

Today

From 3D Printing and Personal Fabrication to Personal Design

- Personal Fabrication: Concepts and tools
- Fab Labs
- Personal Design and HCI

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The 3rd Digital Revolution?

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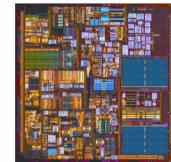
Digital Revolutions



analog → digital communication
~1945



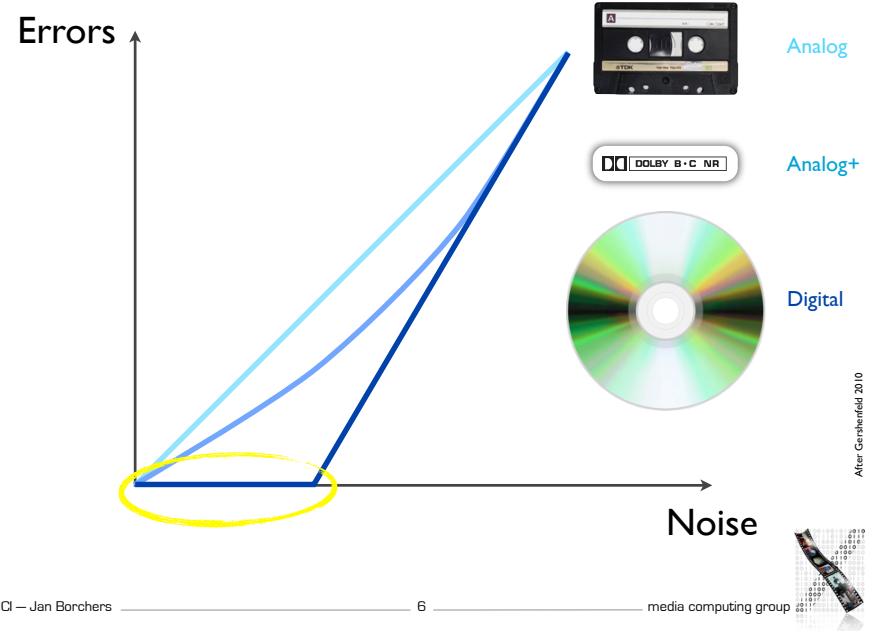
analog → digital computation
~1955



analog → digital fabrication
~2005



Source: Gershenfeld 2010



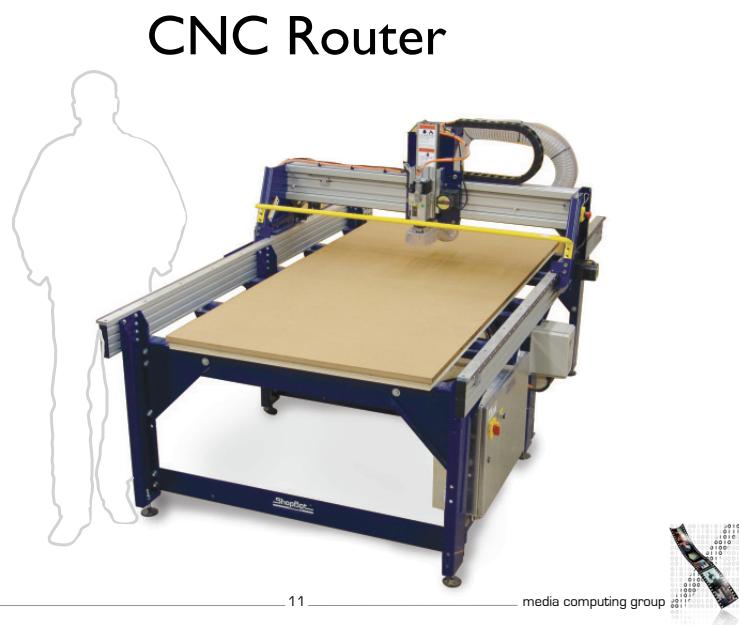
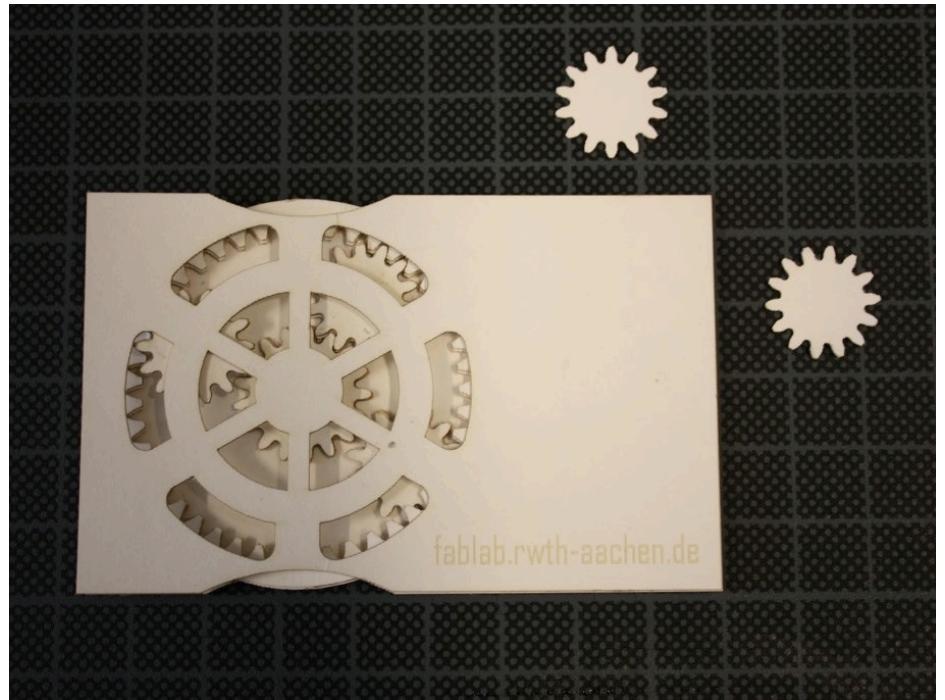
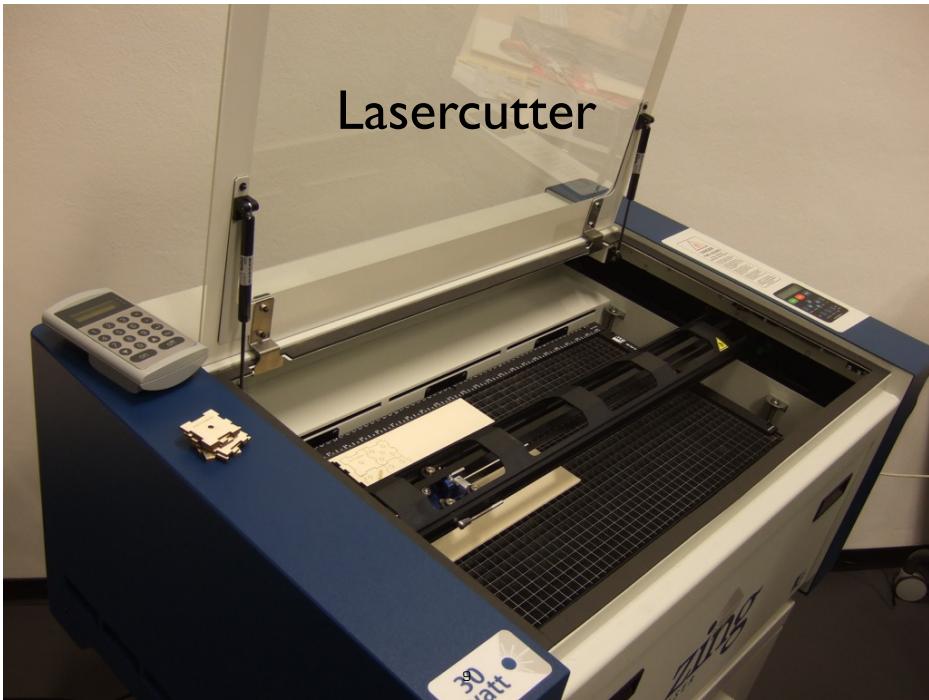
Personal Fabrication (Fabbing)

