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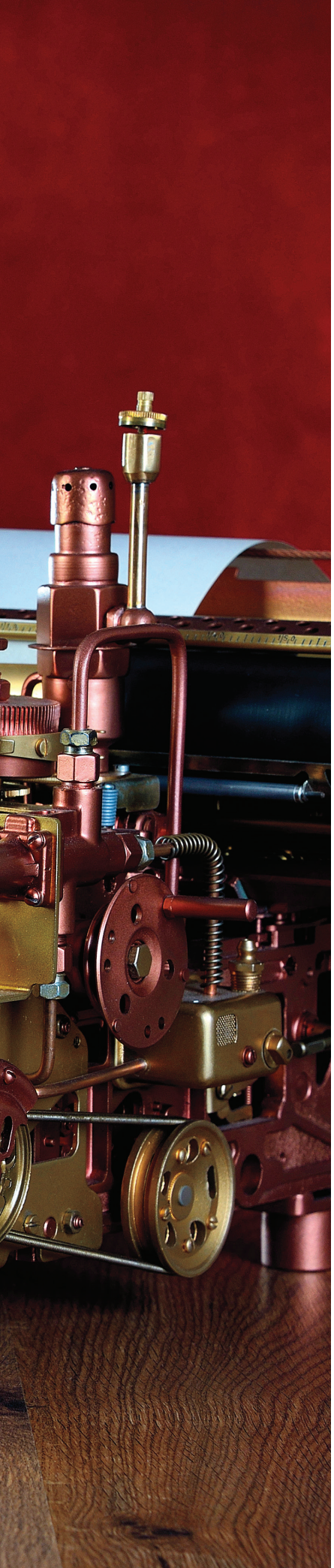

# Steampunking Interaction Design: Principles for Envisioning Through Imaginative Practice

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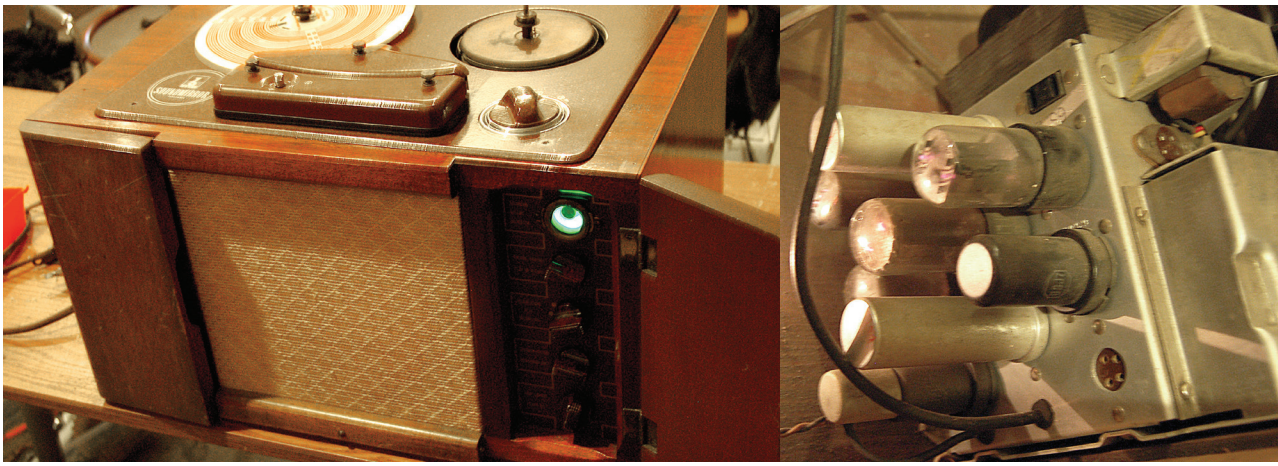
*Behind the glass loomed a vast hall of towering Engines ... It was like some carnival deception, meant to trick the eye—the giant identical Engines, clock-like constructions of intricately interlocking brass, big as rail-cars set on end, each on its foot-thick padded blocks. The white-washed ceiling, 30 feet overhead, was alive with spinning pulley-belts, the lesser gears drawing power from tremendous spoked flywheels on socketed iron columns.*

