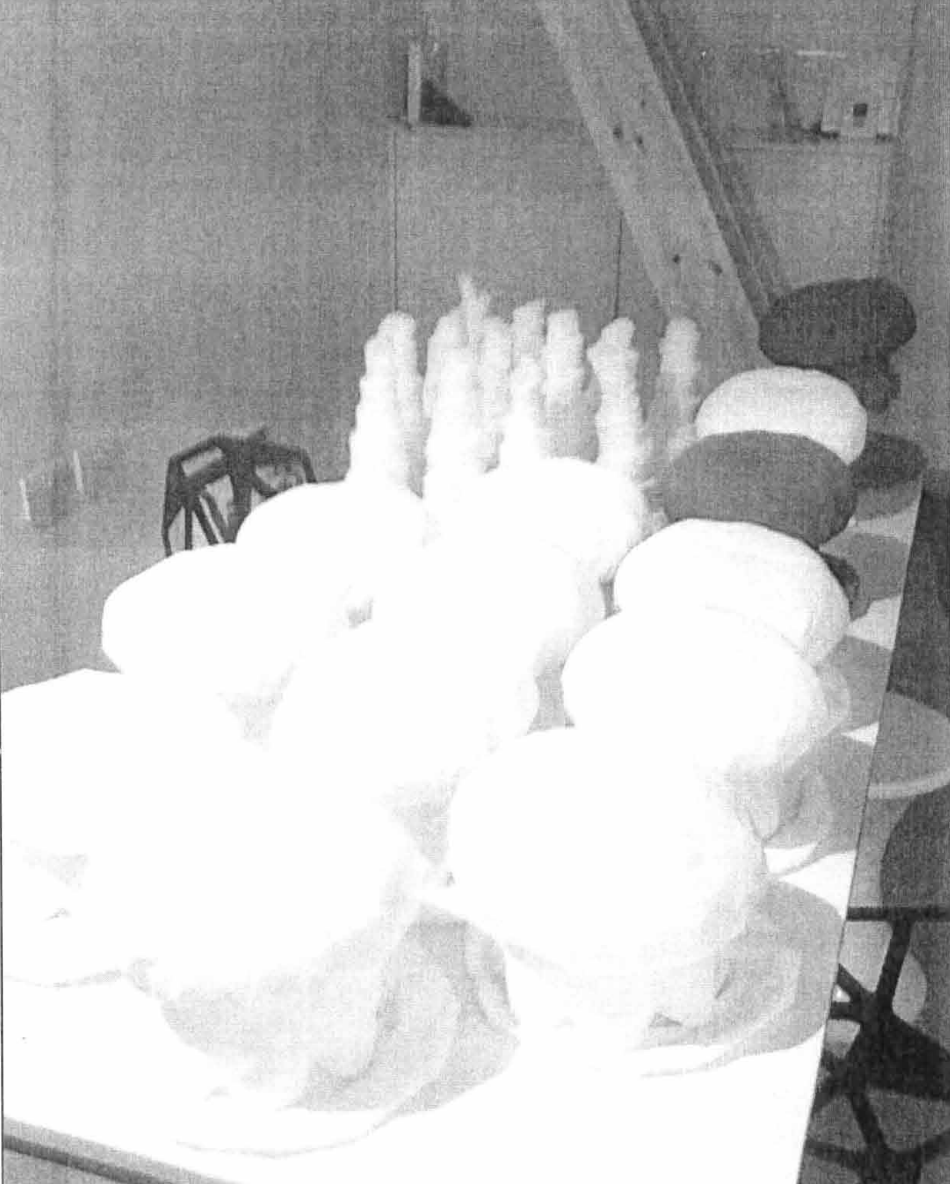
Breathing spot colour:

A Critical Making exploration of physical standards

ginger "all-lower-case" coons
Faculty of Information
University of Toronto
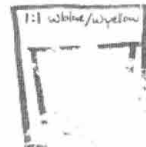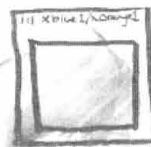
You've probably heard of Pantone. You may have seen a Pantone swatch on a mug or read news releases detailing Pantone's fashion colour forecast for the season. Pantone has become something of a lifestyle brand. But at its core, Pantone is a colour matching system used heavily in the printing and graphic design industries. Most printing (including the work done by your desktop inkjet) is done with a four-colour process. The four colours of ink – cyan, magenta, yellow and black – are applied to paper or another substrate. The inks work together to form almost any colour. That "almost" is the basis of Pantone's business. Pantone is a highly popular spot colour system. Spot colour fills the void left by "almost." In spot colour, a specific ink colour is mixed from a collection of pigments (more than the standard CMYK four) and is then applied. When you see a flourescent, a particularly convincing Caucasian skin tone or anything vivid in the red end of the spectrum, chances are good it's the work of spot colour.

For two and a half years, I (often literally) breathed spot colour. I made a practice of studying spot colour because of a practical problem: there isn't good Pantone support in Free/Libre Open Source graphics software. The licenses are incompatible. So I opted to make my own standard. It was going to be called the Open Colour Standard and it was going to live up to its name. My intention was to create a well-documented, publicly-available, modifiable and freely-implementable spot colour standard. As a

Critical Making (Ratto, 2011) project, it was meant to be an exploration of the standardization process almost more than it was intended to be usable. In effect, I tried, without the normal infrastructures and supports of institutionally-developed standards, to create a widely-usable and accessible standard for a physical system.

While the inspiration for OCS did lie in Free/Libre Open Source Software movements, the work involved in defining a physical colour standard is somewhat different from normal F/LOSS work. Where the usual work of F/LOSS, as implied by the second S. is in the development of software, the main body of development in the Open Colour Standard was focused on pigment solutions and mixes of those solutions with other materials to form inks.

The workflow involved in the development of a physical standard is quite different from that (or those) involved in software development. First and most obviously, there is a far higher degree of materiality required in the development of an ink standard than in the development of a piece of software. A physical system requires physical development. Given that requirement, there is a different set of tools used. In software development, the bare minimum required is a computer with a text editing program and a compiler for the programming language being used, as well as a keyboard or other text input system. While different developers employ different workflows, these three things are the minimum required for modern programming.

In the work of ink development, on the other hand, a far larger set of tools is required. Among that set: pigments; water; carrier medium; stabilizers and other chemicals (which are determined by the pigments and carrier mediums being used); mixing implements; containers; paper or other relevant substrates; measuring apparatus; etc. This list accounts for the bare minimum of necessary tools.

The process involved in the development of the Open Colour Standard was, from a perspective of materiality and tools, quite different from more usual F/LOSS development practices. It did follow F/LOSS principles in other significant ways. OCS adheres to ideals about documentation, attempting to keep as straightforward and imitable a practice as possible. This is an essential principal of F/LOSS, even if it isn't always followed in practice. In the case of Open Colour, the adherence to documentation is realized through rigorous taking of lab notes, careful (and un-secretive) documentation of formulas and processes and open discussion of the development process with others.

ink

FD&C Blue!! 1 , FD&C yellow#5

distilled water

speedball white screen printing ink

The hands-on work of OCS was meant to replicate the sort of process that might lead to the development of a physical, material standard. This experimental process largely followed basic laboratory methods, although from a self-reflective, critical perspective. In addition to the hands-on process, I used a mix of methods to conduct the research around OCS. I analyzed the guidelines of standards-setting organizations such as ISO (the International Organization for Standardization) and W3C (the World Wide Web Consortium), employing media analysis techniques (Berger, 1991). Looking at their own guidelines was an essential step in understanding how they expect their systems to work. I looked at how the documents are situated in the cultures of their making, how they impact their end users and how they represent the social and economic assumptions of their creators (ibid).

developer and maintainer of a variety of material and standards management

developer & maintainer of such standards as HTML, CSS & SVG

The bulk of my experimentation was with an aim towards developing a palette of screen printing colours. This experimentation was concurrent with my first reading of *Laboratory Life*. The influence of Latour and Woolgar at this time helped to grow a sense of self-consciousness in the documentation of the experimentation process. This self-consciousness resulted in the development of a form of meta-note taking, which attempted to take into account as many contributing factors as possible, from the tangential-but-relevant to the frankly odd. I took great pains to make clear, in the notes, my state of mind, factors which might

play into my performance (going so far as to record what music I was listening to at any given time, how I felt physically or how much caffeine I had consumed that day) and other items which may seem extraneous to the actual work of mixing colour.

In the development of Open Colour, I spent a great deal of time paying attention to my own actions, moods and quirks. There were two major reasons for this behaviour: first, after Bowker and Star, I was convinced that the process involved in the creation of a standard has a significant impact on the final form of the standard in the sense that it becomes "frozen organizational discourse" (1994); second, influenced by Latour and Woolgar, I was convinced that the process of doing work in a scientific or semi-scientific process involves a degree of flattening and simplification, turning reality into narrative (1979). I was set on avoiding that flattening.

In the development of standards and processes, the final product of method is meant to be generalizable and transferable. Because of this valuing of generality and portability, the final product must be divorced from the context of its process, even if that process is documented. While the importance of good documentation for reproducability and transparency cannot be ignored, the process, which takes place in real time during the development of the product, has

no way of standing on its own feet. Instead, the documentation, another product of the process, is the only thing explicitly recounting and recalling the process (although, of course, in its way, the final product must also embody the process of its production). The documentation exists not only for functional reasons like allowing reproduction and testing, but also to give context back to the ultimate product. By recounting the story of the process, it sheds additional light on the product. The problem, of course, is that documentation is representation. Representation, by definition, leaves things out.

Purely tangential, silly or arbitrary things do not often show up in final standards documents. They seem largely irrelevant to the actual deployment and adoption of the standard. Despite their seeming irrelevance, they tell a story about the in-built biases and reasons behind the standard. Surely the knowledge that certain decisions have been made purely out of convenience might colour the perception of the standard. This disclosure of methods could be the province of a document explaining the methods behind the work. However, if such a methods section exists at least in part to legitimate and back up the work being presented, then there is less reason to admit to arbitrary or silly decisions.

While work completed over the course of the Open Colour project is an attempt to get at a better understanding of the physical issues in the standards-setting process, it is not an accurate stand-in for the large scale, institutionalized instances of consensus-based standards-setting. My work has been a process of seeking out a better personal understanding through an individual enactment of activities geared towards the creation of a specific standard. I do believe that hands-on experimentation can indeed help to shed light on the issues underlying the decentralization of physical information. Such work can provide an insight into the processes and biases built into standards-setting, as well as the practical issues addressed and embodied in standards. This embodiment is key to a deeper personal understanding. The experience of setting baselines, of sourcing and imagining production chains, of attempting consistency can provide a wonderful contribution to thinking about the ways we structure our physical information systems. It lends a more contemplative element to the study of standards-setting, making it more viscerally real than a study focusing solely on document analysis or organizational structure and process. I feel that the element of embodied, personal understanding that comes with attempting to do the work of the standards-setting body contributes hugely to my personal understanding of the motivations behind the decisions made in the creation of physical standards.

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Is becoming old something we have forgotten how to do? Innovative and agile always upgrading and adapting, running out of time, learning to forget.
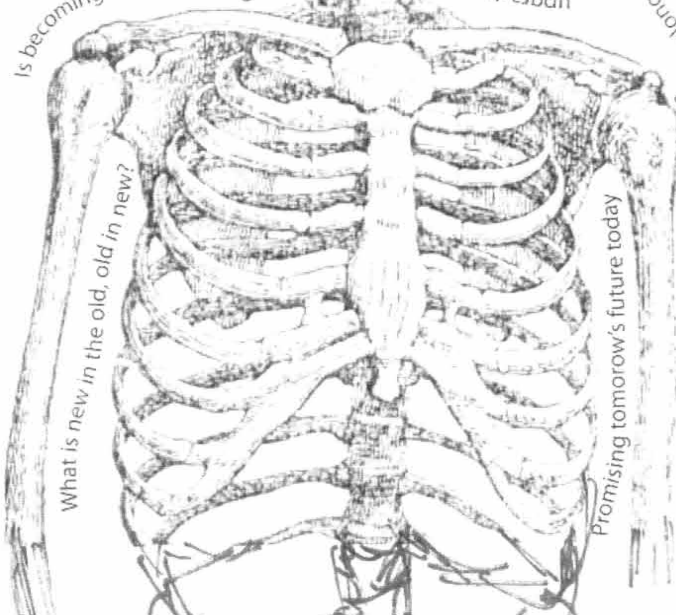
What is new in the old, old in new?

Promising tomorow's future today

or building today the legacies of tomorrow?

e gracefully alongside out technologies and computational practices?

...dition and wisdom

Ember

MARISA COHN
+ YLVA FERNEAUS

Embedded with tradition and wisdom

enduring and long-lived?

...way the legacies of tomorro...

Creep &cruft, or the well-oiled machine? How do we age graceful.

Good riddance to bad practices, rot that's fallen away.

What's soft in hardware? Bendable, pliable elastic, flexible, responsive. The cloud? Physical platforms, The smooth encasement of the leisurely afterthought. The friendly add-on or the tactile, touchable, and graspable wires. the rubber meets the road. The fleshy fruit. Fibrous textures, wove The skeleton for the tissues. tension. Metal on metal, gears and grea. building rigid and durable or fragile brittle and breakable?

What's hard in software? No. You've gone soft. soft or hard? Intangible, abstract, and immaterial or tactile, to The soft image is out of focus. Where the rubbe Hardcore programmers The hard pit to the fleshy fruit platforms, the new, the old, and the broken. ures, woven. code only in binary. Is electricity and nouns. Verbs Machanic versus alive. Pulling the threads, building rs and grease. Sturdy, rigid and d

BUSINESS AS A MEDIUM

by Matthew Manos

VERYNICE

Bank of America

Customer Since 2012

"Mainly they were worried about the future, and they would badger us about what's going to happen to us. Finally, I said: 'Look, the best way to predict the future is to invent it. This is the century in which you can be proactive about the future; you don't have to be reactive. The whole idea of having scientists and technology is that those things you can envision and describe can actually be built.' It was a surprise to them and it worried them." – Alan Kay

In the 18th Century, just 3 decades prior to the birth of Leland Stanford, Adam Smith defined "entrepreneur" as a person who acts as an agent in transforming demand into supply. This specific definition, the concept of an entrepreneur as a supplier of what the customer wants, is in agreement to many definitions that preceded Smith. However, this was not a philosophy that remained a static definition of the practice. In his book, The Design of Business, Roger Martin speaks of entrepreneurship and innovation as a way of seeing the world "not as it is, but as it could be." The book goes on to argue that true innovation stems from the exploration of problems that can not actually be found in history, or proven by data. Perhaps in a more extreme use of language, Erik Reis offers up another take on the practice defining entrepreneurship as the act of creating something new under "extreme uncertainty." From juxtaposing the 21st Century definition of the field with the 18th and and early 19th century definitions, it might seem as though entrepreneurship has evolved from a practice that supplies a demand to a profession that creates de-

mands – from a field of regurgitation to a practice of innovation. However, I argue, these theories are not honest representations of the true landscape of contemporary American innovation.

Numbers are a hindrance on history-making. Prescribed methodologies, or the templatization of innovation, yields expected results. Changing history through the production of cultural shifts, an ambition at the heart of entrepreneurship, is an act that is far too radical for a quantitative practice. Entrepreneurs often turn towards numbers to see how coordination or reallocation can be optimized to provide a great benefit to either corporate or social entities. A quantitative and theoretical stance like this is actually crippling to the radical thinking an entrepreneur is capable of, limiting their ability to innovate that which does not exist and change the way we, as consumers and human beings, perceive the world around us on both a macro and micro scale. Peter Lunenfeld states that we need to "move from P&L to V&F—profit and loss to vision and futurity—from ROI to ROV –the Return on Investment to a Return on Vision." A shift in entrepreneurial intention from one that is quantitative to one that is qualitative enables innovators to lessen their concern around the production of profit, and instead focus efforts toward designing a future they would like to inhabit - a shift in mindset that can, and has, transformed entrepreneurship into a medium of design. I argue that these kind of values and aspirations were common amongst 20th century innovations, but has been lost in post-internet entrepre-

neurial endeavor, a practice that has suffered from a disability that has crippled the ability to discover new problems to design solutions for.

"The husband and wife who open another delicatessen store or another Mexican restaurant in the American suburb surely take a risk. But are they entrepreneurs? All they do is what has been done many times before. They gamble on the increasing popularity of eating out in their area, but create neither a new satisfaction nor new consumer demand [...] Indeed, entrepreneurs are a minority among new businesses. They create something new, something different; they change or transmute values." – Peter Drucker

Instead of changing or transmuting values, entrepreneurs are focusing energy towards making the old better, feeding off of that which preceded as opposed to laying ground work for that to come. This methodology results in a loss of disruptive tendency within the practice of entrepreneurship. What if we shifted the value of business away from "money making," and towards "meaning making." What if business was reinterpreted as a medium for critical inquiry? By definition, a "project" has a start and end date - it is more than acceptable to, eventually, conclude a project. A business, on the other hand, is designed with the intention of never concluding. Conclusion in business, in fact, is seen as a negative thing - it is seen as an embarrassment within the entrepreneurial community. If you have to end your business, it means you couldn't make it work - you failed, and not in the romantic

sense. This reality, in entrepreneurial endeavor, inspires a kind of mindset that obsessively considers two things at all time: accessibility and sustainability. People need to understand your idea so that they will want to be a part of it. You need to find some way to make your idea impenetrable from the realities of day-to-day necessities so that you can survive. So what if critical designers took a similar approach to their projects by framing their inquiry as an entity that requires a component of self-sustainability?

Leveraging business as a medium for critical design will not only result in a fruitful, long term, source of new knowledge and discovery, it will also make critical inquiry more approachable and accessible by the general public. Business, like it or hate it, is a part of our daily lives - the clothes we wear, the food we eat, the schools we go to, the people we work for... it is an internationally understood tool that we all have some sort of experience with. Turning that ultra accessible medium into something that can make new knowledge, then, has the potential of great power for the critical design community.

To give a personal account of how I am actively using business as a medium for critical inquiry, I will speak a bit about my current venture: verynice. In 2008 I became very interested in all of the disgusting moral dilemmas in the corporate design industry. Specifically, I became interested in the misuse of the word "social," and the falsity of intentions amongst "social designers" in

the corporate scene. This interest soon evolved into a critical investigation into the cultural relevance of pro bono, social entrepreneurship, and the future of volunteerism. But instead of making a poster about it, or doing a sort of one-liner critical design project that amplified my disgust... I started a business: a verynice design studio. verynice has now grown to be a global design, business, and innovation consultancy that gives over half of it's work away for free. We have been able to donate the equivalent of nearly $350,000 in design services for non-profit organizations, for nothing in return. Sure, the pro bono component of verynice is a great way to give designers a platform to contribute to the betterment of society with their unique skills and talents (as opposed to cleaning up a beach), but it has always been about much more than that, on a personal level. It is because of my critical enterprise that I, personally, have been able to gain knowledge around "research interests" through unique conversations with the clients, collaborators, stake holders, and enthusiasts that support verynice's efforts.

I encourage designers and artists to see business as something more than money-making - to instead recognize that it is another medium. To see entrepreneurship as an alternative to photoshop or illustrator - something that can be used as a platform to experiment, learn, and disseminate new knowledge in an accessible and sustainable manner. Here's to a new genre of business, making and design: "critical enterprise.

modernism	wabi-sabi
The box as metaphor (rectilinear, precise, contained)	The bowl as metaphor (free shape, open at top)
Manmade materials	Natural materials
Ostensibly slick	Ostensibly crude
Needs to be well-maintained	Accommodates to degradation and attrition
Purity makes its expression richer	Corrosion and contamination make its expression richer
Solicits the reduction of sensory information	Solicits the expansion of sensory information
Is intolerant of ambiguity and contradiction	Is comfortable with ambiguity and contradiction
Cool	Warm
Generally light and bright	Generally dark and dim
Function and utility are primary values	Function and utility are not so important
Perfect materiality is an ideal	Perfect immateriality is an ideal
Everlasting	To every thing there is a season

modernism	wabi-sabi
Looks for universal, prototypical solutions	Looks for personal, idiosyncratic solutions
Mass-produced/modular	One of a-kind/variable
Expresses faith in progress	There is no progress
Future oriented	Present oriented
Believes in the control of nature	Believes in the fundamental uncontrollability of nature
Romanticizes technology	Romanticizes nature
People adapting to machines	People adapting to nature
Geometric organization of form (sharp, precise, definite shapes and edges)	Organic organization of form (soft, vague shapes and edges)

Koren's comparison between modernism and wabi-sabi, which is useful within the context of DIY/making. (GiH)

Differences:

modernism	wabi-sabi
Primarily expressed in the public domain	Primarily expressed in the private domain
Implies a logical, rational worldview	Implies an intuitive worldview
Absolute	Relative

Albert Borgmann

A Turn to Comprehension & Competence

6/21/12   DIY is a turn to comprehension and
competence and away from ignorance
and consumption. The ignorance I
have in mind is~~,~~ the unavoidable
kind — how does your ~~computer itself~~
~~work~~ iPhone work? Yes, you push,
touch, and slide. But why does that
work? What makes the screen sensitive
to touch and motion? Where did your
movements summation pictures, music,
and text from? Yes, from chips. But
how does a chip work? And I'm just

2

scratching the surface of these
impenetrable and unintelligible structures.

Of course, there are the benefits of the
opaque and concealed structures, the
ease of calling up my favorite music,
of getting the news, of contacting my
friends. ~~It's sheer and unen~~
                    → The iPhone is a source
                       of endless
~~of riot   of diverse and~~ unencumbered
pleasures. They're easy to enjoy and
hard to resist. That kind of
enjoyment is consumption.

Are there objects, other than iPhones, that

produce music? Consider my fellow Missoulian, the violin maker Mark Hollinger. His major raw material is wood. He knows, its origin, its ~~where it comes from~~, and ~~total~~ species, ~~what~~ age, ~~what~~ grain. He shapes it mostly by hand, glues the pieces together, varnishes the thing, strings it. When ~~the violin~~ he looks at the finished violin, he understands it all the way down, and he sees a monument to his competence.

6/25/12

Whether anything like a comprehension of the entire world is possible today, I'm not sure; and anyone's competence

has to be limited. And yet we can be sure that the circumscribed comprehension and competence of DIY are immensely valuable — they circumscribe the good life in a culture of ignorance and consumption. More than that, they reveal that underneath and amidst the forbidding structures and sleek commodities of the technological culture there is ~~still~~ an engaging and ennobling world.

Still ~~the~~ its limits cast a shadow on DIY. If it's so beneficial, is it enough that you and I and she and he each lives in their own little wholesome world? What fills

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BREN SCHOOL ICS

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06/28/2012 14 40 40672811894
BREN SCHOOL ICS

me with great sorrow, and not just
me, I'm sure, is the fact that the
victims of DIY are found in so many
little worlds, and yet they fail to
have a collective effect on the
world at large that nationally and
globally is dominated by the forces
of commodification and its vaguely
sensed consequences of growing
incomprehension & incompetence.

Consider these movements: Voluntary
simplicity, farmers markets, the
hospice movement, the new
urbanism, ... All of them are
devoted to recovering within their

compass a measure of understanding
and skill. But politically they
count for very little. They don't
converge & cooperate to take on
~~a~~ the daply flawed mainstream
culture.

~~So~~

So that has to be next — recognizing
the diaspora of ~~the~~ good people and of
the good life, joining together,
and making a difference in
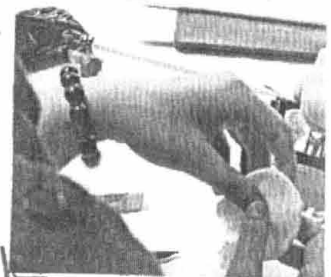electoral politics.

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JUN-26-2012 13:46 BREN SCHOOL ICE

Hardware hacking and recycling strategies in an age of technological obsolescence

Benjamin Gaulon

Planned obsolescence was first explicitly formulated in the 1920s and 1930s as part of a strategy to promote recurrent consumption [1]. The term "planned obsolescence" already appears in the 1930s, as exemplified by Bernard London's pamphlet of 1932 *Ending the Depression Through Planned Obsolescence* [2]. In the 1950s, further evidence of this dynamic can be found in statements by designers such as Brooks Stevens [3] and retailing experts like Victor Lebow [4].

Planned obsolescence may be described as a design strategy that pre-emptively restricts the lifespan of a commercial product, looking at factors intended to promote early replacement [of the object or itself] before its usefulness is fully exhausted. These limiting factors may be of a technical or material nature, e.g., some inkjet printer manufacturers use smart chips in their ink cartridges to prevent them from being used after a certain threshold like the number of pages or time. Apple's iPod, iPhones and iPods are manufactured with no user serviceable parts inside, including their batteries. After approximately three years of use, the lithium-polymer battery will no longer work and the device will either need to be professionally serviced or discarded. Sometimes they may comprise a marketing strategy in which the appearance of "new" models within the same product range relegates older models to obsolescence [5].

Planned obsolescence is an especially notable strategy in the consumer technology and personal electronics market, where there is a clear premium on the novelty and iterative development of new generations of the same underlying technologies (e.g., the personal computer and the mobile phone). Darren Sloan, a senior industrial engineer at Pentagram Design, which builds portable devices and computers for companies like Hewlett Packard, says "We note that we design [visible]" [6]. The combination of short term design and marketing strategies and fast consumption behaviours tends to generate a fast increasing amount of electronic waste [7].

A counterpoint to the development of planned obsolescence is evidenced in the work of artists, hobbyists, hackers, activists and sustainability advocates who exploit the latent potential of apparently "obsolete" devices. Early indications of this tendency are in the work of Reed Ghazala [8] who ventured and first conceptualised the practice of "circuit bending" as the 1960s which has not been widely documented, studied or theorised [9]. An other emerging practice is the recycling and hardware hacking processes that are driven by necessity by Hackers and Bricoleur in western and developing countries [10]. Though driven by entirely different motivations, these practices can inform each other. Furthermore these practices have the potential to make significant contributions into the debate of technological obsolescence.

Hardware hacking, as an art practice has emerged very recently, notably in the field of electronic music, as the technique of 'circuit bending' where cheap music toys and instruments are modified to create new and unique music instruments. While not prevalent for visual artists, perhaps because it requires more specific skills and knowledge, it is a practice, which has seen a growth in popularity.

While it is a new practice, its art historical precedents can be traced back to the cybernetic art movement of the 1960s first known through the Jasia Reichardt curated *Cybernetic Serendipity* exhibition in the U.K in 1968. Key influences would include the installation work of Nam June Paik, the machines of Jean Tinguely and the lesser-known work of French cybernetic artist Nicolas Schöffer.

Examples of artists and artists groups involved in hardware hacking would include the Institute for Applied Autonomy, Peter Vogel, Casey Smith [funkhouse: Labs], Gebhard Sengmüller, Karl Klomp, Gijs Gieskes, Reni Mookjian, Tom Verbruggen, Jonah Brucker-Cohen & Katherine Moriwaki [Scrapyard Challenge], Ben Castro and Miguel Rodriguez of Basurama, Garnet Hertz, Niklas Roy, Todd Holoubek, Gordan Savicic, Harald Schedlins, Peter Edwards, Martyn Diamant, Gunter Erhart, Nicolas Collins, Cory Arcangel, Natalie Jeremijenko, Troika, Phil Archer, Michael Golembewski, Julien Bowen, Julius von Bismarck, Caleb Coppock, Lesley Flanigan, James Houston, Aleks Kolkowski, Alexis Malbert, David Wills, Brian Duffy, Jeff Boynton, Tom Koch, Arcangel Constantini, LoVid, Stefan Junkus, Philip Stearns, and many more.

New technological developments such as the availability of low cost micro controller boards like Arduino [11], made specifically for artists and designers and the sharing of techniques and information via the Internet have made hardware hacking easier and as a result the popularity of hardware hacking is increasing as an artistic technique.

The significance of this type of artistic practices is clear when one considers the sheer volume of waste electronics being disposed round world. Moore's law dictates that the complexity of computer chips doubles each 18 months. By consequence every year 20 to 50 millions tones of E-waste is generated worldwide [7].

Notes

[1] It is worth noting that some critics have suggested that the very concept of promoting unnecessary consumption (through the premodern "wearing out" of a commodity) is already in evidence in the 15th century, pointing to sources such as Discourse on Trade (1690) by Nicolas Barbon in which he argued that, "Fashion or the alteration of dress is a great promoter of trade, because it occasions the expense of cloaths before the old ones are worn out" (see Edwards, 2005, pp.24)

[2] Bernard London, "Ending the Depression Through Planned Obsolescence" (pamphlet), 1932. Reproduced by Adbusters Magazine, "How Consumer Society is Made to Break," available online at <http://www.adbusters.org/category/tags/obsolescence> (Last modified October 20th 2008, last modified October 16th 2008)

[3] "About to want something a little newer, a little better, a little sooner than is necessary," Brooks Stevens, Talk at Midland   [Minneapolis] in 1954, audio recording available at <http://www.utsa.edu/collections/archives/brooks/biography.asp>

[4] "These communities and services must be offered to the consumer   with   a   special urgency. The require not only lowest level consumption, but expensive consumption as well. We need things consumed, burned up, worn out, replaced, and discarded at an ever-increasing pace." Victor Lebow, First Competition in 1955, The New   York Consumer Journal of Retailing, Volume XXXI, Number 1, Spring 1955, page 7

[5] Although the term has wide currency in popular discourse, considered definitions for "planned obsolescence" are not very common although Josh Vance Packard (The Waste Makers, Sower & Schuster, 1970) and Thomas Frank (The Conquest of Cool: Business Culture, Consumerism, and the Rise of Hip Consumerism, University of Chicago Press, 1997) have attempted to provide them. These definitions tend to focus on the question of consumerism and not specifically about electronic waste.

[6] Companies Bash Warranties, Rendering Gadgets Disposable, Tuesday, July 16, 2002, By Jane Spencer Staff Reporter of The Wall Street Journal

[7] The average lifespan of computers in developed countries has dropped from six years in 1997 to just two years in 2005. Mobile phones have a lifecycle of less than two years in developed countries. 183 million computers were sold worldwide in 2004   (3.6 percent more than in 2003). 674 million mobile phones were sold worldwide in 2004   30 percent more than in 2003. By 2010, there will be 716 million new computers in use. There will be 1.78 million new computer users in China, 80 million new users in India. The e-waste problem, background   May 23, 2005, Greenpeace International   http://www.greenpeace.org/international/en/campaigns/toxics/electronics/the-e-waste-problem/

[8] Q. Reed Ghazala, "The Folk Music of Chance Electronics: Circuit Bending the Modern Coconut," Leonardo Music Journal Vol. 14, MIT Press.

[9] Some interesting work exists such as Zombie Media, Circuit Bending Media Archaeology [Jussi Parikka and Garnet Hertz] Parikka July 16th 2010, Vilem Flusser Theory Award 2010

[10] Sumoism - Phone recycling - t-na Technoreb Blog by David Knuttemaker http://technoreb.wordpress.com/domebas/phone-recycling-t/

[11] Arduino is an open source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. http://www.arduino.cc/

CRITICAL MAKING /// TEACHING & POLITICS

BY - ALISON POWELL, MEDIA @ LSE

When the accounting class came to use the classroom at the LONDON SCHOOL of ECONOMICS this March, there was golden GLITTER everywhere! My MSc in Media and Communications had been working on a critique of Google that they developed by BUILDING Google. Along with @aleksk [Aleks Krotoski] I led my students in an exploration of (making)
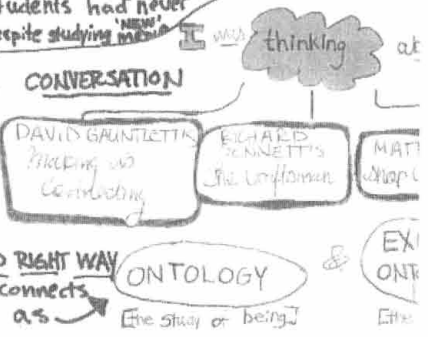
WHY teach social scientists CRITICAL MAKING? They are often taught to ANALYZE + CRITIQUE media, but not necessarily to MAKE media. Many of the students had never even edited WIKIPEDIA despite studying 'NEW' media.

I wanted to START a CONVERSATION about HOW IT FEELS to WORK WITH YOUR HANDS as well as to THINK BY MAKING. Unlike a lot of work you do in school, in making there is NO RIGHT WAY and FAILING IS OK. This connects with some theory such as →

AT **ISSUE** the way we think ourselves and each Projects, but on **PRA** well. The (mostly) method

I was thinking ab

DAVID GAUNTLETT'S making is connecting

RICHARD SENNETT'S the craftsman

MAT shop

ONTOLOGY [the study of being]

EXI ONT [the

UE are questions about ideas, process, and think and engage with each other - not just on academic

PRACTICAL terms as method helped students from different backgrounds

THINK TOGETHER

[in class]

In PROCESS

about

MATTHEW CRAWFORD'S shop class as soulcraft

EXISTENTIAL ONTOLOGY from Heidegger [the politics of being]

CRAWFORD writes:

"POINT YOUR STUDENTS NOT JUST TO A LIVELIHOOD BUT TO SOME MORE COMPREHENSIVE VIEW OF WHAT A **GOOD LIFE** LOOKS LIKE" (2009)

This holds true, in my opinion, for students in all trades and fields

MAKER PRACTICES HELP US TO MAKE THE WORLD INTELLIGIBLE

JOURNALIS

(recursive "making the thing about" making shed)

1
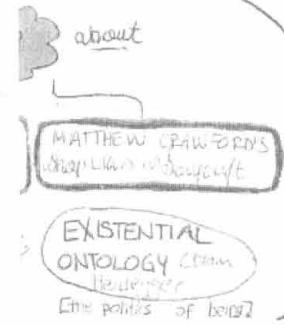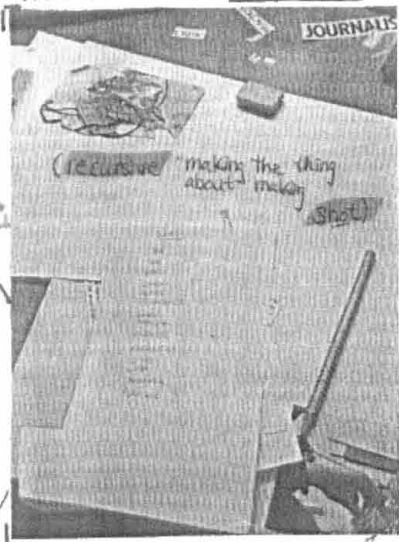
Oh! Glitter,...

The Results

Five groups of students made different constructions, including a tower topped with a brain, a sponge with one flower representing "what we search for" and another representing "what we find". ONE GROUP dropped GLITTER all over their sculpture, leading to the ire of the accounting professor and some tough questions from me. Despite the GLITTER EXPLOSION the group needed to develop a coherent story for the meaning of their project. As they aligned narrative and explained that it was have "THE GLITTER OF POLITICS" we all realized that UN-EXPECTED THINGS HAPPEN IN RESEARCH as well as in making. We create stories to explain that MESSINESS of the WORLD. The stories are always the result of UN-EXPECTED THINGS HAPPENING.

In his book What is Archaeolog JUSS! PARIKKA the study of forms part of the politic media. He de engage in ima this RE-IMAG of MEDIA. For class was able ALTERNATIVE of Google This interesting, que the political of CRITIC

What more RA CRITIQUE

now!

EVERYONE CAN LEARN TO MAKE MEDIA ?

s book as Media uology? KA argued that way of IMAGINARY MEDIA part of the investigation politics of contemporary He describes how artists in imagining media and E-IMAGINING the POLITICS A. For an hour our able to construct IATIVE CONCEPTIONS This raises some questions about their impact TIC making RADICAL might we

ANALYSTS REPRESENT

EMPIRICISTS EXPLORE

the WORLD

By taking my students out of their EXPECTED mode of working with ideas, I hope to INSPIRE more OPEN CREATIVE & ENGAGED PRACTICE

Turn me on.

K A NETWORK or TAG

Photos. Right hand photo on p.1 by author All other photos by Aldes Kroker. All photos Creative commons non-commercial, attribute licensed.
Books. Crowley, Matthew (2003) Stop Classes Student New York Penguin. Crowther, David (2011) Making is learning. The Social Meaning of Community London. Polity. Parikka, Jussi (2012) What is Media Archaeology. London Polity.
Sennett, Richard (2009) The Craftsman New York. Penguin. 2

?

Participatory decentralization, a mantra of art and political networks, expresses a peculiarly intimate bureaucratic form. These forms of organization represent a paradoxical mix of artisanal production, mass-distribution techniques, and a belief in the democratizing potential of electronic and mechanical reproduction techniques. Borrowing from mass-culture image banks, these intimate bureaucracies play on forms of publicity common in societies of spectacles and public relations. Intimate bureaucracies have no demands, no singular ideology, nor righteous path. Intimate bureaucracies monitor the pulse of the society of the spectacle and the corporatized bureaucracies: economics, as in Big Business; culture, as in Museums and Art Markets; mass media, as in Studio Systems and Telecommunication Networks; and politics, as in Big Government. Rather than simply mounting a campaign against big con-glomerations of business, government, and culture, these intimate bureaucracies and their works use the forms of corporate bureaucracies for intimate ends. Rather than reach the lowest common denominator, they seek to construct what those in the business world would call niche marketing to the specific, narrowly defined demographics. Ironically, the

model these artists developed has now become the new mantra of businesses interested in utilizing the World Wide Web and the Internet, as these technologies allow for very specific niche marketing. Intimate bureaucracies emulate, and resist, the very systems of the new business model used in Internet marketing. George Maciunas's FluxHouse project functioned like a DIY development corporation, but with cooperative and social capitalists motivations. Maciunas referred to it as entrepreneurial commu-nism. Intimate bureaucracies, and other distributed weaves of networks online, unwittingly move toward appreciating even the most powerful government's lack of power as a threat, rather than as a revolutionary's ultimate dream-come-true. Lack of power (or power to attack only), rather than the ability to defend, preserve, and protect, may define contemporary culture's greatest threat. If, as the Fascists say, the trains always ran on time in Mussolini's Italy, then, one might answer, they ran only for the Fascists. In the contemporary version of that tautology, the escape plans and contingencies worked in the flooding of New Orleans by Hurricane Katrina, for example, but only for those that escaped. Intimate networks respond by setting up online networks, and even the most frivolous enthusiasms, like knitting or craft sites, prepare the participants.
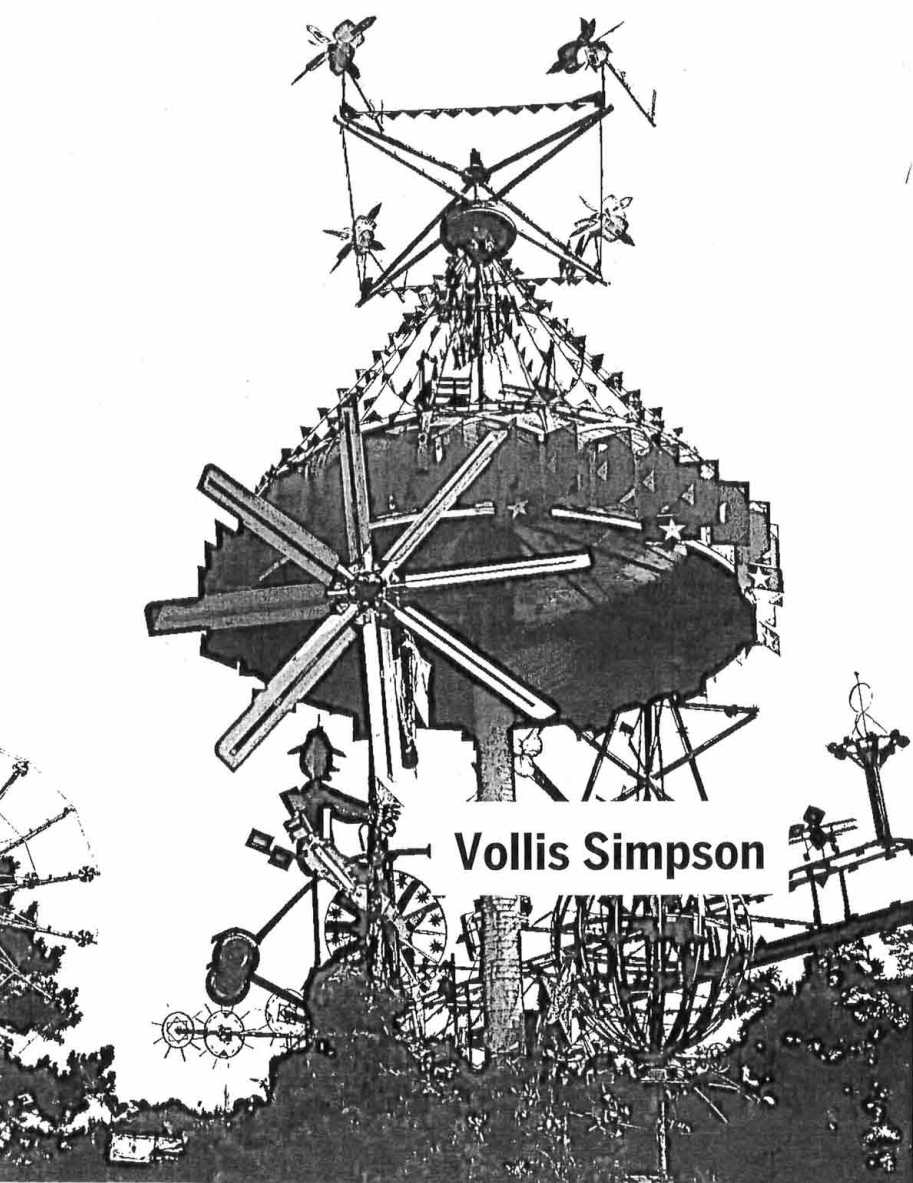
Vollis Simpson

Vollis Simpson, a retired WWII veteran and farm-equipment repairman from North Carolina with an 11th grade education, was officially labeled a self-taught artist or Junkyard Poet of Whirligigs and Windmills by the New York Times in 2010. Simpson, who is a 94 year old mechanical genius was one of twelve children who learned to fix things before he learned to read and write. While in the Air Force he made his first windmill from parts of a junked B-29 bomber to power a giant washing machine for soldiers' clothes. After working fifty years as a repairman, twenty-five years ago Simpson began collecting material from junkyards including discarded steel and aluminum, and parts from bikes and air conditioners, which he hammered and assembled to create large-scale kinetic sculptures. When asked during an interview if he considered himself an artist he responded that he is simply a country boy. However, his work has been sited at the Museum of Visionary Art in Baltimore, Maryland, among other notable art venues.
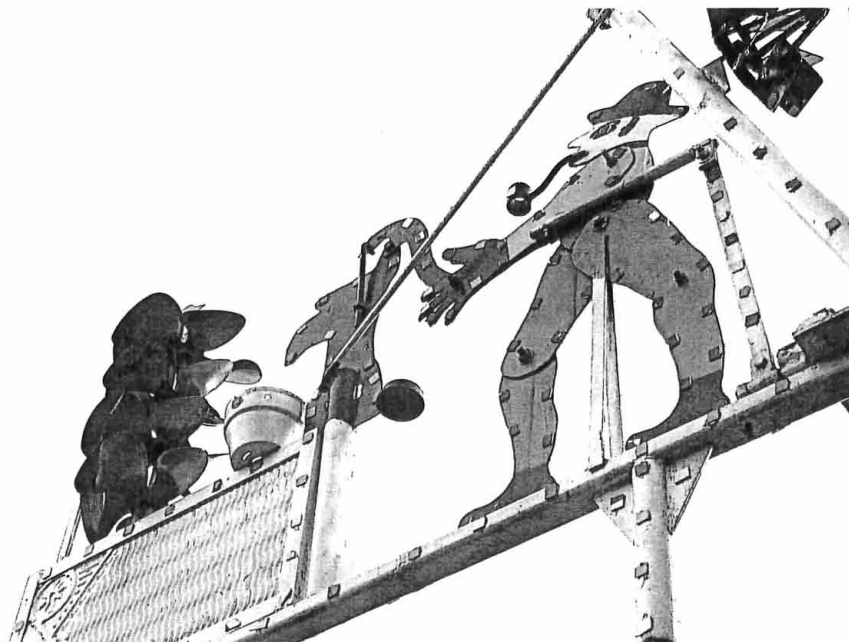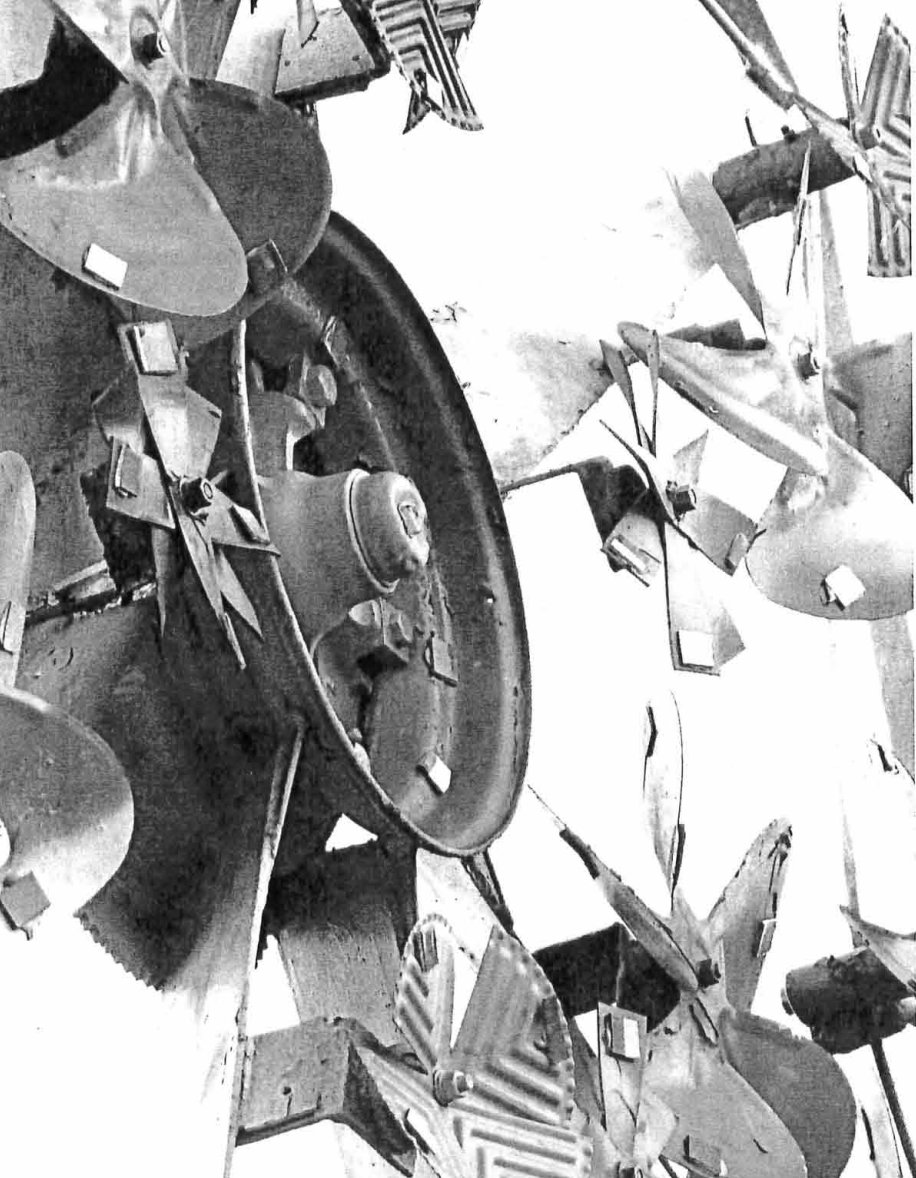
Simpson is the product of a simple rural childhood where making something from nothing was a common survival tactic. Such family backgrounds have produced other Visionary artists including Grandma Prisbrey from rural Minnesota who at 60 years old started collecting discarded bottles at the local landfill in Simi Valley, California to build a series of light filled colored bottle buildings or *Bottle Village* (1956-1982); or Leonard Knight, raised in rural Vermont, who built *Salvation Mountain* (1982-present) with buried waste covered with cement and salvaged paint to express "God is Love" in the California Desert near Slab City. Although these visionary or otherwise outsider artists were not formally trained in aesthetic pursuits, their desire to retrieve waste was similar to that of Noah Purifoy who attended Chouinard Art Institute in Los Angeles in the mid 1950s. In 1963 Purifoy stated, "I do not wish to be an artist. I only wish that art enables me to be." Throughout the 1980-90s he sited dozens of large-scale sculptures and installations assembled from found objects on ten acres of land near Joshua Tree, California. His art was formally identified as Assemblage in the 1960s.