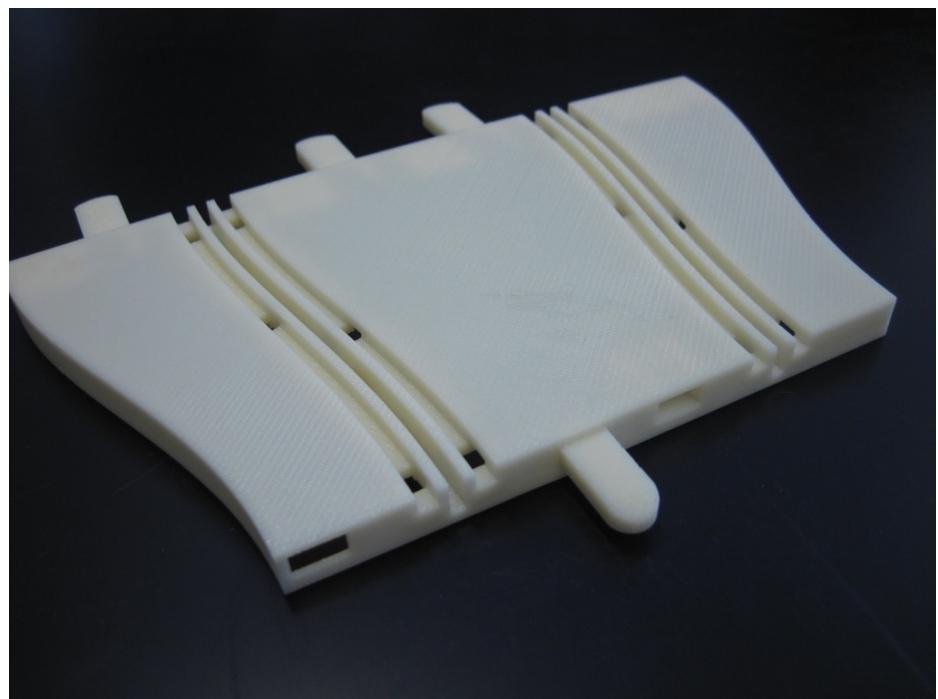
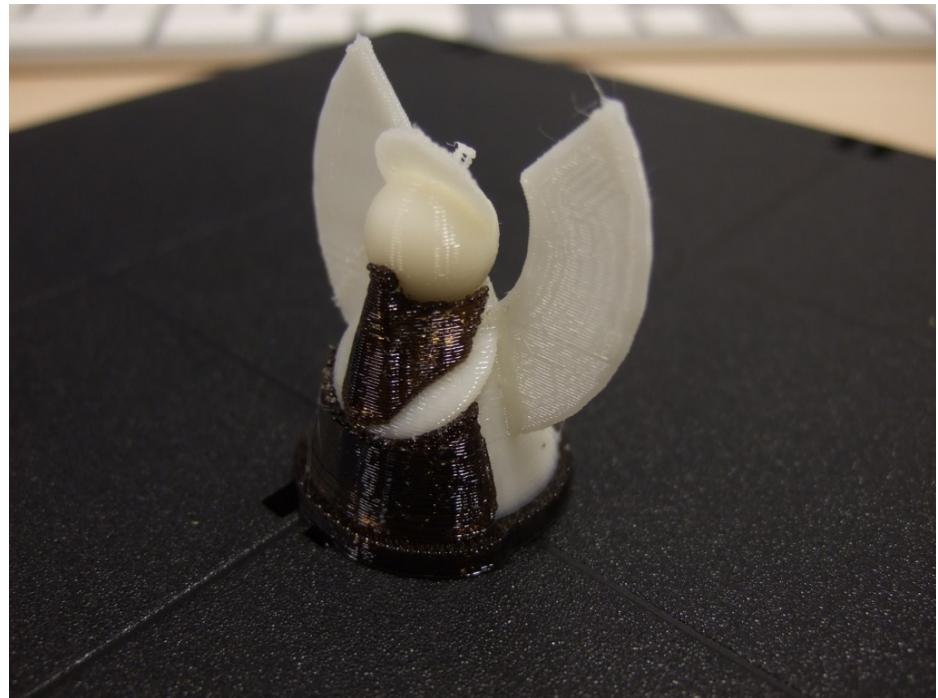
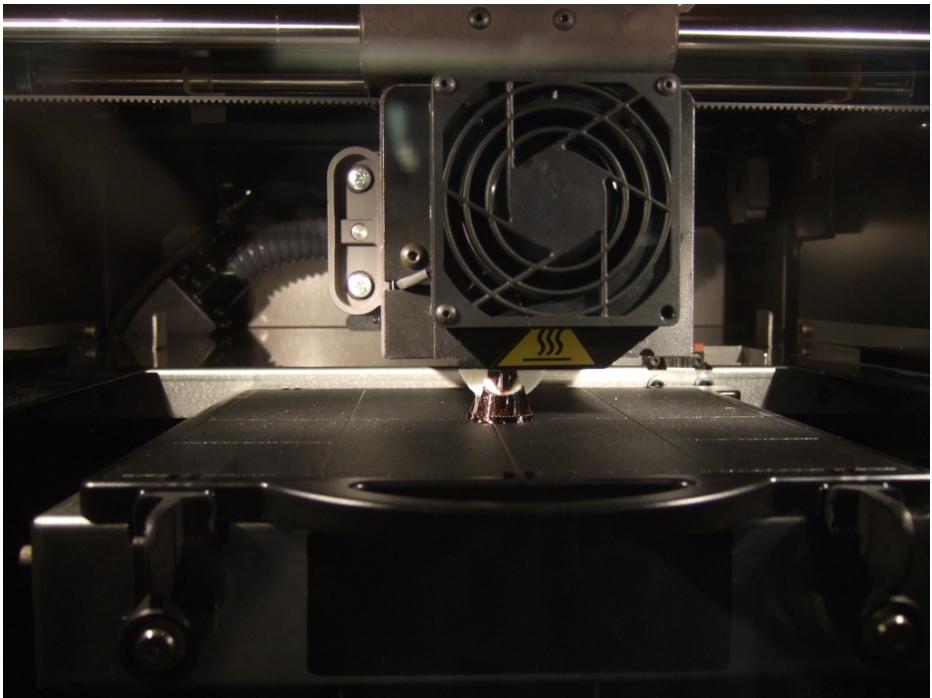
lossless

