Introduction to Personal Fabrication

CTHCI'20 – Marcel Lahaye

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Process Documentation in Open Makerspaces

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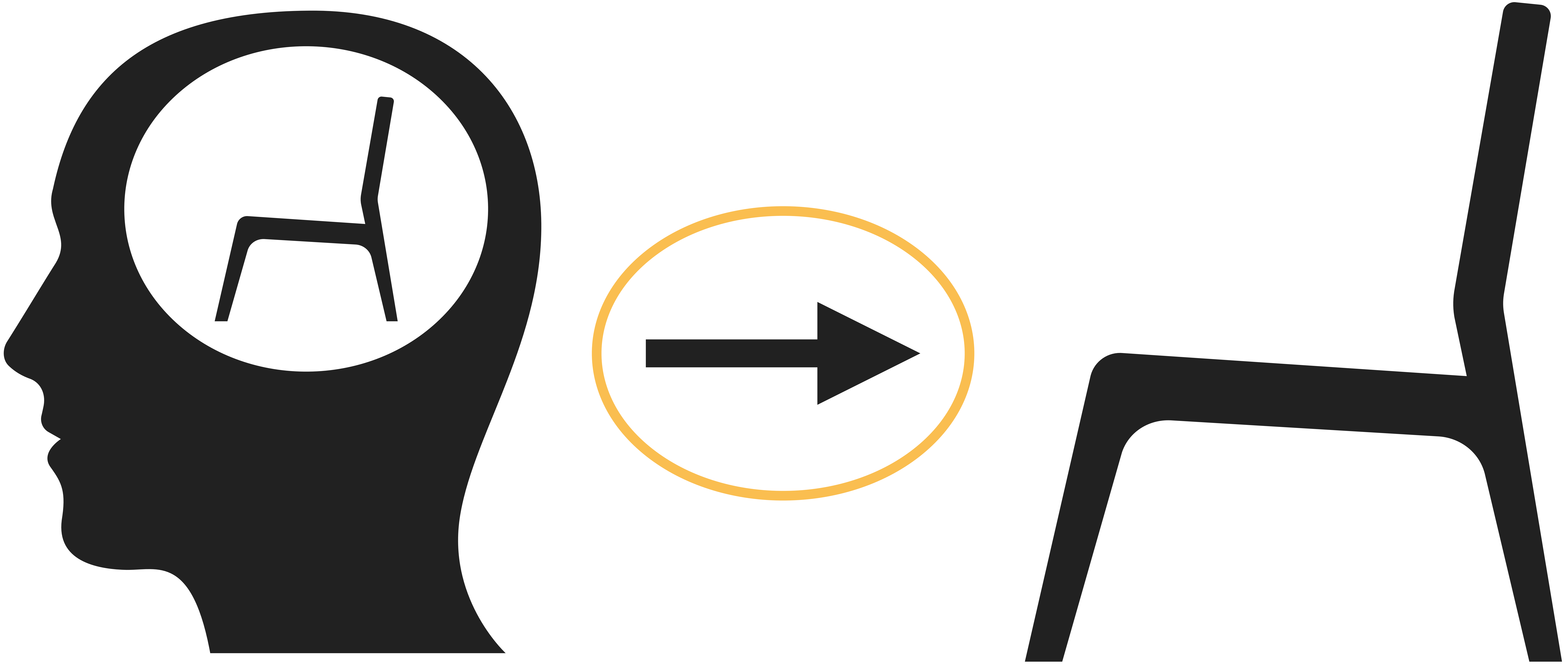
What is Personal Fabrication?