However, the evolution of creative applications for those who see waste as a source of inspiration is changing with our massive supply of electronic waste at hand. Post consumer conceptual artists Jonah Brucker-Cohen, who holds a PhD in Disruptive Design, and his partner Katherine Moriwaki, have recently been conducting Scrapyard Challenge Workshops internationally where participants employ salvaged e-waste to make simple electronic projects including building robots. This activity demonstrates that making something from nothing also has the potential to provide practical applications in our resource-based economy, which is consistently shrinking with our growing population and capitalist consumer habits.

– Patricia Watts

Flickr ☺ photos in order of appearance: Jon Betts, bobistraveling and bobistraveling.
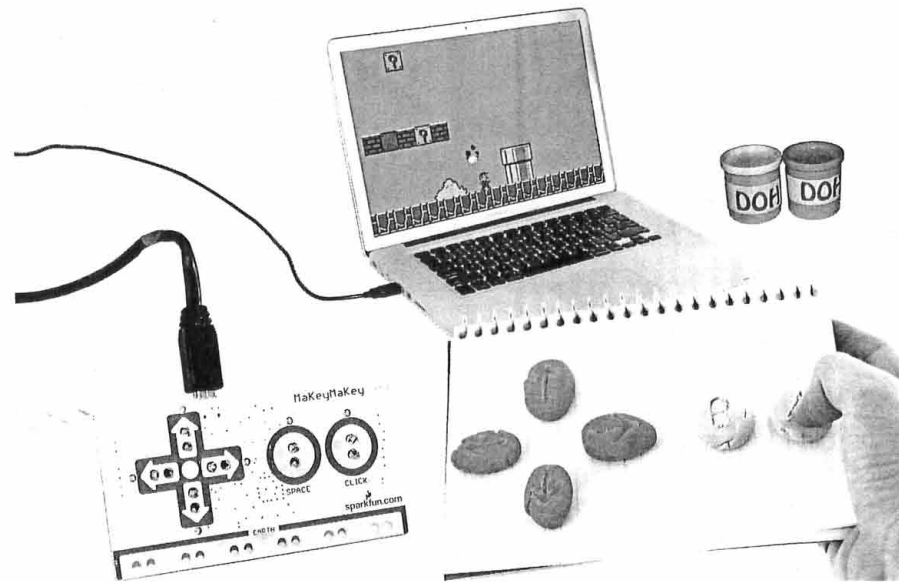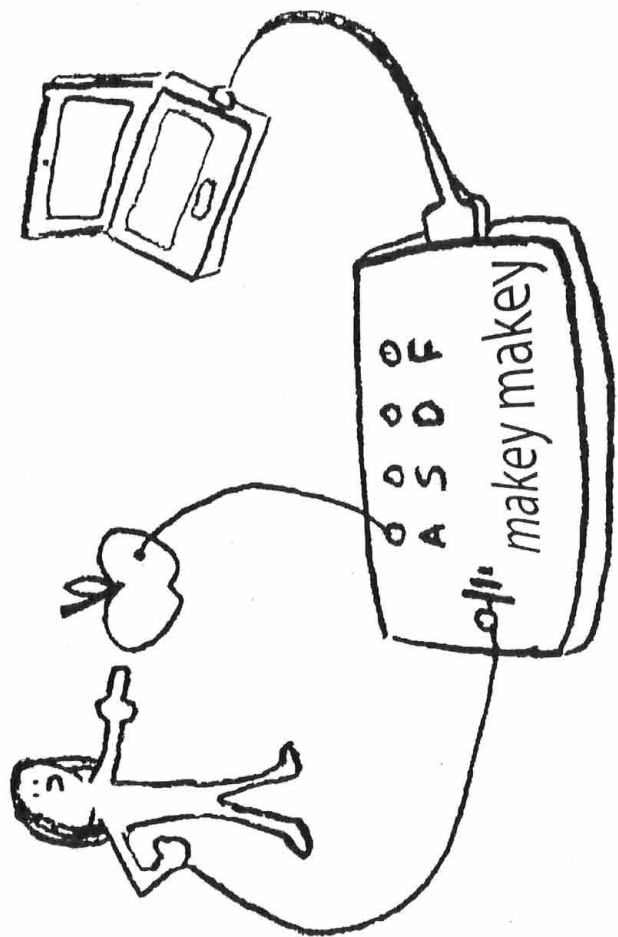
MaKey MaKey doesn't require programming or hardware skills, just alligator clipping. But it does require the most important part of interaction design: the designation of meaning. One of the most fundamental concepts that isn't taught in schools. Meaning is made not pre-existant. To re-purpose is to give purpose (again, and in some cases for the first time). One of the things I love about MaKey MaKey is that you have to repurpose just to use it. You have to repurpose something from online, and repurpose something in the physical world, and then hook them together.

Jay Silver

How to Make Very Large Projects (1)

Rafael Lozano-Hemmer

I often say that my public art work is as big as my insecurities. I have long been interested by the colossal and have used technologies to amplify participants to an urban scale (or to a planetary scale, budget permitting). But now that I go to psychotherapy I am making small pieces as well. Derrida was right in "The Truth in Painting" that the Kantian sublime can also be experienced in front of the tiny. For me now scalability matters more than scale: a project should be vectorial and be rendered for whatever target resolution is appropriate or affordable.

In 1997 I made a project called "Displaced Emperors" to interactively transform the Habsburg Castle in Linz, Austria, into the Chapultepec Habsburg Castle in Mexico City. The project was one of the first instances of "projection mapping" and used what was at the time the World's brightest projector, a 7kW pigi unit from ETC Audiovisuel that could make images measuring 30x30 m (100x100 ft) and animate them using robotic scrollers.

Will Bauer's wireless 3D sensors calculated where participants in front of the castle pointed to on the façade and a large animated projection of a hand was shown at that location using a 1200W robotic light. As people on the street "caressed" the building, they could reveal the interiors of the Habsburg residence in Mexico City and hear different music tracks, one per room. (2)

Shortly after presenting that project, I met Mexican artist César Martínez. I told César about my experience with high-power projection mapping and he humbly showed me a piece he did in 1984. He was a student and had no means to produce a large public art intervention. So he borrowed a small 35mm slide projector from school, packed the carrousel with erotic imagery and projected this onto the dome of the Santa Rosa church in Mexico City. Of course, as the projector was not bright enough, no one could see the transgressive images on the dome, but he put a camera on a tripod and took long-exposure photographs which revealed the intervention in all its smutty beauty. For César this piece was an atheist declaration, a moment of apostasy, the appropriation of technology for tactical interventions below the radar of potential censors. The condition of possibility of his project, its grandeur, was the use of low-power projection, his economy of scale. (3)

Burroughs said "bigger is better and better is best" and, after seeing César's work, I believe this statement to be true, except when it refers to scale.

(1) Garnet Hertz asked me to write about very large projects and suggested this title.
(2) For a full description of the project please see:
http://www.lozano-hemmer.com/displaced_emperors.php
(3) For more on César Martinez please see: http://martinezsilva.com

How I Designed the Video Coat
by David Forbes

I was thinking about what to do for Burning Man as I waited the 9 hours for my ticket order to go through. I thought about dressing up the car with an LED display. Man, that would cost a lot! But wait... what about dressing me up in LEDs?

I did some quick math and some visiting of Digikey's website. They sold RGB LEDs for about 40 cents each. I figured that I'd need a display with at least as many pixels per square inch as my SatanVision screen, and it would be larger to cover my entire body. SatanVision has 13,000 pixels arranged as 96x128. The next size bigger would be 120x160 or 19,200 pixels. That's $8,000 just for the LEDs! Holy shit!

On the other hand, wouldn't that be cool.

I was on the verge of shipping a metric buttload of Nixie watches to eagerly-waiting customers around the world. I had no doubt that I could sell a hundred Nixie watches in a couple months. That would leave $20k in the bank by May.

I chatted with my lovely wife about this. She said, "What??!!!?" Then she said that she trusted my judgement and I could do whatever I wanted with the profits from my watch sales, as long as I didn't throw it down a rathole.

I made some sketches of the pixel PC board layout, since it would be critical to get that ever-so-right for the project to work. It looked like I could use a tiny 4mm square part to drive 16 LEDs. The part was also available in a larger TSSOP package, which I could solder easily myself. I did sketches of both the QFN and the TSSOP parts, with the QFN on the front of the board and the TSSOP on the rear.

Then I had to figure out what on earth to use for PC boards. I have only ever designed rigid PC boards before. They have this problem, when mounted on clothing, that they're stiff. There are also flexible PC boards, such as used inside cameras and disk drives. They are orange and cost way more than rigid boards. But they would really solve the problem of flexibility.

I thought about how to do the draping of the displays on the coat. Naturally, I decided to copy someone else's work. That's what all the best engineers do. I looked to the LED video dresses designed by Hussein Chalayan and Moritz Waldemeyer. They used a bunch of 1" square rigid boards, each with a 2x2 pixel array. The boards were suspended from ribbon cables in vertical strips. Why not do the same thing, but with vertical strips of flex boards?

I thought about it, an made some paper strip prototypes to see if it made sense. It seemed to.

I had to find a supplier of flex boards. The Internet turned up a few companies. I selected a small one whose owner was happy to discuss the technical ins and outs of the job with me.

Many compromises were made in order to get the pixels to all fit on 0.30" centers. I used three individual LEDs instead of an RGB block, because they were smaller and 20,000 of each were in stock at Digikey. I had to route some signals next to each other that didn't seem like a good idea to do so, and later proved to have been a not good idea.

Eventually, the boards were designed and I received some prototypes. I built three rigid LED boards and a set of driver boards. Soldering a thousand LEDs by hand is not exactly interesting, but it wasn't too hard either.
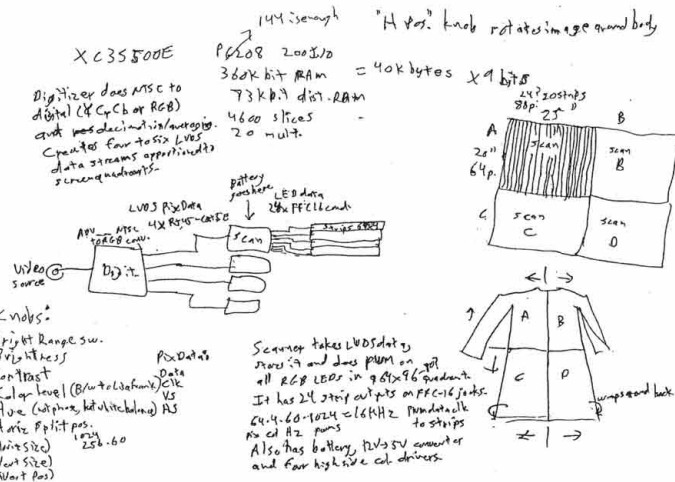
I discovered that even though I thought that I knew a thing or two about how color TV worked, I actually had no clue how to turn the thing coming out of a yellow RCA plug into red, green and blue pulses of the proper duty cycles to make an image that looked good. So I bought a book and read up on it. It turns out that those guys who invented the NTSC color video system in the 1950s were doing some amazing alchemy with half a dozen vacuum tubes!

I found that Xilinx, the big maker of FPGA chips, has published a set of RGB video conversion functions for their chips that I could download and use for free. So I did. I also discovered that these free modules generate a shit-ton of warnings when compiled. So many that it was hard to find the REAL warnings about problems in MY code.

I found that the LEDs were manufactured with enough consistency that I didn't have to make corrections for each pixel's brightness, as I thought I was going to have to do. That was very good, since it would take a lot of work to do the correction. I did have a vague plan for it, but no desire to implement that plan.

If you've ever wondered what gamma correction is, all you have to do to find out is to build a video display from scratch. It has to do with applying a nonlinear brightness mapping to the LEDs to make the dark scenes dark enough and the bright scenes contrasty enough. Fortunately, it's documented fairly well in the literature.

I ran into all sorts of trouble getting the video to display correctly. The data rate was very high (27 Mbits/sec), so the clock and data signals had a hard time making it down the ribbon cables and through the LED strips cleanly. I had not used very good signal integrity methods in laying out the PC boards, as there wasn't much room for such niceties. I do regret this shortcoming.

Assembly of the video coat required a lot of work with a hot glue gun. The LED strips were glued to the outside of a lab coat, and the dozens of white ribbon cables were stuck together with double-sticky foam mounting tape and sometimes glued into place.
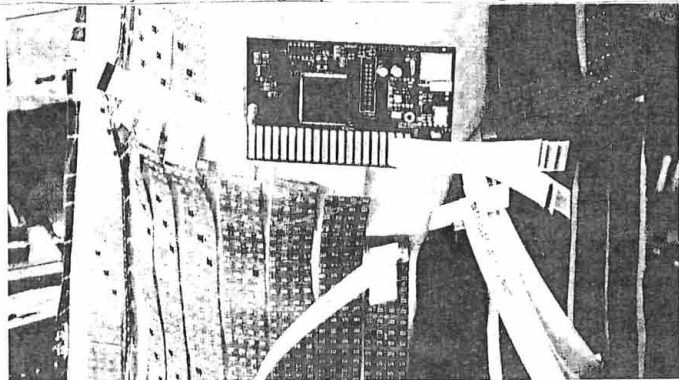
The four scanning PC boards, one on each shoulder and each hip, were held on with metal brackets glued onto the coat. It ended up being rather bulky and hard to handle, but it all worked.

When it was mostly done, I took it out to a Fourth of July party. It seemed to attract attention. I also wore it into a bar a couple days later. The bouncer asked me if I had copied that guy that he saw in the YouTube video. You see, I had a friend make a short video of me wearing the coat in my workshop. The video went viral. I explained to him that no, there's only one of these in the world.

I knew I was in trouble when it showed up in a Wall Street Journal blog.

Eventually, I prepared to take the coat to the Maker Faire in Detroit at the end of July. I had to disassemble it and pack it into a suitcase to take it on the airplane, as it was rather unwieldy and difficult to carry. Besides, festooned with wires and circuit boards, it looks a bit intimidating. More on that later.

I went on a week of vacation with my family, then the time came to assemble the coat in preparation for the Maker Faire. I was at a hotel in Ohio two days before, at a water park resort with my kids. I had my older son Henry act as my mannequin while I put the coat back together. This involved installing the four display scanning PC boards and all the attendant ribbon cables, then testing to see if it still worked. Of course, it didn't. I eventually discovered that I needed to put the four display scanning boards in exactly the same places they were before so that it would work. I hadn't done that, assuming that it didn't matter.

Finally it started to work. I wore it while walking through the hotel, and found that it attracted a lot of attention. Kids would run up to it to see what was going on.

It was a hit at the Maker Faire. I also attended a street party with my wife in downtown Detroit one evening. It took me half an hour to walk into the place to find a beer, as so many people wanted to photograph it.

Eventually it was time to go home. I had to catch the flight back to Tucson directly from the Maker Faire, since my vacation plans were made without the Maker Faire in mind. I didn't have time to pack the video coat into its suitcase, so I wore it into the airport. A bit of commotion ensued, as a cop walked up to me at the checkin counter and told me that he'd had about 50 calls about some guy wearing a coat with wires all over it. Apparently, wires = danger. So I took some time to pack it back into the suitcase and check it as luggage.

Then the TSA decided that since I was such a risk, they'd subject my entire family to their super-special screening, just to make sure we didn't have anything dangerous on us. We got poked and prodded and felt up and bombarded with X-rays and swabbed and so forth. However, they didn't seem to be bothered by the eight high-power lithium-polymer batteries I had placed in my son's backpack.

It only dawned on me later, at Burning Man, as I plugged two batteries into each other (they have special crappy connectors that let you do that!) and I saw the sparks fly, just how badly the TSA had screwed up in allowing me to carry those batteries on board. Tee hee.

| 25-minute wait | assholes | bad coffee | boring |

| caveat emptor | changing table | cheap drinks | broken meter |

## QR_STENCILER & the QR_HOBO_CODES

are homebrew "infoviz graffiti" tools, intended for civic markup and *in-situ* information display. **QR_STENCILER** is a free, open-source, fully automated software utility that converts QR codes into vector-based stencil patterns suitable for laser cutting. The **QR_STENCILER** software was used to create the **QR_HOBO_CODES**, a collection of 100 stencil designs which, deployed in urban spaces, may be used to warn people about danger or clue them into good situations. Inspired by 19th Century "hobo symbols", these stencils can be understood as a covert markup scheme for urban spaces — providing directions, information, and warnings to digital nomads and other indigenterati.

http://fffff.at/qr-stenciler-and-qr-hobo-codes
By Golan Levin and Asa Foster III, for the
Free Art & Technology (F.A.T.) Lab, 2011

OCEAN LIFE DEPLETED 90% SINCE 1950

WOMEN EARN 77% PER DOLLAR OF MEN.

INFOVIZ GRAFFITI

addresses a lack of tools for the high-speed reproduction of infographic messages in and around urban surfaces. An **adjustable lasercut pie-chart stencil** allows for quick tagging of pertinent data. It is ideal for "locative infographics", or "situated visualization" — when the content of a visualization-graffiti is tightly coupled to the specific location at which it has been deployed.
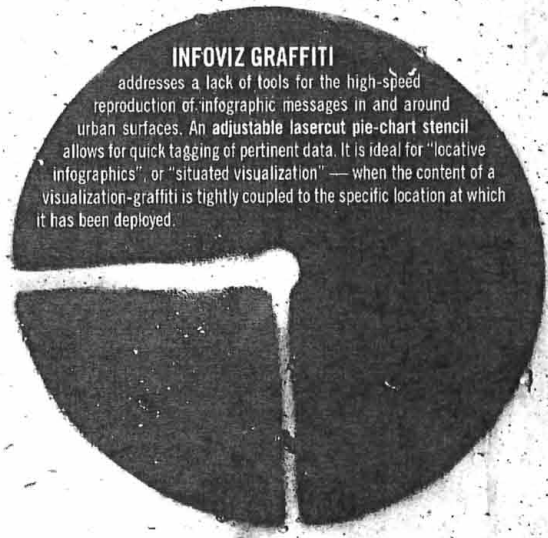
USA CONSUMES 25% OF WORLD'S ENERGY

WHITE

http://fffff.at/infovo-graffiti-stencil
By Golan Levin for the Free Art & Technology (F.A.T.) Lab, 2011

title: Hazmat Kite
materials: Tyvek, graphite fishing rods, caution tape, string, wind, sky
dimensions: 124 cm x 124 cm
artist: Ken Gregory

The Hazmat Kite was created as a site specific response to the smog problem in Windsor Ontario during an Artist in Residency at the Art Gallery of Windsor April 22 to June 10 2006. Windsor is on the border between Canada and USA with the Detroit river acting as a physical delineation of the border.

Detroit Michigan is right across the river from Windsor. Michigan has been historically an industrial state with automobile and steel production driving the economy. Coal burning power plants provide a lot of the power for these industries. Windsor's economy is very closely tied to the Michigan activity with auto manufacturing amongst others playing a big role in the economic evolution of the city.

Although Ontario and Michigan have significant environmental policies and laws in place to govern all these industries there remains a very visible smog problem in Windsor and surrounding areas in Southern Ontario. So much so that part of the daily weather report includes an air quality forecast.

Various groups have set up studies to try and link the smog problem to health issues such as increased respiratory diseases, poor health and cancer in the local population. There are many attempts to identify the various culprits who are guilty for spewing dioxins, mercury, carcinogens, particulate and other air born chemicals into the air. Many studies and reports from various environmental groups, companies, citizens groups, industrial corporation spin doctors and government officials have been published with fingers pointed in multiple directions depending on who funded the report, what science was used to create the report and who spins the best media output.

During my 3 month tenure as Artist in Residence I was confronted by the air quality problems with very observable situations. If I left my apartment windows open, I would come home at suppertime to black particulate on all surfaces inside. I would often have eye problems that would leave me blinded momentarily while my body tried to deal with them. So much so that when I left I had to pull over on the highway every 50 kilometers or so with stinging watery eyes closed shut. During my work at the Art Gallery of Windsor I observed a brown/black haze over the downtown area on an almost daily basis. I thought to myself, everyone is breathing this stuff. That can't be good. Hence the kite.

The Hazmat Kite was created as a response to the smog problem that I encountered while I was there. There are many people writing letters, campaigning for clean air, fighting for better environmental laws and policies, complaining in the local media and protesting so I wanted to create a response that was an alternative to all that.

The diamond graphic is a hazardous materials label certified by the American Department of Transportation (DOT) for use in labeling hazardous materials during transport and storage. The skull and crossbones is a universal symbol that means whatever it is labeled with is poison, deadly to ones health. The 'inhalation hazard' means there is potentially dangerous stuff in the air, don't breath it. And the numeral 6 refers to a class of toxic liquid substances that give off vapors that are dangerous for humans to breathe.

POISON

6

UN CLASS 6
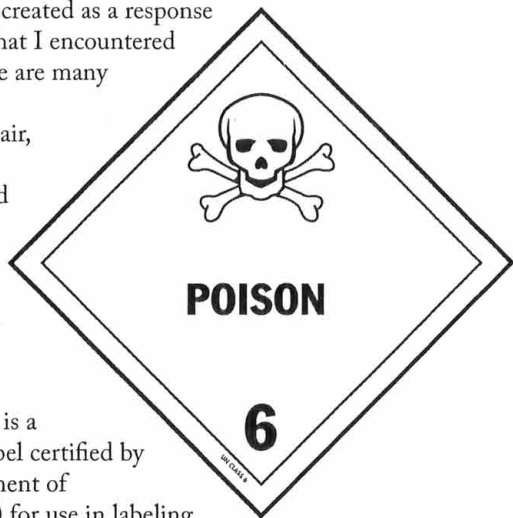
Artistic license

I decided to label the air above Windsor as hazardous to inhale. I was already working on kites as a possible form for my artwork and was spending a lot of time researching kite designs, kite craft and kite culture. The kite was custom designed by myself and is a cross between a Delta kite and a Malaysian Fighting kite. This plus the fact that it was big for a kite made it chaotic and hard to control in certain wind conditions.

This kite was flown on the banks of the Detroit River on the Windsor side of the border many times during that time period. The most poetic and poignant moments came about as I was flying it near the Ambassador Bridge (one of many border crossings) with the kite juxtaposed against the back to back transport truck traffic slowly moving across the bridge and brown/black smog in the air above the river.

Bio

Ken Gregory is an artist and hardware hacker based in Winnipeg Manitoba Canada.

www.cheapmeat.net
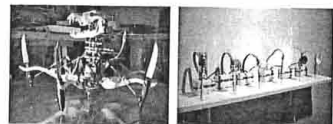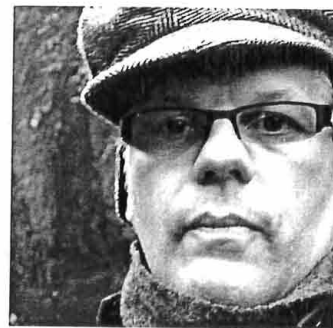
"Mistakes and accidents frequently shape the course of my artwork. They typically occur when I have met some kind of technical or financial limitation, or some material quirk asserts itself contrary to my aims. After much hair pulling, occasionally I realize that the unintended behaviour is interesting in itself. I drop the original goal and pick up a new path, letting it lead me along instead of trying to bend it to suit pre-determined criteria. Knowing how to read these hidden signposts as they reveal themselves is a crucial part of my process."

Peter Flemming
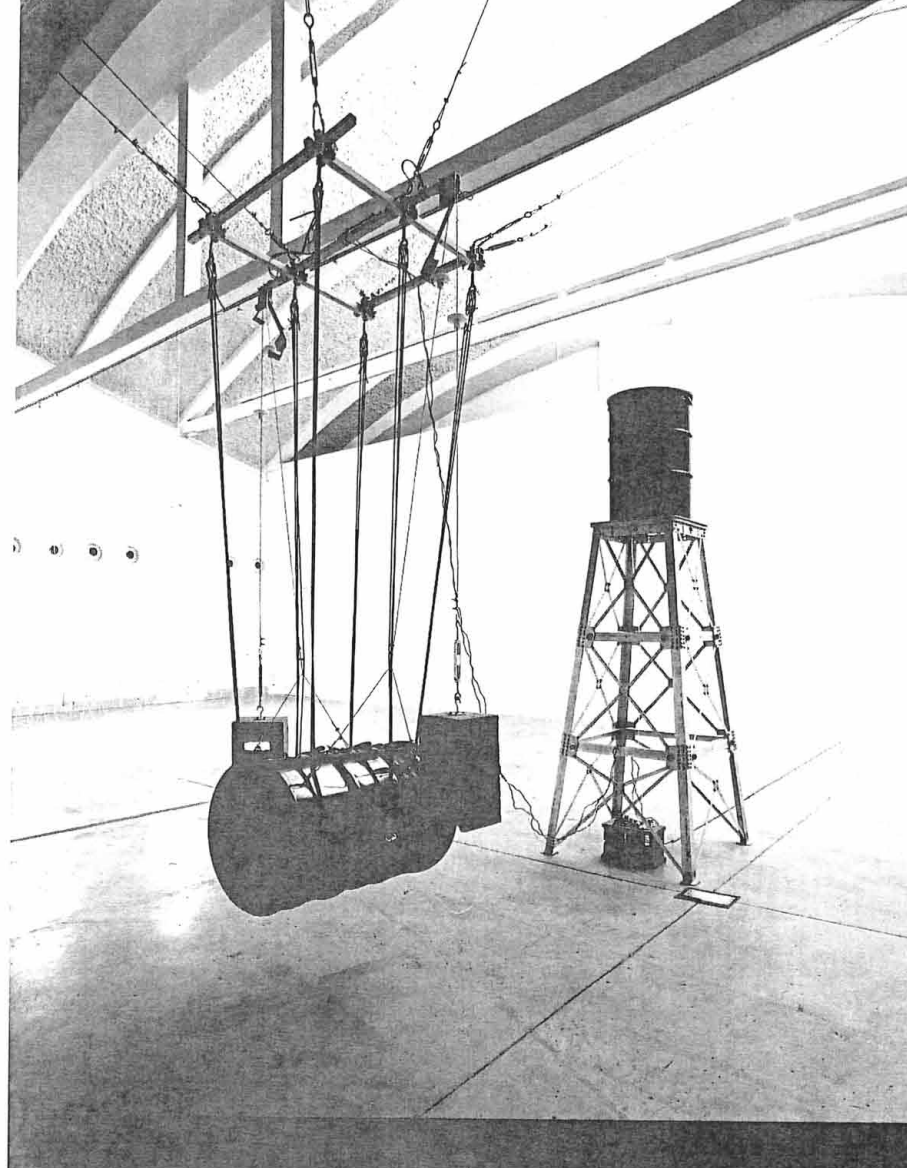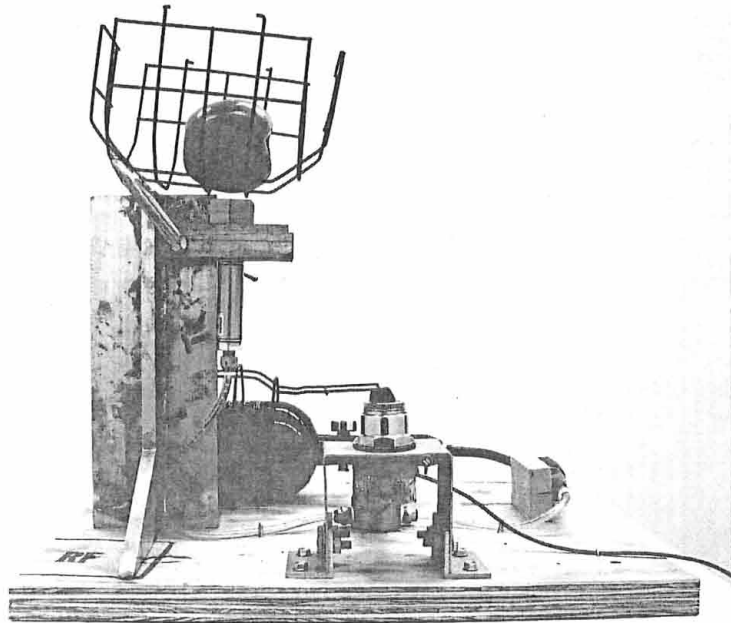
Prototype for a Machine that Creates Video Static. Prototype for a Machine that Plays Five Finger Filet. Prototype for a Machine that Inserts Razor Blades into Apples. The absurdity of these machines comes from their deadpan description-titles, the seemingly inappropriate application of technology and materials, and the questionable logic behind investing resources into the invention of devices with such dubious goals. But when we pose those questions to "legitimate" expressions of technology, do those machines and systems not seem equally absurd by those standards? Does the cannon that a farmer fires at the skies to scare away the hail not seem Neanderthal in its logic? Are the everyday Rube Goldberg contraptions that service our

hygiene and food preparation needs not of dubious design and manufacture? And with regard to intention, to whom are these objects targeted and to what potentially covert social, political or economic ends?

The common perception of technology is that it is an apolitical entity with ancillary and momentary contact with culture through its users. A more realistic picture of what technology entails is painted in Arnold Pacey's "The Culture of Technology." The common use of the term "technology" refers, according to Pacey, to a limited definition that encompasses only the technical aspects of a much larger domain - the remainder of the space being split between the cultural and organizational considerations. This more comprehensive view of technology affords an investigation of the complex political conditions embedded within this broad field - and indeed, within every designed technology object.

"A Prototype for a Machine that Inserts Razor Blades into Apples" is a foil for every other invention in our designed world. A deadpan, purely technical description of its function makes it no less sinister. Are other technology objects, machines and products so accurately or honestly labeled? Does its

labeling alter our perception of its intent?
Does its shoddy construction, its label iden-
tifying it as a prototype or its presumed
existence in an art context make the user of
the device any less complicit in the act of
inserting a razor blade into an apple? A tech-
nical manual for a safety-certified finished
version of the product, capable of performing
the action en mass accompanies the object. The
prototype, however, provides very little tech-
nical mediation in the act of picking up a
razor blade and getting it into the fruit. In
the end, the difference between this prototype
paired with its documentation and a properly
designed, engineered and marketed machine is
in the transparency of its intention. If we
consider both types of objects to have their
own embedded political ideology, then how can
we compare the one that ignores or hides its
place in political systems versus the one that
blatantly, and perhaps with blissful igno-
rance, announces its cultural locus? These
sorts of questions and the discussions that
follow them were my motivations in creating
this series of seemingly irrational inventions
during the years 2010-2011 -- Rob Duarte

Soft Publics
Mike Manalo / The Rare Studio

According to current Los Angeles Municipal
Codes, any registered hitched trailer is al-
lowed to park on the street as long as it is at-
tached to a registered motor vehicle with the
State of California. Our purpose is to facilitate
temporary sites for legally protected speech.

The system is made of three parts: a reg-
istered vehicle / a mobile panel system /
a registered cargo trailer. The panels are a
deployable system that essentially extend the
legally-defined space of the parked vehicle,
thereby enabling a range of temporary "edits"
of the urban streetscape.

1. Visual Blockade is a physical screen to
block a building's visibility from the street or
a specific form of advertisement along the
streetscape.

2. Shelter for Occupation can be for a variety
of uses. It can house a small demonstration
or be a small pop-up park for a neighborhood
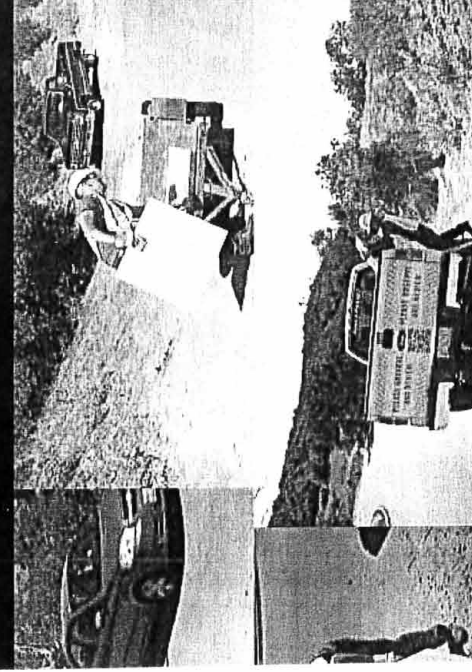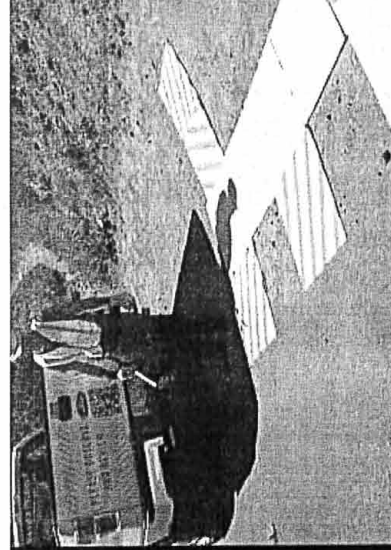that is devoid of public space for leisure and
play.

3. Alternate Wayfinding is a mode that redirects pedestrian or street traffic with iconography. This is one of the specific modes that re-negotiates how the right of way is used and defined.

4. Virtual 'White-Out' triggers through QR Code white-out of a building or the phantom appearance of a proposed improvement. By using our smartphone app the panel system has a digital layer that extends a message beyond its physical structure.
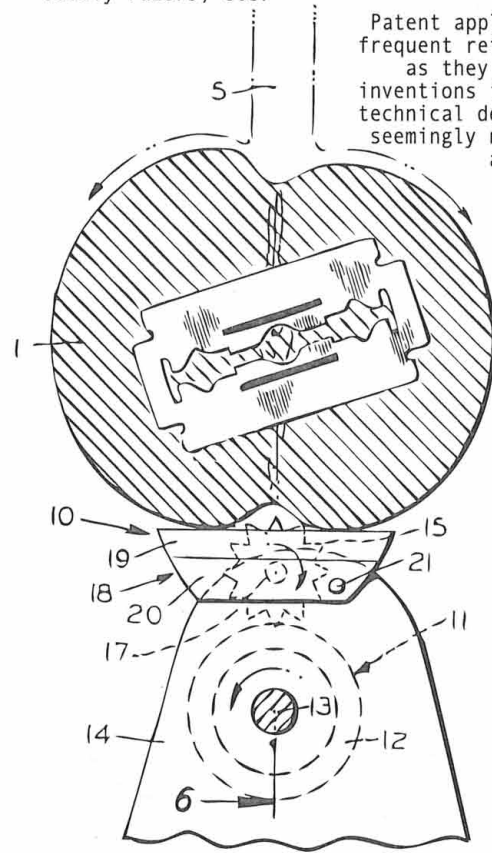
5. Activator Mode is where the system creates a spectacle through the structure for people to gather. We recommend using this mode when creating a meeting point.

6. Re-territorializing is a mode where this space is filled with borders and boundaries for specific uses and functions. This mode helps build hierarchies or specific orders for groups wanting to use the space.

:: An illustration from my pocket technical menu for an imagined industrial instantiation of the machine. The 16-page folded pocket manual was constructed by piecing together technical illustrations and text from patent filings for a variety of methods and machines used in processing fruit, dispensing safety razors, etc.

Patent applications are a frequent reference for me, as they often describe inventions in excrutiating technical detail, yet with seemingly no awareness or acknowledgement of their political implications.

robduarte.com

labeling alter our perception of its intent? Does its shoddy construction, its label identifying it as a prototype or its presumed existence in an art context make the user of the device any less complicit in the act of inserting a razor blade into an apple? A technical manual for a safety-certified finished version of the product, capable of performing the action en mass accompanies the object. The prototype, however, provides very little technical mediation in the act of picking up a razor blade and getting it into the fruit. In the end, the difference between this prototype paired with its documentation and a properly designed, engineered and marketed machine is in the transparency of its intention. If we consider both types of objects to have their own embedded political ideology, then how can we compare the one that ignores or hides its place in political systems versus the one that blatantly, and perhaps with blissful ignorance, announces its cultural locus? These sorts of questions and the discussions that follow them were my motivations in creating this series of seemingly irrational inventions during the years 2010-2011 -- Rob Duarte

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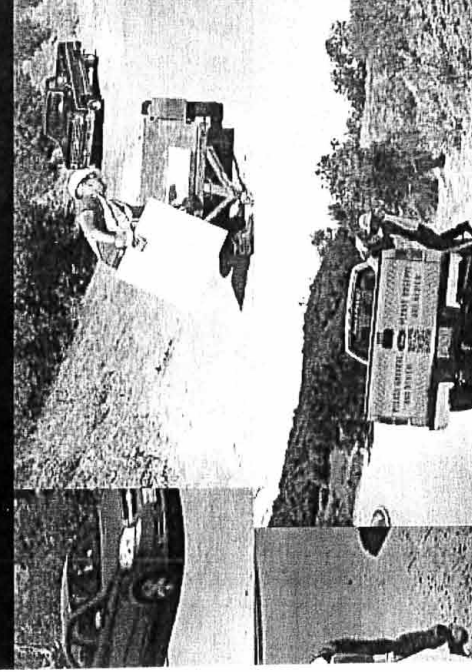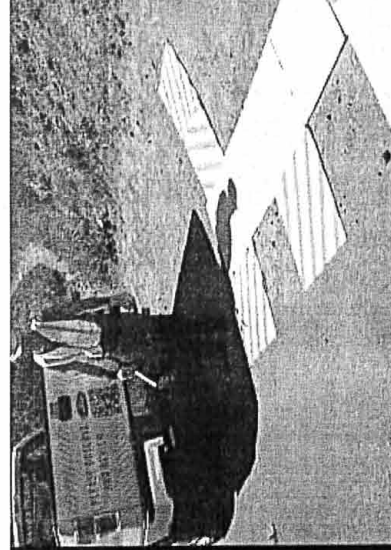
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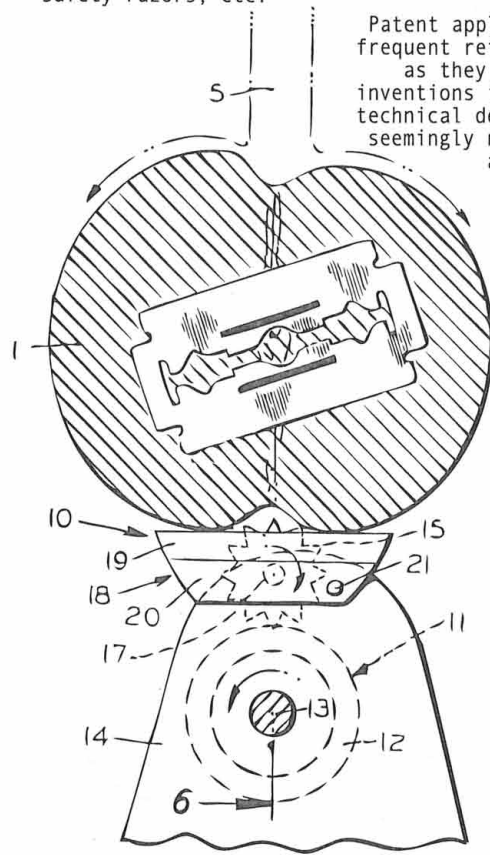
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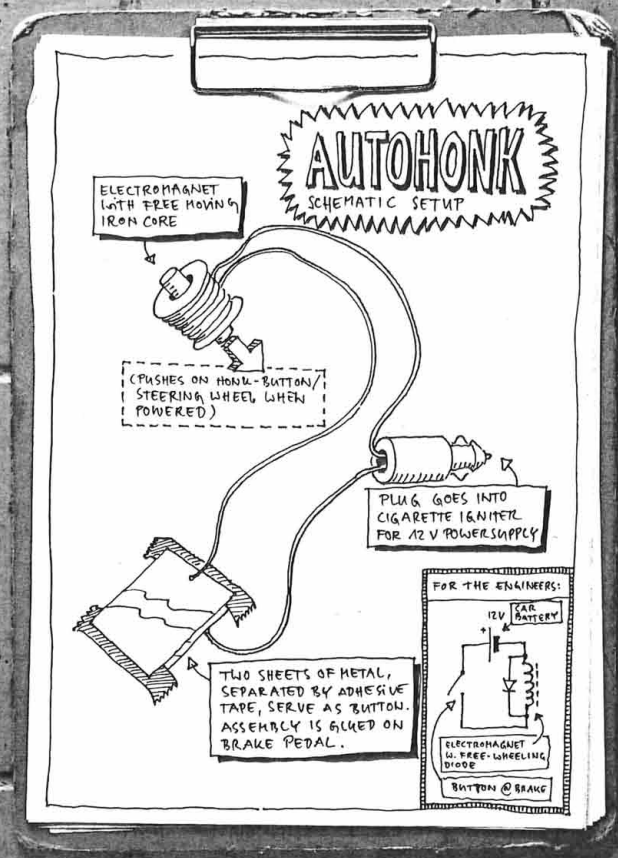
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robduarte.com

[by Niklas Roy]

Back in 2007, I was invited to Sibiu, a little town in Romania on the eastern edge of Europe. I was asked to contribute to an exhibition about 'mobility'. The idea was to have artists working in Sibiu where they could make interactive works on the spot, inspired by the local setting.

I was excited, as I hadn't been in Romania before. So there I went, for a week, constructing a racing urinal on wheels and a remote controlled walking ladder. Neither piece had anything to do with Sibiu but I had fun making them! And finally, on the day of the opening, I came up with a piece, which was related to the local car driving culture:
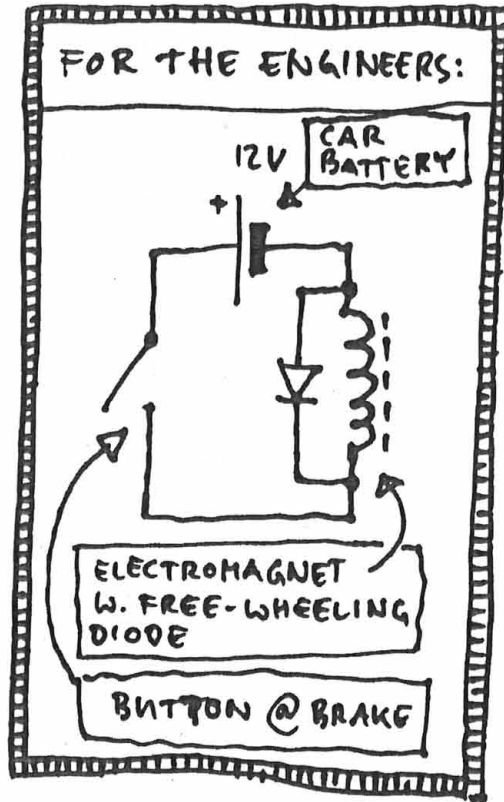
AUTOHONK

While in Romania, I observed that drivers behave differently than in Germany, where I come from. In addition to speed, the most noticeable difference was excessive honking. Not only in situations where the traffic demanded it, but also for fun. Honking at women just to get their attention was nothing exceptional in Romania. It seemed like anyone who could afford a car gained additional power with it, which obviously had to be shown with pride, for example, by honking a lot.