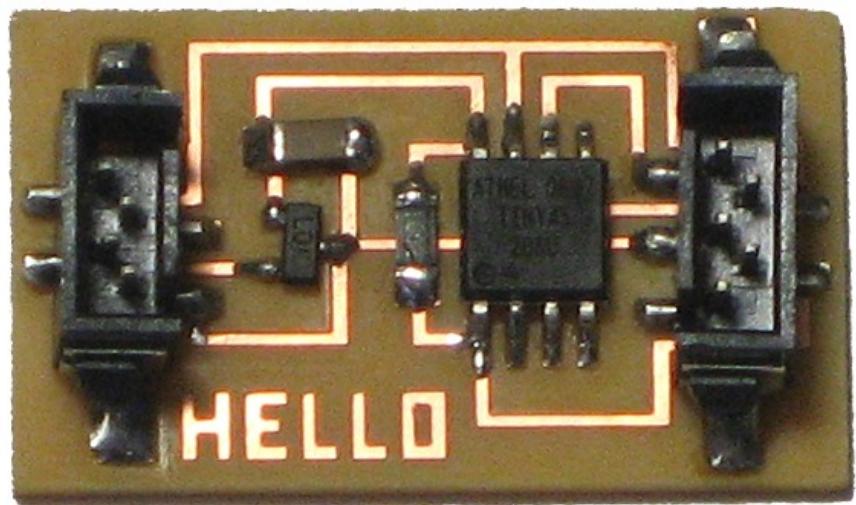
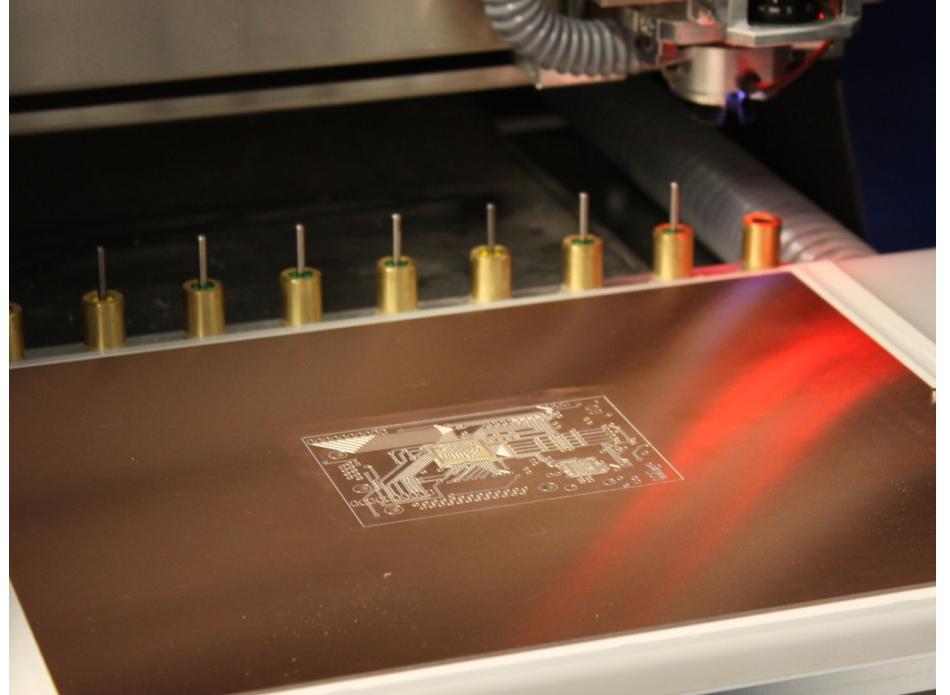
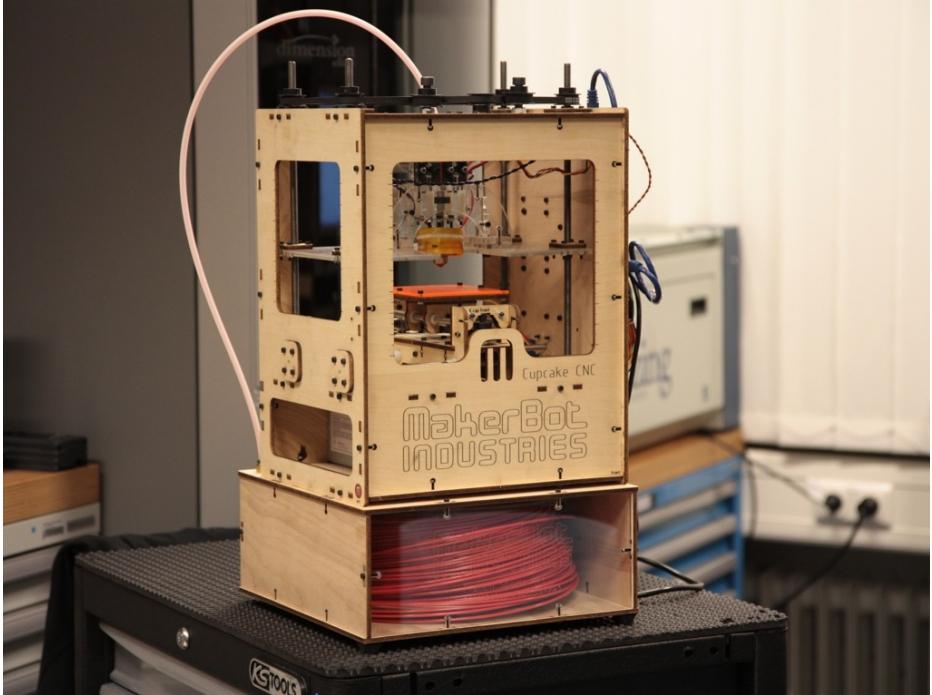
fast