—William Gibson and Bruce Sterling, *The Difference Engine*

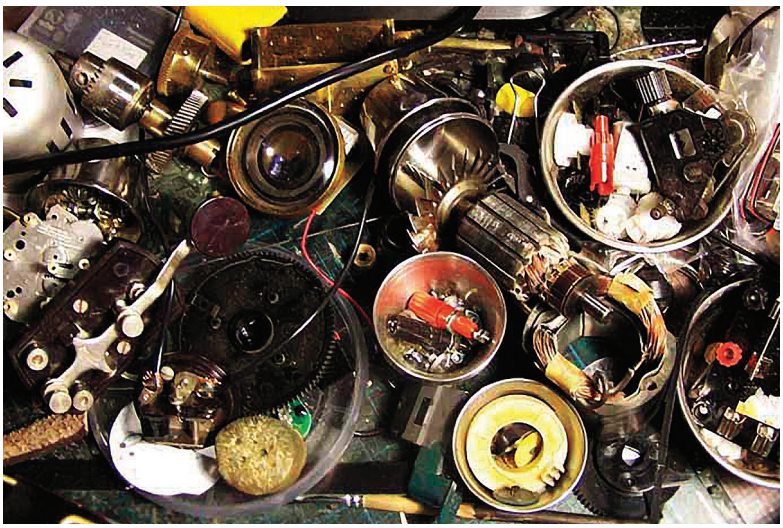
Clacking mechanical computation; majestic dirigibles; clockwork automata; gleaming machines of brass, copper, leather, wood, and glass; gentlemen in top hats, ladies in corsets and everyone in burnished brass goggles and pocket watches—these are the trappings of the Steampunk aesthetic. Originating as a minor literary genre that blended Victorian- and Edwardian-era aesthetics with modern technology, Steampunk has grown into a complete subculture connected to a community of DIY (do it yourself) practice. Within this community, the precise definition of Steampunk is a subject of ongoing debate—every practitioner has his or her own personal stake in what Steampunk was, is, and should be. We see it as existing at an intersection of a number of interesting practices: an aesthetic fascination with the technology of a past that never happened; a contemporary practice of appropriation and envisioning; a critique of current industrial processes and scales; a fashion statement and a subcultural lifestyle.

Research and reflective practice are not foreign to the Steampunk


▸ Figure 1. The Steampunk Xbox 360.



▸ Figure 2. Work-in-progress images of our Steampunk Media Center computer, built in the reclaimed body of an antique tape recorder and radio.



▸ Figure 3. A collection of raw materials from the workbench of one of the Steampunk makers we interviewed.

community, a group that valorizes science and invention as core values. We come to Steampunk as both practitioners and researchers. As practitioners we create Steampunk artifacts and characters, engage in online discussions within the Steampunk community, and attend conventions and events. As researchers we have conducted in-depth case studies with Steampunk practitioners, including open-ended interviews, video walkthroughs of processes of making, and the collection of images of processes and projects. The line between these two roles is often unclear. This year we ran a series of workshops and classes on Steampunk making at the large Maker Faire in the Bay Area, and a smaller Maker Faire in Portland, Oregon. In this context we were both teachers and students—researchers and subjects—as we observed workshop participants with a wide range of experience (in some cases far outstripping our own) as they tinkered, explored, and questioned. Debating the nature of Steampunk is a central pastime for Steampunks: Alongside making, it forms one of the pillars of the community, which continually grapples with the various conflicting value systems that arise when one

attempts to reclaim the beautiful parts of history without also repeating its moral and ethical missteps.

Much of Steampunk takes the form of recasting modern digital technologies into a fantastic neo-Victorian form, as in the case of our own Steampunk Xbox (Figure 1), and our ongoing Steampunk media-center project (Figure 2). By blending the past, present, and (imagined) future of technology, Steampunk makers critique mass production, industrialization, and a perceived uniformity of contemporary design culture. The relationships and values modeled by these practices provide a useful lens for thinking about the future of interaction design, and for understanding our evolving relationships to technology.

