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# Redeform: Participatory 3D Printing in Public Spaces

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**Abstract**

Redeform presents an alternative vision of 3D printing that complicates common divisions between human/machine, abstract/concrete, and high/low tech. It invites people to perform the functions of a 3D printer in order to collaboratively construct digital models from everyday materials in everyday spaces. At TEI, Redeform will serve as a site for discussion about values in digital fabrication design.

**Author Keywords**

3D printing; participatory art; hybrid fabrication.

**ACM Classification Keywords**

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

**Introduction**

"The machine is not an *it* to be animated, worshiped and dominated. The machine is us, our processes, an aspect of our embodiment."

– Donna Haraway, *A Cyborg Manifesto* [1]

Consider two scenarios: In one scenario a person meticulously follows a knitting pattern and translates text instructions into specific stitches in order to produce a garment. In the other, a computer-numeric controlled (CNC) knitting machine takes a digital model

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Figure 1: Top. A 1:10 scale model of the proposed project made using Jellybeans. Bottom. The laser guide used to guide maker(s) along 3D printer paths.

as input, translates it to a list of text commands, and mechanically creates stitches in a garment. Which of these scenarios describes digital fabrication? Which is more technically sophisticated? What is a person able to experience and express in each scenario? The way that we, as researchers and designers in HCI, respond to these questions has important implications for the kinds of making and makers that are included in a growing maker movement. Redeform attempts to provoke discussion and/or debate on these questions through the construction of an alternative system for 3D printing.

Redeform is a system that guides a human in building objects by following the instructions typically given to a 3D printer. As a functional system for making, it allows for the construction of digital models from everyday materials, in public places, and at scales that are still difficult for 3D printers to support. What is lost in precision and control is replaced by opportunities to collaborate with other makers and realize unexpected forms. As a critical art piece presented at TEI, Redeform invites researchers and designers of human-machine systems to experience an alternative to 3D printing and contribute to a conversation about the trade-offs that emerge with each configuration of humans, machines, materials, and context in making activities.

### The Mechanics of Redeform

The core functionality of a 3D printer is the ability to take a digital model of 3D object; slice it into layers, and split those layers into paths. A 3D printer consists of a programmable head that draws those paths with materials in order to reproduce a 3D form. Redeform mimics a 3D printer by using an actuated laser pointer

to communicate the position of a 3D printer head [figure 1]. It invites people to physically follow the pointer while “extruding” materials. Following the laser pointer guides the maker along the exact paths of a 3D printer and over time a physical version of the digital model emerges. The interaction can be conceptually understood as a 3D version of connect-the-dots.

At TEI, Redeform will be showcased as a participatory performance art piece that invites participants to construct a human-scale physical instantiation of the Stanford bunny using balloons. The Stanford bunny is a historic test bench model used to compare the efficacy (usually in terms of precision, resolution, and speed) of 3D printers. When conference attendees visit Redeform, they will be invited to blow up balloons and use markers to label them their desired heuristic for evaluating 3D printers (i.e. expressivity, cost, precision, discovery, sustainability). Then they will be invited to become the 3D printer and follow the pointer with the balloons they inflated and marked. Over the course of the exhibition a large physical version of the Stanford bunny will emerge from the collective breath and opinions of the exhibition attendees. We hope it will complicate human machine binaries, serve as a site for reflection on values in digital fabrication design, and prompt discussion about possible futures of 3D printing.

### Acknowledgements

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### References

- [1] Haraway, D. *Simians, Cyborgs, and Women: The Reinvention of Nature*. Routledge, 2013.