cheap

- Personal, digital fabrication of goods
 - Personalizable to individual needs unlike mass-market products
 - Largely missed by corporate world until now



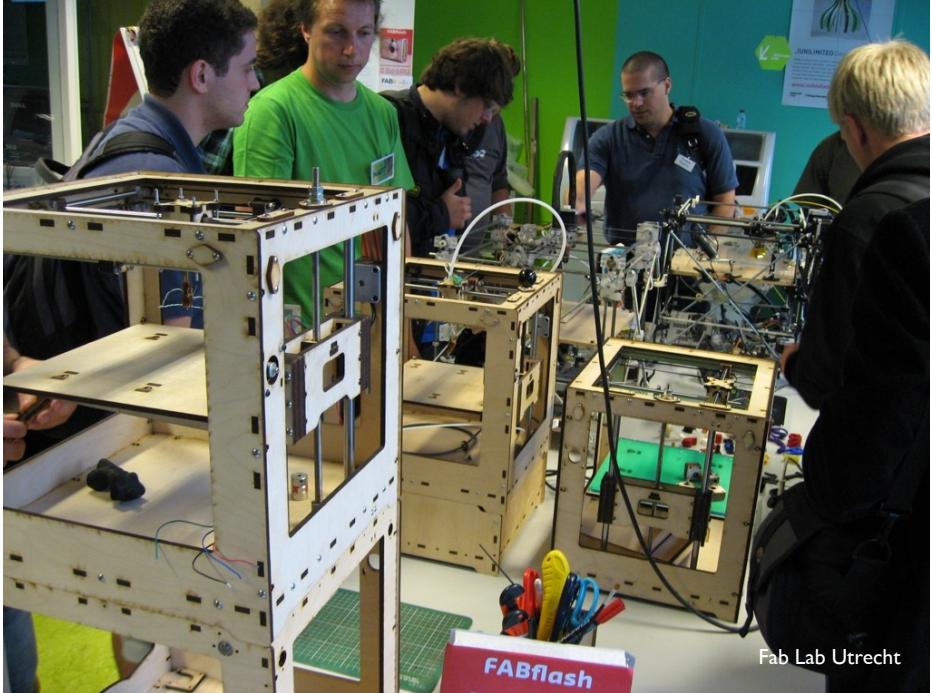




Four Stages

- Fab 1.0: Expensive digital machines on dumb materials
- Fab 2.0: Easily replicated machines that make (MTM)
- Fab 3.0; 4.0: Smart, self-arranging (replicating?) materials





Physical Literacy

- Correcting historical error ("liberal arts" excluded making stuff)
- Reunite arts and artisans, creator and consumer