As honking was such an integral part of the local driving culture, something had to be done with it. This led me to the idea of automatic honking, something where the driver would not need to think of it, but it would happen in the natural flow of driving. So I connected the honk to the car's brake, as any situation, which requires a driver to brake must be also suitable for some honking.

AUTOHONK

A plug ...

... the Autohonk is activated.

... all with your foot.

It's wicked.

... goes into the cigarette lighter .

And most of the problems are solved.

AUTOHONK

FOR THE ENGINEERS:

CAR BATTERY

12V

ELECTROMAGNET W. FREE-WHEELING DIODE

BUTTON @ BRAKE

The setup of the Autohonk was simple: I attached a 12V electromagnet to the steering wheel of the curator's Mercedes with tie wraps and gaffa tape. The magnet's moving iron core pushed the button of the car horn when powered up, and a button made of two sheets of metal separated by layers of tape was glued on the brake pedal. Finally, switch and electromagnet were connected to the car's 12V battery via the cigarette igniter. That was it. And even though all the cable connections caused quite a mess during steering, the setup worked fine.

So we went for a ride with the curator, excited to try out the improved honk. Touring around Sibiu, I filmed the curator driving, honking and braking, looking enthusiastically at the reactions of the pedestrians and the other drivers. But they were completely ignorant – even if the curator and me found the honking rather embarrassing. It seemed that no one outside our car recognized the ingenious brake-honk connection.

But we still had the exhibition, so I dismantled the Autohonk in order to show it in the gallery together with the video of our ride. The visitors in the opening were totally excited about the racing urinal. It was the hit of the show. And no-one cared about the Autohonk.

[The author makes strange things with electronics, mechanics and code. The results of his works are often shown in art exhibitions. He is based in Berlin but works and exhibits worldwide. You can find more about him on his website www.niklasroy.com. There, you can also watch the Autohonk video from which the still images are taken.]
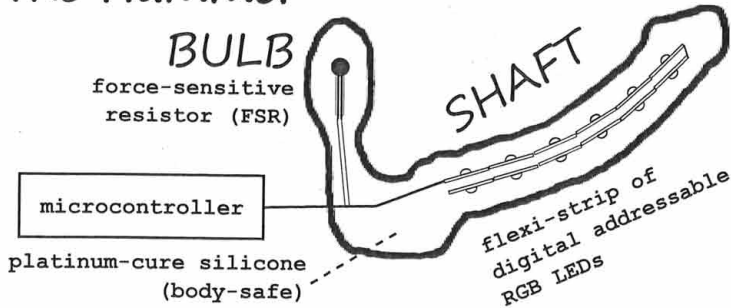
THE HAMMER

·CAN YOU RING·TEST YOUR STRENGTH!

A do-it-yourself, muscle-controlled, light-up dildo

project by
Kristen Stubbs, Ph.D.
www.toymakerproject.com

The Hammer

BULB
force-sensitive resistor (FSR)

SHAFT

microcontroller

platinum-cure silicone (body-safe)

flexi-strip of digital addressable RGB LEDs

The Hammer is a silicone toy consisting of a **bulb** instrumented with a force sensor and a **shaft** containing a strip of LEDs. The bulb is inserted into a vagina or anus. The Hammer gets its name from a carnival-style Test Your Strength game: When the wearer squeezes, the shaft illuminates. The harder the squeeze, the brighter it gets!

Build a Hammer and...

☆ Receive visual feedback for Kegel exercises or physical therapy
☆ Have a lightsaber duel
☆ Get a blowjob or handjob in the dark
☆ Watch the Hammer change color as you orgasm

... or anything else you can program!

Materials

- Strap-in toy to copy (like a Feeldoe®)
- Platinum-cure silicone
   I use Smooth-On Dragon Skin® for making molds and SORTA-Clear® for casting.
- Force-sensitive resistor plus a 10K ohm pull-down resistor
- Flexi-strip of digital addressable RGB LEDs
   I recommend finding a strip that uses the WS2801 LED driver.
- Microcontroller which can supply 5V power
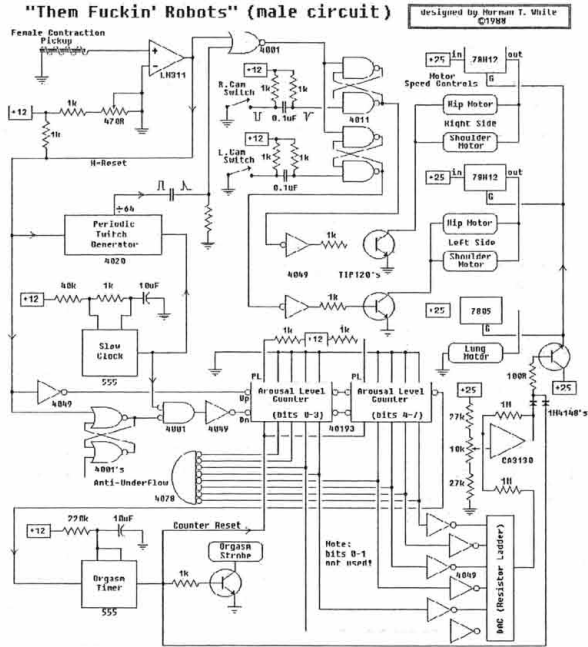
Circuit Diagram
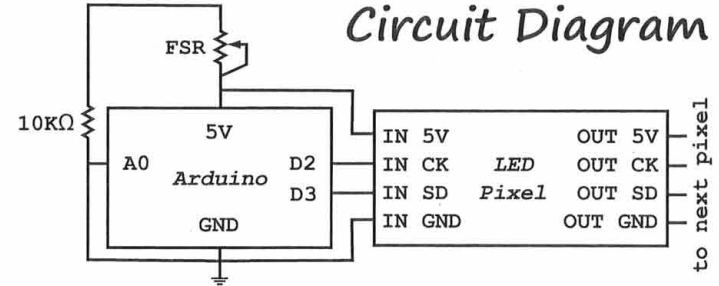
Assembly & Programming

1. Make a mold of your strap-in toy. Make sure to use plenty of silicone-compatible mold release on your original!
2. When casting your Hammer, you can basically just embed the sensor and the LEDs into the silicone as-is.
3. To program the Hammer to act as a Test Your Strength game, your code will need to:
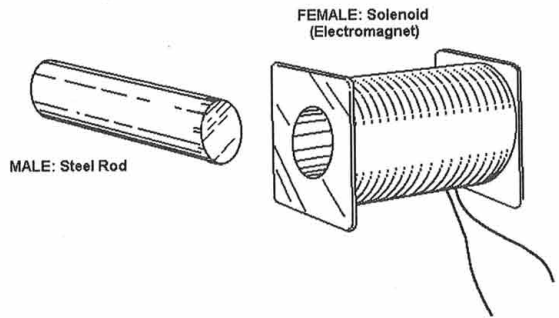
   * **Calibrate for the min/max sensor values it sees**
   * **For a given sensor value (or moving average of values), compute how many LEDs to light**
   * **Light the LEDs**
   * **Obtain a new sensor value and repeat**

The Hammer is an exercise in **technological empowerment for sexuality and pleasure**. How do we enable people to build and modify objects around them so they can have the kinds of experiences that they want to have? For more details on this and other projects, visit **www.toymakerproject.com**.

"Them Fuckin' Robots" (male circuit)

designed by Norman T. White ©1988

T.F.R. -- Givens

FEMALE: Solenoid (Electromagnet)

MALE: Steel Rod

"Them Fuckin' Robots" -- a collaborative work I did with Laura Kikauka, with Laura building the female robot, and I, the male. These were built apart and in secrecy, with only the sex organs and the position (female on top) agreed on in advance. They perfomed first in 1988 at 44 Dovercourt, Toronto.

NORM WHITE

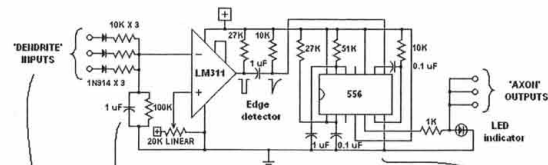NORM WHITE

10/14/79

Ladies and Gentlemen :

THE BUT GATE !
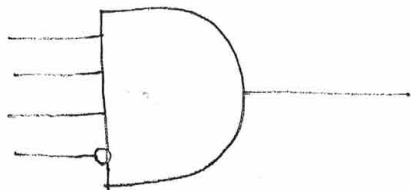
A visual joke for electronic geeks.

NORM WHITE

---

the capacitor accumulates charge received by the 'dendrite' inputs, while the resistor bleeds off that charge. The capacitor can reach a critical charge either by stimuli occurring more or less simultaneously at several inputs (Spatial Summation) or by successive stimuli happening within a short time frame at a single input (Temporal Summation).

These are the excitation inputs, which come from other neuromimes or, if at the start of the chain, from sensors. They don't all have to be of the same value... smaller values will cause a corresponding stimulus to be more likely to influence the neuromime to fire.

The upper half of the 556 determines the Latency Period (the time it takes for the impulse to travel along the axon to the output terminals) while the lower half determines the width of the output pulse

The following properties have yet to be implemented:
* Refractory Period -- this could be achieved by adding a third edge detector and timer (555), feeding back to the non-inverting input of the LM311 comparator.
* Inhibition inputs -- similar to the excitation input complex, except also connected to the non-inverting input of the LM311 comparator.

I first read about scientists designing neuromimes back in the 70's, but it wasn't until Daniel Jolliffe's "Open Source Hardware" conference at Banff in 2006, that I actually tried designing and building one. The idea is simple: to construct an electronic circuit that has the properties of a biologic nerve cell, so that chains and matrices can be assembled to mimic simple neurological function.

NORM WHITE

Eight Missing Projects of the Maker Generation

DANIEL JOLLIFFE

I did not realize it until now, but ever since I began buying how-to electronics magazines like Radio Electronics and Popular Electronics as an eager teenager back in the late 1970's, I have been waiting for a project that really blows my socks off, so to speak, in a social way. By social I mean a project that acknowledges the larger issues of the world, and uses technology to bring those issues into the field of view of the DIY "Maker".

My desire for an electronics project that offered an experience beyond technology itself was not be satisfied by, for example, building a *Stereo TV Decoder* (Radio-Electronics, March 1986) or an *Easy to Build Burglar Alarm for Apartment Use* (Popular Electronics, July 1976). Let's face it, those are boring, and at that age I was not allowed to muck with the TV or rent my own apartment. Even then it struck me that something was missing. Only a dictator in a country full of drone-like consumers would want their citizens to be working on these kinds of things.

Unsatisfied with the hobbyist magazines of the time, and in search of the elusive socially-engaged electronics practice, I promptly got a ham-radio license. In the days before the Internet, Amateur Radio held out the prospect of unfettered communication around the world. A decade or so later, Ursula Franklin would call amateur radio one of the true holistic technology practices in her 1990 treatise on how we approach and use technology, *The Real World of Technology*, recognizing it as a non-prescriptive, holistic way to employ technology between diverse and disparate societies.

I could see it now: it was going to be one giant party of "rag-chewing", with a multitude of free-ranging international chit-chats from my suburban teenager QTH (or location to the uninitiated). In the course of studying for my license, the bubble burst when I discovered that the advice of both the Canadian and American Amateur Radio governing bodies was more or less the following (I paraphrase here from memory taking, so to speak, great liberties):

"Don't be a schmuck. A good operator always avoids talking about anything controversial at all times. And by that we mean politics,

sexuality, nationality, race, health, economic status, environmental issues, or anything else that extends beyond "hello, *how is my signal strength?*" and *"I have a medium to large sized antenna"*.

So there, you have it: A unique communications practice reduced to a 1950's Missouri sidewalk hello.

Undeterred, I entered the world of Art (the capital A signifying the contemporary variety that is taken seriously in universities) and finally found the outlet I was looking for. In Art, every topic is fair game, no matter how controversial or distasteful it might be. In Art, and more specifically in Art that uses technology, we have the holy grail of technology that is allowed to encompass serious issues in a reflective way. Take, for example, Natalie Jeremijenko's Feral Robotic Dogs, a pack of radiation-sniffing toy dogs, or the Graffiti Research Lab's Laser Writer, a laser pointer driven public speech spectacle. In Art, despite the obvious downsides of a limited audience and an often similarly limited impact, there is at least the freedom to embrace whatever it is one wants to reflect on or say about the world we live in, without the censorship of political, moral and commercial concerns. And, as one of my professors told me early on "Art is the only business where you're allowed to make people feel bad and they will keep coming back."

And so, after the above somewhat long-winded introduction to my point of departure, I am pleased to present a few project outlines to correct the longstanding lack of controversial topics in the the paper-based and digital products that constitute the technology hobbyist magazine. Some of what I write below is serious, some in jest. I leave it to the critical reader and "Maker" to find the dividing line between them.

The Maker Consumption Meter

If you are like most Makers, your imagination for the possibilities of technology and the fun it entails means you have a hard time keeping up with the costs of your Maker practice. The Maker Consumption Meter solves this in a Jiffy! It keeps an ongoing record of the materials, energy, and cash expended on Maker projects, and sends an hourly, daily or weekly tally of your consumption to your choice of Twitter, Facebook or a plain old HTML web page.

Materials and Skills Required

- some programming knowledge
- secure connection via https proxy to your credit card account
- Knowledge of introductory texts on consumer capitalism is recommended
- approximately $173 in Arduino "shields", an extensible expansion format for Arduino
- Full tool chest including SMT soldering kit and 4-trace New-style phosphor oscilloscope

Lifetime Health Care Costs Tally Meter

Concerned about how much your health care is costing you in the long run? Build the LHCCTM to keep track and save money at the same time! The LHCCTM is a pocket-based digital recorder that links wirelessly to your HMO health care provider. Giving you a daily, monthly and lifetime tally for your ongoing healthcare costs. Visits to the hospital can be expensive, but the LHCCTM allows you to keep on top of these costs with its clear .7" LED readout.

Materials and Skills Required

• permission of HMO provider to access billing information online
• Arduino-compatible processor
• Red LED displays
• Lithium-Ion battery pack
• some programming skills
• Adequate eyesight and health to complete assembly

Combination New York City Traffic Stop Recorder / Bill of Rights Handy Reference

The NYCTSR/BRHR gives you a quick way to deal with the "card checks" so frequently conducted by the New York City Police. This project contains two segments: the NYCTSR records your stop/ confrontation/ interaction with the police in HD video and 44.1Khz CD-quality audio, while the optional Bill of Rights Handy Reference allows you to call up polite and argumentatively convincing citations and references to the bill of rights. This three-evening project is guaranteed to increase your sense of wellness and security when travelling in the NYC area!

Materials and Skills Required

• Graphical LCD
• Arduino-compatible processor
• Downloadable Bill of Rights file
• EEPROM storage for BOR
• HD video camera
• Knowledge of NYC police uniform styles

Streaming Genocide Alert

The Streaming Genocide Alert (or "SGA" for short) alerts you to genocides and atrocities on the fly, as they happen world-wide. Based on a pocket Arduino and Wi-fi connection, the SGA allows you to donate to relief agencies and UN-sanctioned intervention efforts. If you've over-donated already, the SGA included a mute/ignore button that silences the piercing 120 decibel alert, instantly placing the device in standby mode for the next alert.

Materials and Skills Required

- Arduino
- Wifi Shield
- introductory knowledge of the philosophy of moral motivation (cf. Mackie, Singer, Plato)
- Arduino-compatible $1000 MacBook for programming

Supreme Court Decision Predictor

Who needs CNN, FOX or the New York Times? The Supreme Court Decision Predictor, or "SCDP" for short, is a handheld decision predictor for upcoming Supreme Court decisions, based on advanced fuzzy logic, published SCOTUS decisions and, of course, an Arduino. Amaze your friends or capital hill staffers with this handy device: simply answer a series of yes-no questions and the SCDP does the rest!

Materials and Skills Required

- Cheap HD4470-based LCD from eBay,
- Ethical and practical disposition to use eBay and Paypal,
- Cheap Arduino clone from same,
- 9V battery,
- Open-Source fervour,
- Limited knowledge of recent Supreme Court decisions,
- Standard 7805 regulator circuit,
- Capacitors,
- Understanding of how the moral compass of a nation is traditionally politically determined by incumbent presidents.

Boolean Politics Logic Gate Learning Game

The Boolean Politics Logic Gate Learning Game (or "BPLGLG" for short) is a great introductory project for school-age children. Parents who want to instill a lasting knowledge of how contemporary politics equates to the basics of Boolean Logic as developed by George Boole in 1854 can build this exciting project with their child. Using a series of switched, LED lights and a hand-cut faceplate that reflects incumbent politicians, the BPLGLG brings together math and politics, in an exciting game that is sure to bring your child the awareness they need to survive in the mid to late 209th century.

Materials and Skills Required

- Pushbutton switches
- Arduino-compatible processor
- Knowledge of logic gates
- Knowledge of local political systems and systems of governance

The Environmental Damage LED Globe

The EDLG is a handy four-evening project that allows you to calculate and keep track of the environmental damage wrought by your backyard and garage Maker projects. Using the EIPRO (environmental impact of Products) conceptual framework developed by the *European Science and Technology Observatory*, the EDLG gives responsible makers a way to monitor and scale their activities so as to minimize their impact on mother earth. Based on a dynamic data link to the Maker's Paypal, Credit Card, USPS, Fedex, USP, Digikey and Mouser accounts, when consumption is running too high, the 12"/25cm illuminated globe begins to flash red and emits a piercing smoke detector-like sound from its 2"/ 5cm piezo sounder. In the interests of training and beneficial environmental change, the device operates 24/7 and cannot be disabled. This is an advanced project that should only be attempted by accomplished Makers. A special note: this project teaches lead-free soldering skills!

Materials and Skills Required

- 12"/25cm glass globe
- RGB 5W LED lights
- Recycled lamp cord
- Express desire to reduce consumption, or appearance of such
- Recycled power supply from old computer
- Access to purchasing accounts via HTTPS proxy or VPN
- 802.11 Wifi connection and Arduino Shield
- Arduino-compatible processor
- RoHS lead-free soldering set-up
- Sand or lead weight for bottom of globe

MATT RATTO

INTERVIEW BY GARNET HERTZ

Hertz: So, how did you initially come up with the term critical making?

Ratto: For a few years I'd been exploring the relations between sociality and technical systems, using a variety of material semiotic theories and people like Haraway and Latour as starting points. And I was finding it difficult to, you know, articulate truly critical positions and engage with the social thought of philosophers like Heidegger or the scholars from the Frankfurt school within my studies. I had a sense that this difficulty was somehow related to a kind of linguistic bias that I was surprised to find within material semiotic theories. I was trying to come up with some evidence for that linguistic bias or at least create a research program through which I could constitute another way of studying technology. And I was just kind of idly thinking one day and I thought, oh, critical making - that sounds so weird, that's a very odd convergence of two words. That got me thinking, why was it that *critical thinking* as a phrase sounded so OK, sounded so normal, sounded so kind of common-sensical but *critical making* sounded so odd! So that was the starting point and really, my work on critical making has been to try to figure out the conceptual distance between critical thinking and critical making.

The starting point has to do with what we count as critical?

Yes, exactly. My reasoning is basically this; most people consider thinking a linguistic practice – an internal monologue in which we use conceptual categories to make sense of the world around us.

Similarly, we tend to think of criticality as a particular form of thinking, one in which we pause to reflect, and step briefly away from action in the world in order to reason and consider these actions. Therefore, the activity of being critical we mainly think of as one that is bound up in language and to some degree outside the actual world. Critical thinking as it is theorized and as it is taught is first and foremost a linguistic practice. But when we think of making, we have a tendency to consider it as the opposite of thinking, and to consider it a form of habitual or rule following behavior. Making in this light looks a bit like assembling something from Ikea – put this piece here, cut this out, nail this together. There is a strong tendency to consider making as aconceptual and programmatic.

So this is the source of the cognitive dissonance that one feels where hearing the phrase 'critical making' – critical we see as conceptual, and making which is seen as not conceptual, creates a kind of lacunae between those two terms. But that's obviously quite strange if you're at all a maker, if you've ever made anything at all because, of course, making is a deeply conceptual activity, and deeply reflexive, though not necessarily in the same way as critical thinking. So, critical making for me, in the beginning, was an attempt to figure out why making is considered by many to be a noncritical activity and starting from there to find ways to recover, study, and teach the criticality of making.

Right, right. OK. And so at that time that you had come up with that term, was it a response partially to Make Magazine or

Both in a sense. I was aware of Make and the Maker movement more generally, and saw the work being done under these labels as providing enabling conditions for what I wanted to do. But my work was really a response to critical technical practice and to a lesser degree critical design. I like the work that uses those labels, but wanted to focus more explicitly on linking material modes of engagement and critical reflection on our technical environments. Really, my goal was to explore actual making practices and to try and come up with ways to link deep reflection and critical theory within technical activities. Here, its important to see the origins of the term 'critical' in 'critical making' as coming from the notion of critical scholarship defined by Frankfurt School scholars such as Adorno and Benjamin. Central to their work was the idea that criticality entailed not just reflection but also intervention in society. And, Garnet, I'm talking about this from a very academic perspective because when I was first talking and thinking about this, my goal was to create innovative scholarly practice. I wasn't thinking about critical making as a more general form of social engagement. But this was back in 2007 – I now see a lot more connections with some of the things that you and I have talked about before, like tactical media and other forms of material intervention. I now see critical making as a more general practice than just something academics do in some far off castle on the hill. Critical making as a larger category allows us to connect up a variety of practices and see them in some sense as similar. Design practice, art practice, tactical media practice, academic practice, engineering practice. So that critical making becomes a kind of a common hub around which a whole set of material interventions seem to circulate.

I see the term of relevance to people who are making projects who come from the art world, activist world, even the designer world, like the critical design angle, like Dunne & Raby. They are disenfranchised or are questioning the agenda of Make Magazine and an apolitical, gee-whiz kind of perspective that it tends to bring to developing things. That's where I see

people responding to the term of critical making – where they were doing this stuff all along under the banner of electronic art but now Make has done a lot to promote the scene in popular culture but at the same time has thoroughly sanitized it and removed it from the streets and being tactical or controversial.

Yeah, I have a bit of a distant relationship to the Maker movement for some of the reasons you just stated. Like many technologically-inflected movements, it has a tendency to be fearful of politics or, really, of being seen as political which is a bit of a different thing. But it's important to recognize that a lot of the innovation, innovation is a strong term, development, let's call it, that has occurred because of toolsets, technologies and communities really comes out of this great groundswell of interest in material practice. Whether it is knitting, or electronics, or 3d design and printing, or any other types of making, it serves as an important ground for a more critical material practice than what has previously existed.

I have to say it wasn't until very recently, in part through some of our previous conversations, that I started to really think about the sanitization of making you just described. I did note that the maker movement struggled with being political, in the same way the Free/libre/open source software movement did before it. And I do wonder if we will end up in the same place. I mean, how many people know about the history of the terms free software and open source, and the fierce debates that accompanied those terms. Heck, I saw a fist fight break out at the 2002 Open Source Convention in San Diego. But the Maker Movement seems to care much less about these issues and almost ready to discard any sense of being a form of social critique.

It will be interesting as making becomes a more dominant cultural activity and trope, to watch and see what kinds of activities are considered "maker" activity. Right? That's kind of a really fascinating thing that's going on right now. You can certainly see that some people really want to hold on to something other than just the label 'maker.' I mean, Natalie Jermijenko, for instance, who we both know, she told me that she really liked the term 'critical maker'. I think she wants that label

'critical', her work is 'critical'. It's not just maker work, right? Though others might see it – see some aspect of it – and say, "oh she's a maker," and leave out that other critical part. Just as an example of that, people might looks at her 'one tree' project and say "oh look, she made these clones of trees. Isn't it interesting that she was able to clone these trees?' And by focusing on the technical task – as interesting and difficult as it probably was – completely miss the point that Natalie's work served as a way of making material relations between genetics and environments. And then there's all these issues concerned with environmental sensitivity and so forth and so on. To think of 'one tree' as maker work and ignore the critical statements that are being made is to sanitize the work.

So how do you see critical making in relationship to something like critical technical practice? Do you see those two things as related? Is critical technical practice historically coming out more from technology and physical side? Is critical making as you've defined it as coming from more of a scholarly angle?

I think there are a lot of similarities in all these terms – critical making, critical design, critical technical practice, participatory design, and so forth. They all emphasize forms of material engagements as important processes for social intervention. But in my conception of critical making – and I should say that I am not of course the only person who gets to define that phrase – but in my conception of it, I think critical making differs from the others in its broader focus on the lived experience of making and the role this plays in deeping our understanding of the socio-technical environment. I'm turning these other practices into straw men in saying this, so take it with a grain of salt, but I do see the other practices as focusing in on improving technologies by uncovering nascent values, bringing relevant stakeholders into the design process, or by showing alternatives. I've never really thought of critical making as being about the final object, about making functional technologies at all. Instead, I see critical making as first and foremost as a way of learning and exploring the world.

But especially, I mean, I see critical design as being clearly being targeted towards product design. It's really targeted at production design, but also, I think, its limitations are that it's focused and that it often doesn't go beyond that.

That's right. I think of critical making as broader than critical design. With critical design, there is an object that sits out in the world, and, through our witnessing of it some critical reflections of the designer are revealed to us, the observers.

Critical making, I think, is more focused on process than on that final result. And in my own critical making practices, I actually create a bit of a firewall between the object that is created and the process. I've resisted doing things like exhibiting the objects that emerge from critical making courses and workshops, mainly because I'm not quite sure how to stop the idea of exhibiting from overly structuring what we do as we go through a practice of critical making. I assume that this is something that good artists and designers figure out how to do. But for me, personally, because I don't know how to ignore that reality, I worry – I've been worried – that thinking too much about finality and display would reduce participants ability to explore, learn, and reflect.

But, that being said, I do think that critical making is the first step to then doing these further steps, which have to actually do with improving the status of our environment. But critical making could reveal an insight that is not captured in the final object. In fact, I'm sure and I've seen it do that, where through critical making participants come to understandings that really do not get embodied in or even connected to any kind of final object that could move outside of the context of that original making.

But isn't it important to disseminate the projects that people make? It seems like if you are only interested in just – for lack of better terms – the workshop component. I do understand the hesitation to go into the art scene and exhibiting these projects as sacred things apart from the activity of making them. But how do you disseminate the work? Do you host a bunch of workshops, or how does it work?

Because from my perspective making a project is a process with some attributes of the knowledge gained in building it residing in the object. In an art context you're able to display that object and perform with it or even do workshops in a public form, like in a festival or an exhibition.

What's your key hesitation with the art world? Or is it just that you haven't really worked in that field before?

No, I've never worked in the context of art. And in my naive understanding of it, at least when I first started doing these activities, I saw art and design objects being seen as having value because they were considered novel, or innovative, or aesthetically pleasing, or similar valuations. Just as I want to avoid the normative values associated with technologies from engineering perspectives – values of labour-saving, rationalization, instrumental – I also want to avoid the judging of critical making objects through the lens of novelty and aesthetics. Not that either of these types of valuations are necessarily bad when applied in the right context, but I do find them overly limited for the kinds of deep materially-mediated reflections I want to do. I wanted to make sure, for myself and for others that I was sheparding through the process, that our focus didn't shift, that we didn't get captured by the traditional ways of valuing the objects that we are making.

And again, this has all been a process of figuring stuff out, right? Figuring out what it means to make critically. You know, what does that actually mean? There's a couple of commitments that I said to myself when I first started this and one of the first ones was that it had to involve a material engagement. That it couldn't just be any kind of engagement; there needed to be an engagement within the process of critical making where the material substrate that you were working with helped to determine the final form of whatever you were making. In other words, that the world pushed back on your own thought of what the world could be. So it couldn't be a purely imaginative or as Tim Ingold puts it, a purely hylomorphic practice. That was the first commitment. And the second one was that any engagement with the objects of critical making had

to remain active engagements of shaping and production. This means that rather than creating passive moments whereby people would experience the objects that others had made, there had to be a way to construct an engagement between the person coming to that object and the object itself that was real, that actually was transformative for the object as well as the person.

Sure. See, I see that what you're describing right now has a lot in common in contemporary art with movements like Fluxus and other action-oriented, process-oriented type of work.

Or even like happenings, right? I mean, in some ways I think of happenings as almost more kind of model, or the kind of games the surrealists used to play. In some sense that's the kind of way that I've been thinking of the events.

Or situationism...

Or situationism. Absolutely. But I haven't really explored those connections, focusing instead on the more pragmatic details of it all. I guess you could say that my most important critical making is the making of critical making! And I felt and still feel that it would be hubris to link the often quite mundane work I do with terms such as art or design. I just didn't think that critical making would be a label that would resonate for artists and designers. Though in many ways what I've been doing is appropriating the practices of artists and designers as well as those of engineering.

Sure. I think that the term has become more relevant now that a lot of undergrad students are very interested in Make Magazine, they all have an arduino that they've maybe made an LED blink with, they like to go to Maker Faire, it's like they are a sort of Burning Man type of community, or they're a Woodstock kind of community that they have identified with. And I think for a lot of faculty that have been doing this stuff for decades, kind of like shake their heads and go like, "OK, well that's great that you can make an LED blink, but let's try to get you to

think about some bigger issues in culture." And so I see the term being of relevance to groups like that.**

For me, that's very exciting, and makes me a little nervous as well. When I was just off in my little world, doing my little critical making stuff, I really felt that I could push the scholarly and conceptual part a little further. You know, create a new academic form that takes seriously the idea of material semiotics I mentioned before. Many scholars hold to the notion that the world is both simultaneously a real material thing out there that resists our ability to control and describe it, as well as something that is deeply semiotic, deeply the result of our conceptualizations. And everyone tried to theorize their way to an understanding of this; the interfiliation of the social and the natural, the agency of objects, the in-formation of our built environments. But I wanted the materials of the world, the things and objects we engage with to not only be present in these arguments as linguistic artifacts, as textual doppelgangers so to speak, but to exist as key elements of our working throughs. Most importantly, I've wanted to create a way of working in which the materials of the world are a necessary part of critical scholarly work. And it remains fascinating to me how few scholars truly engage with these materials when it comes to social and humanities study of technology.

Sure, of course. I've had a similar reaction being through film and media studies, and new media studies with people who have never touched any sort of computer programming language. And it always seemed, it always struck me as very odd, that it's a completely valid argument to say that if you're studying Foucault that you need to understand French, but if you're studying new media art or technology, that you don't need to know how to program. And I think there have been a lot of other people, like Alex Galloway or other folks that have argued from this perspective, and some degree Kittler and others that have seen an importance in materiality and technology and have described the important of a deep understanding of the technologies

that one studies.

That is in fact one of the most interesting questions that emerges from this work - what counts as a deep understanding? The kind of critical making that I've been describing really troubles easy definitions of deep understanding – pure technical knowledge isn't enough, it's not just about getting close to the machine in Tracy Kidder's sense. You also need to have an understanding of the kind of ways that the materials might impact or relate to or engage with or co-construct the kind of social reality that we live in. You need to have an understanding that includes deeply technical as well as deeply social knowledge.

There are always deeper levels within any technology. Take computing for example: do you need to know how to use Scratch, do you need know how to use Java, do you need to know how to use C++, or do you need to know how to use Assembly? There are always lower levels of any technology. I mean, how low do you go and where does it end?

Exactly. Do you need to know how a computer works? Do you need to know how binary data is encoded on the hard drive? Do you need to know how to write the microcode that powers the processor at the heart of the system. Do you need to know how to build a computer? Do you need to know how functional programming languages work? So the problem here is to decide where it ends. In his book Designing Engineers, Bucciarelli tells this great story about being at a conference where people are bemoaning the state of technical knowledge in the US, saying that no one knows how their phone works. But then he started to think about it, himself, as a trained engineer, "do I know how a phone works?" And he goes down the rabbit hole - do I know how to use a phone. Do I know how the signal is encoded on a phone? Do I know how the switching gets done at the switching station? Do I know the political-economic decisions that have been made that allows this carrier to have X geographic area over this carrier that has a different geographic area? And so forth and so on. One of the things that he realized was that when you start thinking about

what ones needs the know, the line between social knowledge and technical knowledge gets increasingly blurry.

Sure, and what about somebody saying that inside each of these black boxes of technology that there are hundreds of "PhDs" of knowledge inside of each black box and there's a lot of black boxes inside other black boxes. Is it even feasible to think that everybody needs to understand everything? Or how many black boxes can you practically open? And furthermore, how does this process fit this into an educational institution, and how much should you expect a person to know? What's feasible and where's the payoff in terms of having a deeper understanding of technology?

Yeah, I completely agree. And there's a trade off here too, in that opening the black boxes of certain things doesn't necessarily help you use them, and in fact it might make it harder for you to use them. The kind of naturalization of technology to allow us to use them more efficiently, for example, means that we don't want to be constantly conceptualizing and focusing on a deep understanding of our technological environment. You know, if you had to think through the process of how you go about shifting a manual transmission car every time you pushed on the clutch, you'd never go anywhere, it'd be too hard. So there is a kind of need to make invisible the mediation of our technological environments, depending on what we're up to, what we're engaging with at that point.

I don't think that there's a single answer to the question of how much does one need to know. That's the main focus of the book I'm working on right now. I'm trying to develop an object relational framework to allow me to say: these are the attributes to the technological objects that are important for this type of question. So if you're looking at how do individuals use this object, then these are the material attributes that you might want to look at. If you're interested in understanding it from a culture perspective, then these are some of the attributes that you might like to look at. And if you're looking at it from an institutional perspective, then these are some of

the ones that you might like to look at. To tell you the truth, looking at any of of those three aspects that I just mentioned, is often pretty banal. And not particularly evocative in terms of our understanding of the socio-technical world. The really interesting questions start to emerge when we address the contradictions between social forms. How the attributes of an object that afford a particular individual use of it are in direct contradiction with attributes that make it institutionally acceptable, for example. And all you'd have to do is look at something like an MP3 file to start to unpack what that looks like. And this starts to get into the reality of tactical media and the other practices we were mentioning earlier.

Right, I think of critical making as coming from tactical media or the arts as emphasizing the thing that you've made as an object to intervene in social, cultural space. This sort of side steps the whole problem of how many black boxes you have to unravel to really know something. You need to unpack the black boxes and understand the technology enough to make your object so that you can put it out there and that a statement can be made through the object. I see that if too much focus is on just the process of unraveling the black boxes or understanding the technology it results in people learning binary, or going very "low" down which is only really useful if it's targeted in a specific direction. The lowness of technology never stops.

I think the more scholarly project of critical making is an attempt to scope out some of these dimensions, to better frame what one needs to know and when. It also emphasizes — and I think this is pretty important - that not all the knowledge is technical in the true engineering sense, but also involves perspectives that derive from social science and humanities scholarship.

Yeah, I mean, there's another perspective on this angle that asks why do you need to wrap up all these issues in one person, and why does one person need to unravel this? Why can't there just be artists that make

projects and cultural theorists that analyze those objects? What's the importance, or what do you get out of combining those things into one?

I think the most important issue here is to consider what is lost and what is gained when these roles are separated. One way to consider this is to think about how you, Garnet, feel about other people's descriptions and theorizations of your work, how evocative have been those writings in terms of what you intended or the value you saw in the object you've made.

And most of the time, it's terrible. And I think that many artists get into theory out of being frustrated at having their work misrepresented.

They dislike or disagree with the stories that others are telling about their work and they want to do their own conceptualization. So one benefit of bringing those two identities together would be to say, "that's an individual then who has a deep ability to conceptualize their work and to then articulate those conceptualizations in a variety of ways including linguistic forms." Because we do have to remember that part of what is going on here is that those commentators are skilled makers of their own. They're skilled makers in language, or not skilled depending on who they are. But that's their domain; that's, in some sense, their domain of expertise. So, bringing the identities together is not necessary saying, "oh now the artists need to conceptualize their works better." I think artists have always done that. It's about articulating those conceptualizations through a different material forms than most of them are used to working in, which is really the materials of language, or to be more restrictive, the materials of scholarly or art criticism language.

But I think the question of the deep knowledge thing is really an important one and one of the reasons why I like critical making and not just making. Within the maker identity, as its increasingly being performed by Make magazine and other venues, there's definitely a focus on technical knowledge, on people becoming as close to an engineer as they can get. I do think the process of training that I have seen articulated in Make often socializes people into particular ways

of thinking about the way technologies work and work in society. Technologies are made for a function, they're made to solve a problem. And although I don't think the artists follow such instrumental views on technology, the makers and the maker movement definitely has that in it, as I think is something that should be a bit resisted.

So do you see this following through in things like DARPA funding Make Magazine? That would tend to back up what you've just said how there's a normalization happening in the maker community.

Yeah, absolutely. Think about the notion of the post optimal object from Tony Dunne. So what the hell is DARPA going to do with a bunch of post optimal objects? I mean, that's not going to solve any of their problems. The real driver here is to create these nice "STEM-educated" bodies that emerge that will fit nicely into the, not to be too old-fashioned, so-called military industrial academic complex. Certainly the DARPA move is a great example of that. It's not mainly about military power, it's actually about maintaining a kind of a work force. That's the aspect that I am the most uncomfortable with. The idea that the maker movement becomes a nice feeder for a technical workforce that the powers-that-be see North America as no longer providing. It's not just that Make-DARPA guys are going to go make bombs. It's the slotting into an industrial machine that has me worried.

I see it as a fear of Chinese industrial culture eclipsing the United States. I see it very clearly as an anti-made-in-China mentality. And I think it is pitched exactly that way by Make Magazine to the White House. And I think it's true that North America has generally forgotten how to manufacture things. People don't pull engines out of their cars, hot rod them, or even change the oil in their vehicles anymore. There's a real forgetting of material making that has happened in North America over the last several decades, partially at the hands of the dot com boom and the spread of the internet.

I think you're right. For me the main goal of making, whether critical making or whatever you want to call it, is to reconnect people to the world. The most powerful aspect of making is the way it denaturalizes the built environment. Being a maker basically gets people to look around them, to look around their world, and say, "OK, somebody made this." This thing, this object didn't just fall from heaven; somebody made this, they made decisions about it, they made choices about it and those choices are impacting me. And then the next step is recognize those choices as political, as benefitting some people over others. And the final step is for people to find some agency in regards to this political nature of the built environment. That for me is the ultimate goal of making. Which is why depoliticizing the maker movement is so problematic. An a-political maker movement then requires that the objects that are made are equally apolitical.

Yeah, in terms of where the minerals are mined to make that thing, how it was manufactured, where it goes after it's obsolete: much of that is stripped away in terms of how it's represented through Make Magazine. It's often only communicated in terms of what gee-whiz thing it can do for me to do something whimsical to impress my friends.

Right. Part of what needs to happen is that people need to be aware of the trade-offs that occur in making things. Sometimes these trade-offs have to do with the environment as in the rare-earth example you just mentioned. Other times the trade-offs have more to do with social life. We have to be able to say "OK, well they chose a certain screen size which makes it appropriate for a particular user group and probably quite

inappropriate for another user group." Ultimately, people need to understand that ways our social and our natural environments are mediated through the choice-making that is part of the process of making. I think that's the most important thing that critical making should do – other than all the scholastic stuff that I'm interested in – it should help people see our environment as a made environment, made in particular interests, and serving particular interests. So to depoliticize it is to ruin this opportunity. Cleansing making of its politics takes away this amazing opportunity to better understand and exist in the world. It turns the making movement into just another way to create an industrial workforce.

Or just another, or just a sort of prosumer, or consumer type of group of people who now all buy open source hardware that they could maybe assemble on their own but they're too lazy and you know, to make something neat out of.

Yeah, the prosumer thing is a great example, as is user-generated content. I mean, basically a lot of the make stuff that I've seen coming out is basically the material equivalent to user-generated content. It's all so heavily constrained, that it basically provides the illusion of choice. Which is what we get when we go to Burger King, where they say have it your way, if they're still saying that. Have it your way. That means you can choose whether or not you can have pickles on it. But in the end, it's still a hamburger, right? So, you know, often times the prosumer thing is just a way of giving us the illusion of agency, in relationship to our built environment, but providing us so very little true choice.

Ok, let's switch into you discussing what you have in your critical making lab. So let's talk about this in concrete terms, in terms of what sort of equipment, what sort of social structure, what sort of instructional methods. Let's talk about how you have made a critical making lab within a university...

OK, so that's a really interesting question from an institutional perspective. First and foremost, this

has been a very odd process, in some cases difficult, in some case surprisingly easy. I am lucky to work in the Faculty of Information at the University of Toronto, which is somewhat of a hybrid place. There is some technical work going on within the faculty, but it is also deeply embedded in a kind of humanistic interpretive social sciences frame. This creates the perfect context for critical making since it requires both technical and conceptual resources. There are aspects of this that do remain tricky; for instance, I have a laser cutter that I keep moving around campus since it requires external ventilation and my lab does not have access to this. I am in fact located in a library – the main Robarts library at U of Toronto – and this does reduce the kinds of equipment I can have online. Equally, being seen as a technical practice can encourage both students and other faculty to see what we do from that frame. So we kind of ride the wave between being a cultural, humanistic space and a technical space.

What sort of equipment do you currently have in your lab and what direction are you planning on going with it?

My current research focus is on the rubbing together of digital and physical worlds. Most of the critical making that I do in my lab and with students involves making wearable or environmental computing prototypes and using these to explore critical information issues. Therefore, we work a lot of microcontrollers like the arduino, lilypad, or jeenode platforms. We have a pretty complete electronics lab, with components and equipment directed towards both prototyping and, increasingly, fabrication. We just received an LKPF S63 which is a PCB mill, in order to play with creating our own PCBs on the fly. We also do a fair amount of enclosures, or small mechanical structures, so we have a couple of proprietary 3D printers – a Dimension 1200SST and an Object30Pro, a couple of Makerbots, and a Sherline CNC Mill. Probably the equipment that is used the most other than the soldering irons, is our Versa VLS3.50 laser cutter.

We've sort of upped the ante with our current equipment since we've been moving into high-end capabilities, like with the Objet printer. But I do want our main focus to stay on the process-side – in other words to continue to be focused on

exploring the materials of production through making as an important part of critical scholarly work.

So where do you see, where would you like to take the idea of critical making and what do you see ahead for either the term, or your own work, or maker culture, or where do you want to go with this?

I think it is a kind of egomaniacal craziness to pretend to own a term like critical making. It is however a very successful academic model – whoever becomes seen as the original definer of biopolitics or boundary object or whatever gets widely cited. I do hope that my work continues to grow in relevance and that others read it and see it as a stepping stone to their own endeavours. But ultimately, I believe lots of people will engage with critical making from their own viewpoint.

I will continue to work on pragmatic and theoretical frameworks to support such work. Critical making names a mode of engagement in the world that is about seeing and making a world that has somewhat different characteristics from the world that we live in now. I know this is old-fashioned to say, but critical theory spoke specifically of scholarly work that intervened in the world in ways that were emancipatory, that were ways that were freeing, that actually freed up people from these dominant social structures that theorists, artists, advocates saw as problematic. My worry about 'Making' is that it will lose its relevance and its alterity as it becomes more mainstream. I am glad to see more people making since I think practices of engaging materially, whether knitting or building a deck or programming an arduino, help us all see the constructed nature of our physical environments. But I think this work has to be connected to deeper analyses about why the constructed world is as it is. Without such analyses, making runs the risk of just reproducing the environments and constraints we already face.

■■■

NATALIE JEREMIJENKO
INTERVIEW BY GARNET HERTZ

Hertz: In your opinion what's wrong with or how would you change the maker movement? How did you envision the maker movement and specifically Make magazine when it was first coming out and how it is now? Weren't you in some of the first issues?

Jeremijenko: Yes - I was actually in the first couple of issues. I always say "I made it to Make magazine, so I made it." [laughter] This idea that I found a publication to address something was shocking to me at first. When I first exhibited in the early Nineties with technology, in each and every case, I'd be developing the conceptual ideas, but all people were interested in was that I actually made these things and designed the electronics. Most of the people, most of the audience didn't even get to think about the ideas that I was trying to explore and experiment with. They were just fascinated with the fact that technology was the medium and that if I could do it then they could do it. That was the predominant reception of my work, people asking, "How did you know how to make it?" over and over again. Even with the Suicide Box in the early Nineties the response was not so much about the phenomenon of suicide – a tragic social phenomena at a premiere suicide site in the country, the Golden Gate Bridge. So, to get to Make magazine was to recognize a full monthly publication I finally felt addressed, in which we could actually talk about, how you make it and how that was part of the reimagining about technological mud, if you will. If you think of Rich Gold's thing, making work from the mud of our

riverbank. This is our cultural medium, this is the front of social change.

I hoped that Make could actually explore what is possible with new technology, how could we change socio-technical conditions, how could we reimagine our social environmental situations with these new technologies, which is always the question that has fascinated me.