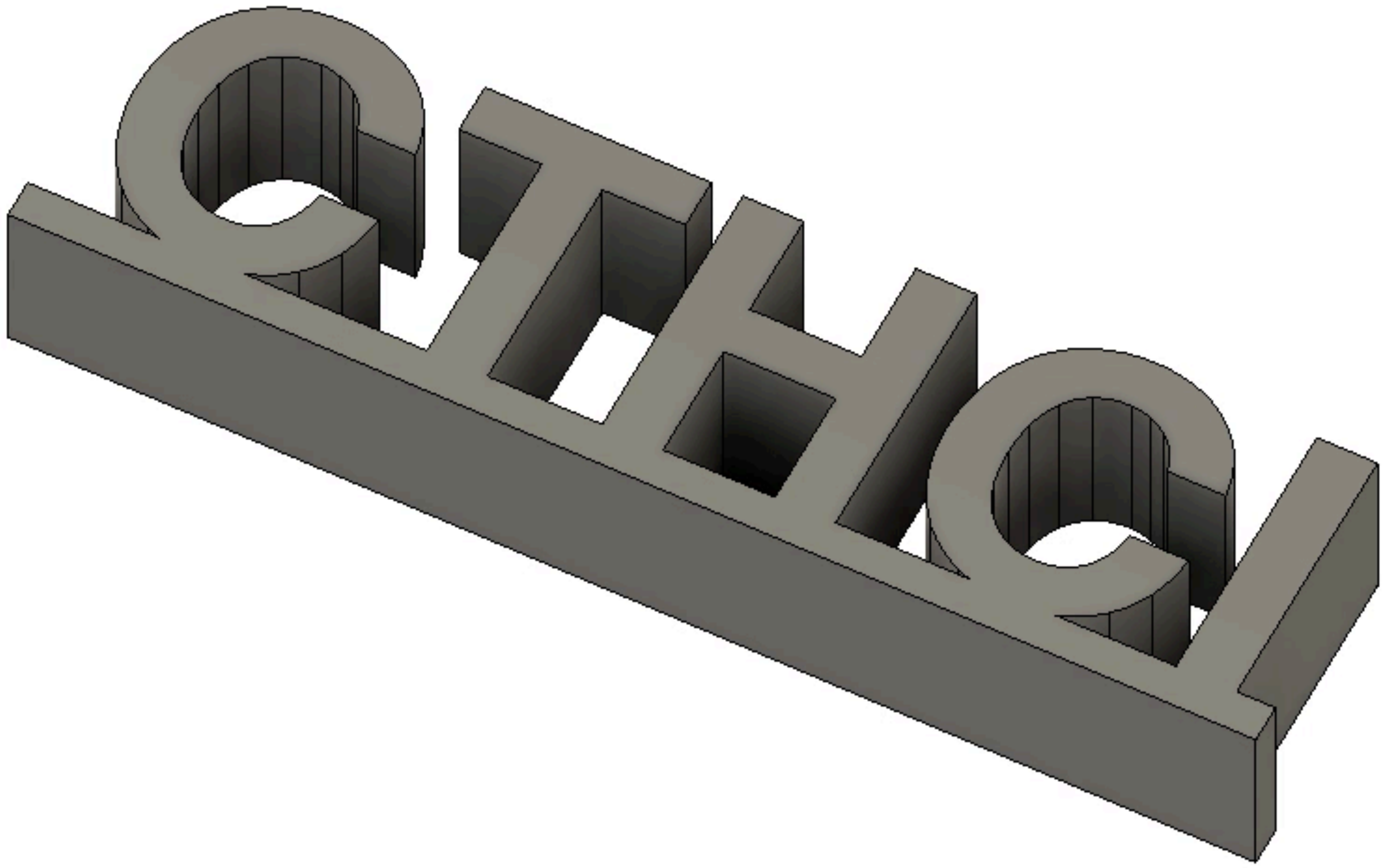
How can we empower **everyone** to create physical objects with ease?

Digital Fabrication

Digital fabrication tools turn bits into atoms, i.e. they create **material objects** from **digital designs**.