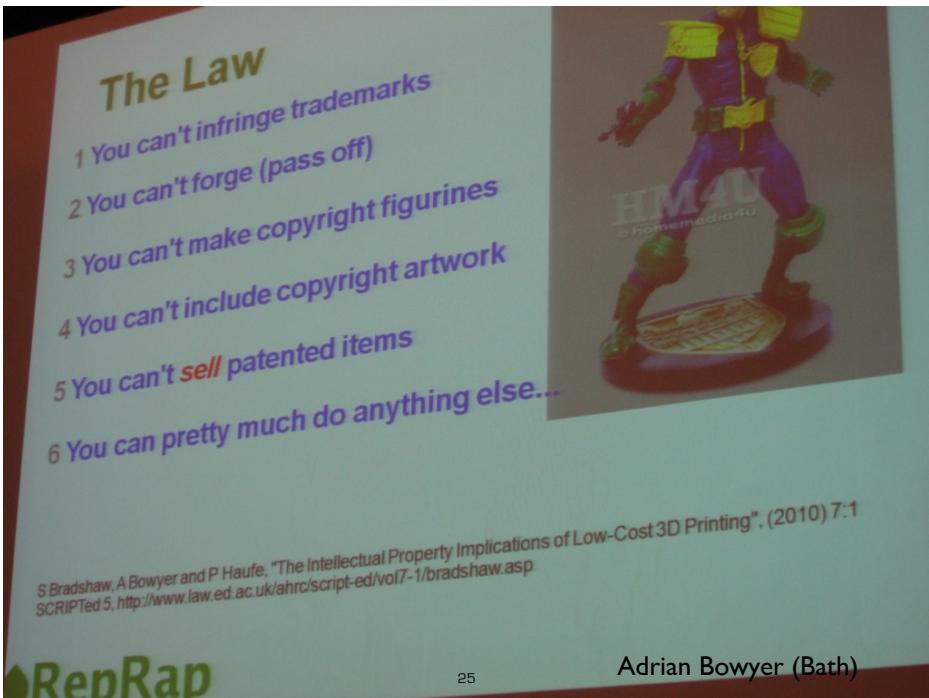


Impact on Society

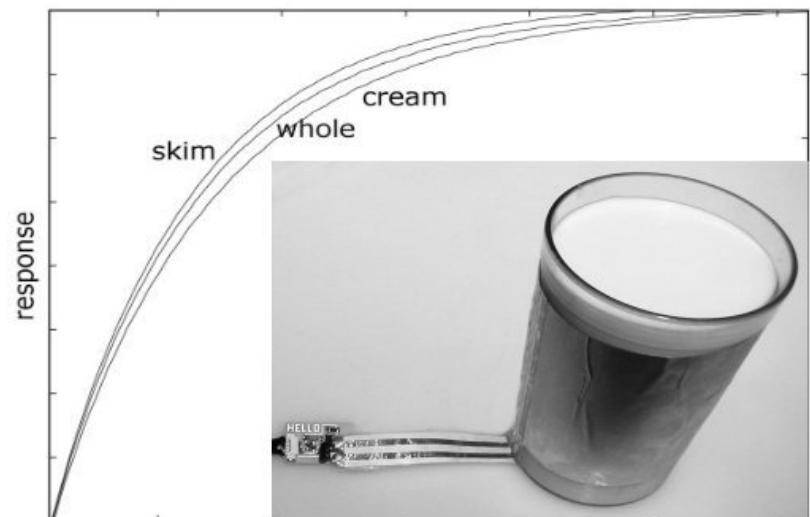


<http://www.bbc.co.uk/news/technology-22423883>





- Free, open access
- Teach “revolutionary” skills
- Community based
- 60 around the world
- Fab Lab Aachen: Germany’s first
- <http://fablab.rwth-aachen.de>