I was really pleased when Make covered the feral robotic dog pack release in San Diego with the students, but they did a story on it that was fairly journalistic. Of course, they didn't write about the struggles to set up a lab that actually functioned in the space, they didn't write about the contaminants or how the contaminants got there, or the kind of political dynamics of the project – for example, how the mayor of San Diego came, how there were only five working dogs released in the class, but how there were seven television news crews, or how we released the dogs on the contaminated public site of Mission Bay, right beside this former military toxic waste dump that is leaching unknown superchemicals into a premiere leisure swim and windsurfing area... and no one is talking about it.

So my complaints about Make magazine are, in general, my complaints about tech journalism. The reluctance of this kind of journalistic mode to explore the very rationale of the project and the environmental, social and political context was something that I was a little bit surprised by. Somebody at Make magazine gives it some lip service, but it was a technofascination instead of redirecting the attention of these companion

robots away from the plastic corporate story of these things as interactive toys – which is just balderdash – and toward the viable and interesting issue about the contaminants of the microprocessing industry. Most of the contaminated sites these dogs are exploring are the sniffing of their own butts, if you will, in a larger industrial ecology sense.

The fact that the journalistic coverage didn't go into any of the parts that I thought were interesting or important was a shock. I realized, to answer your question about the maker movement, this was a kind of technofetishism... of which I am certainly guilty. It's a wondrous engagement with new technology just because it's new technology, not because it's important or critical or that it does something. But this fascination could and should parlay into how does this address the challenges that we are facing, how does this take the challenges of the 21st Century, and give us the capacity to act on them, to explore what is possible.

That kind of bigger discussion is the raison d'être for screwing with this technology, for rejecting the corporate scripts of "Here's the user manual about how you're supposed to use things" and really exploiting the markets of scale to really figure out how we might address the fact that we live in a post-industrial society. We live with over four hundred contaminants in our bodies thanks to technologies and their manufacturing processes - we're trying to figure out where and how and what to do about that. We have to think about these things, and to excise that out of the discussion...seems like that's the meat, that's the whole reason for doing it.

I could care less about a kind of techno-fetishism that's empty and about making vampire costumes. I take play more seriously than that, I think play is really generative and very important and not a distraction, leisure kind of reproduction of sci-fi clichés. I'm profoundly disinterested in them. Why go through all the effort of engaging with reprogramming products and technologies if you're just going to reproduce the same cultural scripts with them? It's boring: you make more vampire costumes and squirt more blood and make a funny noise.

So here we are faced with a climate crisis and tremendous social inequity and opportunities for technologies to really help us explore how to address things. The very agency that is part of the maker impulse and knowledge is to not only to solve problems but to form problems... to think things through in interesting and diverse ways. When that's not what the maker movement is about, it's just developing another app, in summary, that's what's wrong with the maker movement. I'd like to see less about vampire costumes and more about exploring distributed local energy production, or the kinds of big social issues that we're facing.

The first wave of critical making – which I think is in the crystal set radio era – it was a very politicized. The reason for engaging with CB radios and getting your ham radio license and making your own crystal set radio was also to explore the political context: to be able to talk to somebody in Russia, make contact, and to understand who's controlling the airwaves and what they would be used for. This was all part of the necessary discussion you were pulled into when you were made your own crystal set radio: who are we listening to and why?

I have to answer the first question about what's wrong with the maker movement and I think I made one point, the lack of critical discourse outside of the corporate imagination. Instead, the work needs to be about change, social innovation and political innovation – just as much as it is about technological innovation. Social change has been excised from the discussion around making due to political views, and it's a tremendous, tremendous problem.

I think thinking is handwork, which is why I use the term "thingker." We think with things. I can't make sense of the world in theoretical terms without the materiality of what actually works and the open endedness of how others interpret, receive and use things.

I think of making stuff as fundamentally an intellectual activity. I respect the tremendous ingenuity and resourcefulness of someone that is able to make things as much as I respect someone that is mathematically adept or can cite critical theory fluently. The material reality of the world

is where we integrate the social, political, ecological and intellectual ideas – and that's why it's so compelling to me, to this field. So, I don't want making things dumbed down. I don't want "let's teach people about electronics" – this is educational bullshit.

There's not a lot of questioning what robots are, what they do, who they're made for, and how they can be made. If you look at something like robotics competitions, as an example, as this great kind of success in terms of a very celebrated model of essentially making the geeky activity into something like a sport. If you go to one of these robotic competitions - people cheering and yelling "team spirit" - it's exactly like being at a basketball game or a football game, exactly the same, absent of any intellectual discussion about what these robots are for and why you would be doing a stupid little task of putting ping pong balls in a thing, because it's kind of a sports metaphor, not the intellectual metaphor that is actually about what is materially possible and why we make things and how they could be different. You see this kind of sports metaphor imported into robotics, and then you see the kind of like Mindstorms league, which is one of the leagues which just drives me crazy.

The idea of introducing students to robotics through Lego drives me crazy; it is an absurd lie. It is a horrible, disgusting lie... incapacitating. If you're going to build anything, Lego would be the stupidest thing to build it out of, right? Its plastic things are too heavy, they don't have any of the rigidity or any of the structural things that you would actually build something out of. You're not really understanding what works and the fundamentals of engineering. Never would you really build anything out of Lego if you really wanted the form in any way. Moreover, look at the ecological consequences of you these kind of massively industrialized plastic processes. That's actually the big technical engineering challenge, to critique and understand the limitations of it. Moreover, it teaches kids, "OK, you want to a sensor, you want to motor? OK, here's a lego sensor, here's a Lego motor." It turns you into a Lego consumer. It doesn't teach you how to spec a motor, how to spec an LED, any of the fundamentals of what a Mouser catalogue is, or

where you would actually look it up if you really wanted to understand data sheets and if you wanted to order something to make something out of. It teaches you how to consume Lego. If there are any transferable skills from the Lego Mindstorms robotics league into useful productive innovation towards rethinking and contributing new ideas into the promising area of mechatronics or robotics... you just don't get there through Mindstorms. There's a way in which the maker movement or this kind of hands on education or this emergence of thinking of things has been co opted and taken by this larger corporate interest and kind of very conservative pedagogical agendas.

Yes... that's good. Thank you.

So that should be question one of your sixteen. *[laughter]*

One thing in particular that I wanted to follow up on from a previous conversation was your comment about open sourcing kind of as a stand in or replacement in the maker community for criticality because I think it's an important point where you see open source being used as the kind of catch all idea that it is socially engaged in some way. Tell me, can we discuss that? Or tell me what you've been thinking about that.

Well, I certainly think the open source movement is critically important to understanding the time. It's really a complex technical achievement done by programmers and geeks in a loosely coordinated by various strategies actually challenging corporate paradigms. I think it is really interesting and important, it's necessary but not sufficient.

It enables collaboration and being able to draw on the tremendous resource of collective intelligence with many people and many ideas to improve and collaborate and conspire and coproduce. To open source something is to greatly accelerate the amount of ideas you have available to you, but it's not the only thing that makes a project good.

Open source is a very important process and movement with wonderful theorists, but frankly, when it comes to a lot of the main and important

issues, the Apache web server doesn't solve the climate crisis. It doesn't actually address many big issues.

The Manhattan Project, that's one example, a lot of smart people involved and it gets technically really interesting, but they spent the next fifty years producing atomic weaponry. This whole idea of having a hothouse of ideas where you get really involved in a smart community thinking through hard problems by itself it doesn't produce a good end outcome, right?

The idea of open sourcing as necessary but not sufficient... one example would be with cola where I am actually working with my twelve year old son on the open source cola recipe published by Cory Doctorow. Make the ingredients visible and that leads to transparency. Make your own open source cola, tasting what it tastes like, realizing that the ingredients are all clove oil, orange oil, lemon oil, essential oils, and you don't have to put the caffeine powder that looks like cocaine, these things can be mixed and reinvented and changed. Open source only begins the process of innovation and to what extent we can change a normal hack. You want to think about hacking the food system, not just about making them open, not just about describing them with some kind of rigour or depth. It's not just creating the recipes. For me, it's the skills and capacities to make and to reevaluate foods we have developed.

You mentioned the idea of hacking the system and I kind of think of that as separate from only making something. Do you see what's now termed as the maker community as only making stuff and not really involved in hacking?

No, I actually think all making is remaking, so everything is hacking. As far as if you're going to make something, you have to use what's available. So to some extent, I use the term hacking as larger than making, as opposed to hacking being a subset of making, because all design is redesign, all making is remaking.

Criticality is generative. To criticize something is to talk about how to make it better, what's wrong with it, how do you change it. In order to actually

begin to engage with making, remaking, or hacking something, you have to criticize it. Criticism is generative.

Is the term "critical" too negative?

It does have this critical connotation, that it's just about being negative, but it is a step towards remaking. Understanding that the very idea that you can design something from scratch is a tremendous delusion. Critical evaluation of how things are currently made is what enables you to think about how it could be better and how it can change.

Lets talk about universities and hackerspaces. Are universities a good place for a hackerspace? What do you see as the value of a hackerspaces, in general?

That's the interesting juxtaposition: hackerspaces inside of universities. There's a contrast between when you have a hackerspace inside a university and you are introducing hacking being what counts as pedagogy and how we learn and actually getting hands-on learning as a fundamental skill with critical making as critical as critical writing or critical thinking. This idea of hackerspaces inside of universities, to me, couldn't be more important, particularly in engineering.

A hundred years ago when engineering first got to be less about the guy who was running the engine, a tradesperson who had low status, low compensation, and they got engineering into universities, you can get a PhD in Engineering. That was done through actually changing engineering, which of course is the profession legitimately about making stuff, and this was done by taking it out of the shop, out of the machine shops, out of the wood shops and into math classes, and into problem sets. You can spend an entire engineering education without having to make stuff – I went into engineering because I wanted to make stuff.

My career as an academic has been largely spent on how to actually put hands-on education back into the curriculum. It is not sufficient to only discuss important theorists, but you actually really have to make stuff, really engage what it means to

make stuff and who makes stuff and why it is difficult to make stuff.

Walking into a hackerspace is almost like walking into the Stanford shop, where there's a lot of people doing a lot of different projects with a collective set of equipment and an investment in facilities that makes these activities possible. It's a business model, it feels like the Stanford shop, but off campus, just a few blocks away, and you have to pay membership for it. By taking it out of the intellectual context, you obviously lose the intellectual context which I would argue is critically important for this thingking – and that thinking is done with hands, and that thinking is handwork.

Let's discuss critical design within the context of critical making. What useful things can be taken from the concept of critical design, as presented by Fiona Raby and Tony Dunne?

I'm a tremendous supporter of Fiona and Tony's work in producing distopic predictions of technology and the market. I think these predictions are worth contemplating. This type of distopic prediction can be achieved – and is often best achieved – by producing a video and not necessarily making a prototype. In my opinion, making a robust prototype actually gets you to understand what's working and what's not working because it can be put in an open-ended way in the hands of people. Producing a video creates a fictional scenario provides and intellectual context for debate and discussion about how we use things in which technology can play an important role, but I think it's certainly not the only way that good critical design gets done. I emphasize that it is necessary but not sufficient to have distopic ideas.

I have a belief in diverse and atypical types of engineers: women, people not willing to work for the military, or people who aren't seduced by the corporate Jonathan Ive type of superhero icon. In order to understand how things can be better, it's important to gain a perspective on how things are made, who makes them under what conditions, and what the environmental costs are. We should have designers from diverse backgrounds, and

actually have honest, believable experiments in what is desirable, not only what is less desirable. It's another thing creating technology, and that's where critical making takes us.

■■■

ALEX GALLOWAY

INTERVIEW BY GARNET HERTZ

Hertz: In your opinion, what do you see as being wrong with the maker movement?

Galloway: There are a lot of things right with the maker movement, certainly we can talk about that. However, I may have slightly a polemical position on this. You could view the maker movement as the last period of a very long sentence, therefore very not so surprising even if it brings a certain kind of shift in our culture and technology. That larger transformation has to do with how modern society has shifted since, let's say the early 1970s, and really started to shine the spotlight on individuals and turned individuals into makers, in a much broader sense. Our society today is founded on a production that originates from individuals, from their own expression, from their own presentation, from their own performance and self promotion. A production through affect, and behavior, and comportment. We are all makers of our own presence in the world, and we can think of this as a new productive capacity, as a lot of economists do. What's the similarity between Facebook and the explosion of the TED talks phenomenon or the way video games are designed these days, or even in something like the explosion of the memoir in literature? These all show different facets of the same larger social phenomenon, which is that we now focus a lot of energy on the elevation of the individual's productive capacity, its performative expressive capacity. This would be a way to connect Joan Didion with Diablo 3. Maybe there's a new kind of narcissism in this culture that we are going to have to contend with, so Facebook as a narcissistic machine. We are all makers of things. If we were

to evaluate what is wrong with the maker movement, I think we cannot simply limit it to just this isolated movement, we need to think much more generally about things like Web 2.0. Basically, everyone is a maker.

So you don't view the maker movement as reverting back to handmade craft and self-sufficiency, like what was more popular in material culture maybe a hundred years ago, as in homesteading culture?

I think that's happening. We're a really rich country, in the US, but at the same time, we are completely impoverished. We're completely impoverished in our minds, in our bodies. That is why you see a turn now, as there is periodically in modern life, back to a more authentic or sincere way of living. So enter a new authentic hacker ethos where people are building things. Look at the 1980s and the explosion of punk rock and indie punk labels. That was a similar kind of instinct. Today, everyone is a maker, but no one is really making anything. We have this sense of universality, but I'm not sure we really fulfill the promise of collectivity.

I see a thread in DIY culture as gesturing toward what people were doing a hundred years ago — at least in terms of being self-sufficient and getting around commercial culture. However, what I see in the Make Magazine brand of making usually involve building things with Arduinos, making LEDs light up, and using 3D printers — in

A lot of people are interested in the idea of the so called pro-consumer. So a consumer who is also productive and is obligated to be productive. As you're hinting, this has a long history in American and commercial life. A hundred years ago, furniture designers, like Stickley, would send you things that you would have to assemble yourself. They were outsourcing part of the assembly labor to the consumer. The larger craftsman movement also connects with what you're talking about with the DIY culture. Maybe it's very American too. We have this myth, this Emersonian myth of self-reliance and the Protestant ethic and the spirit of capitalism: pull yourself up by your bootstraps, be self sufficient. I actually love all of that; I am definitely seduced by self sufficiency and can see the appeal.

Right. Something that was brought up to me by Natalie Jeremijenko was this idea of open source licenses replacing or standing in for the idea of being critical or thoughtful. We had talked about it in terms of people saying "Well here's my gizmo, here's my gadget and it's open source so that means that I'm critically engaging with culture." Do you have any thoughts on open source hardware, or how it's been developing over the last little while?

Open source is a tricky subject. On the one hand, we should acknowledge that open source software is hands down one of the single most important things that had happened in our time. The idea that one of the largest corporations on the planet – like Microsoft, for example – could actually be threatened by a completely self-organizing, open source project. Sometimes not simply threatened, sometimes completely bested – look at the Apache server and its deep penetration in the server market. For example, imagine if there were an all volunteer, open source, non-commercial airplane project that was threatening Boeing. It just makes no sense. We have to acknowledge that, as a chapter in industrial history, open source software is tremendously important.

But I think that I can sympathize with what you're getting at. Simply to stamp something as open source is not at all sufficient for qualifying it as a critical project or a project that has some kind of progressive or political sensibility. Not at all. In this day and age we need to be cautious. We need to ask ourselves who wants the world to be open source? Google wants the world to be open source. Facebook wants the world to be open source. There are whole new production models and ways in which value can be produced based on opening things. It could be opening up your own life, opening up your social network, or in the case of Google, opening up vast reservoirs of untapped data. So it's a double edged sword. We need to do more granular analysis of each individual case.

Are you aware of this DARPA grant that O'Reilly and Make recently received, and what do you think of it? Is it inevitable that DIY or hobbyist type of cultures align with larger institutions, or do you see this as going against some of what Make had started... or is it actually following in line with what they were always doing?

I don't think there is any surprise there. We should remember that DARPA has been funding this since the very beginning, have no illusions about it. At the same time, I don't want to be a hypocrite. O'Reilly code books are the best in the business – everyone knows that. I first learned how to code perl using that blue camel book, and I learned what TCP/IP is through O'Reilly books. I think everyone loves how they don't really pander or patronize the reader. Yet the DARPA funding issue is no surprise. The deeper question is, what are the politics of hacking, or what are the politics of coders. That's a much more difficult question and there aren't any easy answers to that.

I get a lot of flack when I say this, but I honestly think that hackers tend to be either politically naïve or politically neutral. They are simply uninterested in politics a lot of the time. Anonymous gets a lot of press, but most coders and hackers do what they do because they are into code, not politics. They want to make cool stuff. Thus they tend to be scattered across the political spectrum. In fact, when they're on the

left, they tend to be centrist liberals, or sometimes left libertarians. Only a minority of hackers are what we might call left progressives in the traditional sense. You could read any number of things from Fred Turner and others about the way in which, historically, lets say over the last fifty years, how the rise of cybernetics and the rise of new media is essentially coterminous with the rise of the new technocratic, neo-liberal, global systems of government. So DARPA and O'Reilly is not very surprising if you look at deeper trends.

Sure. On that front an initiative that DARPA, and Make through DARPA, is developing is a hackerspace-style proliferation through through schools. There's a goal of having a thousand spaces set up over the next several years. Related to this, what role do you see hackerspaces having within a university? Have you been involved in any spaces like this, or how do you see this kind of thing being put into universities?

That is kind of tricky. I maybe have an unpopular angle on this too. We have to remember that after the church, the university is the most conservative institution in society. And I'm not sure that's a bad thing [laughter]. I think there is a reason why universities are traditional and conservative. Certainly I am all for certain kinds of deconstructions of the university system and its staid organization, for example with the canon wars in the '80s and '90s and the quest to diversify the canon. But I'm also a person who teaches classes and says, "no devices in class. No laptops, no devices."

The problem is that often this hack-ification of the university really is a disguise for a neo-liberal makeover of the university. Ideas like "Let's turn seminars into laboratories for entrepreneurship" – I don't think that's a good idea. I'm not against entrepreneurship, but I don't think that, outside of business school, this is what universities are for, particularly the liberal arts and humanities parts of the university. I think I'm quite traditional and conservative on that point. Having said that, I also would add that, to be a person in modern life today, I think one should know one foreign language and one computer language. So let's

learn how to code, but let's also read Plato and maybe ultimately try to bring these domains together.

Can you comment on the idea of the difference between critical work that you do and critical theory as defined by the Frankfurt School? What I'm getting at here is more of an idea of the term critical making, whether that's a valuable term, or it's maybe too academic or maybe too negative or maybe should be updated into something else. Do you have any ideas about the term critical making and whether that's a good label to embrace, or is it maybe better to think around different terms?

I think "critical" is a good term. Like a lot of labels, it can be vacuous sometimes and, certainly, it can turn into a certain brand. I use the word critical to describe the kinds of projects I aspire to – whether it be the critical study of software, or an interest in tactical media, or the politics of code.

We can look at the origins of critique. There's basically two origins for this word. There's the one that comes from Kant and the one that comes from Marx. If you read Kant, the idea of critique has to do with the rejection of dogma. An antidogmatic interest in self knowledge, the self reflective quality of knowledge; the ability for knowledge to be able to do what it needs to do without appeal to external scaffolding (in, for example, an appeal to dogma). Kant's legacy has colored our entire modern experience.

At the same time, there exists a similar but slightly different sense of critique that comes from Marx. This also concerns the antidogmatic, self-reflective, modern position. His is a rather mundane, terrestrial, and non-transcendental position. But of course in Marx, it's all driven by a kind of polemic; it's driven by an antagonism. A dialectical relation, where you are always in contradistinction with something.

Marx's sense of critique is about taking a position. Consider something like Wikipedia. Wikipedia would be an instance of the opposite path – there's not one sentence of critique on Wikipedia.

This is because of the principle of neutrality that guides all writing on Wikipedia. They have very specific editorial guidelines that prohibit what we know as critique, and for good reason. Critique means you have to take a position, you have to defend it, you have to be against something. There has to be a dynamic or differential. So to answer your question I am definitely interested in the legacy of Frankfurt school critical theory and I don't see a dramatic shift in that kind of methodology or approach. Part of what I am trying to do is take that legacy of critical theory (while adding bits from continental philosophy) and try to see if and how and whether they connect to contemporary questions, particularly ones having to do with digital media.

What useful things can be taken from the concept of critical design as established by Anthony Dunne and Fiona Raby?

Critical Design is a bit silly. Designers have always been great at branding, and this is no exception. Design is a fundamentally critical process, from the get go. That's what the design process means: it's an iterative process in which you revisit ideas, refashion them, recalibrate, and produce multiple versions. That's why people say "everyone is a designer" today. We live in the age when everyone is a curator, everyone is a DJ, everyone is a designer. We need to take seriously the notion that whereas a generation ago critique was more or less outside mainstream life, today critique is absolutely coterminous with the mainstream: this is why one day a designer is doing a so-called critical design project, and the next day they're doing a project for IKEA. It is normal.

For maker or DIY culture, what are some interesting projects, groups, directions, themes or trends that you've seen lately. Is there anything you've recently seen that has been unexpectedly provocative or interesting?

Well, I've tried to keep up, but I'll admit I'm not a hardware guy. I'm not a physical computing guy, so I've never been able to participate in some of the really interesting spurs that have come up recently like 3D printing, and microchip coding and Arduino and things like that.

In terms of interesting projects, I guess for me the holy grail is still ad hoc networking. Once we have truly viable ad hoc networking, rolled out to a significant number of machines and mobile devices, at that point, we will see a major shift in technology and modes of sociability. Imagine if the Occupy Movement was not a quote-unquote "Twitter revolution" (which is such a problematic claim to begin with!), but imagine if it was completely ad hoc, imagine if the network itself was local and ad hoc. Things would be very different. That's one thing I find quite interesting. I think it will have the kind of dramatic shift that we saw, let's say, in the way in which something like Bittorrent really changed file transfer.

That doesn't answer your question directly, but I think that it may be a part of DIY. I think it is, since it embodies the spirit of a bottom up, grassroots movement. We don't need a backbone. We don't need an information backbone. With an ad hoc network, just by turning on a device, we fortify the backbone, the grassroots network.

Yes, and I'm glad you brought up the Occupy Movement because it's something that's been an interesting contrast to the the apolitical and family friendly tone of Make Magazine. Many interesting things have happened in what could be termed as DIY culture through the Occupy Movement and other things that are screaming politics or controversy. It just seems a bit odd to think of DIY culture as being apolitical, and there are some documents, some vision statements that Make has put out that defines the maker movement as non-political... and I think it's sort of taking the hacking component away. It is extracting the making component out of hacking or taking the hacking part of the hacker ethic away from making and it's sanitizing it. It's not quite Disney-fying it, but it is making it family friendly, which I think has really been, in some ways, maybe key to its spreading, and may be essential to being taken up in a popular way. But also it sort of loses a lot of that punk aesthetic and hacker aesthetic that I think is so rich and interesting.

I think you're onto something. One could do a whole historical sociology of aesthetic and political techniques, lets say from the 1960s, and the way in which they constituted genuine counterculture, even antisocial behavior, critical of the mainstream and so on. Then, one could trace these techniques and show how (or if) what was once more radical or countercultural has become normalized. Or even how certain techniques may have been co-opted to play for the other side.

Sure, I think a good source on that is Rachel Maines' work... I don't know if you've read it. She talks about it in terms of the hedonization of technologies and of practices that once were labor oriented and the process of how they transform into a pleasure-oriented leisure activity.

Think about the status of desire. In the 1970s Deleuze and Guattari talk about desire as a radically, liberating capacity – the situationist international too. But now think about how Facebook works today. It is completely embedded in the mode of production now – activity, affectivity, performativity. If you read Judith Butler in the early 1990s, it's a radical position to take, but now it is completely sewn into the Facebook business model. So a lot of things have changed in the last twenty, thirty years or more.

Think about interactivity. If you talked about interactive media, let's say in the late 1960s, you were a radical, because interactivity meant that media should be bi-directional, it meant that it was not a broadcast model. Media should be bi-directional; if you were talking about interactivity essentially you were for the people. Now interactivity is, at best, completely normal, and at worst, maybe even slightly nefarious. I'm not sure I want Google to be interacting with me when I don't want them to be interacting with me. I'm not sure I want Gmail to be interacting with the emails I write.

In fact one could say the same thing about remix culture. I was looking recently at some early experimental film and video projects. And they are so surprisingly similar to watching an MTV bumper from the 1980s. It's exactly the same technique, hyper quick edits, and so on. Such are

the strange twists and turns of history. At one moment something is marginal, critical, even antisocial, and then a generation later it becomes normal or mainstream.

So what are your thoughts about contemporary use of the term DIY, whether that's through Mark Fraeunfelder, Matthew Crawford, or other people. Do you have any thoughts on how that term has changed, or where it's at now, or where it comes from? Because when you say "DIY" it can mean everything from going to Home Depot to buy lumber to programming an Arduino or a whole range of things. Where do you think is the most useful way to take that term, where to go with it or what to do with it?

Here in New York rooftop gardens are all the rage. We have so many rooftops and they're all empty. My parents were back-to-the-landers in the 1970s, and I grew up on a farm in Oregon. So I'm a product of the DIY ethos to a certain extent. I'd love to have a chicken coop again in my backyard if I could!

As I said before, I think we're a really rich country but we're impoverished at the same time, because even in our making, we've lost the essence of making. It could be physical knowledge, or it could be spiritual knowledge. You mentioned Crawford, and we could discuss others (Richard Sennett's book on the craftsman, and so on). In continental philosophy right now people are talking about carpentry – I kid you not. Tools are very fashionable right now. We mentioned Etsy. Even in music you see a return to the DIY hand-made ethos. Ten, twenty years ago, it used to be the height of cool to be on a small label like Sub Pop. Today it's even cooler to self-release.

Right, or on cassette or vinyl, too... to self-release on vinyl.

Right, I find that kind of humorous. We're seeing it in all aspects of culture, and of course it's still generally a good thing, whether it's in music or with Linux or Occupy. These are good developments. But we should also frame them

within a larger landscape. Romanticism never gets old for people; there's a basic phenomenology that people never lose interest in. What I mean is that people will always crave a sense of authenticity, a sense of sincere presence in the world. When our social relations fray and become alienated and commodified, we will see people return to what they view as a more authentic, sincere existence. It started with Socrates and it's happened periodically ever since. Phenomenology and romanticism are maybe only the most recent emblems. I think that's a way of framing what you're getting at with your question here about a return to the handmade, maintaining a personal relationship to one's objects and, as those objects disseminate, a personal more sincere social relationship to one's friends and relations. I'm a woodworker, I make furniture in my spare time, so I get why people feel this way.

I see part of it as people, in a simple way, just being tired of buying stuff at Wal-Mart and being sort of sick of that. They're returning to using – for example – some hand carved spoon that their grandfather made or a quilt. And I think that it's very difficult to replicate that genuine sort of hand made, or sentimental type of object that you'd have in handmade culture.

You mean, if it's computer based?

Well, that's a good question as to whether that could be computer based. I think you see some replication of sentimentality in software through things like Instagram, which adds sentimentality through software. Physical objects do have a weight to them that is maybe more difficult to replace through software.

Media always play that role. We often think of media in negative terms; "Oh, these are the aspects of modern life that are impersonal." But look at what media do and how they work. I am thinking of something like the invention of anti-aliasing. The invention of anti-aliasing was precisely to add a soft, authentic, smooth visuality to images. You could even look in the reverse, because the flipside to romanticism is a naïve

sentimentality or nostalgia. That's a trap; romanticism is an ideology in itself, of course, we should acknowledge that. But I love these small nostalgias that appear here and there. People are nostalgic now for the CD as a music format because MP3s tend to be compressed and CDs have a richer, deeper, sonic spectrum. People are nostalgic for – as you mentioned – vinyl, or the pops and hisses that you hear when you drop the needle on a record. Such media artifacts return as the telltale signs of a more immediate authentic experience.

Right. So if you had to spit out some sources for a reading list related to either Do It Yourself Culture or making or maybe critical making or handmade craft, what would it be? You mentioned Sennett and Crawford and some other sources. What would you add to that list, or what would you think would be good for people to dig into?

Wow, well there's all the old hippie literature from the back to the land movement. How to build a house by yourself, books on goat husbandry, and so on.

...and you still see herds of goat in Los Angeles, clearing brush for fire codes. You can drive down the freeway and see people who are still "husbanding" goats...

[Laughter] Related to the idea of phenomenology, a favorite of mine is the architect Christopher Alexander. In terms of the immediacy of production and design, Alexander is a legendary figure. But more contemporary, my hero is Geert Lovink – and I'm sure a big influence on you too. Especially that early book of his called *Media Archive*, that he co-wrote under the pseudonym Adilkno. He's been writing on this stuff for a very long time and has been thinking about critical media practice more deeply and with greater subtlety than anyone I can think of. What's so great about his work is that he doesn't fall into the two typical camps. Either people are geeks who are into hacking, and their response is generally thumbs up; or people are knee-deep in the proprietary commercial world and give it a thumbs down (when it threatens their profit

margin). But someone like Lovink – or even consider Matthew Fuller's work, or Tiziana Terranova, or certainly the Critical Art Ensemble – is a huge influence to a lot of us these days. That kind of work remains absolutely crucial for me.

Another book that gets better and better every time I read it is McKenzie Wark's book *A Hacker Manifesto*, a text influenced significantly by Guy Debord and Deleuze. I think it's one of the very few good books on digital media and the world of digital culture. It's one of the handful of books that really stands up since the web boom of the late 1990s.

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PHOEBE SENGERS

INTERVIEW BY GARNET HERTZ

Hertz: How do you see the term critical technical practice both developing and relating to your work? How has it been loved, abandoned, taken up or used in different ways?

Sengers: Critical technical practice is one of the key terms behind my work, a key inspiration for what I do. When Phil Agre's *Computation and Human Experience* came out – it was right before I finished my PhD and I already had been doing work in the same vein – it brought together a lot of the things that I'd been thinking about... and so that book's become really important for me. The key idea behind critical technical practice as far as I'm concerned is to tie the idea of technology building to the idea that one can be critical during the process of technology building. So often we think either you're building or making things, or you're just criticizing. So to me, the power of critical technical practice is to really articulate why thinking about things critically and culturally can make a difference within technical practice.

Over the course of the years I've been working with this term, one part has become clearer and clearer to me – and I don't know how much this is in the mind of everybody who does critical practice – critical technical practice is about rhetorical formations. It's about how technology is created as a way of thinking. Critical technical practice isn't about one individual person building something technically and then thinking critically about it – that's an important part, of course – but it's also about how ways of technology-building bring in particular

assumptions about the way that the world is... and to be able to question those assumptions in order to be able to open up new spaces for making and new spaces for thinking about technology and people. That may or may not be an important distinction with critical making.

Some of the kinds of references that you were talking about in regard to critical making seemed to be more about individuals getting a sense of personal enlightenment out of the making and I think that that's a part of critical technical practice, but it's also important to think about it in terms of larger cultural institutions and formations. The reason I think that that's really important is because in the end it's about a political agenda of saying technologists are building the world - not all of the world, but a large part of it - and it's important that there be a critical voice within that practice to make sure that engineers around the world are building things that we want to have as a society or that are making the world a better place and not just a more high tech place.

In terms of the development of the term, I'm not sure who uses the term critical technical practice. To me critical technical practice is a little bit of an insider term. There are people like me who write on *Computation and Human Experience* and then there's the rest of the world that doesn't really know what you're talking about. *[laughter]*

Right.

So it's hard for me to talk about the development of the term, because it's not clear to me how it's developed beyond a pretty small inner circle of

people who talk about it. And maybe you actually know that better than me. Because I think there's more people at Irvine talking about it then there are at Cornell.

I've seen it used by a number of artists or people who know Phil Agre, but I haven't seen it used very widely. A number of the terms, whether it's critical making, critical technical practice, critical design, those terms are terms that have a lot of of currency with a few people but I don't see them generally as wide terms. I see the idea of "maker" as being quite a bit of a wider term and that's part of another thing I'm interested in asking you: How do you see critical technical practice in relationship to a concept like maker or making? And I definitely think that O'Reilly and Make magazine has been pivotal behind promoting this type of term.

The answer to your question from my perspective is pretty complicated. In one sense, this idea of making and the idea of critical technical practice really go hand in hand, because one of the ideas behind critical technical practice is that your understanding of what you're doing is deeply tied in with the material practices of making these things, and this hands-on building is an important part of critical technical practice. So from that perspective I think they're quite aligned. Also, within the idea of being a maker or making is this idea of a built-in critique of consumer society as being part of what you're trying to do with making. So that again is potentially an alignment, although I don't know that Agre would say that that was one. For him, the critical process was more around critiquing the technology process from within, but not so much about bringing in particular kinds of political or cultural modes of critique that you wanted to bring to the technology; that's an area where critical design is quite different in its orientation. The critique of consumer society is a key element of what critical design is supposed to be.

To follow up on that: What does critical technical practice have that the maker movement doesn't have?

I think the key difference between the two is the focus on the maker movement on the amateur, and that has pluses and minuses. Critical technical practice is very much oriented towards critiquing and intervening in the major modes of professional technology production. So trying to get engineering as a profession, both as a kind of research area and an industrial area, to change its ways. And making is much more focused on the amateur and getting these tools into individuals' hands, and not focused on institutional interventions and engineering as a discipline.

What about the critical component of it... as opposed to just the amateur/DIY versus the expert component. In what ways is the maker movement, as it's popularly known, critical? I think you mentioned consumer culture, and I'd agree with that, but can you expand on this?

I have to say my understanding of critical technical practice is a lot deeper than my understanding of everything that's going on in the maker movement. I've watched it as an interested outside,r but there could be a lot things going on there that I don't know about. I think a lot of it, in terms of critique, is about raising more personal awareness that things could be different, that you can lead your life or structure your life in a different kind of way if you take making as central instead of consuming as central. And that's a dominant, critical path that's been taken in the maker movement.

I guess another way of putting it is, instead of saying expert versus amateur is consumer versus producer. Then critical technical practice is about trying to intervene at the production level, and making is about trying to turn consumers into producers. And those certainly aren't incompatible, but they're a little bit different in emphasis. From that point of view, one the things quite interesting about the maker movement is a conviction in the political importance of individuals' experiences with making technology. Some interest in individual experience is implicit in critical technical practice, autobiographical things that Phil would agree with, for instance, in talking about his own transformation in thinking about and experiencing technology. But the maker

movement's got a big jump on critical technical practice in terms of a wide reach, in being able to reach people in a kind of personal way that critical technical practice wasn't intended to do and probably wouldn't be able to do.

What do you make of Matt Ratto's term critical making? Do you see it as somewhere in between making and critical technical practice?

I think that's Matt's aim is for it to be drawing on ideas from those two realms. I've talked with Matt about this before, and I do think that in terms of the distinction in making between critical making and critical technical practice, that he's definitely making that distinction from trying to intervene in the profession of engineering, to trying to place these kinds of tools in everybody's hands. I think that's exactly the kind of interpolation that he's trying to make between those two terms. To bring in more of a critical agenda with critical technical practice, and tying that to this kind of maker –shifting consumers into producers – kind of way of thinking.

Yeah, when I've talked to him, I've seen him describe the term as almost aimed at the humanities. Aimed at getting the people in the humanities to think about technology – and sometimes that means electronics or media technologies – by scholars actually building things.

Yeah, I've definitely seen that.

That's an interesting angle and I've talked to him at some length about this: I don't see critical making as he uses the term as primarily getting engineers to be more critical.

No, no. I don't think that that's his agenda.

I see it more as getting critical people to think about technology and making.

Yeah.

Can you describe how the fieldwork you're currently doing fits in with either the concept of critical technical practice or

making or maybe critical making – or maybe it doesn't fit with that – and can you give an overview of what you're working on and how it relates to those concepts?

What I've been working on for the last couple of years is an ethnographic and historical field study in Change Islands, a small Newfoundland fishing village which up until fairly recently has lived a very traditional lifestyle. Since the 60's, they've undergone rapid technological transformation. So in the 60's, they had no running water, no electricity, no telephone, no TV, no roads, no transportation off the island in the winter. And now they've got broadband Internet and everything.

I've been talking a lot to the people there about the changes they're seen over the course of their lives with the introduction of these technologies. And as you might imagine, living on the coast of Newfoundland, well, they do a lot of making. There aren't a lot of consumer goods. Consumer goods aren't so easy to get hold of and you make do a lot and you make a lot of stuff yourself. Of course, that's changed over the course of technologization, now there's a lot of car transportation, it's much easier to go off the island to go to the Walmart two hours away and go shopping there. But, still, people there do a lot of stuff really hands on. And when I lived on that island, I ended up doing a lot of making-do and making things myself, just because it was easier. So as an experience for me, that was also a new experience to realize how much more intricately tied into the world of consumer goods I was than I thought.

A key aspect of the Change Islands community is that it is working-class, and that involves a different kind of perspective on making and on what we might call 'manual labor' than was typical in the urban, educated communities I had been used to living in before I came to the island. In terms of making and all the other questions that you were asking, I wonder about the class issues that are tied to the maker movement. I wonder whether making, and to what extent critical making, becomes a kind of elite activity that only a few people can do and whether, and to what

extent, it ties to the already widely existing making practices that exist among people who are blue collar. Are those people part of the maker movement? I don't know if they are or if they aren't.

I recently saw a study that was paid for by Intel and done by O'Reilly and Make magazine. They did a market research study of several hundred online respondents that had either subscribed to Make magazine or gone to Maker Faire. The median income was $106,000 per year, and 8 out 10 were male. I had sort of assumed that that would be the case but I hadn't seen any questionnaires or information about that... so I think that you are right in that it isn't a blue collar type of thing and it's not a rural thing.

I've briefly written about spending time growing up on a rural farm in Canada, and I don't think it has the exact dynamic as what you're dealing with in Newfoundland, but it's where it can be difficult to purchase things and stuff ends up just being made out of necessity. I've always felt in that way the maker movement as kind of like an elite, affluent leisure time kind of activity that is very different from what poor people do with technology or in developing nations...It's sort of completely removed from that and the politics of class and income.

I don't mean this so much as a downer on the maker movement, but I do think that there's an incredible opportunity there to think about what making actually means for many of people for whom making is just a part of everyday life. A researcher in my group, Maria Håkansson, has been working with Gilly Leshed on a study on farm families around Ithaca, and a lot of these issues have been coming up. The relation with technology and what they want technology to do is so different from the way that we imagine it when we're building technology for or with white-collar people who live in the city.

I think there's a huge opportunity to say: what are working-class people and rural people doing with

technology? They're definitely making. Are they doing critical making? To some degree I would argue that it is inherently critical in the sense that they develop a very different relationship to what technology should or could do. We should be thinking about how that should be valued within critical making or could be folded into critical making – because if there is an important political agenda built into the maker movement, then that agenda should be made available more widely than to the cultural elite. *[laughter]*

Yeah... I think you're correct.

There's also a little bit of hubris. We need to be careful not to seem like we're the first people who have invented the making of things.

Right, just because you have a laser cutter and a 3D printer and an Arduino doesn't mean that you are some new generation of homesteader that's doing everything from scratch. It's kind of naïve to think that you're doing that.

One of the major the themes I'm looking at in my study is what happens during modernization. What happens when you modernize, how do people change, how do people's experiences change? Tom Hughes says that one big shift that comes with modernization is that you become deeply embedded in large technological systems, so that your whole life exists in interaction with these large technical systems that partly determine what you do. One shift that you can definitely see very clearly on Change Islands is over time getting more and more into larger technological systems that help to determine what is possible.

A simple example is getting electricity on the island, which meant that people had to start paying regular bills. Which meant that people had to join the monetary economy, when before that they been in a barter economy. Which meant that people had to engage in other kinds of employment that generated wages. Which meant that it became harder to engage in a subsistence lifestyle. And so on. One way to think about making is that it would be nice if the maker movement was one way in which we could start

trying to escape some of that dominance of very large technical systems. And it's not clear to me how much high tech making actually allows for that anymore, because you're so dependent on all the pieces of code that everybody else made and what everybody else is doing. It's not clear to me whether it's entirely achievable to do that.

I think with people wanting to raise their own chickens, or cooking everything from scratch and raising your own food, that it's imaginable that you could achieve a declaration of independence from some of those technological systems, at least in some parts of your life. I'm not sure it's possible with that kind of Arduino set-up you were talking about. I think the problem's a lot more complicated.

Yeah, I think you're right. Have you read Matthew Crawford's Shop Class as Soulcraft?

No, I read a review of that, but I haven't actually read the book itself. I've been thinking about that while we've been talking about this.

It's published by Penguin and it's quite easy to read but it's quite insightful. I don't personally know him or anything, but he did a PhD in political philosophy and then moved out of academia and started repairing motorbikes. The book describes of the devaluation and badmouthing of blue collar labor in America, and blue collar versus white collar... and the skill and intelligence of hands-on building. It's really quite easy to read and it's quite nicely put: I'm sure you at least would at least find it interesting or useful.

Thanks... I appreciate it.

I'll ask you another question here in regards to Newfoundland. Something that I've been thinking of is this idea of the kludge, the physical hack where something is done maybe not in a stylish way but in quick and functional way, like using duct tape to put on your rear view mirror that fell off. In what way in these fishing

villages do you see that the work is kludged or put together in a hasty or unprofessional way that maybe there is not a lot of craftsmanship to it? What ways do you see it where people take a lot of pride in these handmade or hand built technologies?

I think you see a wide range *[laughter]*. You definitely see kludges... there's no doubt about it, but you also see a lot of incredibly skilled labor. Some of it just depends on the personality of the person who's doing it, but other things depend on what the situation is. If you're building an extension on your house, then that might be different from:"of jeez, the phone isn't working again, I'm just gonna drill another hole in the wall and make a new connection", or whatever. It's hard to make universal judgements.