We like to view Steampunk through the lens of what Julian Bleecker and Bruce Sterling have termed *design fiction* [1, 2]. Design fiction, as defined by Sterling, is the "deliberate use of diegetic prototypes to suspend disbelief about change" [3]. *Diegetic* is a term from film studies that refers to things that exist inside the world of the fiction [4]; for example, diegetic music in a film would be a song playing on a radio in a scene while non-diegetic music would be what the audience hears—part of the film's score—but which isn't part of the film's narrative world. The concept of diegetic prototypes, referenced by both Sterling and Bleecker, comes from film scholar David Kirby, who uses it to "account for the ways in which cinematic depictions of future technologies demonstrate to large public audiences a technology's need, viability, and benevolence" [5]. This is a central aspect of design fiction: It uses a fictional frame to make an argument about a potential future by demonstrating that future in a context that a large public audience can understand. A common example of this is the gestural interfaces in the Steven Spielberg film *Minority Report,* which took at least partial inspiration from ongoing work by John Underkoffler and the Tangible Media Group at MIT. Bleecker describes how *Minority Report* gave the public a concrete narrative of gestural interaction—a common touchstone conjured through the magic of film—writing that "[*Minority Report*] is a powerful, gravity-like force providing a reference point through which science fact and science fiction swap properties and become partners in their own exploration of possible futures" [1]. Nathan Shedroff has traced in some detail the interplay between how the imagined tech of TV and film has inspired real-world technology designers, and how real-world advances contribute to even more creative visions of the future [6].

Design fictions are a form of what Stuart Reeves has termed *envisioning* [7], and they play an important role in how HCI addresses its work toward an imagined future. Envisioning and design fiction are tools of future-oriented design. They are often integrated into the process of designing and evaluating new technologies and practices and their broader cultural impact. Steampunk is an especially compelling form of design fiction because it uses appropriation and reimagination to create diegetic prototypes as a critique of contemporary relationships to technology [8]. DIY practices within the Steampunk community frequently express a punk sensibility: a "damn the man" resistance to the coldly efficient hegemonies of contemporary design. In order to make sense of the design practices of Steampunk makers, we need to accept and embrace several guiding principles:

- *Aesthetics matter.* Form is just as important as function, and as our technology becomes more invisible, form becomes much less beholden to function. Steampunk makers use new forms to express their own understanding of the functions of the technology: In Steampunk, form becomes symbolic of function rather than reliant upon it.
- *Communities "bootstrap" capabilities.* Design that might seem intimidating at first becomes possible when undertaken within a community of practice. Shared practice motivates the development of new skills and techniques as new makers take

inspiration from more established members of the community.

• *Design entails ethos.* No design is neutral. Design communicates value systems, cultural assumptions, and ethical commitments. In Steampunk making, this manifests as a commitment to reuse and sustainable practices, to community building, and to a critical reflection on the role of technologies that we might otherwise take for granted.

We have observed these principles in practice within the Steampunk community; however, we believe they have a general relevance to design within the HCI community.

### Aesthetics in Steampunk Practice

In Steampunk practice, we witness a celebration of the aesthetics of the industrial revolution: a period of time when a machine's function could be inferred from its appearance. Steampunk makers devote significant energy to collecting objects, materials, tools, and antiques for their projects. Most of them have large and carefully constructed collections of copper, leather, wood, and glass, often reclaimed from old household objects such as fans, chandeliers, candleholders, typewriters, and other machinery (see Figure 3). Steampunk makers develop a keen eye for the kinds of objects and materials that can easily be included in projects, with a particular love for antique technology such as vacuum tubes, Edison bulbs, springs, clock movements, and anything with gears and moving parts.

In a study of appropriation and identity, Binaebi Akah and Shaowen Bardzell [9] propose that Steampunk makers attach their own identities to artifacts by separating form from function, transforming the form to their own ends. This transformation reflects a narrative of reconnecting to machines whose functions have long since disappeared into featureless black boxes. Whether modifying an existing piece of technology, such as a laptop or mobile phone, or creating a new costume or mechanism from scratch, Steampunks expend significant effort to create artifacts that might have been built with the techniques and materials of an imagined era of Victorian high tech. Steampunk's diegetic prototypes express a world in which technology is elevated beyond the ordinary, invisible devices of our present day: Laptops sprout clockwork windup keys and brass chasing, and mobile phones are operated by punch cards. Often these modifications express a Steampunk conception of the object's functionality, a conception that is only loosely accountable to the actual functionality of the underlying technology.