Source: Gershenson 2010



Personal Fabrication Enables New HCI Design/Research/Teaching Practices

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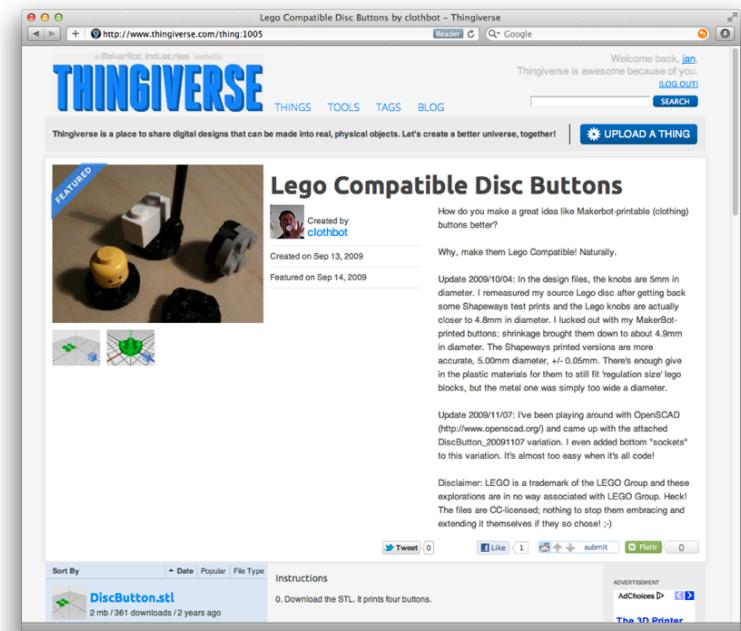
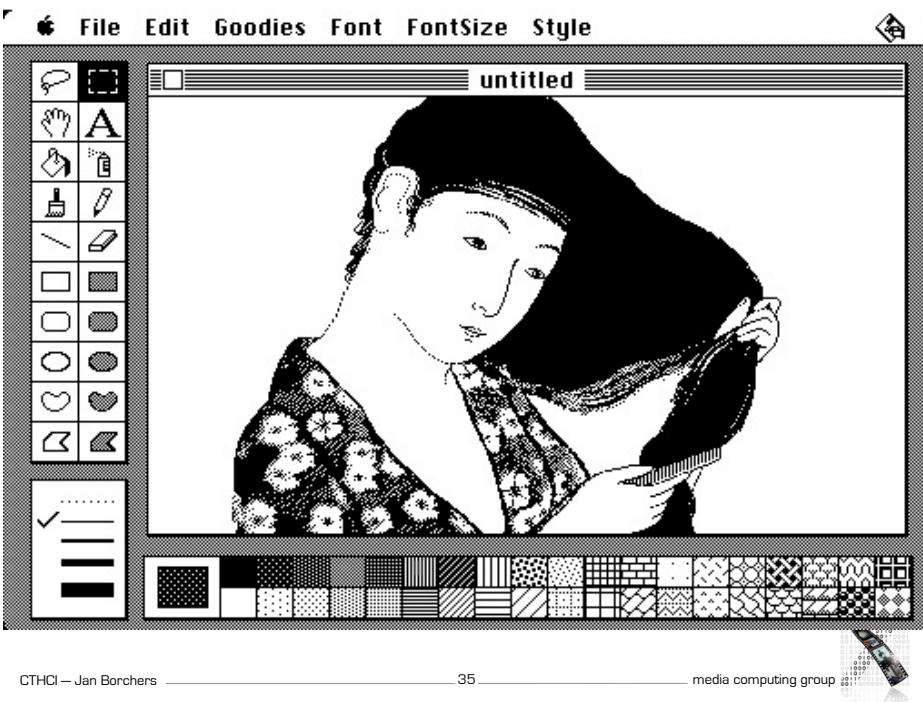
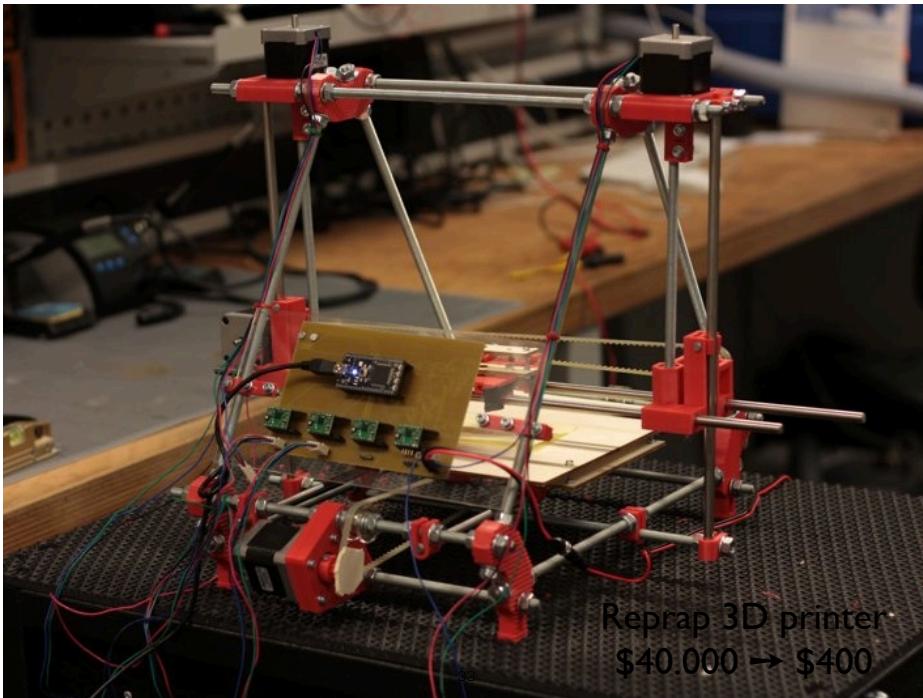
Personal Fabrication Requires New User Interfaces

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Make awesome stuff.

Flat is boring. Capture your world in 3D with free Autodesk 123D apps.

→ Meet the 123D Apps



123D 123D Catch 123D Sculpt 123D Make

Design stuff you really want to make, send it straight to a 3D printer.

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Automatically convert ordinary photos into extraordinary 3D models.

Shape and paint digital clay into amazing 3D sculptures on your iPad.

Transform 3D models into a pattern for assembling real artful creations.