I do think there is a difference though in the way that Newfoundlanders think about or at least traditionally think about material architecture compared to what we might consider normal or professional in urban settings. Traditional Newfoundland architecture is intentionally ephemeral, so houses are pulled apart and reassembled frequently. In traditional architecture, whole houses are moved frequently, and parts of houses are moved frequently. The architect Robert Mellin says in some ways that building a house in Newfoundland was like building a ship: it built on the same manual skills, and was intended as something that could move from place to place. The impermanence of physical structures is a little bit different from what we're used to and in the city. And it's intended like that. You expect that if you have some kind of structure that you're going to have to basically rebuild large parts of it every ten years, and continuously maintain it to make sure it doesn't biodegrade, essentially. A big advantage of that is that when things aren't actively used any more, they disappear. And that's just the way that things are done. So to us that might look like kludge, but it's actually a natural reaction to the way the climate works there and the ways in which the houses fit into the practices that people have who are living in them.
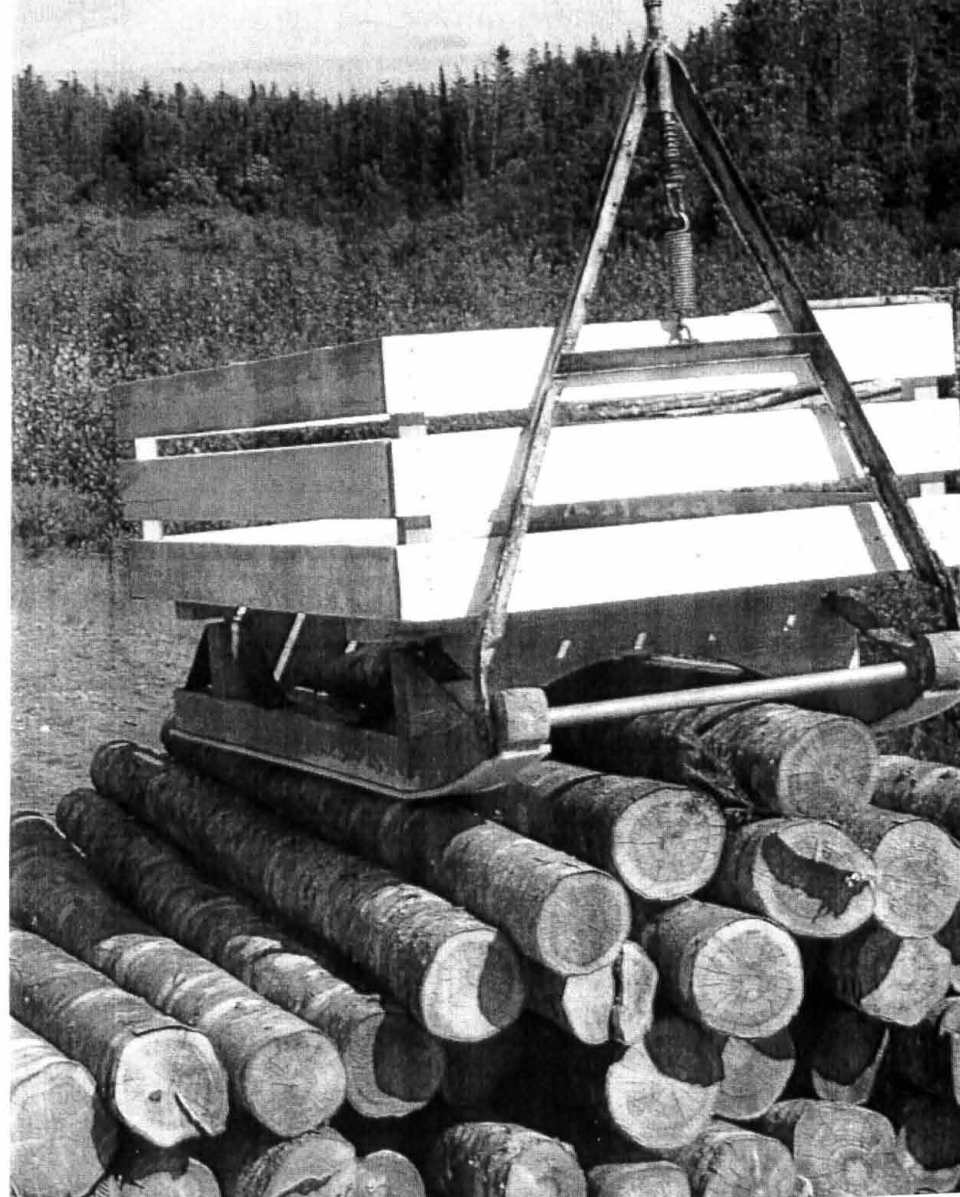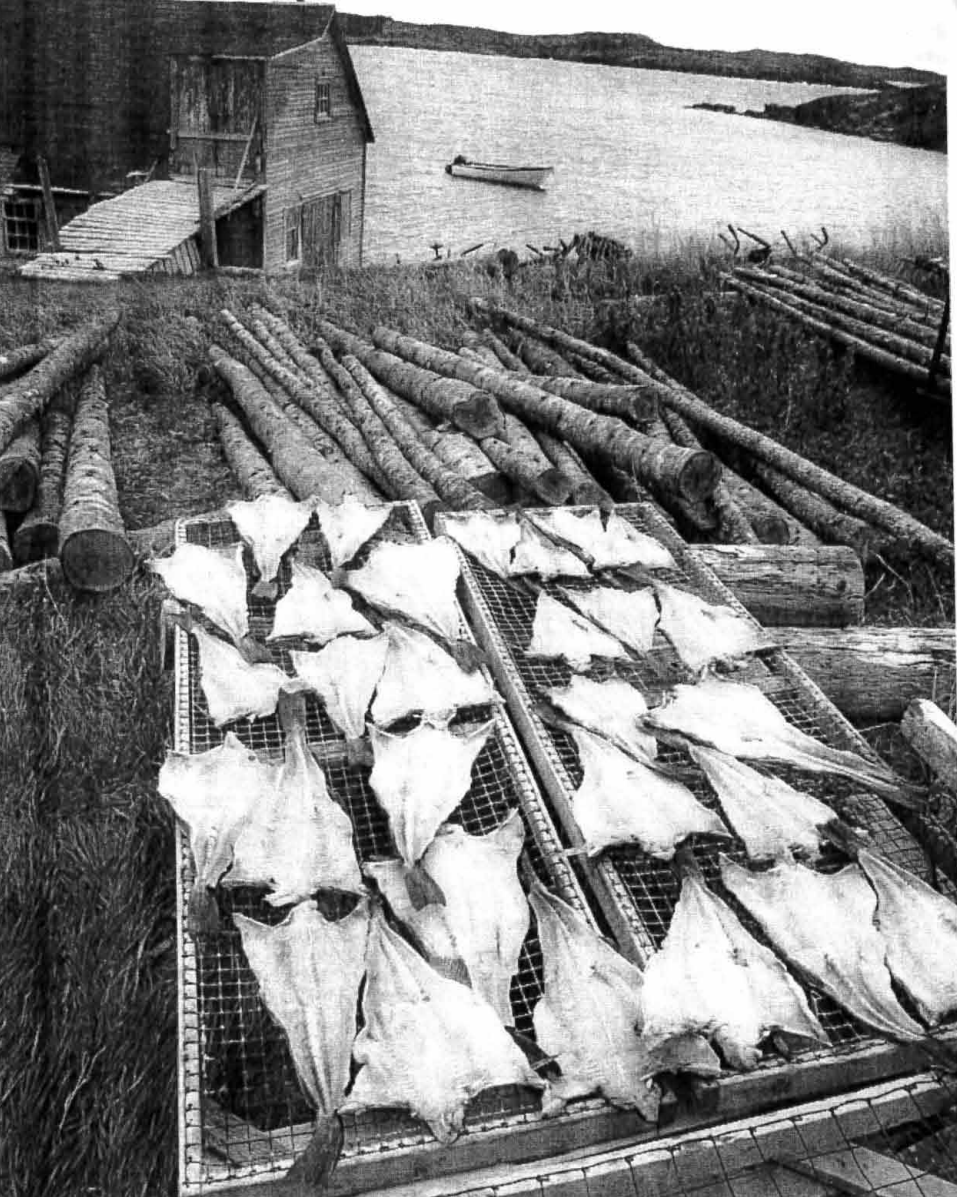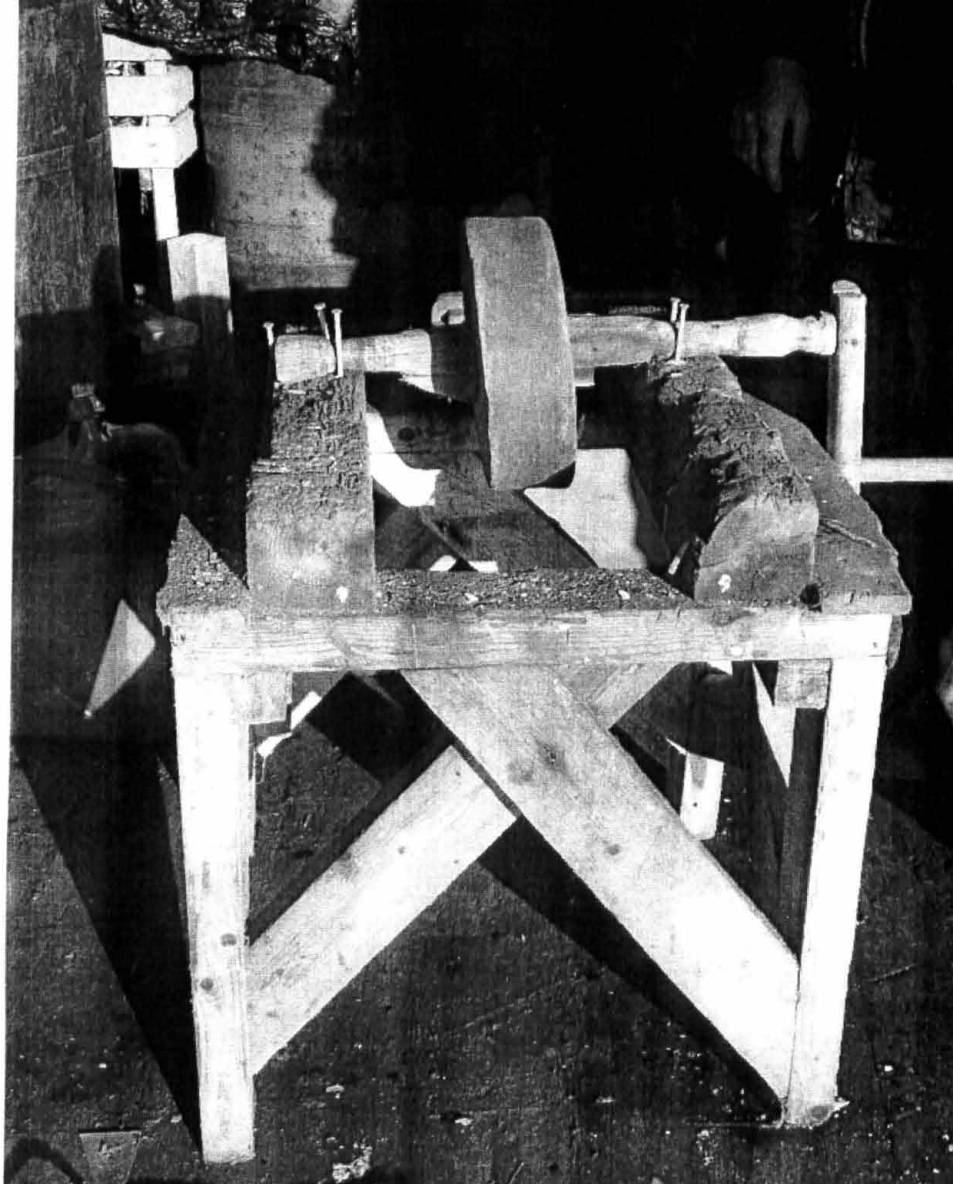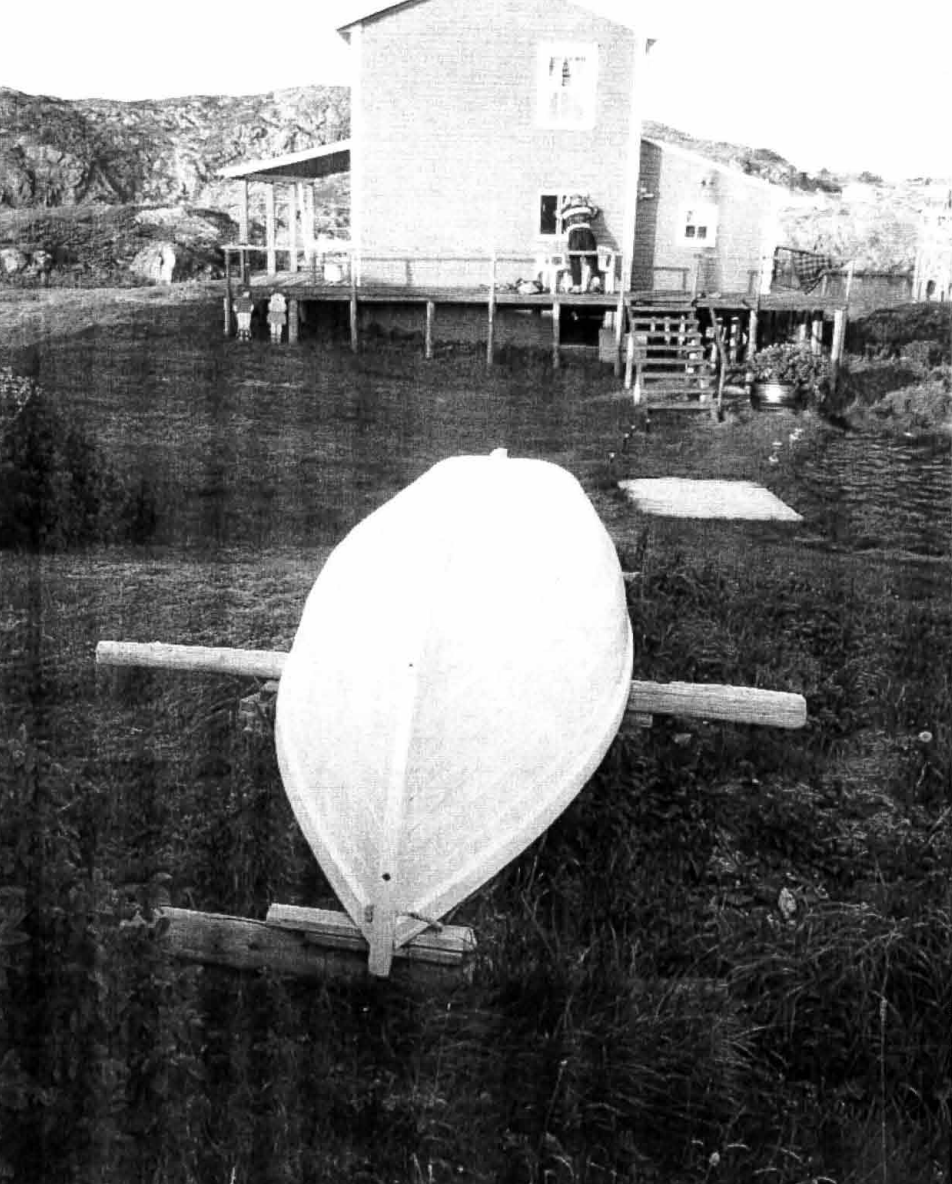
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Making
New York

McKenzie Wark

Took my kids to Maker Faire. It was basically in the parking lot of the Hall of Science, near where we live in Queens. We have a family membership so we got to skip the queue and go in through the member's line. "Big crowd," I said, to the ticket person. "Oh, this is nothing," she said. You should see us in Austin or California. I guess New York City is not really a maker kind of place, or if it is, it's making something else.

My eight year old loved the knitting machines. We soldered some circuits together, but he burned his finger. The best fun was a strange tricycle contraption you pedaled with your hands and steered with your butt. He loved that. My three-year-old daughter loved the giant recreation of the Mousetrap game and the Lego 'robots'. She has a thing about robots. I did not love that there was only one place selling coffee and the line was endless.

One of the good things about maker culture is that it puts traditionally male and female kinds of hobby stuff side by side. My son can try knitting; my daughter can play with Lego robots. There's a subtle reconfiguring of the geek-hobby continuum going on. That's the good news.

On the other hand, it's not really about making things. It's like a homey version of what Nicholas Bourriaud called postproduction art. The stuff has already been made, you put it together. Like Ikea furniture, but, you know, fun. It probably isn't fun working in the factories that makes the circuit boards or the Lego bricks or the knitting machines.

So there's a short-circuit. It's about a hobby culture and a teaching culture that nibbles around the edges of a world that is made elsewhere. It's supposedly good training for labor in the creative and tech industries. You play with the end products to figure out how to make better products.

I'm in favor of knowing how things are made. But maker culture seems mostly about basic concepts, in electronics, for example, or knitting patterns. It's not about actual processes. The handicraft part depends on an industrial part that remains unseen. It's a kind of fetishism.

It was fun though, at least for the kids. We 'made' a bunch of stuff, bought more stuff to make, and went home. Its hard to get into maker culture in New York City, however. We don't have dens or garages or spare rooms. Maker culture seems to assume a suburban everyday life, where there's space for some gratuitous making.

There is a maker culture in New York now, but its different. Ironically, it's not about mechanical or electronic things, so much as it is about food and leather goods and furniture. The name for it is Brooklyn.
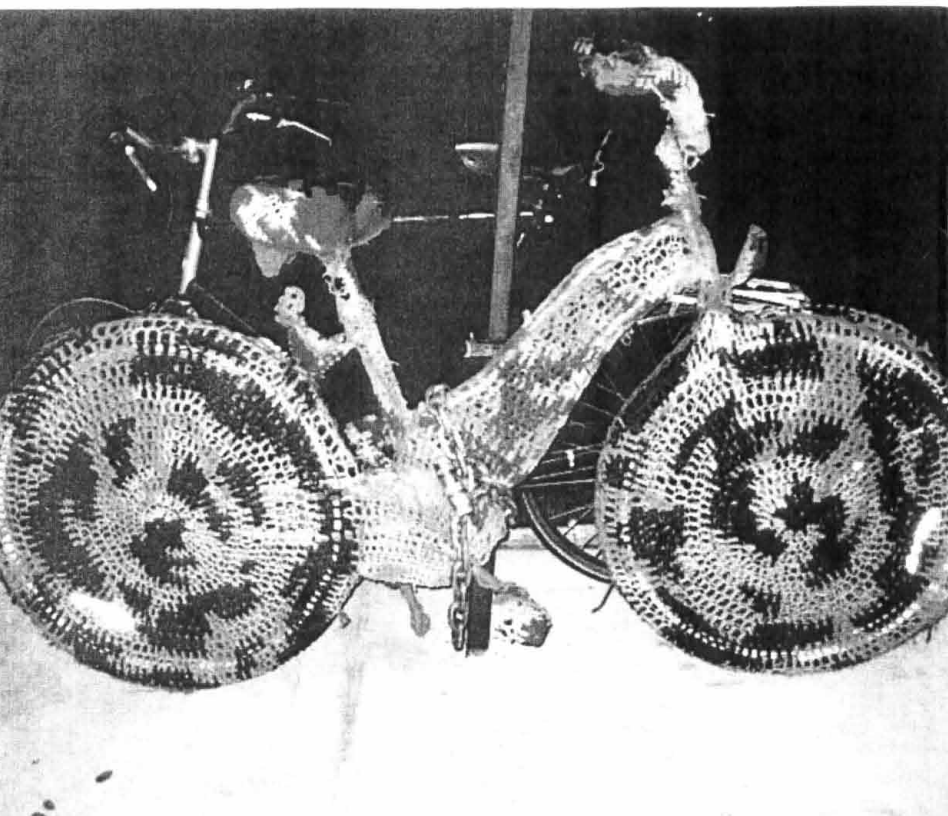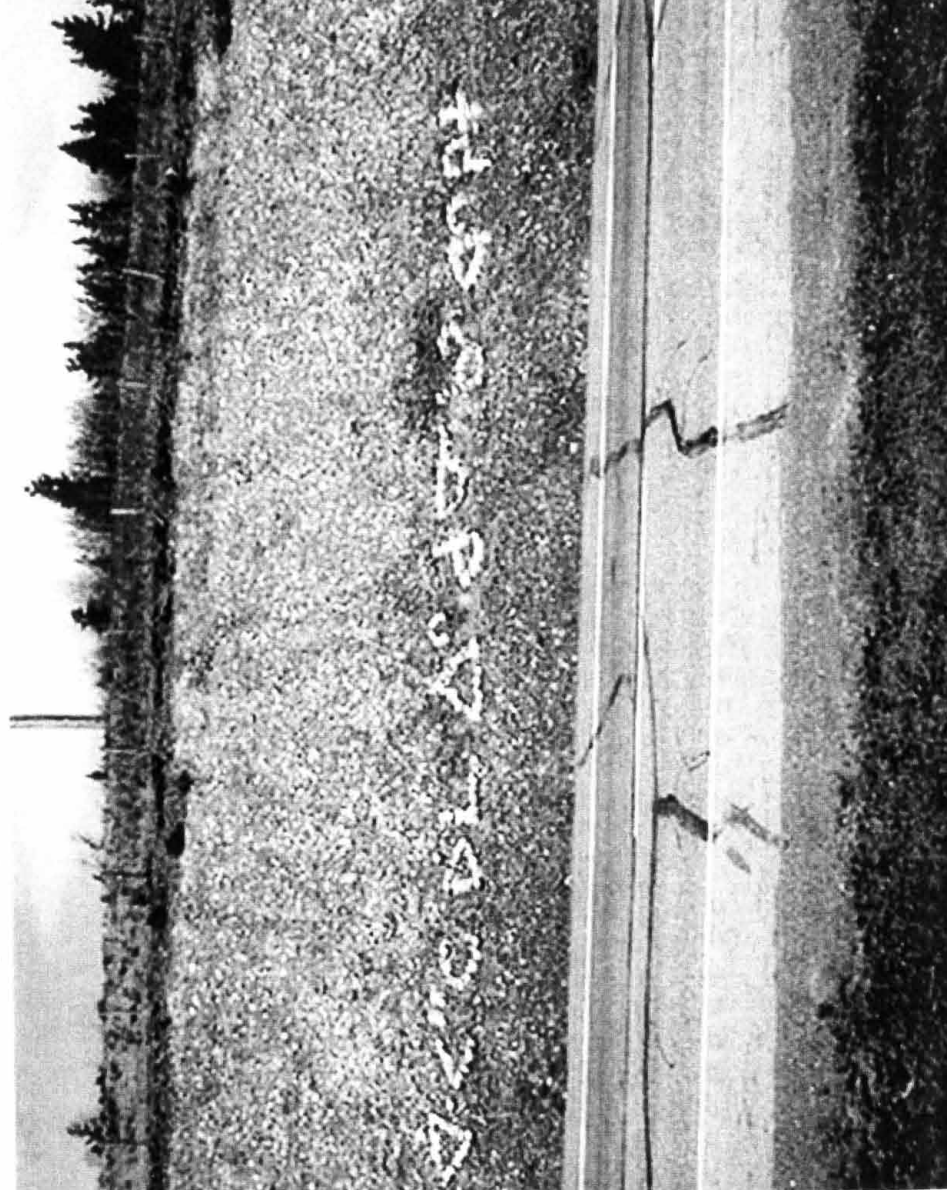
Brooklyn is now home to all sorts of 'artisanal' industries, making everything from bacon to organic beard oil. It relies in part on proximity to under utilized upstate farm land. There is also an urban farming movement, big enough to at least supply some quality restaurants.

In a city so dominated by finance capital and its attendant services, this is both strange and quite inevitable. Brooklyn style maker culture actually makes things, but its things only rich people can really afford. It relies on a steady supply of rich people, living one way or another off this being such a money town.

Both of these maker cultures have their limitations, then. The Make Magazine or Maker Faire version really seems blind to the actual manufacturing of things, but it does at least open the door to a genuine popular culture about the material world. The Brooklyn maker culture really wants to get its hands dirty making things rather than just playing with things already made. But it doesn't scale. It makes a fetish of the artisanal quality of the labor as another way of avoiding the question of labor. ▪

CREE**   Cheryl L'Hirondelle (ᒪᐦᑫᐧᐊᐧᓯᐤ ᐃᓇᕽᐧᐤ)

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ᐊᐸᕐᐩᐩᐊ·ᐤ (English) ᐃᐧᐪᐦᓂᐦᐸᐦᐅᐸ, ᐅᐪᓂ ᐧᐃ·ᐊᐪᕽᐦ ᐸᑕ ᓂᐦᐪᐦᐪ·
ᐷᐸ ᒪᕐᐪᑐᐧᐦᐦᐅᐪ ᐧᐃᐦᐧ ᐅᐸ ᐸᐩ ᒪᕐᐊᐧᐃᐧ ᐷᐧᐦ ᐃᐸ ᐃᐪᐦᐧᕐᐦᕽ, ᐧᐃᐪᐦ
ᐅᐧᐦ ᐃᐧᐧᐦᐦᐧᐦ ᐸᐩ ᐵᐪᐦᐸᐧᐤ. ᐄᐧᐁ ᐵᐦᐧᐤ ᐊᕐ ᐃᐧᐩᐦᐦᐪᐦᐤᐧ ᐵᐧᐤ ᐸᐩ ᐊᕐ
ᐊᐩᐦᐪᕽᐃᐧᐦᐪ ᐷᐧᐦ ᐃᐧᐧᐃᐧ·ᐦᐪ·.

ᐄᐦᑕ ᐃᐧᐵᐤ ᓂᐪ ᐊᐪᐦᐪᐤᐩ, ᐷᓂ ᐧᐷᐪᐦ· ᐃᐸ ᐃᐧ·ᐪᐩᐦᐪ ᐷᐤᐧᕽᐃᐧ·ᐦ
ᐷᕽᐦᐸᐃᐧ·ᐃᐪᐧᐃᐧ· ᐵᐧᐤ ᐸᐩ ᐊᕐ ᐃᐧᕐᐦᐵᕽ ᒪᒪᐧᐦᐃᐧ· ᐊᑕᕐᐦᐪᐪᐦᐃᐧᐦ ᐊᐦᐦ··ᐸᐧᐩᐦ,

(ᐊᐪᐩ ᐷᐦᐸᐦᐦ ᐧᐃᐪᐃᐧᐦ ᐃᐸ ᐃᐧᕐᐦᐪᐩᐦ) ᐧᐸ· ᐧᐃᐦᐦᐃᐧᐦᐦ ᐸᑕ ᐃᐧᕐᐦᐪᐩᐦ
ᐷᐧᐦ ᐃᐧᐃᐧᐪᐩᐦ ᐧᐸ· ᐸᑕ ᐵᐦᐵᐩᐦ ᐸᐸᐦᐃᐧᐤ ᐧᐊᐪ ᐸᐃᐧᐦᐸᐩᐪ ᐅᐪᐪ ᐊᐪᐩ
ᐊᓂᐪᐤ ᐃᐧᐃᐧᐦᐦᐦᐦᐃ. ᐧᐃᐪᐦ ᐅᐧᐦ ᓂᐄᐪᐪᐤᐤᐸᐤᐪ ᐷᐧᐦ ᐊ ᒪᕐᐊᒥᐊᐦᐪᐦ ᐸ

ᐸᐊᐄᐧᐦᐵᐸᐤᐪ ᐷᐧᐦ ᐃᐪᐩᐦᐦᐪ· ᐃᐸᐦᐧᐃᐧ·ᐃᐧ·ᐦ ᐧᐸ· ᐵᐦᐧᐤ ᐸᐤᐦᐦ ᐊᕐ
ᐊᐸᕐᐦᐪᐪᐦ ᓂᐪᐩᐳᐤᐩ ᐅᐧᐦ ᐸᐩ ᐊᕐ ᐪᐦᐪᐩᐪ·ᐤ ᐅᐧᐦ ᐸᐧᐪᐩᐩᐦᐸᐤ ᐷᐦᐧᐤᐸᐩ.

ᑐᐩᐤ ᓂᐊᐦᐪᐦᐪᐤ ᐧᐩᐩ ᐸᐦᐦᐩ ᐸ ᐃᐧ·ᐦᐵᐃᐧ·/ ᐊᐩᐪ ᐷᒪ ᒪᒪᐦᐵᐃᐧ·
ᐊᐪᐦᕐᐦᐪᐊ ᐸᐊᐩ ᐊᕐ ᐧᐃᐸᐦᐦᐦᐃᐧᐤᐩ ᐅᐦᐦ ᒪᐸᐤᐦ· ('0') ᐃᐦᐦ ᐧᐩᕽᐩ ('1').
ᐃᐩᐪᐪ ᐃᐩᐦᐤᐪᐤ ᐊᐸᐦᐦᐩᐧ ᐸᐃᐪᐦ.

Heath Bunting ᐅᐦᐸ ᐸᐦᐸᐦ··ᐊᐪᐧᐃᐧᐦ ᐷᐧᐦ PERL ᐵᐧᐪ ᐸᐦᐧᐦᐸᐦ
ᐊᕐ ᐊᐪᐦᐧᐪᐸᐧᐦ, ᐧᐸ· ᐸᐧᕐ ᐊᐪᐦᐪᐸᐵ ᐷᐧᐦ LINUX ᓂᐵᐤ ᓂᐪᐦᐩᐦᐤ ᐊᕐ
ᐃᐸᐃᐸᐩ ᐊᕐ ᐤᐦᐦᐸᐦᐵᐦᐦ. ᐸᐦᐦᐩ ᐷᐧᐦ ᐸᐸᐦᐳᐤ ᐃᐧᐪᐩᐦᐩᐦ ᐃᐧ·ᐩ
ᐃᐊᐃᐧ·ᐦᐪ, ᐄᐦᐸ ᐸᐵ ᐊ·ᐦᐪᐤᐃᐪᐦ ᐃᐧ·ᐩ ᐸᐵ ᐊᐦᐵᐃᐧ·ᐤᐤ, ᐄᐦᐸ ᒪᐸᐦ·· ᐊᕐ
ᐧᐩᕽ ᐸᐪ·ᐧᐦᐵᒪᐦᐦ ᐊᕐ ᐸᒪᐦᕐᐸᐩ ᐊᐸᐦᐧᐩᐦ. ᒪᐵ·ᐩᐦ ᐸᐸ ᐪᐩᐦᐧᕐᐸᐷᐤ ᐅᐦᐸ ᐅᐦᐦ
ᐸᐩ ᐊᕐ ᐤᐦᐦᐸᐪᐊᐦᐪᕽᐦ, ᐸᐵ ᐃᐃᐧᐃ·ᐦᐪᕽᐦ ᐊᐪᐪ, ᐃᐧᐦᐃᐧᐦ, ᐃᐧᐦᐩ ᐃᐧᐦᐩ ᐧᐤᐦᐩᐦᐤᐸ?
ᐧᐸ· ᐵᐧᐪ ᐸᐸ ᐊᕐ ᐃᐧᐩᐊᐸᐦᐩ, ᐵᐧᐪ ᐸᐸ ᐊᕐ ᐊᐪᐦᐪᐸᐵᐸ? ᒪᐵ·ᐩᐦ ᐸᐵ
ᐃᐵᐵᐩᐩᐧᐤ ᐧᐩᐵᐵ ᐊᐪᐦᐦ ᐄᐦᐵᐦᐃᐪ?

ᐃᐧᐦᐃᐧᐪᐩᐤ ᒪᐦᐊᐪᐪ ᐃᐸᐦᐦ· ᐃᐧᐦᐪ· ᐃᐸ ᐃᐧ·ᐵᐩᐦᐪᒪᐦᐩ ᐧᐩᐵᐵ ᐸ ᐊᐩᐵᐵᐦᐦ
ᐷᐧᐦ ᒪᒪᐧᐦᐵᐃᐧ· ᐊᑕᕐᐦᐪᐵᐦ ᐅᐦᐵ Banff 2002, ᐧᐩᐪᐦᐦᐦᐩ ᐸᐸ ᒪᕐ ᒪᕐᐦᐪᒪᐵᐦᐩᐦ
ᐷᐧᐦ ᐸ ᒪᕐᐊᒥᐊᐧᐤᐵᐪ. ᐪᐦᐩᐸᐪᐦ ᐅᐦᐸ ᐊᐪᐩᐦᐵᐵᐦᐦᐦ ᐷᐵᐵᐩ ᐊᐪᐩᐦᐪᐵᐪ·ᐩ 2003
IMAA ᒪᒪᐵᐧ· ᒪᒪᐃᐧ·ᐩᐪᐦᐵᐵ·ᐩ ᐅᐦᐵ ᐷᐦᐸᐵ ᐸ ᐊᐦᐦᐦᐵᐦᐸ (Regina) ᐸᐩ
ᐊᐩᐪᐦᐸᐤᐵ. ᐄᐦᐵᐵ· ᐵᐵᐦᐸᐦᐤᐩᐦ· ᐊᐩᐸ ᐃᐧᐦᐵᐪᐧᐩᐪ ᐊᐦᓂᐪᐤᐵᐵᐪᐵᐵᐪᐩᐦ/ ᐸᐩ ᐊᕐ
ᐸᐊᐃᐧ·ᐦᐵᐪᐩᐩ.

ᐸᐪᐦᐦᐩ 2003 ᐷᐧᐦ ᐸᐦᐪᐵᐸᐦᓂᐵᐵᐧ· ᓂᐪᐩᐵᐩ ᐊᐪᐦᕐᐦᐪᐸᐵ (Skinning
Our Tools) ᐸᐦᐵᐵᐧᐧ ᓂᐵᕐᐤᐪ ᐧᐸ· ᐧᐩᐵᐵ ᐊᐪᐩᐩᐸᐵᐵ·ᐩ ᐊᐊᐦᐦᐵᐵᐧᐦᐵᐪ, ᓂᒪᕐ
ᐊᐸᐦᐵᐵᐸᐦᐵ ᐸᐊᐪᐩᐦᐵᐵᐦᐩ ᐊᐦᐵᕐᐤᐪᐦᐵᐵᐦᒪᐵᐩᐩᐦᐦ, ᐧᐩᐵᐵ ᐅᐦᐵᕐ ᓂᐵᒪᕐ ᐄᕐᐤᐤᐸᐦᐵᐵᐤ ᐸ
ᐷᐵᐦᐵᐵᐩᐦᐦ ᐷᐧᐦ ᐊᐸᐦᐩᐵ·ᐵᐤ ᑕᐵᐵ··. Sara Diamond ᐸᐩ ᐊᐪᐦᐸᐪᐦ/ ᐸ ᐵᐦᐦᐵᐵ
ᐸᐩ ᐃᐃᐧ·ᐵ·ᐵᐩᐵ·ᐩ CREE** ᐧᐸ· ᐊᐵᐸᐵᐩ ᐵᐸᐦᐦᐪᐦ Celia Pearce, Stephen
Marsh ᐧᐸ· Simon Penny ᐸ ᐊ·ᐵᐦᐵᐵᐵᐧᐤᐦᐦᐩ.

ᒪᐦᐵᕐ ᐸᐵᐦᐦ·· ᐸᐸ ᐃᐧ·ᓂᐦᐵᐸᐊᐊ ᐷᐧᐦ ᐃᐸ ᐸᐸ ᐵᐧᐩᐦᐵᐵᐦᐦ, ᒪᐧᐸ ᐸᐦᐵᐵᐧᐧ
ᐊᐦᐵᐩᐩᐵᐵᓂ ᐧᐩᐵᐵ ᐸᐸ· ᓂᐵᐦᐪᐦᐵᐵᐧᐵ·ᐦᐵᐩᐵᐵ·ᐵ. ᓂᐵᐧᐵ·ᐦᐵᐵ ᐊᐪᐦᐵᐩᐦ ᐃᐧᐩᐪᐦᐵᐵᐪ
ᐊᐪᐦᐦ·, ᐧᐩᐪᐩ ᐸᐵᒪ, ᐧᐩᐪᐩ ᐧᐩᐃᐧ·ᐩᐪ.

                                    Joseph Naytowhow ᐤᐦᐃᐩᐪᐧᐊᐦᐤᐦᐩᐃᐧ·ᐤ (translation)

Aarhus 16/7-2012

Kære Hacker,

Du, der dykker ned i teknologier, skaber, forandrer og definerer.

Det har taget mig flere år at blive bevidst om den paralleldimension, der er din hverdag. Og nu, hvor det er lykkedes, har det blot gjort mig endnu mere forvirret – jeg står som et spørgsmålstegn midt i din bunke af komponenter, flassede ledninger og bablsatre.

Jeg kan bedre forstå skinnende ting. Rigtige produkter. Med logo, glanslak og progressive skiner. Kompivning der har kostet millioner, og som med sikker hånd forfører mig hver dag og leder mig ned ad en vej, hvor jeg får mindre og mindre kontrol over min computer og dens indhold.

Er det dit ansvar at uddanne mig? Det er dig, der sidder med kvalifikationerne og indsigten. Dig, der har overskuddet til at forholde dig til hvilke teknologier og services, der er gode, og hvilke, jeg bør holde mig fra. Og uden dig har ideerne svært ved at blive til andet end blot det – ideer på et stykke papir eller i en fil.

Er det mit ansvar at lære at mestre teknologien, inden den bliver for avanceret, og jeg må give op? At sætte mig så grundigt ind i tingene, at jeg

– selv kan tage beslutningerne, skrive mine egne programmer og realisere mine projekter.

Eller skal vi begge overveje, hvordan vi kan nærme os hinanden, så jeg kan blive dygtigere til at håndtere teknologien, og du kan få en ligesindet, der rent faktisk forstår, hvad det er, du laver, og hvorfor? Og hvis det er sådan, vi skal gøre, hvem tager så det første skridt?

Venlig hilsen

Borger

This bike was actually put together through some of the parts we had when LA Rick was riding with us... he got killed in a truck accident on the 5 freeway. It's what we call the LA Rick Ride. So this bike is more or less like, when we bring this bike out, we're bringing Rick out, to keep Rick's spirit alive, to keep his atmosphere alive. So this bike was more than just a lowrider bike, it's really a monument and a symbol of what Rick was when he was here.

– William James Hollaway
Real Rydaz Lowrider Bike Club

I came from Katrina. A friend of mine who's in the club asked me to come to a meeting, he thought I would enjoy that... I guess get my mind off of it. There were all these pretty bikes in the sun, glistening. The chrome was gleaming. A couple of weeks later, they had another meeting and I went to that meeting and then that's when he said he'd help me get a bike, you know, just to start me off. So that's where Fair Lady comes from. So once I did that, then you know, being with them, they embraced me, they made sure I had everything for the bike... and they embraced my children.

– Helen Myers
Real Rydaz Lowrider Bike Club
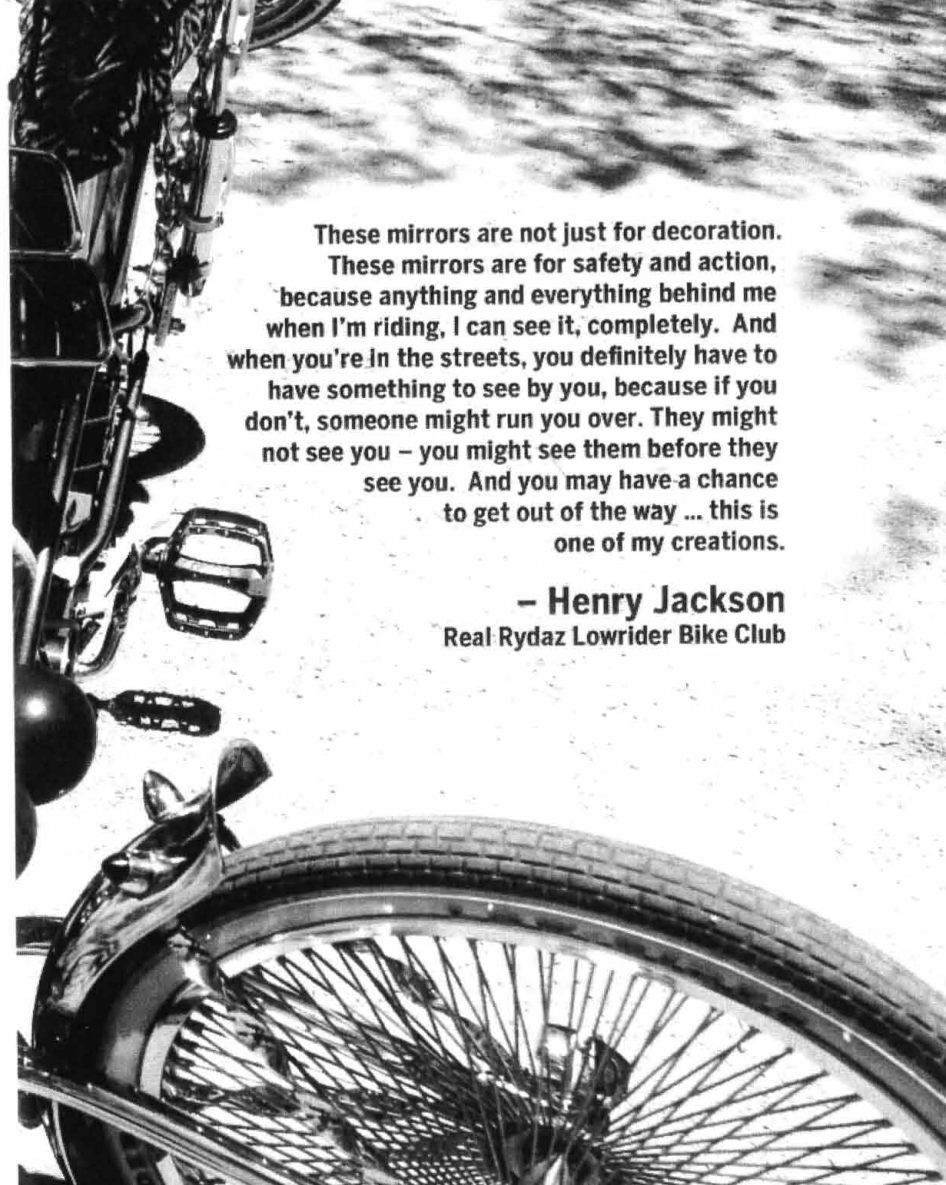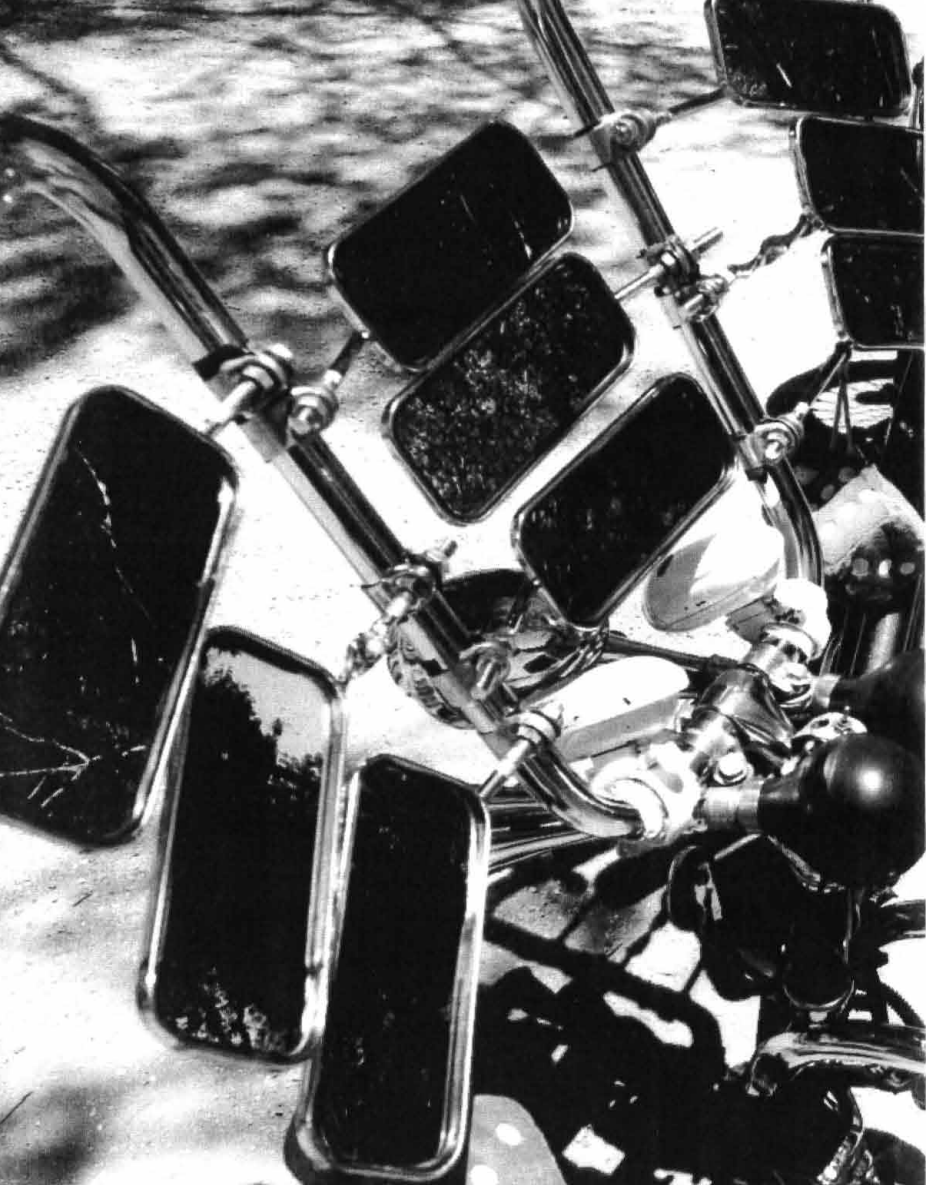
These mirrors are not just for decoration. These mirrors are for safety and action, because anything and everything behind me when I'm riding, I can see it, completely. And when you're in the streets, you definitely have to have something to see by you, because if you don't, someone might run you over. They might not see you – you might see them before they see you. And you may have a chance to get out of the way ... this is one of my creations.

– Henry Jackson
Real Rydaz Lowrider Bike Club

FOLD, RIDE, SHARE AND REBRAND

a low-tech crowdmap for social change and biking in South Los Angeles

by the RideSouthLA team (François Bar, Tafarai Bayne, Otto Khera, Benjamin Stokes, George Villanueva)

Why this map? More than way-finding for cyclists, this is a community strategy for rebranding neighborhoods and starting conversations about social change. With this map, we advocate for the future of the historically marginalized South Los Angeles. Yes it is possible to bring business and connect to grassroots for social change. Our route tells a story, linking businesses that fight for social change to public art and tips on taking action. Group rides spark conversations across the far-flung metropolis of L.A. -- one ride in June drew from 43 different ZIP codes to get 120 riders representing 12 bike clubs.

This is proudly a paper map. We use digital tools for routing and documentation, but insist on printing the map because paper is more practical for street use. Like phones, paper is a "mobile medium" but reaches across the digital divide and persists at local businesses and schools after the smartphones leave. For full effect, fold the map to create a pocket guide, transforming the flyer handout format that is so easily tossed away. Pocket guides are things you keep. We have distributed the map at community events like CicLAvia and TEDxUSC, during community rides in South LA, and left stacks of maps in local bike shops and restaurants.

BONUS FEATURE: Fold it twice lengthwise to create a strip showing turn-by-turn directions, which wraps around your wrist or handlebars. Invent your own map origami!

Photos taken by everyday riders!

Process: crowd-made and low-tech verified. This map was created and pedal-tested by more than 60 cyclists, featuring pictures they took with their own camera phones. We first scouted the route, looking for quiet streets, safe crossings, and experiences along the way. Then last January, CICLE (Cyclists Inciting Change through Live Exchange) and the East Side Riders Bike Club from Watts led more than 60 riders, both Watts residents and visitors, to create an "asset map." They documented the ride live, sending photos from their everyday phone as 'picture messages' via our ParTour system. During the ride, iPads mounted to some of the bicycles displayed the live map. Colleen Corcoran, a graphic designer, then turned the stream of pictures into a printable map. To stay authentic to its contributors, the map was tested in workshops with community organizers, researchers and neighborhood residents.

What's shown on the map? It's a round-trip route guiding your ride from the wetlands of Augustus Hawkins Natural Park to the iconic Watts Towers. On the way, you can grab a bolillo from Pancho's Bakery or enjoy soul food at the Watts Coffee House. Plan to stop by Roosevelt Park and catch the skateboarding action. There are locally-owned bike shops, should you need a repair, and Metro stations where you can hop on the train if you get tired. Make sure you visit the Watts Labor Community Action Center, serving the community since 1965. And of course, don't miss the Watts Towers! We highly recommend the close-up inside tour to see the detail of Simon Rodia's hand-made masterpiece, entirely covered with recycled ceramics, glass, and found objects.
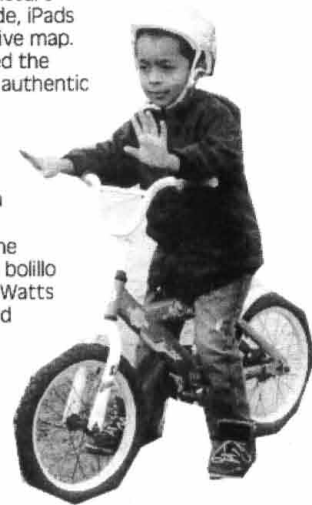
To find out more or to download the map, go to RideSouthLA.com

Tun Yuh Han Mek Fashion
Jamaican DIY and the Making of a New World

KAITON WILLIAMS

In my attempt to figure out Jamaican DIY and critical making, I conducted an informal survey of one, asking myself "what do Jamaicans make?"