### Communities Bootstrapping Capabilities

Contemporary Steampunk culture owes much to the Internet and the communities of practice that have arisen online to share techniques, post tutorials, debate principles, and generally create an ecosystem that supports and celebrates improvisation, exploration, experimentation, and bricolage. Although some prominent Steampunks, like the creator of the now legendary "Steampunk Laptop," Richard Nagy, were already skilled machinists and artists before discovering Steampunk, most practitioners are first drawn in by the aesthetics of the genre, later trying their hand at fabrication. The online Steampunk community provides a multitude of resources and information for the aspiring Steampunk practitioner. Experienced Steampunks will often undertake projects for the sake of developing a new technique or skill set. The spirit of exploration that pervades the community creates a safe space for taking risks, expanding capabilities, and acquiring new skills. As a community of practice, Steampunk cultivates what Lev Vygotsky might describe as a communal zone of proximal development [10]: an environment in which practitioners support each other in recognizing and attaining new capabilities. As a result, Steampunk makers are always taking on new projects and learning new techniques and skills.

Issues of form and function play into this aspect of Steampunk as well, through practices of reverse engineering. Many of the images of Steampunk artifacts that circulate online are not accompanied by documentation of how that object was fabricated. In our own practice, we often attempt to reverse engineer the designs of other makers who inspire us: By un-puzzling assemblages of different objects and textures and techniques, we attempt to convert form back into function—to deduce the hand of the craftsperson in the craft.

### Values and Politics in Steampunk Making

Steampunk practitioners encode their values in their design process. As Frank, a Steampunk maker from Montreal, explains, "I am convinced that the values in Steampunk should be shared with others. These values are: recycling materials, finding other functions to objects, enlarging your horizons, and regaining control over the fabrication of our everyday objects—compared to objects that are produced in industries thousands of kilometers away."

Steampunk values re-appropriation and sustainable design practices. Its adherents cultivate an eye for the potential beauty of broken items, a practice fundamentally rooted in a resistance to mass pro-

duction and consumerism. For this reason, the Steampunk community overwhelmingly favors handmade goods over manufactured "products": *wearing* a set of brass goggles might demonstrate one's allegiance to the community, but *making one's own* goggles solidifies membership. These types of practices cut against a technological economy that relies on regular cycles of obsolescence, but they also thrive on the raw materials cast off by that economy. The result is a communal value of reuse and experimentation. Bruce Sterling captured this when he wrote, "Frankly, the heaviest guys in the steampunk scene are not really all that into 'steam.' Instead, they are into punk. Specifically, punk's do-it-yourself aspects and its determination to take the means of production away from big, mind-deadening companies who want to package and sell shrink-wrapped cultural product" [11].

As Sterling notes in that article, Steampunk's celebration of rich materials, of handmade goods, and of counter-industrial practices and individual production owes much of its political identity to the Arts and Crafts movement of William Morris and John Ruskin. Emerging as a response to the aesthetics of mass production in the late 1800s, the Arts and Crafts movement valorized the process of individually crafting items by hand. Like Steampunk, Arts and Crafts design drew heavily on earlier aesthetics, styles, materials, and techniques, and, also like Steampunk, the Arts and Crafts movement was politically at odds with the machinery of industrialization and the design hegemonies it produced. In both cases, the practices and the artifacts of design reflect the politics and the values of its practitioners.

## Conclusion

The principles and practices that we have identified within the Steampunk community have implications for how we envision the future of interaction design. Steampunk's unique convergence of design fiction, DIY, and punk politics gives rise to a type of expert user that has not yet been conceptualized or addressed by the broader HCI community. Bruce Sterling argues that Steampunk's practices are born out of the realization that our technological infrastructures are rapidly becoming irrelevant: "We are a technological society. When we trifle, in our sly, Gothic, grave-robbing fashion, with archaic and eclipsed technologies, we are secretly preparing ourselves for the death of our own tech. Steampunk is popular now because people are unconsciously realizing that the way that we live has already died. We are sleepwalking. We are ruled by rapacious, dogmatic, heavily armed fossil-moguls who rob us and force us to live like corpses. Steampunk is a pretty way of coping with this truth" [11].

Steampunks have imagined a whimsical neo-Victorian fiction to frame their design practice: an optimistic lost age of adventure where invention, individuality, and innovation reign supreme. This fictional world reflects a set of values and relationships with technology, but that is not the most interesting or relevant thing that Steampunk has to offer the HCI community. Instead, it is in the practices of Steampunk makers that we can observe a possible future for interaction design: a future in which design is driven by aesthetics, grounded in a sustainable ethos, and aimed at serving the needs and preferences of distributed communities of engaged expert users.

**ENDNOTES:**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