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- The VisiCalc of LaserCutting
- Open-source, free
- <http://hci.rwth-aachen.de/visicut>

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~ VisiCut

Full Preview Cutting Preview Zoom: 517 Capture Foto

Laser Cutter

Epilog ZING @ Fablab

Material

Acrylic Glass

Total Height: 3.0 mm

Dimensions: 600 x 300 mm

Mapping: Engrave

Estimated Time: 00:08:10

Execute

FORMULOR® Create Design Design Templates Materials EPS/SVG upload Help Shopping Cart Login

Save in your Formulor account

Material Create design

Engraving

3 mm Acrylic GS orange, opaque 181x181 mm EUR4.34 plus shipping costs add to cart

interactive view

add layout...

Cutout Position X: 70.9 Y: 129.3 Width: 46.8 Height: 46.2 lock Rotate 30 Flip Composition Edit points Copy Delete shape

5.0 mm 74%

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Cassius Lamp
(AEC '09)





3D Scan

Parameterization

Download/Query

HOW?

AI, Assistants, Templates

Crowdsourcing

Gesture

Touch&Haptics

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Personal Design vs. Personal Fabrication

	Local Design	Outsourced Design
Local Fabrication	AutoCAD +RepRap	Thingiverse
Outsourced Fabrication	Shapeways	Traditional

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HCI Research Topics

- Tools for HCI Research
 - Examples: SLAP, Madgets, Pneumatic Displays (CHI 2009)
- Software for Fabrication
 - 123D Make (Autodesk)
 - SketchChair.cc (Igarashi)
- New Interactions for Fabrication (beyond CAD)
 - FreeD
 - Constructables

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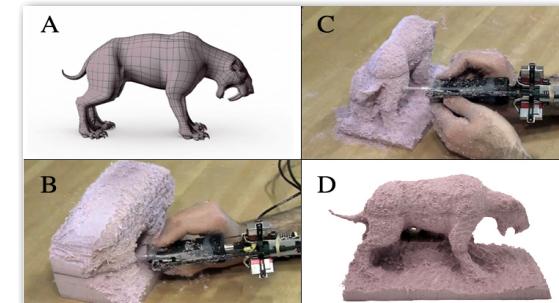
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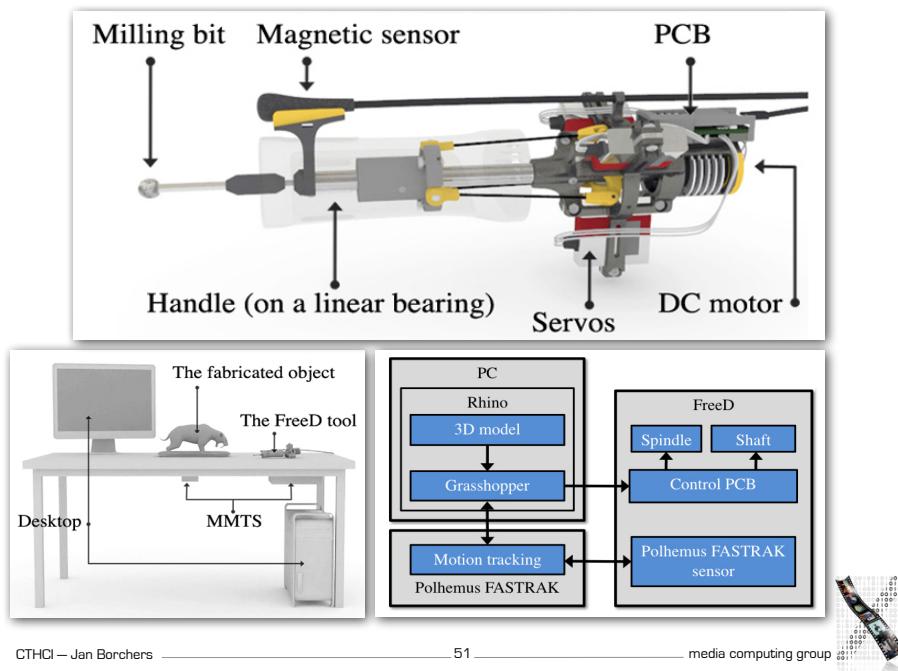
FreeD: A Freehand Digital Sculpting Tool

- Amit Zoran, Joe Paradiso (MIT), CHI 2013 (vimeo.com/59826043)
- Handheld milling device knows 3D model, constrains sculptor to avoid, e.g., carving too deeply



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Interactive Construction

- Stefanie Mueller et al. (HPI), UIST 2012 (youtu.be/8g3LaF9oVFY)
- Use laser pointers to draw on material, lasercutter cuts interactively





- “People doing strange things with electricity”
- International network of people doing interactive art and electronic hacks
- We launched the Aachen dorkbot chapter in 2009
- Meetings every 3rd Wed of the month, here (room 2222)
- dorkbot.de