"Food, music, and trouble," I thought. We're a nation of disruptors and I mean trouble in the most positive, life-affirming way. This year, Jamaica will celebrate 50 years of independence as a result of tireless troublemaking, and the entire country continues to reverberate with a DIY spirit. That spirit is embedded in the struggle against colonialism and for the freedom to make what we wanted of our nation and our selves.

Our history of trouble puts Jamaican DIY as a grand project of making new things from the old, of making grand ideas, of making a new path to an intersection with what you've long felt was your destiny. DIY as that ability to "tek yuh hand tun fashion"—to take what you have and make something new—may just be the defining characteristic and expression of Jamaican life.

I think of Jamaican DIY in shapes formed and bounded by that history reaching back to the island's discovery: our world continually being re-made as New. All those revolutions, rebellions and projects of independence continue to be as much about making our world as about remaking our relation to it. Our national motto, "Out of Many, One People" recognizes this jumbled past and our jutting and rumbling assemblage of artifacts, people, and memories.

When I think about Jamaican DIY, I also think about my father. This year he too marked a milestone and retired from 30 years as a life insurance agent. I'm still young and foolish, and that's longer than I can imagine doing any one thing. But my father never really did one thing—few Jamaicans do.

Multiplicity is our default mode of being; our definitions tied up with the multiple and evolving sources of income and pastimes from which we source our identity. More than a way to maintain economic viability, our multiplicity is central to our curious embrace of freedom: our expression of our soul and its determination.

My father started his career as a teacher of what was known then as the "Industrial Arts," a transcendent, yet somehow contradictory sounding 19th century term for what might otherwise seem prosaic: technical drawing and working with wood and metal. He's never retired from the Industrial Arts, and my family, under his watchful captaincy, was so DIY that it hurt…frequently.

At home, the projects my father led sprawled across a stunning variety of fields. We grew produce, raised chickens (and a pair of rabbits named Chuck Norris and Diana Ross), and kept bees for honey. Storerooms and closets were filled with tools and the remains of projects prototyped, postponed, and in progress. Together we repaired cars, poured concrete and laid tile, fashioned sophisticated scarecrows high in the tops of fruit trees, repaired appliances and fiddled with electricity. Friends avoided my house on Saturdays, lest they be dragged into some scheme or the other.

As a child I failed to appreciate being pressed into labour and a lesson but now, when I think about DIY, I know that we did these things because my father had no intention of letting ignorance lead to inability, or our material lacking to a metaphysical one. More than a response to material absence, our DIY cultures are also a response to a spiritual loss; a way to repair a break in the continuity of people and culture sustained in the creation of our New World.

So, when I think about critical making, I reflect on the circumstances that drove my father and countless other Jamaicans to become self-made men and makers. I travel back to our early founders and wonder what they must have thought. How did they conceive of and fashion a new nation? How do you go about the task of re-making a people? I think of the interwoven and fragmented histories that are a staple of Caribbean people. I think of peoples who were remade without much of a memory; people who had their languages, customs, and beliefs obscured, constrained, and disassembled. I think that for us to remember is to reassemble these fragments—to re-make. Those of us transplanted to the Caribbean were consumed in a New World and, from inside the beast, have produced an even newer one.

#OSJUBA
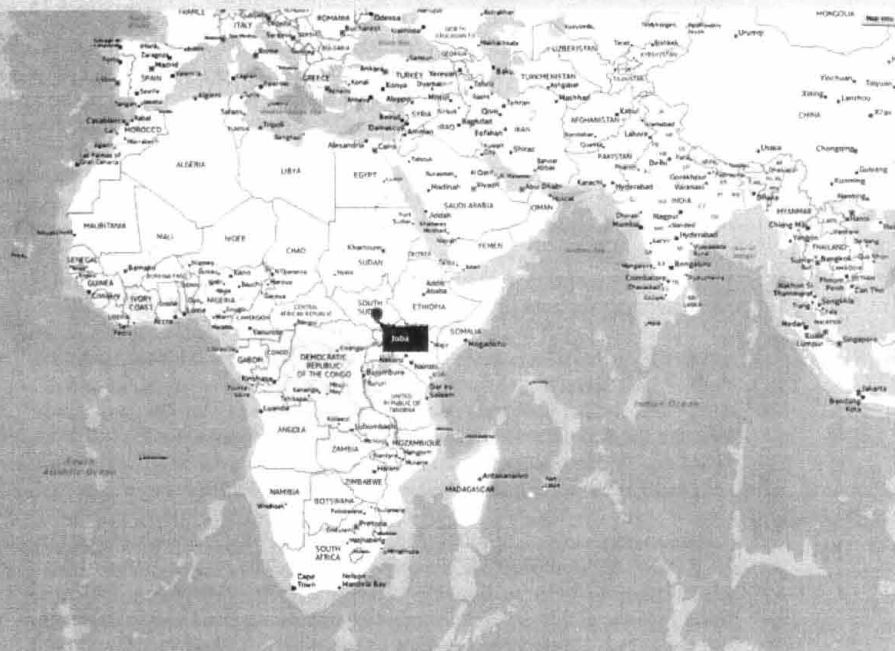
Juba. The world's first Open Source City?

Open Source and DIY Culture in Post-Conflict Development

S T E P H E N   K O V A T S

In many parts of the world, new governments and civic societies emerging from shattering conflict and revolution are facing the challenge to (re)construct nothing less than entirely new nations. Urgent calls to define political participation, state identity, economic development, self-determination and freedom to speak, learn, move and - very often- to reconcile among resolute opponents have transformed seemingly local conflicts into issues of global concern. Considering this scenario in the age of social networks, citizen media and globally generated, shared and accessible data #OSJUBA seeks to apply the means and tools of creative Open Source, DIY and collaborative methodologies to the future of development and capacity building, particularly in post-conflict society.

Where no uniform political entity or national infrastructure has existed in the past, what are the priorities in establishing a state? Who charts the paths and gives the people a voice in their collective destiny? How will a new, post-conflict identity, based on the hopes and aspirations of former lifelong combatants emerge? How will the new state's cultural contours form, and how will these be perceived by its neighbours and by the world at large?

July 9, 2011 - a nation is born.
One year later - do we have a capital yet?

After more than four decades of brutal conflict, South Sudan, the world's newest country gained independence. A complex multi-cultural and multi-ethnic mesh of peoples and competing interests, the new state seceded from Sudan after a referendum for independence supported by close to 99% of its population. Juba, nominally a capital since the 1972 Addis peace accords granted the South autonomy, this dusty regional administrative town now finds itself in the eye of a storm of competing interests, speculation and hectic unbridled development - a chaotic city juggling 'nation building' against the sheer basics of urban survival. With independence government calls have grown to build an entirely new capital city.

A capital city is however a unique place. Vested in symbolic attribution and a nation's aspirations it must act as both an efficient administrator as much as the showcase of the nation's identity. In the case of a new state still working to define its own cultural and societal contours, the capital city takes on an even greater symbolic - as well as pivotal function. In Juba, this is a free-for-all dominated by the interests of external powers jockeying for pole position in a potentially lucrative battle for natural resources. Having acted as guarantor for the fledgling state's viability to survive as an independent nation, South Sudan's oil reserves, fertile lands and Nile waters now become its accessible rewards. Who will gain the upper hand in their exploitation, and how will its

citizens experience not only the symbolic assets of freedom, but participate in its autonomy and self-determination?

The world's first Open Source City?

#OSJUBA proposes to apply the means and methodologies of the international Open Source / FLOSS, DIY, free culture, accessible technologies and hacktivist communities in creating a vision for the new capital of South Sudan. Building a model to be applied in the broader context of an emergent, transparent and participatory democracy Open Source and DIY methodologies also play a crucial role in fusing diverse cultural traditions into existing, established and highly engaged global communities. In the context of many developing and post-conflict societies such those that comprise the nascent South Sudanese state these are cultures where DIY in particular is not only alive and thriving, it forms a fundamental basis for the very survival and operation of everyday economic and cultural practice. It is THE essential market survival mechanism and knowledge generator creating complex and rhizomatic forms of experience, providing not only basic sustenance but highly sophisticated business models touching large and broadly networked communities. Open and free DIY methodologies also provide the necessary cultural vocabulary that can be applied as sustainable models linking traditional knowledge and contemporary Open Source practice - be they digital, manual or spoken.

The elements inherent to DIY and Open Source of cultural collaboration, grass-roots enterprise and economic innovation are driven by multidisciplinary ideals that have the ability to support and augment the most complex development issues and scenarios including:

- creating new economies and user-based technologies informed by local knowledge
- crowdsourcing and open access to data for better transparency in government and resource management
- increased digital mobility for networking information and communication fostering freer expression, civic interaction and cultural diversity
- new forms of citizen-based, community or device journalism, incl. SMS, radio, data streaming
- enabling open peer to peer education formats complementing traditional learning structures

The essential characteristic of such methodologies is one of sustainability. As economically and politically powerful tools, Open Source technologies, mobile platforms, DIY infrastructures and collaborative data sourcing methodologies now have the ability to be implemented as viable alternatives to tried and often failed attempts at nation building, urban and social development. Given the rise of user generated tools, content and technologies, the world's Open Source communities are in a unique position to strengthen the basic tenets of free and open expression, investing in the boundless potentials of media literacy, community development and individual enterprise.

Challenging and Identifying Open Source Approaches

In collaboration with its partners Media in Cooperation and Transition (MICT) and SUPERMARKT Berlin, r0g_agency for open culture and critical transformation hosted an introductory look on the 'eve' of South Sudan's first anniversary of independence at the challenges this new country faces, discussing leading developers, artists, activists and policy makers how the mechanisms of the global Open Source and free culture movements can be used as effective engines for new forms of global development practice. The event critically examined the robustness and feasibility of Open Source and its related DIY and collaborative methodologies squaring these off against the issues of operating sustainably and avoiding the issues of international development 'colonialism' in regions challenged by post-conflict reconstruction, lack of infrastructure, and poverty that bars access to the most basic of daily needs. With the aim of creating a vocabulary and tool kit of Open Source Culture for Development #OSJUBA hopes to encourage a new discourse for development and post-conflict resolution.

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July 9, 2012

E-Waste: Elephant in the Living Room

Richard Maxwell
& Toby Miller

In a 2005 Flow article, Christopher Anderson directed readers' attention to General Electric's cynical policy of "ecoimagination," a word invented as part of US$90 million in product development that included advertisements with trees growing from smokestacks and a computer-generated elephant dancing around a rain forest. The backdrop to this was that GE, which owns NBC-Universal, holds the record for polychlorinated biphenyls (PCBs) dumped into US waterways. This essay raises environmental questions that media studies needs to address in hopes of encouraging further research into the ecological context of media technologies and their environmental impact.

The greening of industrial strategy was not invented by GE's PR campaign. Ever since the 1970s, "clean" information-based technologies run by "knowledge workers" have been pegged as crisis-proof replacements of the "old" economy. Increasingly, the high-technology service and cultural industries of the "new" economy are constructed as a post-manufacturing utopia for workers, consumers, and residents, where the by-product is code, not smoke. Corporations have waged green campaigns ever since European regulators, international treaties, and mounting public opinion began to challenge US businesses to address global warming and other environmental ills.

Meanwhile, media companies managed to avoid becoming the target of environmentalists. That is, until the problem of electronic waste ("e-waste") began to tarnish their reputations. E-waste is shorthand for obsolete and discarded electronics (computers, cellphones, TVs, etc.). Concern with electronic waste and its disposal and/or recycling has grown since the 1980s thanks to activist groups like Greenpeace and the Basel Action Network (BAN). The transborder movement of hazardous waste was prohibited under Basel Convention of 1992, while e-waste became the specific subject of restrictions imposed by the 2002 EU Directive on "Waste Electrical and Electronic Equipment" ("WEEE"). In 2002, BAN published its report, *Exporting Harm*, on the global inequities of e-waste trade and recycling. Since then the term e-waste has stood for environmental hazards associated with the end-life of electronic media technologies (Smith et al.[1]; Grossman[2])

Pollution from today's electronic media includes such highly toxic contaminants as trichloroethylene, a probable carcinogen that can enter

groundwater, pass into soil, then return to waterways, and heavy-metal sources like lead, zinc, copper, cobalt, mercury and cadmium. About 70 percent of heavy metals in the world's landfills are e-waste. In 2004, the Political Economy Research Institute's report, Misfortune 100: Top Corporate Air Polluters in the United States, had media owners at numbers 1, 3, 16, 22, and 39.

Yet the propaganda of the media industries as post-smokestack, green industries that are less reprehensible than old-school manufacturing continues to color media studies. In fact, there is not a single substantial work within our field that responds to environmental concerns. While Hollywood celebrities added their 'carbon footprints' to the list of enviable personal traits—small was finally fabulous—and the Ecorazzi (paparazzi on the eco-celebrity beat) obliged with non-stop coverage, the industry as a whole met with no critical scrutiny—unless you include the friendly needling of trade and popular press reports (see also the Environmental Media Association). There is growing interest in e-waste, in particular the problem of discarded television sets and computers (Sterne3; Parks4; Ellis 2007: 217-19; Maxwell and Miller5; Miller6); but media, communication, and cultural studies have otherwise failed to document or even hint at the existence of an ecological dimension to media technologies themselves. Is this the elephant in media studies' living room?

Over 80 percent of electronic scrap is being exported to the poorest quarters of the world. A hundred thousand PCs entered the port of Lagos, Nigeria, each month in 2006 — 75,000 of them unusable other than as scrap. California alone shipped about 20 million pounds of e-waste last year to Malaysia, Brazil, South Korea, China, Mexico, Vietnam and India. Across the US, perhaps 60 million PCs and their detritus are seeping through our own landfills or being burned in incinerators, while the transition to exclusively digital broadcasting in 2009 will see an e-waste avalanche of 270 million outdated analogue TVs hitting landfills across the nation and the world. Tragically, the United States has failed to ratify the key international accord on this matter, the 1992 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, or its subsequent updates. The Basel agreements seek to prevent the export of e-waste.

While the issue of contemporary e-waste is of vital concern, the ecological context of electronic media technology originates in the earliest industrial

CRT monitors at a recycling facility in South Africa

applications of chemical and mechanical science. For example, the type and volume of chemical waste emitted today into the air and waterways by large-scale papermaking and film-stock production can be traced to the chemical process for cellulose extraction from wood pulp invented in the 1800s. By 2000, Eastman Kodak had become the primary source of dioxin—a carcinogen known as a persistent organic pollutant—released into New York State's environment, while the company's hometown of Rochester was number one in the US for overall releases of carcinogenic chemicals.

From an environmental perspective, the most significant point of convergence of telecommunication and microelectronic technologies is electricity. Just as the print and paper industries set a pattern of ecological relationships with waterway and steam power, 20th-century media technologies are wedded to electric power and its underlying physical property of electromagnetism. At the same time, chemical processing continues to function as the shared technical basis of electronic components, enabling the fusion of technologies while creating a common sinkhole in the earth's ecosystem for chemical elements and compounds.

The ecological context of electronic media technology includes environmental burdens of energy generation and consumption throughout a medium's life cycle, from production to consumption and disposal, its chemical basis, the inputs from the Earth (via mining, drilling, logging, etc.), and outputs into air, land, and water. Input effects involve the earth's ability to provide resources whose quantities are either renewable or not (soils, forests, water, minerals, and so on). Output effects involve the ability of the earth's ecosystem to absorb wastes from media technology's electrical and chemical products and processes. The effects of these inputs and outputs outlive the medium's existence through deforestation, CO_2 emissions, irreparable harm to habitats, land and water poisoned by PCBs, dioxin, and heavy metals and toxic chemicals, etc.

In May 2007, another example of corporate "greenwashing" took place when Rupert Murdoch convened, for the first time, a global meeting of all NewsCorp's employees (televised from a stage in New York City). The single agenda item was the announcement of the company's "energy initiative", which aims to make NewsCorp "carbon neutral" by 2010. The proposal is substantive, and surreal to an extent that even GE's ecoimagination campaign could not achieve (as you listen to Mr. Murdoch

tell his employees: "If we are to connect with our audiences on this issue, we must first get our own house in order," remember that Fox News pundits routinely refer to global warming as "junk science"). It's worth reading the report issued by the company: it may help pave the way for media studies to become green itself.

See the video at http://www.newscorp.com/energy/energywebcast.asp. We urge media scholars to take up the challenge of media technology's impact on the environment: recycle and rethink the life cycle of media technology within its ecological context, from design to disposal.

Image Credits:

1. A boy hauls e-waste in Lagos, Nigeria:
http://www.ban.org/BANreports/10-24-05/images/Large/IMG_4943.jpg
2. CRT monitors at a recycling facility in South Africa:
http://www.kfpe.ch/projects/echangesuniv/pics/zumbuehl_URC_electronic_scrap_stockpile.jpg

NOTES

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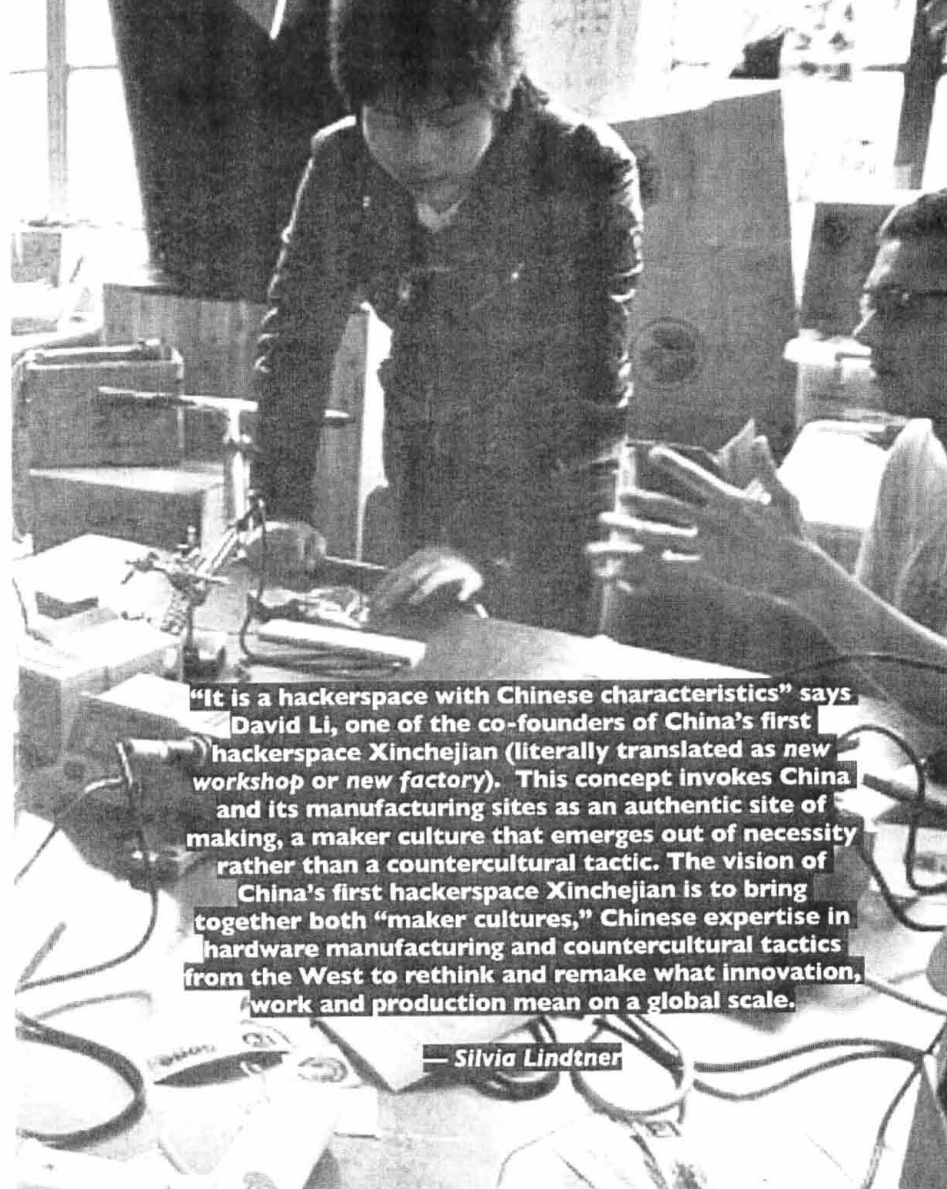
"It is a hackerspace with Chinese characteristics" says David Li, one of the co-founders of China's first hackerspace Xinchejian (literally translated as *new workshop* or *new factory*). This concept invokes China and its manufacturing sites as an authentic site of making, a maker culture that emerges out of necessity rather than a countercultural tactic. The vision of China's first hackerspace Xinchejian is to bring together both "maker cultures," Chinese expertise in hardware manufacturing and countercultural tactics from the West to rethink and remake what innovation, work and production mean on a global scale.

— *Silvia Lindtner*

HAXLR8R IS A 111 DAYS HARDWARE STARTUP PROGRAM BASED IN SHENZHEN AND THE BAY AREA. APPLY NOW
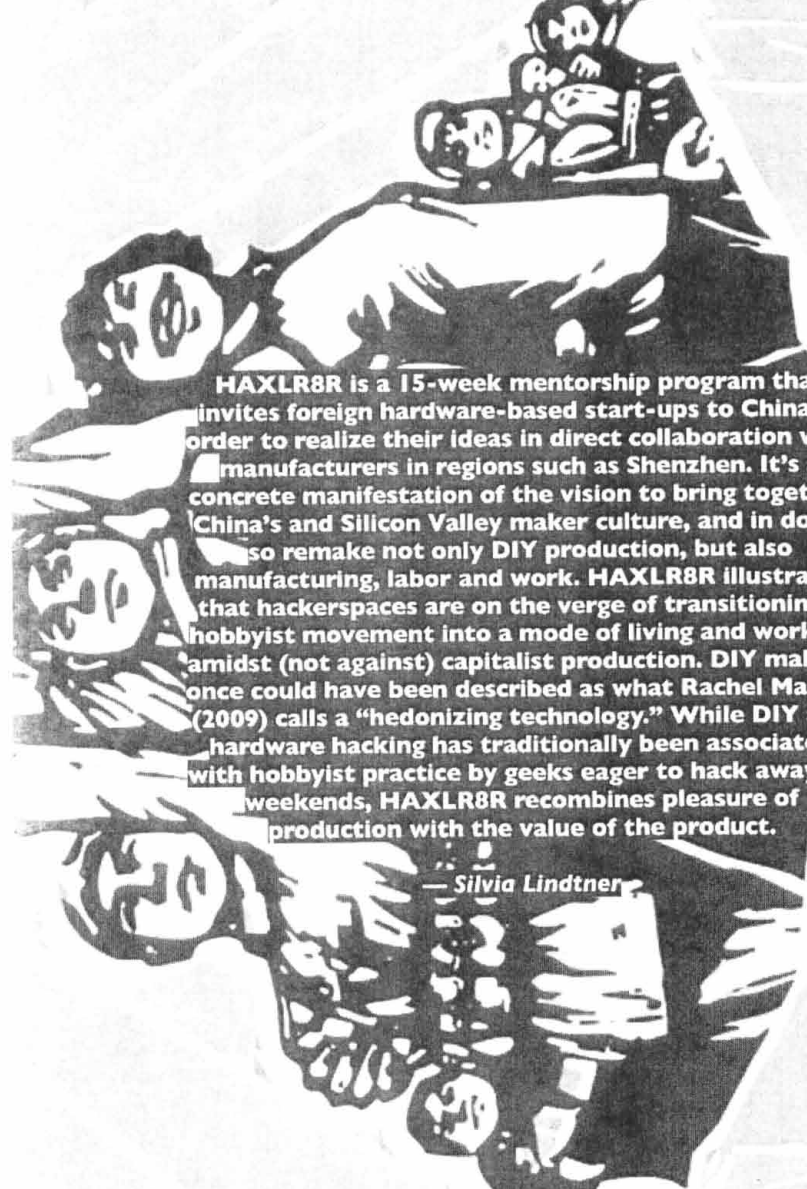
HAXLR8R is a 15-week mentorship program that invites foreign hardware-based start-ups to China in order to realize their ideas in direct collaboration with manufacturers in regions such as Shenzhen. It's a concrete manifestation of the vision to bring together China's and Silicon Valley maker culture, and in doing so remake not only DIY production, but also manufacturing, labor and work. HAXLR8R illustrates that hackerspaces are on the verge of transitioning a hobbyist movement into a mode of living and working amidst (not against) capitalist production. DIY making once could have been described as what Rachel Maines (2009) calls a "hedonizing technology." While DIY and hardware hacking has traditionally been associated with hobbyist practice by geeks eager to hack away on weekends, HAXLR8R recombines pleasure of production with the value of the product.

— Silvia Lindtner

Ontological Disobedience in the Age of Tinkering: Crowdsourcing Data or Hacking Hardware?

POSITION STATEMENT   Denisa Kera
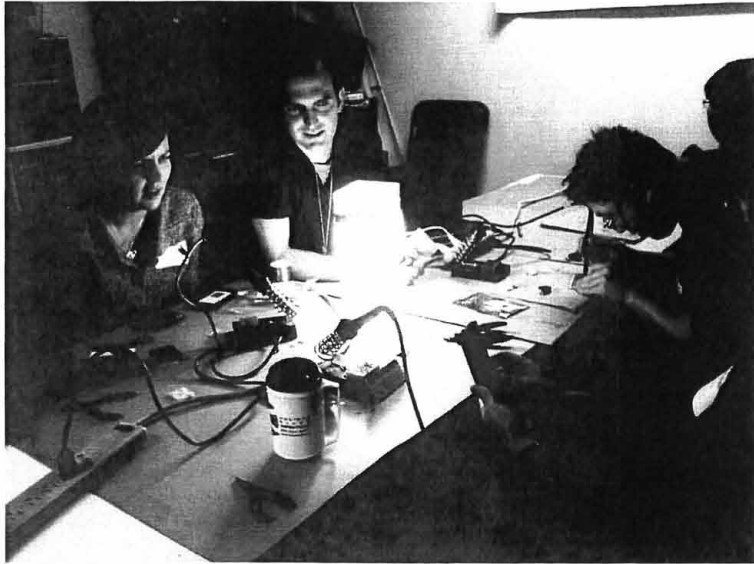
Tinkering with hardware and data in recent years is supported by developments in distributed and social computing, design trends in social networking and gamification, social movements, such as "quantified self" an DIY and maker communities, but also aesthetic and cultural trends, such as the interest in visualizations, crowdsourcing, crowdfunding and open source initiatives. While the data oriented projects tend to embrace some notion of collective intelligence and crowdsourcing, the hardware oriented projects demand more in terms of the individual efforts of the citizens. They target niche communities formed around building and hacking tools in a DIY and open source manner.

On one side we have projects involving screensavers for crunching data and sharing computer power, such as SETI@home and Folding@home, or some basic cognitive operations in the form of so called Human Intelligence Tasks and Amazon Turk type of applications (GridRepublic), which reduce complex tasks into simple operations of sorting, tagging, observing etc. This type of "digital" Fordism and its data "assembly line" reduces citizens to very passive and automatic, semi-intelligent machines, which offer their computers and brains for a type of community service in science. It differs from more demanding initiatives around data, such as collective visualization and sharing of datasets over Many Eyes IBM or Kaggle, in which citizens are challenged to collect, interpret and discuss data or even compete against experts in some research.

On the other side we are starting to witness projects involving citizens in maker and DIY activities related to hardware, such as building laboratory gadgets and tools in the Hackteria projects (DIY Microscopy, DIY Micro Dispensing and Bio Printing), Maker magazine and Maker Fair communities, and many workshops in various Hackerspaces for soldering (Noisebridge). The tension between these two opposite sides of data and hardware hacking activities is often bridged in the case of participatory environmental monitoring and distributed environmental sensing projects, such as Common Sense Project, BioWeatherMap , SciStarter, Kanarci etc. and recent post-Fukushima Geiger counters hacking efforts in Japan (Safecast). These projects involve not only gathering of data but also knowledge how to operate and hack various sensors.

Citizen science projects working with data (very often from astronomy, ecology, and health) gained a lot of attention and recognition in recent years for its supposed democratization of science and involvement of citizens in the research process as a form of public participation and popularization. However, it also created a certain illusion that collective intelligence will solve all world problems and that it is enough to just gather and crunch large amounts of data to become a good citizen. In this respect, the more demanding hardware hacking initiatives offer a more radical and critical approach. The niche communities formed around 3D printers, low tech lab gadgets and around building low tech tools for environmental monitoring and sensing, various DIYbio hacking activities etc. involve citizens in more complex cognitive operations demanding certain skills but also humility. The global Hackerspace movement or similar communities, such as Hackteria and HONF, and even new university driven projects involving communities interested in building low tech lab equipment for developing countries (CellScope, Tekla Labs, Seeding Labs) present a new trend in hardware and maker oriented citizen science projects. They allow us to witness the weaknesses and imperfections of various scientific tools and methods rather than take part in the

mysterious collective intelligence, which is able to embrace information emerging from the chaos of data. This individual, messy involvement with materiality and with various limits of technology and scientific knowledge by hacking tools and experiencing various problems with even simple science protocols give a more realistic experience of science. Citizen science projects related to low tech, open source hardware hacking (projects such as InMojo or Safecast) and DIYbio protocols create a more critical understanding of how science works in practice and how data relate to tools and measurements. The messiness and materiality behind data, issues with calibration, precision, complex conditions surrounding every experiment are better lessons for amateurs and enthusiasts to master before they can understand, participate and asses science.

The hidden tension between data and hardware driven citizen science projects touches upon important issue of how awareness and knowledge relate to embodiment and practice and how collective intelligence relates to various social, economic and other conditions, which often decide on the research and even its results. True democratization and participation in science and technology need to involve this more critical experience and assessment of the practices of science rather than dwell on metaphysical notions of emergent patterns and intelligence behind data liberated from human agency. Another problem with data driven projects is the impression they make that they are targeting new discoveries, while hardware and DIYbio hacking seem only to reproduce banal protocols by cheaper means and to re-create already existing tools from the market. The low tech focus helps us understand the processes of these discoveries back to its basic tools and conditions, in which they appear. It also opens the research process to people in the developing countries, which are not commonly involved in the data driven projects. Furthermore, they not only popularize and make science cool, but help everyone to understand the limits and problems of various experiments, technologies and protocols, and to appreciate them even when they do not yield immediate and crowdsourced results.

Hardware driven projects as well as data crowdsourcing are means of what Steven Woolgar, an important philosopher and sociologist of science and technology, calls "ontological disobedience". Ontological disobedience is synonyms with individual freedom and social innovation in an age when we need to take into account the technological conditions of every process, action, and event. It is a form of perpetual rebellion against social and other conventions in the name of probing their conditions, limits and possibilities, which are often technical and economic. Woolgar's ontological disobedience is a rather reflective activity and attitude, and what we are starting to witness with these hardware hacking is that it can also involve creating, making,

breaking and being involved with various ontologies and things outside of our human agency and will. Not only individual reflection, but also open and collective design and prototyping can become means of ontological disobedience, where the scientific, technical, biological and social are being "disobedient" at the same time. Ontological disobedience simply means that we test different configurations and relations between people, molecules, traditions, tools and norms, and we reach consensus by experimenting with people, data and hardware at the same time.

Links

Amazon Turk https://www.mturk.com
BioWeatherMap http://bioweathermap.org/
Common Sense Project http://www.urban-atmospheres.net/CitizenScience
DIYbio http://diybio.org/
Fablabs http://fab.cba.mit.edu
Folding@home http://folding.stanford.edu/
GridRepublic http://www.gridrepublic.org/
Hackerspaces http://hackerspaces.org
InMojo http://www.inmojo.com/
Kaggle http://www.kaggle.com/
Kanarci http://kanarci.cz/
Make http://makezine.com
Many Eyes IBM http://www-958.ibm.com/software/data/cognos/manyeyes
Safecast http://blog.safecast.org/
SciStarter http://www.scistarter.com/
SeedingLabs http://seedinglabs.org/
SETI@home http://setiathome.berkeley.edu
Safecast http://blog.safecast.org/
TeklaLabs http://www.teklalabs.org

Denisa Kera

Short bio: Food "hacker" with interest in networking over body data (SNPs, fMRI) and kitchen open source hardware. Works at the National University of Singapore, member of the global biohacker organization, Hackteria.org, and Prague based Hackerspace, Brmlab.cz. Follows and supports Singapore Hackerspace and Indonesian citizen science and art initiatives, LifePatch and HONF. In the present, she works on a book about design and policy in relation to the Hackerpsace movement.

The Politics of Information and Participation: Digital Citizenship and Public Science ▪ Paul Dourish

The fundamental question that motivates me in the field of DIY citizenship the question of what kind of model of citizenship is embedded within the rhetoric of DIY production and technoscientific production. One of the consequences that comes out of this is thinking about what barriers to participation are erected, potentially, by that rhetoric. And turning it around some, what are the opportunities for realigning some technoscientific power structures through practices of DIY production?

The particular thing that I'm going to use to focus this on, because it's been one that has arisen a great deal in my research area over the last couple of years, is the topic of "citizen science": for instance, where DIY technologies get deployed in support of large-scale environmental pollution monitoring and are harnessed to big science projects.

I'm taking DIY citizenship here broadly to identify a site and form of informal technology production which provides a site for different kinds of elements of citizenship practice: a site of engagement, potentially, with the state and with regulatory authorities; a site of reflection upon those forms of regulation and the kinds of representations of us and our practices, of people and their lives, that are embedded in a variety of both state and commercial

processes. And as a means and mechanism of civic participation: as a place for people to get involved.

The particular focus I want to take is on citizen science projects: large-scale scientific efforts where people are interested in crowdsourcing science, if you will. On capitalizing on the large cognitive surplus that Yochai Benkler talks about and that Trebor Scholz has pointed to, a technological surplus, what we might call a geographical surplus. The fact is that we are all over in places scientists can't necessarily be, and we may be able to take advantage of this to engage in projects of variously labeled public science, participatory science, citizen science, or participatory sensing.

This is the site where I want to try to think about DIY citizenship, because these projects are frequently invested in rhetoric of participation that is very similar to what we're talking about.

There are two lenses I want to try to adopt when I'm talking about DIY citizenship and citizen science projects. One is a relationship between science and citizenship: the extent to which one's position on science and one's position on different kinds of scientific work is embedded within what it means to be a citizen, and what it means to be a participant in state processes.

Conversely, I also want to focus a little bit on the questions of scientific governance. That is, on what Tim Mitchell has called the "rule of experts," the ways in which certain kinds of technoscientific processes embed themselves within the tools of statehood and the tools of everyday regulation.

I want to do this by exploring three main themes. I think it's three; it might be four. I'm still slightly uncertain as to how to count them, but for the moment I'm going to pretend there are three. We'll collectively decide afterwards—as public science—how many of them I've done.

One is thinking about the practice of citizenship in and through different forms of scientific engagement. Another is the issue of contests of expertise that arise in the relationship between people and the scientific state. And then the last one is the embedding of particular kinds of DIY within capitalist production and consumption.

Thinking about citizenship sent me off looking at some of the literature on citizenship, in which I am absolutely not an expert. But certainly from some of the stuff that I was looking at, and that has been influential in work on public understanding of science and the state, scholars of citizenship have identified a series of criteria that are at work in the notion of citizenship.

So, the first one here is a categorical criterion, identifying citizens as members of a polity who are subject to law, subject to its particular regime of control. At the same time, a contingent criterion, which is really a formulation of citizenship as something available to those persons who are competent to govern. So, in a democratic state there's a notion that a competence to govern is one of the conditions upon citizenship.

I find these interesting and resonant when we think about forms of scientific citizenship or technoscientific citizenship: when we think about the kinds of pictures of citizenship that get embedded within a lot of DIY technoscientific production. First, it raises the question, particularly with respect to the categorical criterion, about what kinds of laws you want to be subject to, and what kinds of laws and systems of regulation are being attested to by a model of citizenship that's grounded in technoscientific performance and technoscientific inclusion.

Second, if the contingent criterion from the citizenship studies focuses upon those people who are competent to govern, then there's clearly also a competence question that underlies a notion of DIY citizenship. If your citizenship depends upon your competence to govern, then your "DIY citizenship" depends in some ways on your technological competence, which may be distributed differently than the competence to govern, but is certainly not necessarily evenly distributed in society.

I think it's important to try to focus, when we link DIY to citizenship, on the ways in which things might come across from the notion of citizenship, and be reshaped by a commitment to technoscientific production.

If we do so, then, we encounter a series of questions about who and how technologies include, and who and how technologies exclude. There's a sense in which one of the particularly vibrant notions bound up in the concept of DIY citizenship is the opportunity for a form of participation that might not be available to people otherwise. And yet that participation is itself subject to a certain kind of familiarity with, and indeed a commitment towards, a notion of technoscience. So, it's not just about what you can build, but it's also about what kind

of models of experimentation, of empiricism, of representation and modeling you buy in to.

There's certainly a notion, then, of participation and inclusion, but at the same time there is one of exclusion. We always have to be conscious of that. We're shifting balances, but we're shifting them and we need to recognize things about where we've shifted them from, where we've shifted them to, what kinds of conditions, shape and participation in these kinds of worlds, whether that's technological competence, technological access, or scientific literacy.

I'm primarily concerned about the commitment to particularly scientific forms of understanding, and particularly technological models of intervention and progress—a form of technofetishism, if you like.

It's clear that we live in a world of technoscientific governance, and part of the emergence of this right-wing contemporary neoliberal state, is one that depends upon a vast infrastructure of science. A vast infrastructure of scientific monitoring, management, regulation, prediction, and that any kind of notion of what it means to participate involves to a certain extent, if not a complicity with that, then certainly an acknowledgement and engagement with that. With the systems of expertise that are invoked by the state, with the systems of evidence and evidentiary reasoning that attend to it as well—this is also beginning to speak perhaps to the issue of contest of representation and expertise. And these things, of course, occur not solely at a national level but supranationally as well. The emergence of large-scale organizations – whether it's the International Monetary Fund or WIPO or whoever – are also driven by the same kinds of commitments.

And so, my point here, of course, is that at the same time as thinking about the opportunities for a form of DIY citizenship to destabilize and to extend right to a new set of people, we have to recognize the ways in which they're building upon a series of commitments that the infrastructure has already made.

So, there are several different readings of citizen science at work here. Many projects – environmental monitoring, birding, and so forth – claim a basis in a form of bottom-up science that incorporates people into the scientific process rather than removing it from a scientific governmental elite. And yet at the same time, we can talk about it in terms of those expropriations of labor that don't actually involve people in a scientific process terribly much: what Jason Corburn has called "citizen sensors" rather than citizen scientists.

At the same time, it's grounded a great deal on what in the literature on the public understanding of science has often called the "deficit" model. The deficit model identifies the public, essentially, as failing to understand a variety of important (scientific) topics. And the goal of public understanding of science is to educate them about that, to fill in those gaps, because then they will understand what we're trying to do. If only people knew, then they would be in a position to act differently, support emerging policies, or whatever.

And actually, even in my discipline of human-computer interaction, we find frequent manifestations of this same approach: this idea that, if I can inform somebody about, for instance, the carbon footprint of their travel patterns, then they will be in a position to make all sorts of different decisions about how they live their

lives, which equally builds upon this deficit model. An example I want to draw upon is one that Brian Wynne uses in his work on the public understanding of science: the consequences in the mid-1980s for Cumbrian sheep farmers and for government scientists, of tussles that they had over the appropriate response to radioactive fallout from the explosion at Chernobyl.

The Chernobyl explosion was in late April of 1986. And a lot of rain fell in Britain – well, a lot of rain falls in Britain anyway. But a lot of rain fell in Britain in May 1986 that carried with it radioactive cesium, causing the government to need to try to figure out something they were going to do.

And for a long time they did nothing at all, and said nothing. And then after a while they decided that there was pollution that was dangerous, and particularly they wanted to be very careful about it entering the agricultural system. And there would have to be in Cumbria certain exclusions and zones where sheep wouldn't graze, and the rest of it. But they wouldn't have to last very long.

Three weeks later, they changed their mind entirely and said that there actually wasn't terribly much pollution at all; but where there was, there was a great deal of it – and the exclusions were going to have to last much, much longer.

The sheep farmers in Cumbria were deeply suspicious of this entire process for all sorts of reasons, not least, of course, the fact that if you look at the government reports, that it would appear that all the radioactive cesium from Chernobyl had all fallen within a small radius of the Sellafield nuclear fuel reprocessing plant operated by British Nuclear Fuels. The sheep farmers had been

unhappy about the nuclear activities there for decades.

If you look at Wynne's work, what you can see playing out over a long period of time is essentially a breakdown that is based on the fact that the scientists know a great deal about cesium, but the farmers know a good deal about sheep. And so what the issue turns out to be, is that the models that the scientists are applying don't follow very well for the actual soil types and the grazing patterns of the sheep.

But perhaps more problematic, is the kind of failings of expertise that were associated with the sorts of predictions that the government scientists would make; and then their sudden turnabouts and recantations of their own kinds of predictions.

So, after a while, instead of operating from Whitehall and issuing these edicts that were not getting them terribly far in the north of England, people were sent off to actually take field samples as opposed to just predict things on the basis of weather models, and actually take soil samples rather than just presuming what kind of soil was there. Sadly, this only served to undermine the scientific expertise even more, as the farmers watched these people slipping down muddy fields, and penning up sheep in ways that they would never actually normally be penned up by isolating them from the rest of the populations, and so forth.

So, I think there are two things that I really want to point to here. One is that the very encounter between scientists and citizens was the point at which the credibility of government science and public science was being undermined. This wasn't a deficit model. This is actually a case where citizens —in this case the farmers—knew more about how it was the measurements were

being taken and how science was being conducted. The fact that when you measure the same thing three times in a row you get radically different numbers and you just have to decide which one is the best, it was actually this very engagement that undermines the credibility of the scientists' work.

And at the same time, the kinds of models the scientists brought systematically excluded the forms of expertise that were available on the ground through the farmers. Expertise about sheep was somehow not part of the equation.

And so, what I think we often find is – and indeed, much of these kinds of things that the sheep farmers knew about the sheep, about their grazing patterns – about the fact that these farms don't, for instance, have fences, and so one farmer's sheep don't just graze on his own land, and so forth. These are things that disappear in the kind of mathematical modeling that's necessary to any form of reasonable scientific reduction. In order to get the work done, you have to come up with these mathematical approximations; and yet it was exactly that, that were these sites of contest.

So, now when I point to the encounter – and I mean the very physical and material encounter between the scientists and citizens as one of the sites that undermines legitimacy of technoscientific reasoning – that may well be a good thing if it engenders an appropriate mutual conversation and mutual engagement.

But certainly it's an interesting case with which to think about some of the problems of the encounters that we see in civic science, or in citizen science. It points to the problems in those kinds of encounters between citizenship and science, of the

power structures of science: not only the power structures that govern everyday science, but also the power structures that locate science within a policy discourse.

It's these kinds of projects, I think, which are frequently engaged in the production of scientific subjects, or they frequently are the sites of the production of scientific subjects. I mean that in three senses: the production of scientific topics that we all recognize, the production of individuals as people to recognizing them as subjects of certain kinds of science, and similarly the production of the kinds of science to which we are all subject as citizens in particular kinds of regimes.

The question is, then, to what extent any kind of engagement with the power structures is the basis of these kinds of citizen sensor projects. I should point out that I'm not simply trying to throw stones here. This is something that my own discipline is doing: last week I was at the program committee meeting for one of the major conferences in my area, and one raft of papers that were submitted for review were ones that were all about the use of Mechanical Turk as a means for testing and evaluating user interfaces.

So, I want to move towards wrapping up. The last of the points I want to quickly make – thinking about DIY and citizens and thinking about – in particular about the often countercultural and transgressive reading of DIY – that arguably it's actually really hard to think of something that is perhaps more commercialized and more commoditized than DIY. Fiona Allon at the University of Sydney has a useful book called *Renovation Nation* which includes an entire ethnographic study of Bunnings Warehouse, which is the Australian equivalent of Home Depot: I was reminded again of Irvine

"Choose life. Choose a job. Choose a career. Choose a family. Choose a fucking big television, Choose washing machines, cars, compact disc players, and electrical tin can openers. Choose good health, low cholesterol and dental insurance. Choose fixed-interest mortgage repayments. Choose a starter home. Choose your friends. Choose leisure wear and matching luggage. Choose a three piece suite on hire purchase in a range of fucking fabrics. Choose DIY and wondering who the fuck you are on a Sunday morning. Choose sitting on that couch watching mind-numbing spirit-crushing game shows, stuffing fucking junk food into your mouth. Choose rotting away at the end of it all, pissing your last in a miserable home, nothing more than an embarrassment to the selfish, fucked-up brats you have spawned to replace yourself. Choose your future. Choose life…"

→ Irvine Welsh, *Trainspotting* (1996)

Welsh's quote, where DIY becomes this iconic emblem of nonreflective middle class complacency.

The important thing here is, I think, to try to draw lessons from other sorts of forms of media studies, about much more complicated relations between production and consumption, which are at work; and to be very wary, perhaps, of the rhetoric of resistance when it's embedded within some large-scale system of commercial exchange. But I think there are actually opportunities here, because this does point us towards the way that consumption doesn't necessarily look like a simple middle class complacency, and at the same time production isn't necessarily as transgressive as it might be.

So, to close, I want to point towards two challenges. So, the first is how we might move beyond the deficit model as I have outlined it. To what extent are we able to engage the forces of DIY citizenship in the kinds of projects that we're doing, to focus on alternative epistemologies, on different models that aren't actually the same as the models that the technology was necessarily itself invested in. I actually think that Natalie Jeremijenko's work is a great exemplar of trying to incorporate a much more diverse kind of idea about the forms and epistemologies at work in the encounters of people and technology.

At the same time, the question is, can we make use of the kinds of things we talk about in the DIY citizenship context to question some of the representational reductions that are at work? Clearly, making those representational reductions—it's part of writing computer programs. It's part of building systems. It's part of what we all do. But I think it's important that we try to do it in a conscious and reflective kind of way.

And so if our focus is on making, then the other set of challenges is to be appropriately reflective about what it is we're making. Certainly, many of the projects we hear about are focused on making interventions. But at the same time we're also engaged, I think, in making publics, and I mean publics in a Michael Warner sense, of an imaginative relationship on the part of the recipient of a media object. Our recognition of the ways in which these different kinds of projects and technologies are aimed at people like me, and therefore might write the connection that I build to, who those imagined people like me, might be, through the technology, I think is an important thing to focus on.

And then finally, as well as making publics, also making infrastructures, drawing on Geof Bowker and Leigh Star's work. The idea of the infrastructure as embedded in a system of practice, and what is being produced with the technology—and it is frequently the technology that we celebrate—is actually a system of practice of encountering the world through and with that technology, of creating different kinds of positions around that technology. And that is actually where we need perhaps to focus our attention.

■

At the seams: DIYbio and public engagement with science

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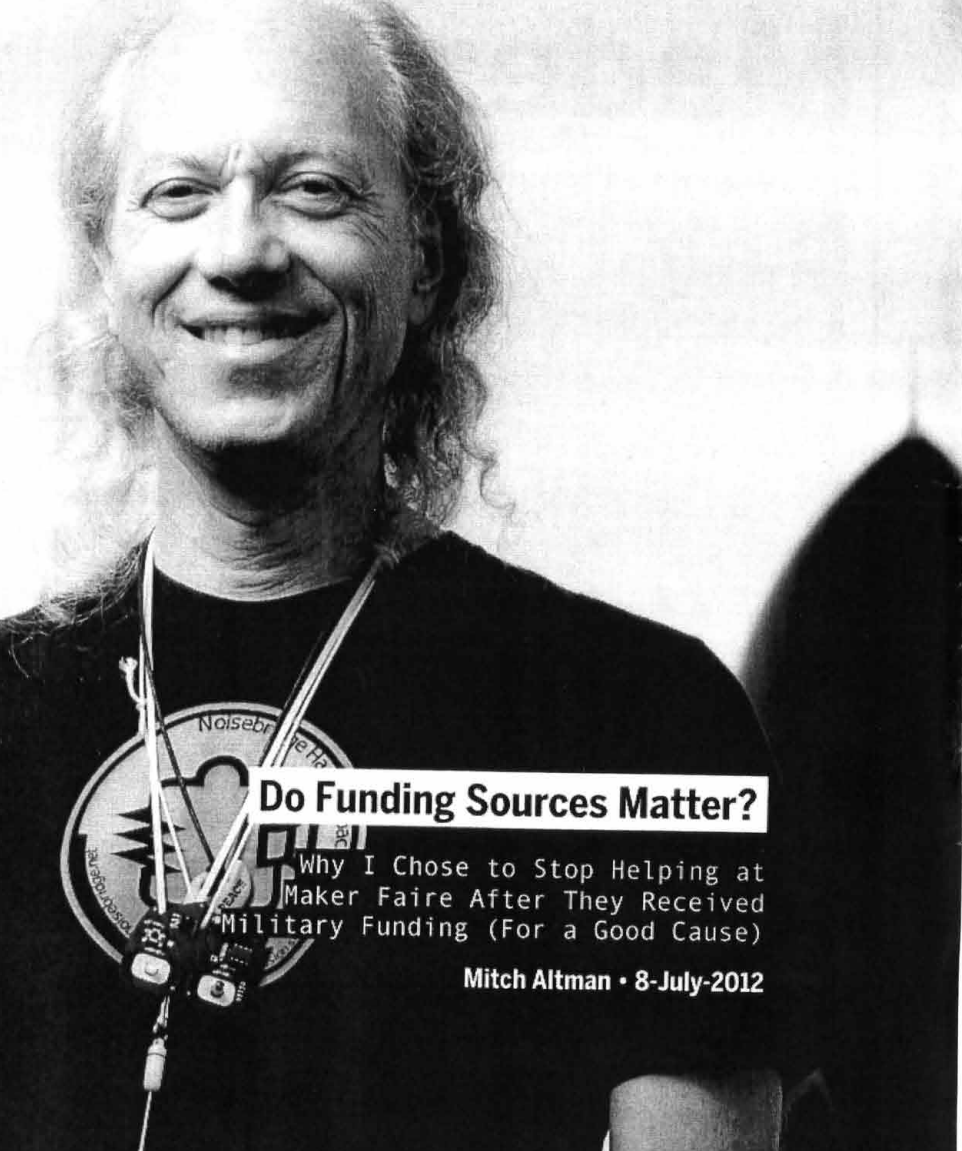## DIYbio (Do It Yourself Biology)

a growing community of scientists, artists and hobbyists tinkering, playing, experimenting with biology outside of professional settings

DIYbio.org, founded by Mackenzie Cowell and Jason Bobe in 2008, serves as a meeting point for practitioners around the world, with over 1900 members, from professional scientists to artists and hobbyists.

As expressed by DIYbio.org, the community values "making biology an accessible pursuit for citizen scientists, amateur biologists, and do-it-yourself biological engineers who value openness and safety"

DIYbio projects worldwide cover a spectrum of art, science and engineering, including DNA extraction, developing biosensors, culturing bioluminescent bacteria, designing microbial fuel cells, or replicating lab equipment with off -the-shelf parts, to name a few.

DIYbio + professional scientists

DIYbio has intentionally positioned itself as a movement outside of and in some ways opposed to professional biology. From its motivations (to 'open source' science), to the aesthetics of tinkering with organic materials and its close associations with existing hackspaces, DIYbio's agenda is not one of academic research. At the same time, material constraints, safety concerns and the complexity of the science necessitate biologists to remain at the core of DIYbio.

How can information and materials be shared more fluidly across professional and DIY domains?
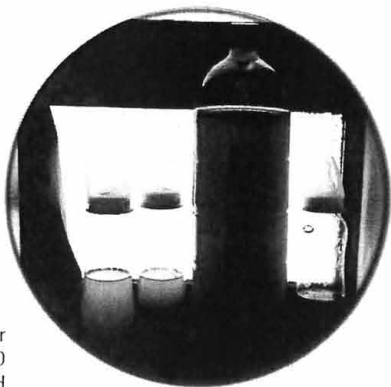
DIYbio + the general public

DIYbio encourages people to participate in 'hands on science' through workshops, classes, etc., while also navigating the many public concerns regarding its practices. Its outward-facing efforts, from a code of ethics to mechanisms that make lab work more transparent, publically address questions of safety and ethics.

What technologies and practices can support *transparency* and 'demystify science'?
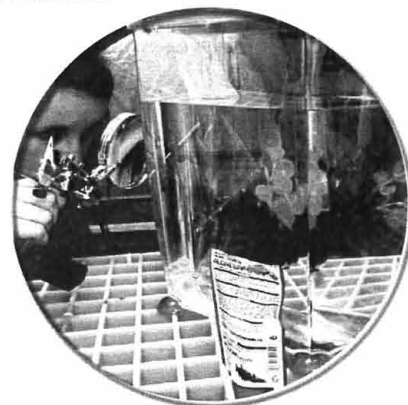
Organic + digital materials

Common electronics—Arduino, sensors, servo motors, etc.—are combined with more professional lab equipment to culture, study or modify organic specimens such as e. coli, c. elegans, zebrafish or snails. The underlying seam—between living organisms and digital technologies—results in imaginative, innovative and sometimes strange workarounds across issues such as storage, disposal, time and uncertainty.

What then are the challenges and implications of these emerging *hybrids*, which leverage living organisms as inputs and outputs into digital systems?

Do Funding Sources Matter?

Why I Chose to Stop Helping at Maker Faire After They Received Military Funding (For a Good Cause)

Mitch Altman • 8-July-2012

I love helping people explore and do what they love. This is the main reason I do almost all of what I do. It is why I invented and manufacture and sell TV-B-Gone remote controls (which I love). It is why I co-founded Noisebridge hackerspace in San Francisco (which I love). It is why I travel the world and help other hackerspaces (which I love). It is why I have put so much energy into creating huge hardware hacking areas to teach thousands of people to solder at Maker Faires (which I love).

Sadly, lots of people on our planet don't know what they love to do - for whatever reasons they haven't had a chance to explore what it might mean for them. Some haven't had the opportunities, some find it challenging to make the time, some feel overburdened with responsibilities and obligations...

One thing that can make it easier and more enjoyable (and more likely) for people to explore what they love is to be part of a supportive community, such as at a hackerspace or a Maker Faire, where so many are already exploring and doing what they love. In these communities it is much easier to get inspiration, overcome fears, be exposed to cool ideas and activities one may not have come across otherwise.

Furthermore, it is unfortunate that in the US, what goes for "education" is more concerned with standardized test scores (for the sake of the education bureaucracy) than with what education should be about: learning what we each want to learn to live lives we each want to live. (And education systems in other countries have their own problems that keep education from being what it could be.) Hackerspaces and Maker Faires can provide opportunities for some people to get a real education.

Wouldn't it be cool if there were more hackerspaces and more Maker Faires to give more people these opportunities? I think so, yes!

But, of course, it does cost money to make this happen.

How much money do we need? What are we willing to do get the money? What are we willing to stop doing to get the money? Does it matter where the money comes from? Do any changes in our behavior change who we are and what we are about?

I ask these questions because I think they are important ones to ponder, and important to answer for ourselves.

And, given that these answers are personal, what am I willing to do and not do based on the answers that others come up with?

I love Maker Faire! It has been a huge, wonderful part of my life since the first Maker Faire in 2006. It has changed my life for the better in so many ways. It has positively changed so many peoples' lives! And it will continue to do so.

So, it was not an easy choice for me to choose to stop helping at Maker Faire while its associated MENTOR program is being funded by DARPA, the Defense Advanced Research Projects Agency.

At the start of the World Maker Faire in New York last September I was awarded the first (and last) "Mitch Altman Maker Hero Award" for my "outstanding contribution to the cause of maker-related education and/or open access to technology." It was overwhelmingly emotional for me to be honored in this way. I never would have imagined at that moment that this was my last Maker Faire.

Two days later, at the end of the World Maker Faire, at the thank you dinner for folks who helped make it happen, Dale Dougherty, who started MAKE Magazine and Maker Faires, gave thanks and inspiration to us all. And he saved the really good news till the end: Maker Faire received a $10 million grant to give kids opportunities for hands-on learning at a thousand high schools. Yow! Then, almost in passing, he mentioned that this grant came from DARPA. To some, this may have had no impact. To me, it felt like a kick in the gut.

Without exception, at every place I've ever worked, someone has wanted to use the cool things that I and my co-workers created for military purposes. Again, for others, this may not be a problem. But for me, it has led to me quitting the project each time. A couple of examples: my first job was making games on Apple II computers - the military wanted to modify them to make killer helicopter training simulators. At the company where we developed Virtual Reality, and where I spent three months of my life creating a VR system for the University of Central Florida, I later found out that the military was behind the sale, and

that they were going to use the VR system for World War III training simulators.

I guess I just never anticipated that Maker Faires would be anything but unambiguously positive for me. Maybe I was naïve.

As the hacker scene has grown from handfuls of spaces in 2007 to about a thousand spaces currently (and growing), and as Maker Faires are now being sponsored by large corporations, I suppose it was inevitable that we would become a market. And I suppose it was inevitable that we would be seen as opportunities for others for their goals. And those goals may or may not be in alignment with mine.

I struggled for months trying to decide the best thing to do. Should I keep helping out the way I have been at Maker Faires, and in some ways help DARPA in their goals? Should I stop helping out the way I have, and eliminate a great source of joy in my life?

I looked into the goals of DARPA.

According to their website, DARPA's mission is "to maintain the technological superiority of the U.S. military and prevent technological surprise from harming our national security by sponsoring revolutionary, high-payoff research bridging the gap between fundamental discoveries and their military use." According to Wikipedia, they currently have an annual budget is $3.2 billion to accomplish their goal. If our country's military were simply for defense, and for the security of our country, then I would have no problem with DARPA's mission. Unfortunately, the way I see it, our military is only partly for these purposes, and primarily a means for large profits for military contractors' profits (despite the tragic consequences, both to people in other countries and to our own country's own safety and security).

I looked into the DARPA grant that the Maker Faire folks received for what they call their MENTOR program.

The DARPA grant's stated purpose is to increase the number of high quality engineers available. The stated reason this is necessary: the US education system is not adequate to provide them. Money from the grant is renewable annually. As already stated, I agree that our countries education system is

Tactical Technology Office

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PROGRAM MANAGER

LTC Nathan Wiedenman
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THE MANUFACTURING EXPERIMENTATION AND OUTREACH (MENTOR)

The Manufacturing Experimentation and Outreach (MENTOR) program focuses on engaging high school-age students in a series of collaborative design and distributed manufacturing experiments. DARPA envisions deploying up to a thousand computer-numerically-controlled (CNC) manufacturing machines—such as "3D printers"—to high schools nationwide. The goal is to encourage students across clusters of schools to collaborate via social networking media to jointly design and build systems of moderate complexity, such as mobile robots, go carts, etc., in response to prize challenges.

Several performers are currently under contract as part of MENTOR. As their efforts mature, MENTOR will expand to ultimately reach our goal of 1,000 high schools by the 2014-15 academic year. Schools for the first year of the program have been selected, but as we prepare for rapid expansion in the near future we welcome input from interested schools and districts. Contact us at mentor@darpa.mil.

RESOURCES

- "Democratizing Design." Remarks by LTC Nathan Wiedenman at Maker Faire (5/19/2012)
- DARPA-BAA-11-19: Manufacturing Experimentation and Outreach (MENTOR). CLOSED
- 9/28/2010 Press Announcement

inadequate. Myself, I'd much rather see educational opportunities created for people by organizations that exist to better peoples' lives (rather than by the military).

Everything has pluses and minuses. How can I balance the amount of good that will come from this grant's money with my perceived negative consequences?

Maybe there was a middle ground? I spoke with Dale on the phone at length, trying to come up with a way I could help without being associated with the DARPA money. We couldn't come up with a way.

After weeks more of struggling to come up with an answer, I realized that I simply could not feel good helping the way I had been helping at Maker Faire, knowing that I was also helping the goals of DARPA that are not aligned with mine. Not wishing to hurt Maker Faire, I made a short, simple, heartfelt, public announcement that was as gentle as I could make it. Here is the complete post I made on my social networking accounts:

mitch altman April 2, 2012 Public

It's official. I'm greatly saddened that I won't be able to help at this year's US Maker Faires after they applied for and accepted a grant from DARPA.

I look forward to working and playing at Maker Faire again, after they are no longer associated with DARPA.

By his response to my post, it seems that the head of O'Reilly media, which is the umbrella company that runs the Maker Faire, was greatly angered by my post, and is perhaps holding a grudge against me. As a result, I may never have the opportunity to help out at Maker Faire again. And that makes me even sadder.

Sigh.

It was the best I could do. I wish I could have come up with a way to feel great about it all. But, I failed at that. Yet, I would feel worse if I thought I was helping DARPA's goals.

To explain my intellectual reasons further, for what their worth:

● If funding sources didn't matter, then politicians should be able to receive "gifts" of any amount from any person or corporation. After all, there are no strings attached, right? The money is a gift, and the politician can do whatever they want with the money.

● Given that a gift is renewable annually, what kinds of things are people (consciously or otherwise) willing to compromise to increase the likelihood of receiving next year's funding? What kinds of things are people (consciously or otherwise) willing to stop doing to increase the likelihood of receiving next year's funding? Will what we do start becoming more about money, and less about what we love?

● One of the more powerful forms of marketing is to show that somehow *you* are inadequate (because you aren't happy, you have dandruff, you are somehow helping to cause harm etc.), and then to associate a warm fuzzy feeling with others getting some benefit from PRODUCT X - where PRODUCT X can be a Pepsi, a political candidate, a corporation's "concern" about the environment, etc. With repetition, a higher percentage of people end up buying PRODUCT X. In the case of this DARPA grant, the inadequacy is your educational opportunity (or your project's funding), and PRODUCT X is the US military.

● There are pluses and minuses to every choice. There are pluses and minuses to funding choices. DARPA funding exists to further the goals of DARPA.

Accepting the funding may help further one's own goals. We can each do the best we can to balance the pluses and minuses, and make the best choice we can. To use an extreme case (perhaps easier to think about?): Wernher von Braun chose to accept funding from the German military to create his dream of a space program - and it worked! As well, the German military was helped in its goals, resulting in the death and suffering of London civilians bombed by missiles.

- If DARPA is creating opportunities for people, it seems likely that more people will work for DARPA and other arms of the US military. If people are working for the military, some may be doing what they love. Others will merely have a job. Will this job help them explore and do what they love?

- What does it mean that money for worthwhile endeavors, such as education, is no longer funded by organizations that exist for those endeavors, but are funded by the military? Are these unelected officials the people we want making decisions about spending priorities for our country and its future?

There are no obvious, absolute right and wrong answers to all of this. Hackers and hackerspaces are being given more opportunities to apply for DARPA grants. And as we contemplate these opportunities it is up to each of us to make our own choices. My wish is that you make choices that are conducive to creating more fulfillment in your life, and for the lives of those around you. Then each of us can all learn from the consequences of our choices (and make new choices).

■■■

DARPA Funding For Hackers Hackerspaces And Education

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590 views

DARPA Funding for Hackers, Hackerspaces, and Education: A Good Thing? Mitch Altman, Psytek, Willow Brugh, Fiacre O'Duinn, Matt Joyce Mitch Altman caused a stir this spring when he publicly announced that he would not be helping U.S. Maker Faires this year, after it was publicly announced that they received funding from the Defense Advanced Research Projects Agency (DARPA). So, what's the controversy? DARPA, an agency of the U.S. military, has funded many famous projects over the past several decades, including GPS and the Internet. People in DARPA are now making large amounts of grant funding available for hackers and hackerspaces to do projects of their choice, as well as funding for education through hands-on learning, which MAKE Magazine is using to help schools. Does it matter that DARPA is responsible for the development of new technology for the U.S. military with an annual budget of $3.2 billion? What are the ethics of using funds from people or organizations that may or may not be aligned with one's own goals? What are the ramifications for the hacker/maker movement? Is DARPA funding overall a good thing? There is no simple answer. Explore the ethics and ramifications with Mitch, as moderator, and the panelists, as they give their perspectives on this complex set of issues.

Makerspaces in Education and DARPA
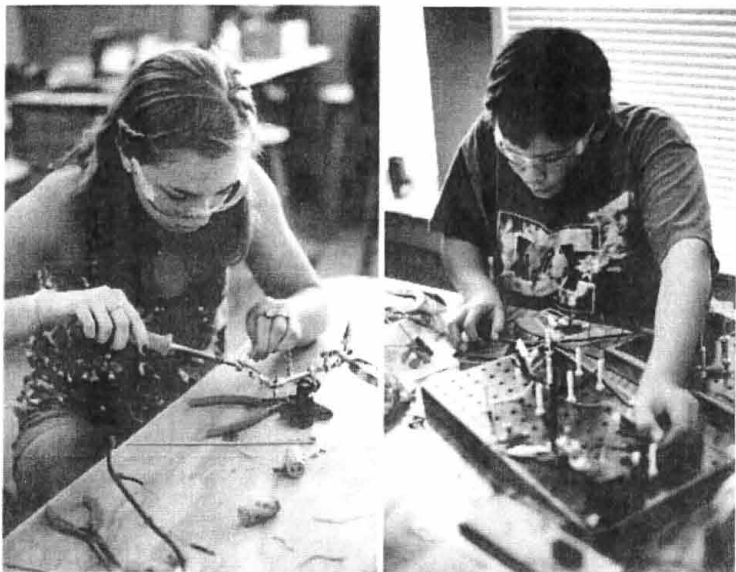
Dale Dougherty | Wednesday April 4th, 2012 2:00 PM

Recently, Mitch Altman announced publicly that he's not participating in Maker Faire this year because MAKE received a DARPA award for education. I have talked to Mitch and shared in detail our proposed work. I have listened to him express his concerns about the DARPA award. I don't agree with Mitch, but I respect his opinion. I believe that Mitch's public statements do not fairly characterize the program and have caused confusion about DARPA's role. I'd like to explain what we're doing and why.

In 2011, Saul Griffith and I, representing Otherlab and O'Reilly Media's MAKE division, respectively, learned that DARPA selected our MENTOR proposal to bring the practices of making into education and extend the maker movement into schools. The new tools and methods of collaboration that are shared within the maker community need to be brought to schools, and it was going to take a major effort to make this happen. Our program would encourage schools to engage more kids in making by creating makerspaces and providing access to these tools for student projects, and use Maker Faire to showcase more work from students. We announced the program early in 2012 on makerspace.com.

The DARPA award challenges us to establish the practices of making in high schools, reaching 1000 schools over four years. (Those schools need not be limited to the United States.) By creating makerspaces in an educational context, students can have access to tools and equipment that they might not have otherwise; they can collaborate on projects that are driven by their own interests, and by doing so, develop the capacity and confidence to innovate. We see making as a gateway to deeper engagement in science and engineering but also art and design.

Here are the major areas of work we have under development as part of the Makerspace program:

1. Work with engineering and science educators to develop teacher's guides for MAKE projects that will help educators integrate making into their own curriculum. All materials that we develop under the program will be made available for free under a Creative Commons license.

2. Develop modular specifications for low-cost makerspaces in educational settings. We want to encourage schools to establish makerspaces, so we are providing some basic guidelines on the costs of getting started. You can find a draft of these specifications on makerspace.com.

3. Write an overall guide to teaching the practices of making for educators, mentors, and others who help coach students to become makers. This is similar to the guide we've written for the Young Makers program. (see youngmakers.org)

4. Build a collaborative online platform that can be used by teachers and students to select projects, monitor progress, and generate student documentation for the work. This platform will allow students to work beyond their own classroom with other students and mentors.

5. Integrate new design tools for CAD and CAM that help students become familiar with 3D design and personal fabrication.

6. Prototype a low-cost, open-source CNC machine that can be affordable for schools to use.

7. Over three years, build a network of up to 1000 participating high schools.

8. Showcase the work of students at Maker Faires and bring students together to meet each other and other makers in the community.

All the software we develop as part of the program will be made open source. All material developed for the program will be made available online under Creative Commons. Neither DARPA nor O'Reilly is placing any claim on student work.

Saul Griffith of Otherlab, our partner in Makerspace, wrote the following summary:

> The Makerspace program aims to build literacy in design, science, technology, engineering, art, and mathematics, by combining what O'Reilly Media, MAKE magazine, and Otherlab have learned about the maker community. We wish to do this with as much engagement as possible with the broader maker community to leverage the fantastic energy and talents of everyone doing beautiful things.
>
> Our emphasis will be threefold:
>
> 1) Self-directed learning (building your own project as a better motivator to engage in engineering).
> 2) Lower the cost of building and realizing dream projects through lower cost tools (software and hardware.)
> 3) Making making more social and engaging.

Creating models for makerspaces at schools is the heart of our approach. In some of our pilot work, we are seeing that having a place to make things creates new opportunities. We are re-thinking the shop class and re-inventing the computer lab, and combining both of them. The makerspace should be like a library, available for use by anyone in the school to make things for a variety of purposes.

Insight into DARPA

We were motivated to apply for the DARPA grant by the following statement that was part of the MENTOR program: "One of the biggest challenges we face as a nation is the decline in our ability to make things," Dr. Regina Dugan, then Director of DARPA. The MENTOR (Manufacturing Experimentation and Outreach) program, we believe, gives us a framework to develop educational materials for high schools and to promote the practice of making inside of school.

I can't speak for DARPA, but if you want more insight into their rationale for funding, you can find a talk by former Director, Dr. Regina Dugan, on this page:

http://web.mit.edu/newsoffice/2011/darpa-manufacturing-event-1214.html

This video also points out that DARPA has relationships with lots of organizations including many top universities. The article opens with: "The connection between MIT and the Defense Advanced Research Projects Agency (DARPA) over the decades has been a strong one." MIT has been known to produce more than a few hackers. MIT also produces engineers who work in a variety of fields, including the military. This is true of every university that trains scientists and engineers in the US.

Clarifications

I have been following the conversations on Facebook, Slashdot, and Twitter. I am troubled by speculations that others might accept on face value.

- All software we develop under the DARPA program will be available as open source. That's a DARPA requirement and

we're glad that they have it. This also applies to content and other materials that we develop for the program.

- Student work is not owned by DARPA. Any assertion that DARPA is providing funding to access student work or its intellectual property is just not true. DARPA does not have any claim on student work. Our program encourages students to *make* and share. It is up to the students and educators what to build. We are building infrastructure for project sharing, which we believe engages more students in the process of making.
- We had the military participate at Maker Faire in Detroit, representing TARDEC, one of the area's largest employers. (RDECOM, the Army's research and development group, employs something like 30,000 civilian scientists and engineers worldwide.) We published a story, Code 72, on the makers who work at the Detroit facility.
- We've engaged with NASA, the Department of Education, the National Science Foundation, and other federal agencies. More importantly, we've supported others in education who are seeking funding from these agencies to develop programs or research about making. If you want to work in education, you need to work in the government.
- We are one of several groups to receive funding under the MENTOR program. Our funding is up for review and renewal each year. DARPA has been a good partner that understands the long-term benefits of this kind of work.
- DARPA funding is only part of the picture of what we are doing in education. I am working to set up a non-profit that will raise funds for promoting making in lots of community contexts, both in school and out. Already, we have almost a year's experience with a program such as Project Make at a local high school. We are in the third year of the Young Maker's program, which supports kids building projects to bring to Maker Faire.

MAKE magazine and Maker Faire have helped establish a worldwide community of good will. This maker community has created amazing new opportunities for lots of people to develop their potential as creators, builders, and innovators. I'm proud of that, but I'm also disturbed by who is not in that community. I believe that one of the reasons for such inequity is our education system, which is broken in so many ways. My work in education is predicated on the idea that exposing more kids to making will create more makers and those kids will have better lives as a result. We can reach more young people through our school system than we can otherwise. I also believe that we have teachers in education who already value making and are already introducing the practices of making. I've heard from many of them and I know they need our support. They want to work together with the maker community to bring about change in education. I know it's a difficult challenge, but I am personally dedicated to making it happen.

By helping young people develop the ability to make new things and inviting them to become makers, we connect them to a global community of experts and amateurs. I hope many of them will choose to be scientists and engineers but I hope that they do so because they have discovered that this is what they love doing. I hope that they come to understand how to use these abilities to tackle important problems and find creative solutions that benefits all of us. The goals of Make and DARPA align in this instance because we have a mutual interest in seeing a more diverse pool of young people become scientists, engineers, programmers.

For me, the DARPA funding signifies that a revitalized manufacturing capacity is a national priority, and fostering interest among young people in making things is how we can take concrete steps to address that issue. Makerspace is not a DARPA program; it is a program that DARPA helped with their funding, which ultimately comes from the US taxpayer. Our Makerspace program is designed to learn from what we see happening in the maker community and work closely with the intersection of the communities of makers and educators to spread these ideas, technologies, and innovation more broadly across our country and the world.
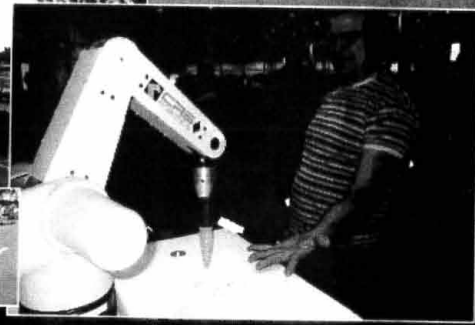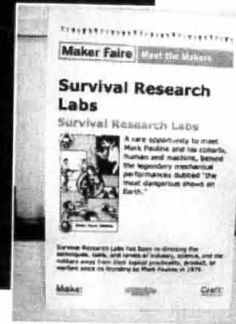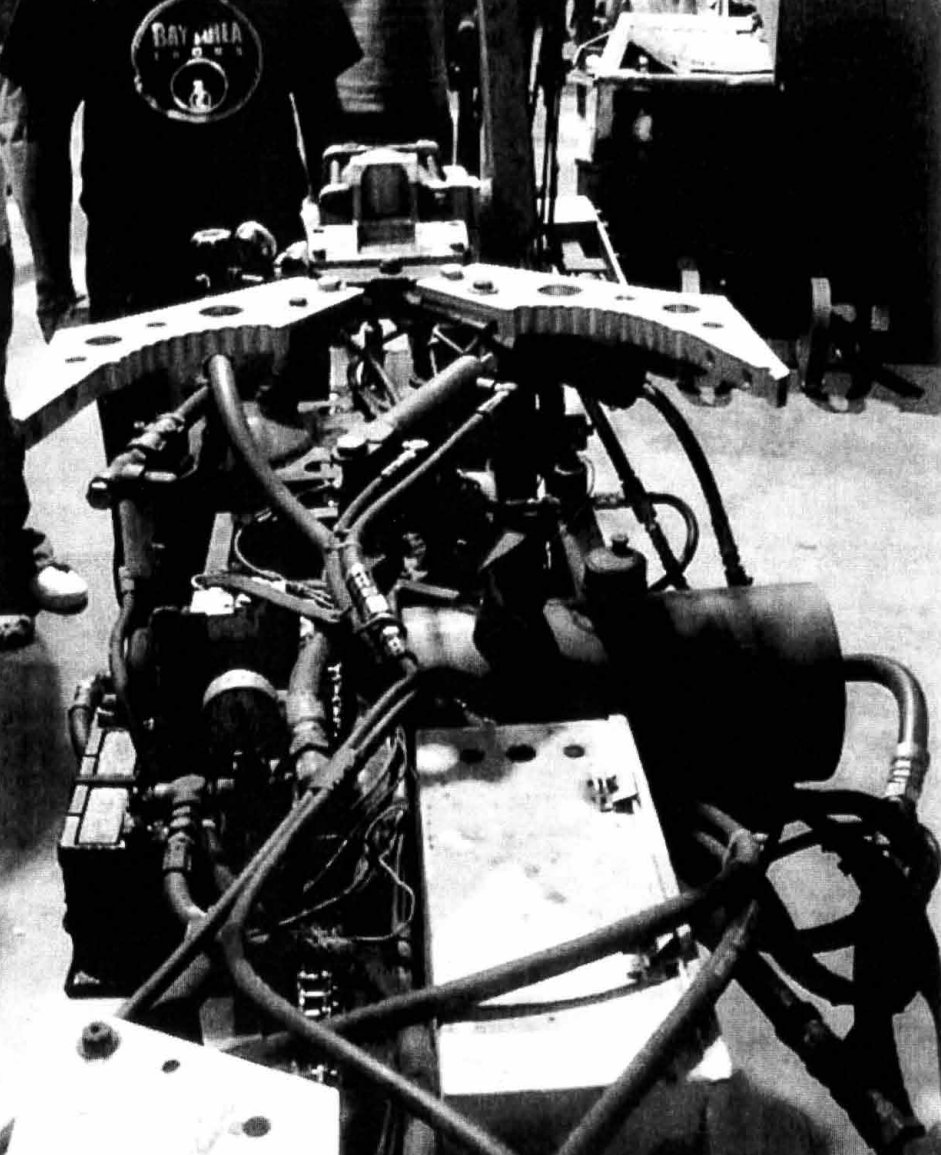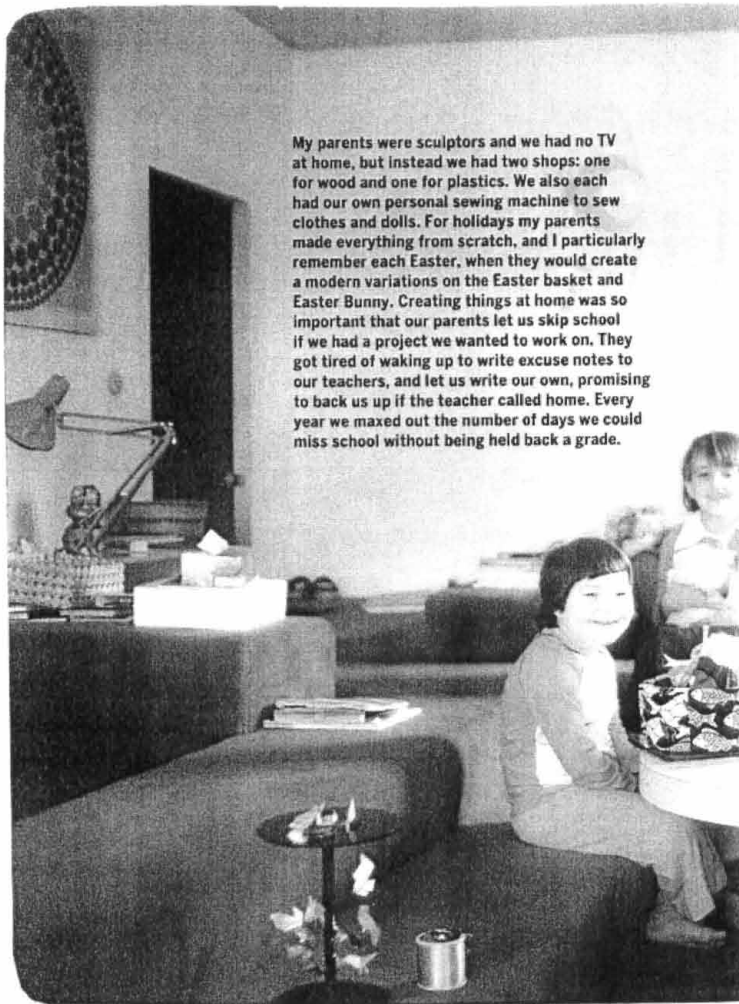
"I'm permanently banned from participating in any Make events since the small SRL show I did at the Maker Faire in 2007... My impression from working with them on that event leads me to believe that the family entertainment aspect doesnt really seem to jibe with SRL activities. I can appreciate the do it yourself theme, but I wish people would make stuff thats a little bit more extreme and useless."

- Mark Pauline
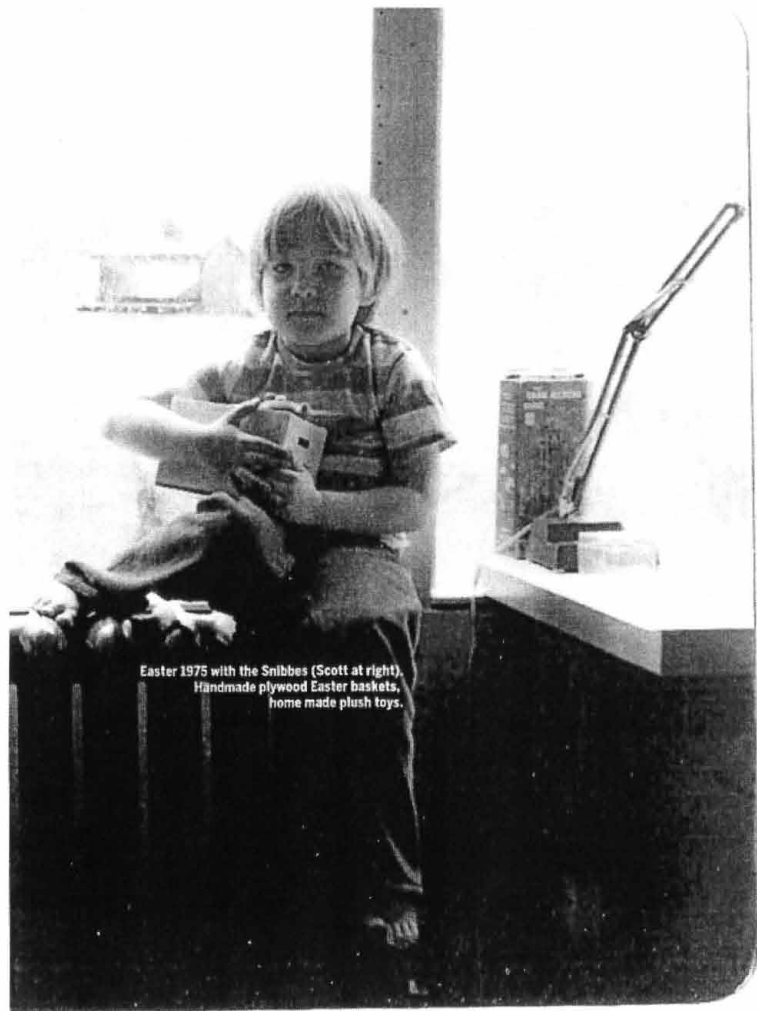
Easter 1975 with the Snibbes (Scott at right).
Handmade plywood Easter baskets,
home made plush toys.

My parents were sculptors and we had no TV at home, but instead we had two shops: one for wood and one for plastics. We also each had our own personal sewing machine to sew clothes and dolls. For holidays my parents made everything from scratch, and I particularly remember each Easter, when they would create a modern variations on the Easter basket and Easter Bunny. Creating things at home was so important that our parents let us skip school if we had a project we wanted to work on. They got tired of waking up to write excuse notes to our teachers, and let us write our own, promising to back us up if the teacher called home. Every year we maxed out the number of days we could miss school without being held back a grade.

Easter 1978 with the Snibbes (Scott at right): home made stretch-fabric baskets with handmade plush dolls. Living room with raised levels my Dad made inspired by Beatles Help! movie, with beds inset as couches. Plastic mobiles hanging in rear, and origami creations by Scott hanging in front with nylon spool. Home made baskets at rear.

The Necessity of Authentic Boredom

by Rebecca Niederlander

Caine's Arcade

A cardboard arcade made by a 9-year old boy.

the need for boredom. Boredom is a necessary part of any creative process

A space empty enough to contemplate, to begin, to ponder, to hash it all out.

denied the need for boredom. Boredom would be honest if they denied thinking of something totally unfamiliar to you, neighbors, created an arcade out of used empty cardboard boxes from his father's auto parts store.

A filmmaker named Nirvan Mullick came into the store, fell in love with Caine's arcade and made a 10 minute Vimeo about it that went viral

or talk to your use the internet in social media,

What labor-based creative practitioner, maker or true DIY enthusiast would that special place

Author Jonah Lehrer calls it *mind wandering*, that special place

And *wandering*, that special place where anything goes.

that person? $210,784 matched by the Goldfish Foundation to transfer their boredom to the DIY world?

A nine year old named Caine Monroy. Caine, who you know unless you don't participate who is the brightest star of the DIY world? best able to transfer their boredom to start the cainesarcade.com/thefoundation. imagination Foundation.

BOREDOM IS YOUR WINDOW. ONCE WINDOW OPENS, DON'T TRY TO SHUT IT. ON TH THE CONTRARY, THROW IT WIDE OPEN. — JOSEPH BRODSKY

Authentic Boredom

Experience sampling during MRI reveals default network and executive system contributions to mind wandering

Neural recruitment in both default and executive network regions was strongest when subjects were unaware of their own mind wandering, suggesting that *mind wandering* is most pronounced when it lacks meta-awareness. The observed parallel recruitment of executive and default network regions—two brain systems that so far have been assumed to work in opposition — *mind wandering* may evoke a unique mental state that may allow otherwise opposing networks to work in cooperation. pnas.org/content/earl y/2009/05/11/0900234106

Scholarship Fund wi raised for Caine's

122,800 people became Facebook fans of the project and $210,784 was

http://vimeo.com/40000072 facebook.com/cainesarcade

months there were over 7 million views o in a mere three

The question is whether or not Caine would have made the arcade had he not been hanging out at his Dad's business for hours on end during summer break without any planned activities. Where would Caine be without his boredom?

— NIRVAN MULLICK

Yahoo said when they put the video on their home page it was the most watched video ever. This made people rethink how they wanted their kids to pick about play, not have to think stuff up immediately, a real world game changer.

Bend or Make? Hmmm.
I found this pic of me as
a little boy and asked my
mom if she remembered
what I as up to. Her reply,
"Oh who knows. You were
always doing things like that."

Reed Ghazala

BADGES

BY LIZ LOSH

When I was a kid, my sister borrowed my scout uniform for a costume party and I saw those badges for the dance hustle and the the badges that like a crystal radio braid or fabric. I entered a dark punk rock. I and begged for or a sewing machine STORIES or EXPLORE that this is at later, when I Mel and I made that made fun of some other corporate idea of a "respect something for boy made a mock-up for BADGE that had service projects their DRM-hobbled how to find creative badge companies for the scouts just anything. They do have limits. So don't try to get them make that patrol badge with George Bush as a clown) started to circulate thanks

sister borrowed my scout party and I never again. I had worked hard badge by learning the hora, but mostly I liked you earned by making things or a tunic bordered with gold woven on a shoebox loom. Then period between scouting and tried to work on my own projects a sixteen millimeter camera because I wanted to TELL IDENTITIES. The reason all important is that years became an Internet scholar some fake merit badges the fact that the MPAA or. morons were promoting the copyright" patch as to earn. We also FREE CULTURE a lot of nice community like helping old people with devices or showing little kids commons resources. (In reality won't make some to

When the images to blogs like Boing

Boing, I began to get e-mails from scoutmasters and eagle scouts. Some were offended by the fact that I had praised their organization for the gender-bending work of teaching boys to cook and sew, but others thought a free culture badge was a good idea and very consistent with the ethos of scouting. Now my own son is active in scouting. Recently he earned the COMPOSITES MATERIALS MERIT BADGE, which is sponsored by the American Composites Manufacturers Association (ACMA) for making a clipboard and a Roman helmet out of fiberglass.

It is a beautiful badge that shows resin flowing from a beaker and a hand skillfully smoothing this wonderful man-made goo into sheets.

And this is why I think that the MOZILLA OPEN BADGES project is deeply misguided, because they are privileging online learning and social network sites over the embodied practices that engage with the constraints and affordances of the material world. Sure openness sounds good and copyright sounds bad, but in some ways these Mozilla badges are as useless as the respect copyright patch, in celebrating nonachievements in an imaginary system of value. What if we give up on the idea of PROPERTY to embrace THINGS? Badges should be things - that you earn for making things, signifiers of the RES PUBLICA, meaningful objects that can be shared and lost.

MAKE: a place for genders to intersect?
by @mbjerede

Why is it that a field that is as fundamentally egalitarian as engineering has so few women in it?

The technology fields accept diversity at a gut level — professionals in the field mostly tend, ourselves, to be some sort of "different" and are dismissive of those who consider those differences to be detriments. We care more about ideas than personalities. If an idea is strong, it wins — regardless of whether it came from the grizzled Unix veteran or the girl intern.

Geeks do battle with words and concepts, show supremacy through our deep and broad and systemic understanding of any technical topic at hand, and are delighted when more people join in: win or lose. Gender-blind, engineers welcome women as easily as men into the fray and out of courtesy will even accept those foreign systems models that include "soft" arguments and metrics involving human capacity, human interactions, user experience, and design esthetics.

In the end, though, we fall out along the lines of those who indulge technology as a hobby, staying up until 3:00 am playing with algorithms or devouring technical articles or soldering circuits, or hanging out at assorted physical and virtual geek watering holes, and those who, well, don't. We respect, we truly do, those people who can engage with us on our own turf, even if at the end of the day they go home to families or art or they choose to stick to their knitting. But let's be honest, we can't really call them *technical*, now can we? Why won't more women choose to be *technical*? We really want them to.

It was always this way for us techie types. As kids the girls would prefer dance team to science club, even when they were stars in chemistry class. Not even pink microscopes could persuade them! Invited in to show they were "just as good", they were still uninterested in building battling robots, even though we knew some of them would be good enough to win. We knew girls weren't so different from boys, so why didn't they get it?

But today, when we look at our own kids, we see many that are different somehow. Girls who design and MAKE wearables imbued with electrical circuits that light up and play sounds are both artistic and technical. Boys who MAKE eight-foot fire-breathing dragons are both technical and artistic. Kids who MAKE enjoy teaching and learning from each other more than beating each other, and together MAKE art, MAKE technology, MAKE friends, MAKE a community, and MAKE a future: one that's gender-blind. And eventually, maybe, a technology landscape that's gender-balanced as well?

INFORMANT NUMBER 11: 100 YEARS OF SCIENTIFIC MAKING IN CELEBRATION OF FRANK MALINA

Roger Malina, E-mail: <rmalina@alum.mit.edu>.

Submitted: <June 9 2012>

Abstract

We review how rocket pioneer and kinetic artist Frank Malina espoused a type of scientific 'making' that drew on scientific theory and mathematics as well as rapid prototyping approaches. The hacker and maker communities draw on this ethos of scientific 'making'.

My father, Frank Joseph Malina (1), was born a hundred years ago on October 2 1912 in Brenham, Texas. The son of Czech immigrants, his parents were music teachers, but had run grocery stores and a hotel; they wanted their son to be a musician. Music was a respectable profession; my father went on to become a rocket scientist, a field that was not respectable did not exist when he was born.

Brenham was a small farming community and my father tells of his boredom and finding refuge in the town library. There, among other books, he read Jules Verne and became infected with the dream of space travel. And to go to space you had to make things, invent things.

My father majored in mechanical engineering at Texas A and M and went on to study aeronautics at the California Institute of Technology, Caltech. There he started studying under Theodore Von Karman (2) who has started one of the first experimental aeronautics labs, a wind tunnel and the Guggenheim Aeronautical Laboratory. Von Karman is now recognized as one of the top research engineers of the twentieth century but as a young professor he had a lot of resistance introducing scientific reasoning and mathematics into engineering practice. Engineering was often a trial and error affair; Von Karman believed that you could make things scientifically. My father went on to become a leading pioneering of American Rocketry and, with Von Karman, founder of NASA's Jet Propulsion Lab. The team led by my father is credited with launching the first human-made object into space.

When my father started working on rockets he was a student; his fellow students were all headed for the booming aeronautics industry, the internet of its time; they couldn't believe he would waste his education on a field as absurd as rockets. Rockets were in such bad repute that they use the word Jet Propulsion rather than the word Rockets. My father and a motley group of students started making rockets. As a student group they had no funding, just the informed consent of Von Karman; their first funding came in cash in a brown paper bag. Two of the crew, Jack Parsons and John Foreman (3), were amateur rocketeers; one an amateur chemist, the other into white magic. They kept blowing things up on campus and became known as The Suicide Squad and were forced to move into an Arroyo. The group went on to found a leading aerospace

company, Aerojet General Corporation and was major contributors to what became the space program. They were makers.

During the McCarthy years in the USA my father got caught up in the communist red scare, was indicted, lost his passport and lived as a refugee in Paris just as his startup company made him a millionaire. The FBI files of the period are now public (4); in these files there are interesting interviews with "informant No 11". Informant No 11 claimed my father was a communist and had tried to delay the winning of the war. Informant No 11 asserted that my father insisted on doing too many experiments and mathematical calculations rather than just building and firing rockets. My father had of course learned this view of scientific making from Theodore Von Karman. The group had developed mathematic models of air flow in nozzles to guide the design of larger and better ones; they did calculations of multi stage rockets to optimize the weight to propellant ratio; they carried scientific experiments of novel rocket fuels. For them, successful making required the best scientific theory, the best mathematics and the best prototyping and experimenting; a scientific "making". The group disbanded. Ironically one of their team, Tsien Hsue-shen (5), was expelled from the US against his will and went on to head the Chinese rocket program and became a member of the Chinese politburo. Little did Informant Number 11 know how he would change the course of history.

Unable to continue working as a scientist, my father in midcareer became an artist. When I was growing up I would come home from school to find my father, the research engineer, painting in our living room. As he experimented with various forms of painting, collage, assemblage, and moiré grids he come obsessed with introducing real motion into his paintings, In the mid-fifties he started exhibiting what became to be known as 'kinetic art' (6) and he became one of there pioneers of that art movement . He started putting light bulbs and motors into his paintings to make the patterns move. To his dismay his paintings would sometimes burst into flames because the heat from the light bulbs was too intense. He solved this problem in a classic 'eureka' moment one Christmas. We were at the dinner table and next to us was a Christmas tree with one of the first available garlands of flashing Christmas tree lights. In the middle of dinner, my father stood up suddenly, rushed to the Christmas tree and grabbed the lights to put them into his kinetic painting. Problem solved.

As my father continued to develop his kinetic paintings, he started studying psychology, visual perception and cognitive sciences. He didn't understand why artists didn't use the theory and science of perception to help them in their art making. How could you use the science of color and motion to create specific moods?; what speeds were best suited for particular kinds of artistic expression?; how did the brain integrate sound and sight? Just as my father had applied mathematics to rocket nozzle design he applied the most recent science to help him in his art making. There was a prevalent view that artists should paint and not talk or write about their work; there were even 'gate-keepers' known as art critics who explained what the artists intended. My father was aghast. As a scientist he had written about his ideas and his work, even though his avocation was not as a writer.

Why should he not, as an artist, be able to write about his ideas and discoveries?

My father went on to found the international art-science Journal Leonardo (7) now celebrating its 45th year. Artists write about their work, explain their ideas and document their discoveries in the open literature; until then most artists kept their inventions as secrets of the trade. For him scientific making involved also collaboration with your peers and sharing your ideas.

Today's hacker and maker cultures are inheritors of many aspects of the ethos of scientific making that my father believed in. Use theory and mathematics to short circuit un-necessary experimentation; experiment and prototype before building the real thing; share your problems and discoveries with your col-leagues; create ways for scientists and engineers to collaborate with artists and designers; pursue your idea even if the Academy thinks it is stupid (universities are conservative and change slowly); put together teams of the best people, whether or not they have the right diploma; it sometimes helps to give your idea a new name. Today the proliferating technologies from 3-D printing to on-line collabor-atories to new forms of publishing and curating work, enable in new ways the kind of scientific making my father espoused. But the institutional blockages for collaboration between science, engineering with art and design are still immense; un-necessary roadblocks exist and new opportunities stymied.

Over the last two years, with funding from the U.S. National Science Foundation, discussions have been held between scientists and engineers and artists and designers. A network, SEAD (9), is being set up to help identify roadblocks and opportunities, to bridge the academic and non-academic, for profit and nonprofit research commun-ities, the formal and informal hacker and make communities. The citizen science commun-ities are beginning to have a real impact on the way science is done and the direction scientific research will take; how can we build flexible, evolving collabor-ation communities that bridge disciplines and institutional frameworks ?. We have issued a call for White Papers from members of the community (9) and will be forwarding a meta-analysis of all the recommenda-tions the various stake-holders. We encourage the hacking and make communities to partici-pate in the discussion and actions of the SEAD network.

Oh Yes. And watch out for Informant No 11. You never know when he will kill your idea dead or maybe change the course of history to help create the Chinese Rocket Program and the Kinetic Art Movement.

References and Notes

1. Frank Malina web site is at: http://www.olats.org/pionniers/malina/ malina.php . A recent documentary provides an excellent overview: http://www.jpl.nasa.gov/podcast/content.cfm?content=1029

2. Theordore Von Karman: http://www.nas.edu/history/members/ karman.html

3. Jack Parsons http://en.wikipedia.org/wiki/John_Whiteside_Parsons > There is a voluminous literature of the many aspects of Parsons.

4. Excerpts from the Frank Malina FBI files are available at http:// malina.diatrope.com/frank-malina/frank-malina-fbi-files/ .

5. Tsien Hsue-shen : see Iris Chang's book Thread of the Silkworm: http:// www.amazon.com/Thread-The-Silkworm-Iris-Chang/dp/0465006787

6. Frank Malina, " Kinetic Painting : The Lumidyne System ", Leonardo, Vol. 1, N° 1, pp. 25-33 (1968) available at http://www.mitpressjournals.org/ doi/abs/10.1162/leon.2007.40.1.81 . See also the book Kinetic Art: Theory and Practice : http://www.amazon.com/Kinetic-Art-Practice-Frank-Malina/dp/048621284X

7. The Leonardo organisations, ISAST:International Society for the Arts, Sciences and Technology and OLATS: Observatoire Leonardo des Arts et Technosciences, have published the work of over 7000 new Leonardos. Find their work documented at www.leonardo.info and www.olats.org

8. SEAD: network for Science Engineering Art and Design: http:// sead.viz.tamu.edu/index.html

9. The White Paper call is at: http://sead.viz.tamu.edu/white_papers.html

Excerpts from "Make it Yourself" (1927) – useful in showing how historical DIY practice was often utilitarian and required considerable manual skill. Pay attention to the words "easy" and "simple." Try making some of these; let me know how it goes. (GH)
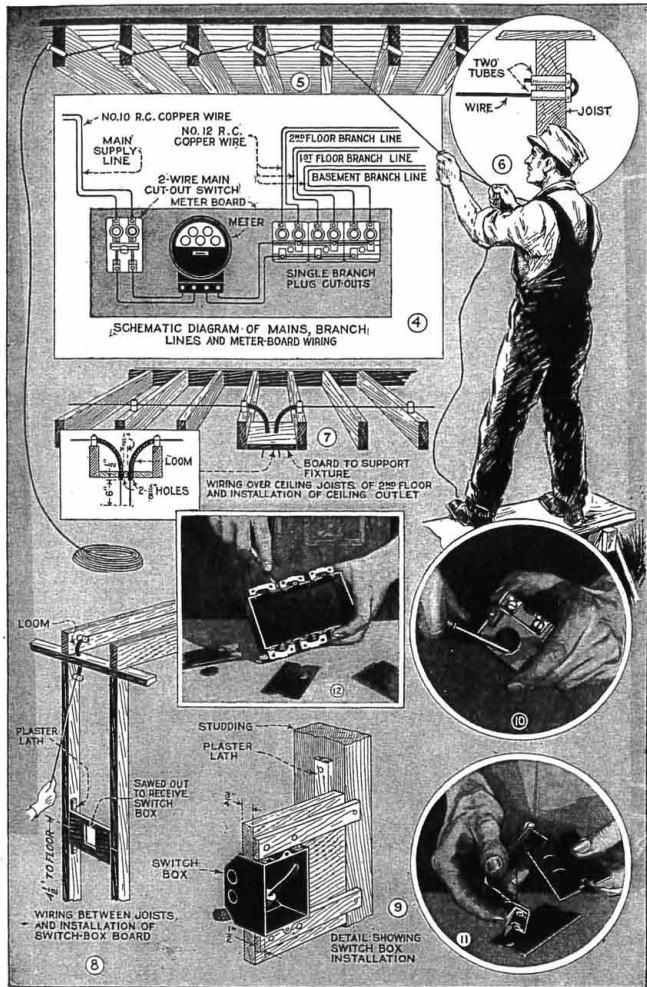
Baby Crib Made from Barrel

The latest contribution to a baby's ward in a hospital in Oakland, Calif., is a "barrel crib," which was devised to meet the shortage of baby cribs. The barrel was sawed out as shown and was mounted on a simple wooden frame made of 1 by 4-in. material. The barrel was padded on the inside with a heavy comforter, which was tacked on. The outside was rubbed down smooth with sandpaper, and given a liberal coat of white enamel, and a neat brass drawer handle was screwed to each end, so that the crib could be carried around conveniently. A number of these cribs have been made, and have given every satisfaction.—Miss Seline Hess, Oakland, Calif.
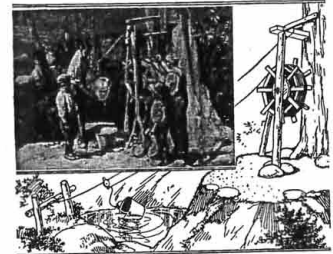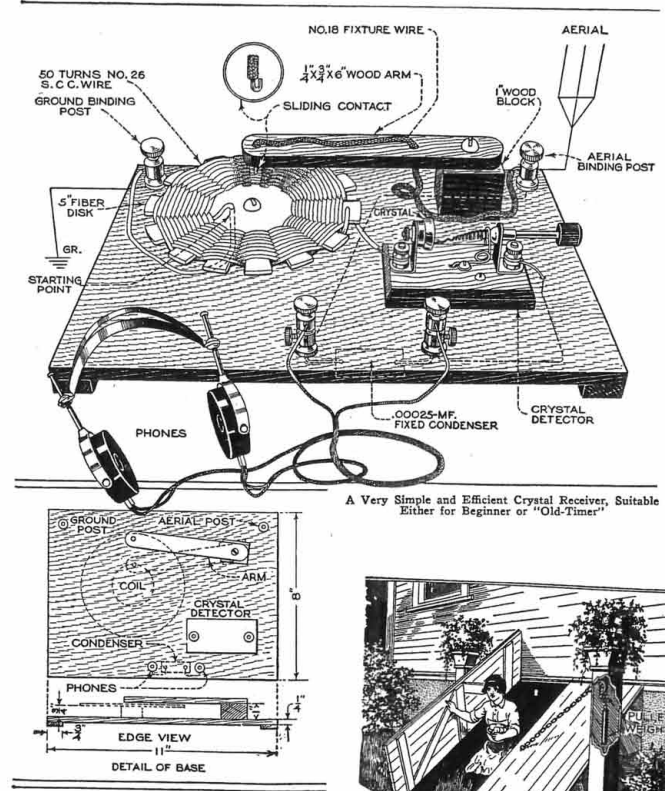

A Handy Conveyor for Lifting Water up Steep Inclines, That Saves Hard Climbing
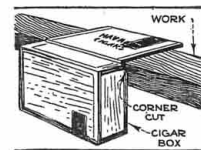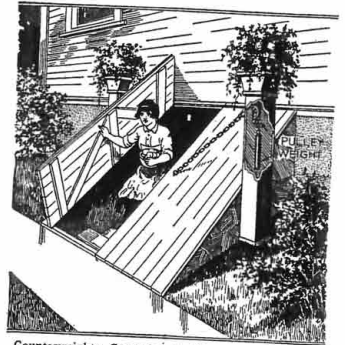

Fig. 1
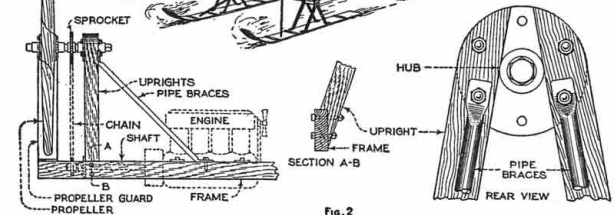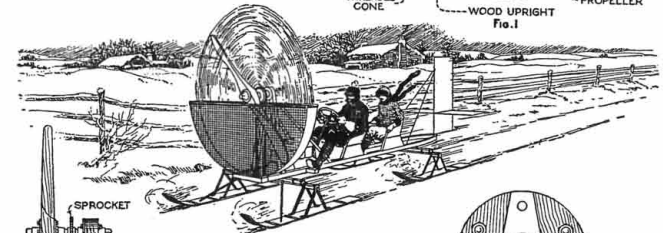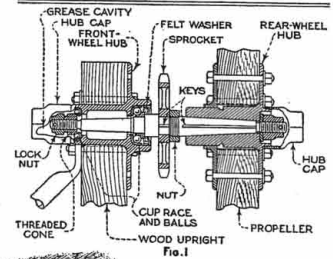
An Exceptionally Neat Mounting for an Aero Propeller, Made from Standard Automobile Parts, Which Are Easily Obtained and Renewed
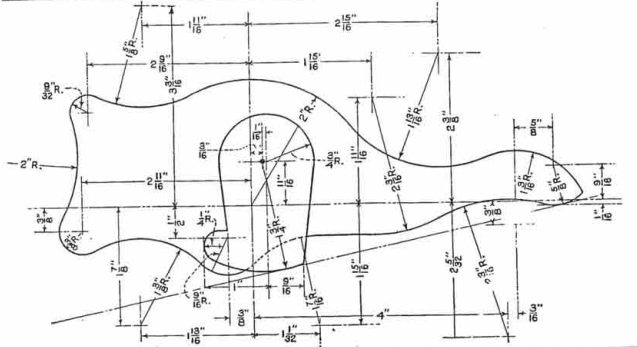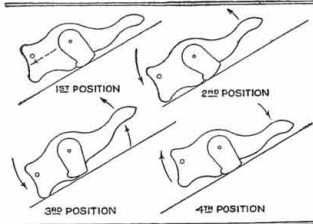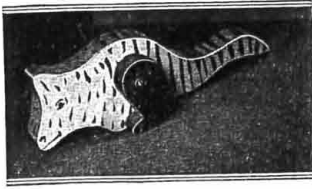
Fig. 2

Left illustration

NO.10 R.C. COPPER WIRE

NO.12 R.C. COPPER WIRE

MAIN SUPPLY LINE

2ND FLOOR BRANCH LINE

1ST FLOOR BRANCH LINE

BASEMENT BRANCH LINE

2-WIRE MAIN CUT-OUT SWITCH METER-BOARD

METER

SINGLE BRANCH PLUG CUT-OUTS

SCHEMATIC DIAGRAM OF MAINS, BRANCH LINES AND METER-BOARD WIRING

④

⑤

⑥ TWO TUBES — WIRE — JOIST

⑦ BOARD TO SUPPORT FIXTURE

LOOM — 2 HOLES

WIRING OVER CEILING JOISTS OF 2ND FLOOR AND INSTALLATION OF CEILING OUTLET

LOOM

PLASTER LATH

STUDDING

PLASTER LATH

SAWED OUT TO RECEIVE SWITCH BOX

SWITCH BOX

TO FLOOR

WIRING BETWEEN JOISTS, AND INSTALLATION OF SWITCH-BOX BOARD

⑧

⑨ DETAIL SHOWING SWITCH BOX INSTALLATION

⑩

⑪

⑫

Various Details of a Good Wiring Job Which Can Be Done by an Amateur, No Special Skill Being Required to Do This Work

Right illustration

50 TURNS NO.26 S.C.C. WIRE

GROUND BINDING POST

NO.18 FIXTURE WIRE

¼" X ¾" X 6" WOOD ARM

SLIDING CONTACT

AERIAL

1" WOOD BLOCK

AERIAL BINDING POST

5" FIBER DISK

GR.

STARTING POINT

CRYSTAL

.00025-MF. FIXED CONDENSER

CRYSTAL DETECTOR

PHONES

A Very Simple and Efficient Crystal Receiver, Suitable Either for Beginner or "Old-Timer"

GROUND POST

AERIAL POST

ARM

COIL

CRYSTAL DETECTOR

CONDENSER

PHONES

EDGE VIEW

11"

8"

DETAIL OF BASE

WORK

CORNER CUT

CIGAR BOX

PULLEY WEIGHT

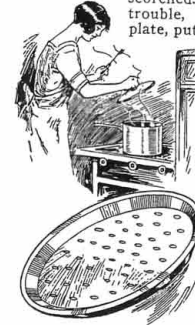Counterweights Concealed in Ornamental Posts Aid in Opening Heavy Cellar Doors

A Weird Toy That will Delight the Youngsters: It Walks down an Inclined Board without the Aid of Springs, Gears, or Other Mechanical Parts


A Novel and Effective Amusement Device for the Youngsters Made from Parts Everywhere Available; Insert, Detail of Roller-Skate Mounting

Preventing Food from Burning

Practically all cooks, at times, place a plate in the bottom of a cooking pot to prevent puddings or other food from burning. Very often the hot fire drives the water from under the plate, which then becomes too hot and the food is at least scorched. To prevent this trouble, take a tin pie plate, put it over a piece of wood and with a nail and hammer punch a number of holes in the plate from the inside. This leaves all the roughness of the punched holes on the underside, which is placed on the bottom of the pan. There will be no danger of scorching or burning when this plate is used, because it is impossible to force all the water out on account of the numerous holes. There are factory-made articles used for this purpose, but a tin plate with punched holes as described is just as good.—James E. Noble, Toronto, Can.

An Ice-Block Fence for a Hockey Field Is Just as Good as a Wooden Fence and Is Much Cheaper
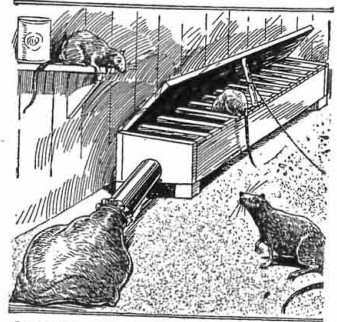
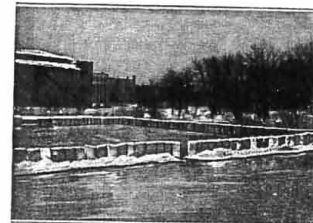Combination Poultry Feeder and Rat Trap That Is Simple to Make and Very Effective

"Anchoring" the Cow's Tail

Anyone who has milked cows has suffered from the annoyance caused by the animal switching its tail around to chase
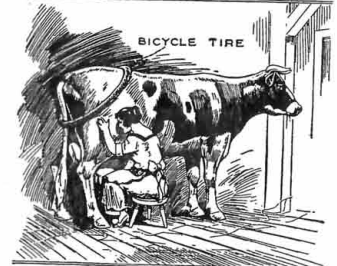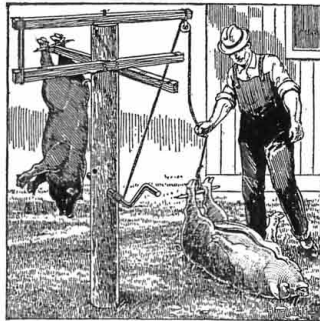

Simple and Effective Method of Preventing Cows from Switching Their Tails

away the flies. This trouble can be prevented very easily if there is an old bicycle tire lying around the yard. The tire is simply thrown over the cow's back as shown. This idea has been tried and found very effective.—F. H. Chick & Co., Strong, Me.

A Hog Hanger That can Easily be Operated by One Man without Any Assistance

Using Rubber Floor Mat as Water Carrier for Filling Radiator

Emergency Filler for Radiator



Adjustable Handle Facilitates Work of Boring Shallow Wells by Hand
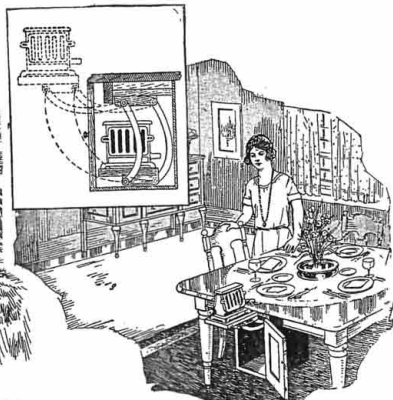
Novel and Convenient Arrangement for Toaster underneath Table Top

Combination Gocart, Baby Bed and Walker

The handiest article I have ever used in the way of a baby vehicle is the combination gocart, baby bed and walker shown in the illustration. It is inexpen-

VIEW OF GOCART FOLDED

Combination Gocart, Baby Bed and Walker Can Be Used Both Indoors and Outdoors
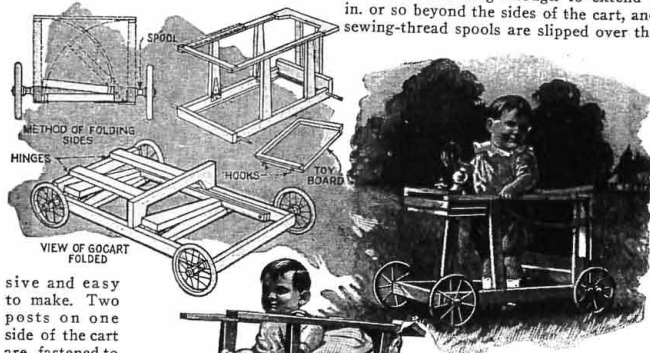
sive and easy to make. Two posts on one side of the cart are fastened to its base and fitted with a bare-faced tenon as shown, the hinges on this side being screwed to the bottom of the post and to the bottom side of the base. The other two posts are hinged on top of the base so that they will fold over the other side. The board used for the rear base should be about twice as wide as the sidepieces, so that the rear end will fold over the side sections. As shown in the photo, the hinges are fastened to the outside and top of this board and to the bottom of the posts, so that they will fold either in or out. By putting the hinges on in this way, the rear section can be folded over the two side sections, or outward so that it may be lowered and held in place with straps when used for a bed. The top of the cart extends forward and a table for toys can be attached to this extension. The table is made of veneer or thin board and molding and is fastened with hooks so that it can be removed when the cart is folded. Any odds and ends about the home can be used to make it. The size of the wheels and axles is immaterial, the axles being threaded or drilled to hold the wheels on. The rods should be cut long enough to extend 1 in. or so beyond the sides of the cart, and sewing-thread spools are slipped over the axle between the wheels and cart. Rubber pads, cut from an old inner tube and tied over the hubs, prevent furniture from being scratched. Various kinds of seats may be used; a swinging seat attached by means of straps, or a piece of strong elastic buckled or pinned on with strong safety pins. The cart may be used for teaching the baby to sit alone, the swinging seat being lowered to the floor and used as a balancer. At a very early age, long before the infant is strong enough to carry very much weight on its feet, it learns to push the cart. The cart can be strapped to the seat or placed on the floor of an automobile and, if the seat is made of a baby swing or something similar, the child cannot possibly fall or be thrown out of it.

The same construction may be used to make a cart that does not fold, using small nails or screws instead of hinges. If the cost of rubber-tired wheels is considered too high, ordinary casters will be found equally satisfactory.—Rose Scandlyn-Benziger, Knoxville, Tenn.

// HACKING THE SPACES

A critical acclaim of what was, is and could be a hackerspace (or hacklab, for that matter) // Johannes Grenzfurthner / Frank Apunkt Schneider (monochrom) // Reprinted with permission from http://www.monochrom.at/hacking-the-spaces/

// Hackerspaces 1 // History

The history of the so-called hackerspaces expands back to when the counter culture movement was about to make a serious statement. In the decade after the hippies attempted to establish new ways of social, political, economical and ecological relationships, a lot of experiments were carried out concerning the construction of new spaces to live and to work in. These were considered as niches to relieve and rescue people from the monotonous way bourgeois society directed civic spaces from kindergartens to cemeteries to be exactly the same and to reproduce its patriarchal and economical order. The politics of establishing open spaces were meant as explicit statements confronting a capitalist (and in the East: an authoritarian communist) society whose very structure, purpose and operating mode were broadly considered to "alienate humans", to take control of and to modify their basic human needs and relationships. Thus, the failed revolt of the sixties survived and flourished in the shadows of a ubiquitous bourgeois lifestyle. And the idea of change was conjured up from nebulous lysergic dreams and pathetic speeches to get one's dreams and/or feet back on solid ground - to be dis-obamaized, if you like. This conversion gained its popularity because macro-political hippie dreaming ("I had too much to dream last night" as the title of a classical psych pop tune by 'The Electric Prunes' put it) had completely deteriorated. The hippies learnt that social and political change demanded more than just joining the mantra of posters, pop songs and drug fantasies that were promoting it. The real world was way too tough to be impressed by a bunch of filthy bourgeois drop-outs mantra-ing about change. The capitalist imperative of the real world was way too effective to really be changed. And yet, when it all was over in 1972, some of the people involved were not ready to give in and give themselves

over to the system and to fade into integration - hence the launching of micro-political tactics. Instead of trying to transfer the old world into a new one people started to build up tiny new worlds within the old world. They made up open spaces were people could come together and try out different forms of living, working, maybe loving and whatever people do when they want to do something. It is necessary to have a look at the historical development of political movements and their relationship to spaces and geography: the students' revolt of 1969 was driven by the idea of taking back places and establishing a different psychogeography within the maze of the city through détournement. Likewise, the autonomia movement of the late 1970s that came to life in Italy and later influenced people in German-speaking countries and the Netherlands was about appropriation of spaces, be it for autonomous youth centres or appropriation of the airwaves for pirate radio. Thus, the first hackerspaces fit best into a countercultural topography consisting of squat houses, alternative cafes, farming cooperatives, collectively run businesses, communes, non-authoritarian childcare centres, and so on. All of these established a tight network for an alternative lifestyle within the heart of bourgeois darkness.

// Hackerspaces 2 // Present

Hackerspaces provided room where people could go and work in laid-back, cool and non-repressive environments (well, as far as any kind of space or environment embedded into a capitalist society can be called laid-back, cool and non-repressive). Sociological termed "third spaces" are spaces that break through the dualistic scheme of bourgeois spatial structure with places to live and places to work (plus places for spare time activities).

They represent an integrative way that refuses to accept a lifestyle which is formed through such a structure. This means they can come to cooperative and non-repressive ways of working on e.g. technical problems that may result in new and innovative solutions. And that's exactly where Adorno's "Wrong Life" could slip in too. The Capitalist system is a highly adaptable entity. And so it isn't surprising that alternative spaces and forms of living provided interesting ideas that could be milked and marketed. So certain structural features of these "indie" movement outputs were suddenly highly acclaimed, applied and copy-pasted into capitalist developing laboratories. These qualities fit best into the tendency in which -- by the end of the seventies -- bourgeois society started to update and re-launch using the experiences gained through countercultural projects. Mainstream harvested the knowledge that was won in these projects and used it. Normalizing dissent. Uh yeah. Thus, the sixties revolt and all the micro-revolutions that followed turned out to be a kind of periodical refreshment. As a system, capitalism is always interested in getting rid of some of its old-fashioned oppressive traits that might block its overall evolution and perfection. As an example: eco-capitalism became trendy, and it was quite effective generating capitalist "good wealth" and capitalist "good feelings". Hackerspaces today function differently than they initially did. When the first hackerspaces were formed there were always clear distinctions (an "antagonism") between "us" (the people resisting) and "them" (the people controlling). Certain people did not want to live and toil within the classical bourgeois working scheme and refused to be part of its ideological and political project for some pretty good reasons. The otherness of the spaces back then was determined by the consistency of a bourgeois mainstream culture on the basis of a dualistic cold war world order. Here again they proved to be third spaces of a different kind: neither state nor free trade capitalism. And being structural and ideological different from that had been

an important political statement and stance. In a society easily distinguished into mainstream and underground categories, each activity carried out within the open space of such an underground was a step from the wrong direction. The very practice of making personal use of alternative structures came with assurance of being on the good side. But post-cold war society established a different order that deeply affected the position of the hackerspaces. While on the one hand it got harder and more repressive, the system (a clever one!) learned to tolerate things that are different (in the pipeline of integrating or assimilating them) and to understand that it always has been the edges of normality where the new substance grows. Milking covert culture. Before that, the open intolerance and often brutal oppression carried out against countercultural spaces only made them stronger and their necessity more evident (at least where society didn't succeed in crushing them). Thus, alternative life forms were applied ideally as a rejuvenation of what was old, boring, conservative and impotent to progress and adapt in an ever changing bourgeois present. New ways to solve technical (and aesthetical) problems were cooked up in the underground and bourgeois talent scouts watched closely to occasionally pick this or that, just as it happened in the field of pop music with the so-called alternative rock of the nineties. Alternative mainstream, ahoi! On the other hand, the nineties marked the triumph of liberal democracy, as Slavoj Žižek writes: "The fall of the Berlin Wall on 9 November 1989 marked the beginning of the 'happy 1990s'. According to Francis Fukuyama, liberal democracy had, in principle, won. The era is generally seen as having come to an end on 9/11. However, it seems that the utopia had to die twice: the collapse of the liberal-democratic political utopia on 9/11 did not affect the economic utopia of global market capitalism, which has now come to an end." It's thus highly ironic that geeks and nerds, while watching the death of liberal democracy in its political form (civil liberties granted to keep the social peace) as well as its economic form (crisis) turn to become liberal-democratic defenders of an ideology that has already failed. Without the political demarcation lines of a cold war society, hackerspaces changed sometimes without even noticing it. The political agenda was mushroomed by individual problems that techno nerds tried to solve in nice fearless atmospheres, non-aggressive states where the aggressiveness of the market was suspended; where one could discuss technical and creative problems and challenges politely with likeminded people. As such, the political approach faded away on en route into tiny geeky workshop paradises. The micro-politics failed on the same scale and to the same extent as older macro-political projects got pulverized through the irreversibility of capitalism. The idea of having a revolution (of whatever kind) was domesticated into good clean reformism, and the only revolutions that lay ahead were the technological semi-revolutions of the internet and its social web sprouts. Without former political agendas hackerspaces turned into small places that did not really make fundamental differences. Comparable to the fall of squat houses becoming legal in status and turning into new bourgeois housing projects where the cool urban bohemians live their lives commuting steadily between art world, underground, IT-business and advertisement agencies. This may not be the case for all the hackerspaces out there today, but it should be noted that most have travelled along the same paths. And while for a long time the macro-political scheme had worked quite well to provide the inherent difference that had been attached to all of the activities carried out in hackerspaces (even to things as trivial as soldering, pottery lessons or juggling trainings), it is missing now. And due to this deficiency hackerspaces can no longer be shaped and politicized on a broader scale. And that clearly means that whatever we might do: our hackerspace communities remain constricted; nothing more than nutrient fluid for breeding human resources. (Soylent Google is made of people!)

So what can be done about this? Actually, it is not very hard to find something to protest against. Surveillance, whatever. It's no problem to use the prefix "anti". Use rule 76 - as long as you can think about it, you can be against it. But that's just too simple. Never before in the history of bourgeois society has everything been as fucked up as it is right now. But what is lacking amongst all the practising going on in hackerspaces is a concise theory of what bourgeois society is like and what should be attacked by us building and running open spaces within that society. The lovely alternative approach we share should be grounded in such a theory, which is to be read: a political agenda that lends some revolutionary glam to what we are doing on a daily basis making technical gadgets, networking through the world, or utilizing our technological and programming skills. To get there we really need a more explicit sense and understanding of the history of what we are doing, of the political approaches and demands that went into it long ago and that still are there, hidden in what we do right now. So to start off we would like to organize some workshops in the hackerspaces where we can learn about the philosophical, historical and other items that we need to get back in our lives. Theory is a toolkit to analyze and deconstruct the world. Plus, we need to reflect and understand that the hackerspaces of today are under the "benevolent" control of a certain group of mostly white and male techno handicraft working nerds. And that they shape a practise of their own which destines most of the hackerspaces of today. (It is hard to understand that there are hackerspaces in certain parts of the US that don't have a single African-American or Latino member. But we'd like to keep our European smugness to ourselves. We have to look at our oh-so-multicultural hacker scene in Europe and ask ourselves if hackers with a migrant background from Turkey or North-African states are represented in numbers one would expect from their percentage of the population. Or simply count your women representation and see if they make 50% of your members.) As such, we find today's hackerspaces excluding a lot of ethnical and social groups that don't seem to fit in or maybe feel so and are scared by the white male nerd dominance, their (maybe) sexist or exclusionist jokes or whatever might be contributed to them. Or perhaps they don't have the proper skills to communicate and/or cooperate with the packs of geeky guys (or at least they might think so). What is needed is the non-repressive inclusion of all the groups marginalized by a bourgeois society just as it had been the intention of the first hackerspaces in countercultural history. If we accept the Marxian idea that the very nature of politics is always in the interest of those acting, hackerspace politics are for now in the interest of white middle-class males. This needs to change. Well, that's all for the moment. Let's start to work on this and see what would happen if we change the somehow boring hackerspaces of the present into some glamorous factories of an unpredictable freedom for all of us even those who do not fit in the classical nerd scheme. Change the nerds. Make them a better space. For you and for me and the entire human race.   //
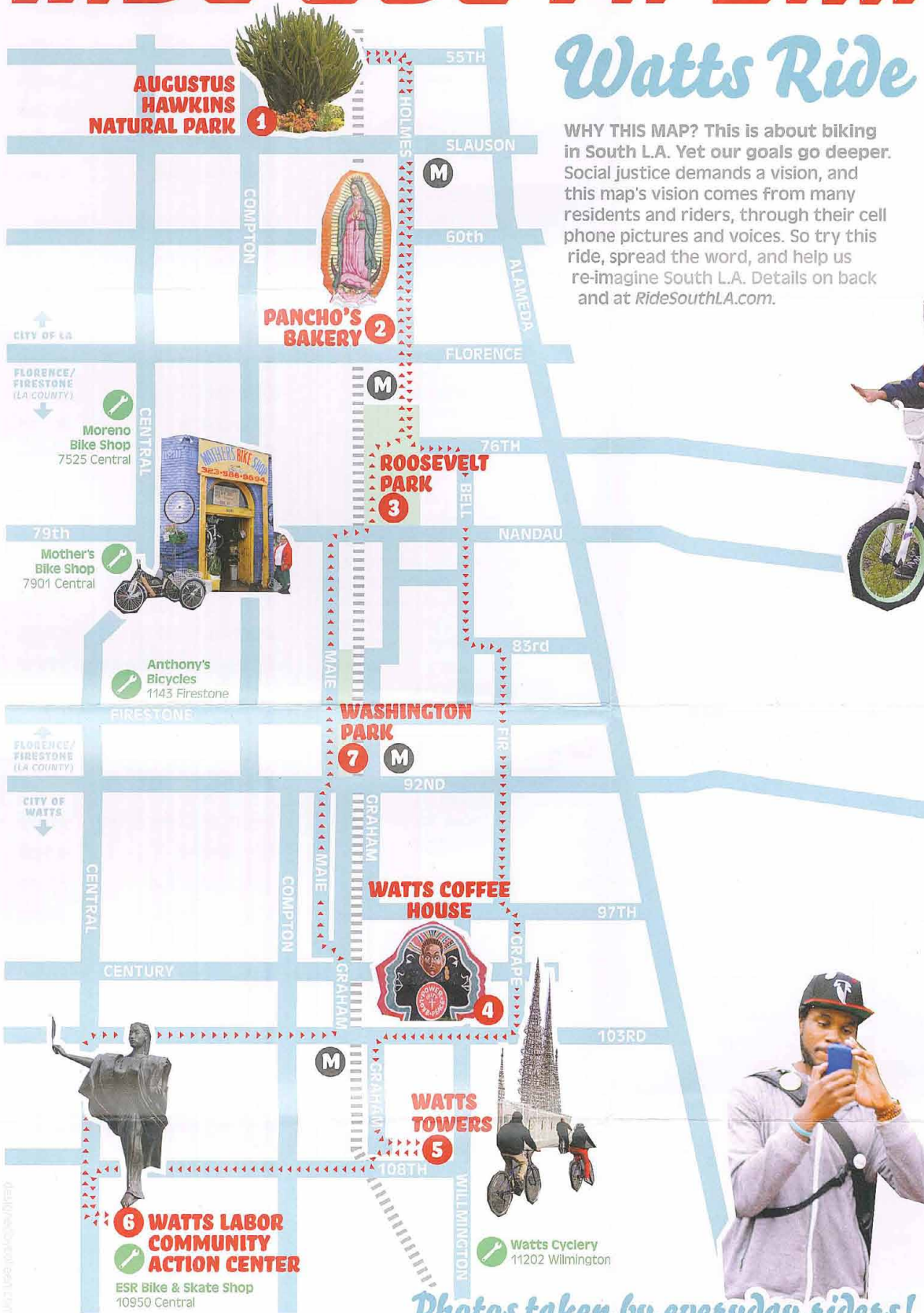
SYSTEM UPGRADE

NOW

RIDE SOUTH L.A.

Watts Ride

WHY THIS MAP? This is about biking in South L.A. Yet our goals go deeper. Social justice demands a vision, and this map's vision comes from many residents and riders, through their cell phone pictures and voices. So try this ride, spread the word, and help us re-imagine South L.A. Details on back and at *RideSouthLA.com*.

1 AUGUSTUS HAWKINS NATURAL PARK

2 PANCHO'S BAKERY

3 ROOSEVELT PARK

7 WASHINGTON PARK

4 WATTS COFFEE HOUSE

5 WATTS TOWERS

6 WATTS LABOR COMMUNITY ACTION CENTER

Moreno Bike Shop
7525 Central

Mother's Bike Shop
7901 Central

Anthony's Bicycles
1143 Firestone

ESR Bike & Skate Shop
10950 Central

Watts Cyclery
11202 Wilmington

Photos taken by everyday riders!

RIDESOUTHLA.COM

HOW TO GET TO THE START OF RIDE

110 **From the 110:**

Exit Slauson and head East. Turn left on Compton. The Augustus Hawkins Park parking lot is immediately on your right.

M **Using Metro:**

You can take your bike on public transit buses and trains. This gives you flexibility to cut your ride short or extend it by looking for where these stops are.
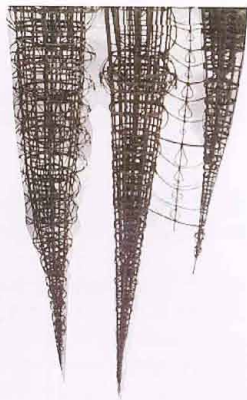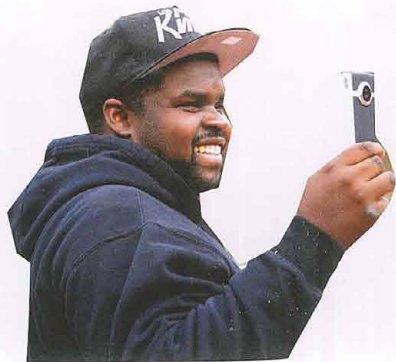
Say Hello!

The community is friendly, **especially to group rides**. Wave to neighbors that you pass. Seeing more bikes in the neighborhood will get more people biking there.

▸▸▸▸ **Bike Route**

|||| **Metro Blue Line**

M **Metro Stops**

🔧 **Bike Shops**
see RideSouthLA.com for more info

RIDE SOUTH L.A.
Watts Ride

RIDESOUTHLA.COM *for more info*

Partner Organizations

T.R.U.S.T. SOUTH LA

EASTSIDE RIDERS COMMUNITY MOVING FOWARD

Annenberg Innovation Lab

C.I.C.L.E.

Metamorphosis
Research Practice and Social Change

CICLAVIA

How this map was made

This bicycling map to the iconic Watts Towers was created and pedal-tested by more than 60 cyclists. They followed a path scouted by cycling clubs in advance and documented the ride live with camera phones. During the ride, a live map of the pictures was displayed on iPads mounted to some of the bicycles. A graphic designer turned the stream of pictures into a printable map. To stay authentic to its contributors, the map was tested in workshops with community organizers, researchers and neighborhood residents.

Watts Ride Route

START AT AUGUSTUS HAWKINS NATURE PARK

NORTH on Compton		0.2 mi
R 57th St		0.4 mi
L Morgan Ave		0.1 mi
R 55th St		0.2 mi
R Holmes Ave		1.3 mi

ROOSEVELT PARK AHEAD

EXIT PARK TO L 76th Pl		0.1 mi
R Bell Ave		0.6 mi
L 83rd St		463 ft
R Fir/Anzac Ave		1.1 mi
L 97th St		213 ft
R Grape St		0.4 mi
R 103rd St		0.3 mi
L Graham Ave		0.3 mi
L 107th St		

WATTS TOWERS ON LEFT

WEST on 107th St		0.1 mi
L Graham/Willowbrook		295 ft
R 108th St		0.7 mi
L Central Ave		

WLCAC ON LEFT

NORTH on Central Ave		0.5 mi
R 103rd St		0.6 mi
L Graham Ave		0.2 mi
L Century Blvd		240 ft
R Maie Ave		335 ft
L 99th St		82 ft
R Maie Ave		0.3 mi
R to stay on Maie Ave		0.2 mi
R 92nd St		148 ft
L Maie Ave		0.5 mi
L Firestone Blvd		79 ft
R Maie Ave		0.5 mi
R Nadeau St		89 ft

ROOSEVELT PARK ON LEFT

NORTH Holmes Ave		1.3 mi
L 55th St		0.4 mi
L Compton Ave		0.1 mi
L 57th St		341 ft

AUGUSTUS HAWKINS NATURE PARK

Get Involved

REQUEST AND REPORT FOR BIKES
You can ask the city to install bike racks, to fill potholes, and more – contact LADOT using links on RideSouthLA.com, or call 311.

SHARE THIS STORY
Post pictures of your ride to Facebook (or whatever you use!), and tell what it's like to ride in South L.A. – your voice is critical to shifting the vision for a future Los Angeles.

BRING YOUR NETWORK
The number of riders depends on how many people you bring to South L.A. or convince to go. What's your pull?

JOIN A CAMPAIGN IN SOUTH L.A.
Campaigns for social change require joining with partners, and many connect directly to this map. See RideSouthLA.com to find out how to connect with organizations working in affordable housing, food justice, transportation issues and more.

Points of Interest

1 AUGUSTUS HAWKINS NATURAL PARK
5790 Compton Ave
M-F: 9am-6pm
Sat & Sun: 9am-5pm
8.5 acre natural park with landscaping replicating the nearby Santa Monica mountains.

2 PANCHO'S BAKERY
1759 E Florence Ave
Traditional Mexican bakery, known for delicious bolillos and pastries.

3 ROOSEVELT PARK
7600 Graham Ave
Open: Sunrise to Sunset
Built as a WPA project during the Great Depression, the park is one of the oldest in L.A. and has been recently renovated.

4 WATTS COFFEE HOUSE
1827 E. 103rd St
T-F: 8am-3pm
Sat: 8am-1pm/Sun: 10am-4pm
A coffee shop in Watts that specializes in soul food and serves an all-you-can-eat buffet on Sundays.

5 WATTS TOWERS
1727 East 107th St
www.wattstowers.us
W-Sat: 10-4 / Sun: 12-4
Tours (every 30 mins):
Th & F 11-3
Sat: 10:30-3/Sun: 12-3

Italian immigrant Simon Rodia built the Watts towers by hand from scrap materials between 1921 and 1954. Today, the Watts Towers continue to serve as a cultural landmark for the community of Watts.

6 WATTS LABOR COMMUNITY ACTION CENTER
10950 S. Central Ave
www.wlcac.org
ESR Bike+Skate Shop: 323.895.0368

The WLCAC has been working to improve the Watts community since the 60s. Look for the Mother of Humanity Statue and the Joseph Randall Skate Park and mural. The WLCAC is home to the Eastside Riders Bike and Skate Shop.

7 WASHINGTON PARK
8908 S. Maie Ave
Open: Sunrise to Sunset

A former lumber yard turned into a narrow park abutting the Metro Blue Line tracks.

Made:

technology on affluent leisure time

JOIN THE
ARDUINO
REVOLUTION

BUT AVOID CIVIL DISOBEDIENCE

Open Source Secret Revealed: Everybody Just Buys The Kit!

101 DIY Gadgets For White Males

How To Use a MakerBot to Make a Three Cent Piece o' Plastic

KA-POW!

$25.99 US/$25.99CAN
Display Until April 1

Make This
DARPA
ROCKET
3 Hours, Start to Launch!

O'REALLY

Critical Making