- Catarina Mota, The Rise of Personal Fabrication, C&C'11

Autodesk Fusion 360


CTHCI

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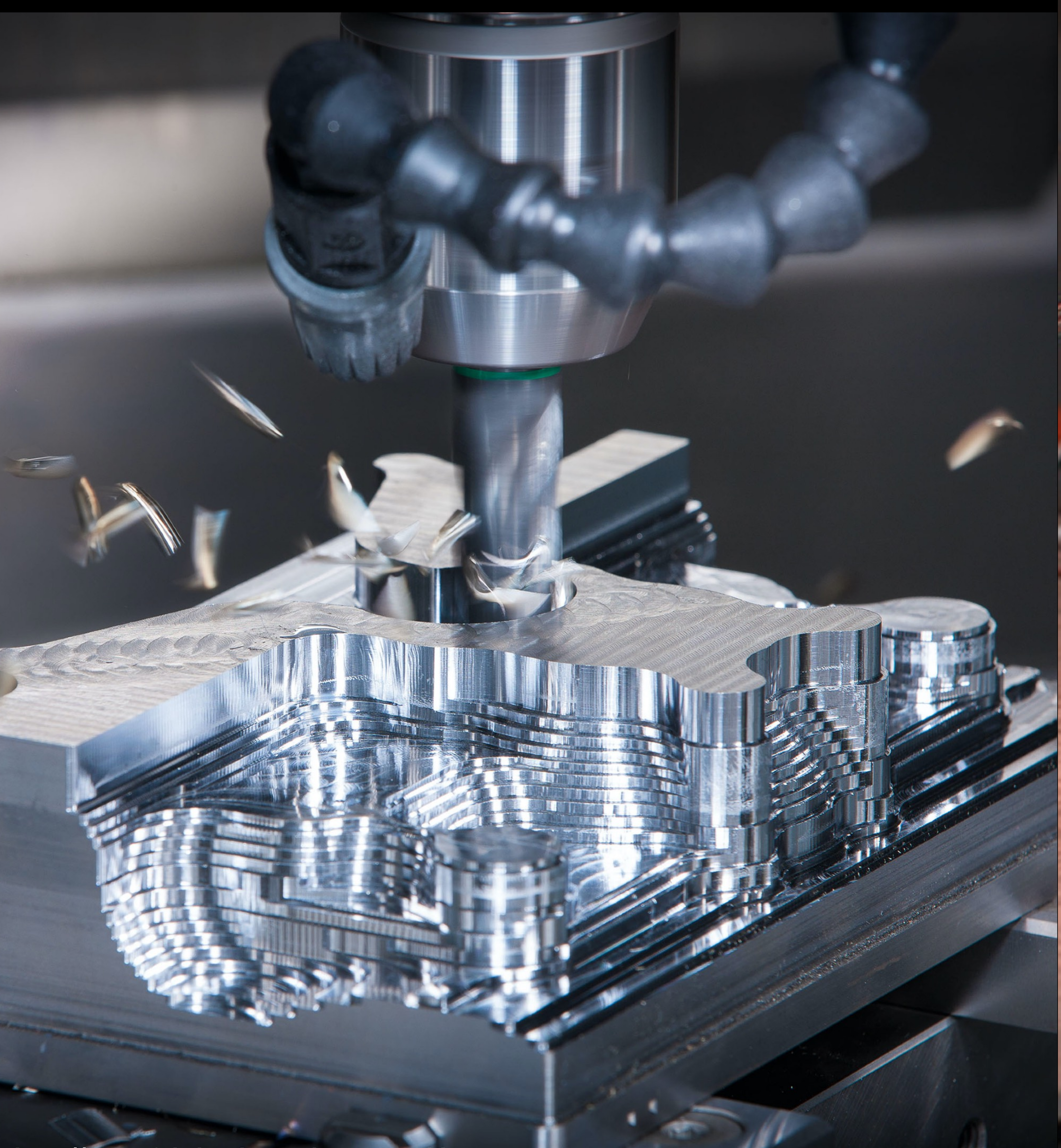
Subtractive Manufacturing



http://www.fabricatingandmetalworking.com

http://en.hglaser.com

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Additive Manufacturing

Source: Ultimaker Ultimaker Press Room Images

Source: https://www.rolanddg.com

Prof. Neil Gershenfeld

One of 1,000+

TED Talks

New ideas every weekday

TED.com

https://www.ted.com/talks/neil_gershenfeld_on_fab_labs#t-772771

FAB LAB

BEUTEL
Chargers
Batterien
Knopfzellen
Akkus
Batteriehalter
und -adapter
HANDSCHUHE
EARPLUGS
Leere Batterien
PUMPEN, SCHLAUCH
LPKF
Laser & Electronics
Ponal

The Fab Charter

draft: October 20, 2012

What is a fab lab?
Fab labs are a global network of local labs, enabling invention by providing access to tools for digital fabrication

What's in a fab lab?
Fab labs share an evolving inventory of core capabilities to make (almost) anything, allowing people and projects to be shared

What does the fab lab network provide?
Operational, educational, technical, financial, and logistical assistance beyond what's available within one lab

Who can use a fab lab?
Fab labs are available as a community resource, offering open access for individuals as well as scheduled access for programs

What are your responsibilities?
safety: not hurting people or machines
operations: assisting with cleaning, maintaining, and improving the lab
knowledge: contributing to documentation and instruction

Who owns fab lab inventions?
Designs and processes developed in fab labs can be protected and sold however an inventor chooses, but should remain available for individuals to use and learn from

How can businesses use a fab lab?
Commercial activities can be prototyped and incubated in a fab lab, but they must not conflict with other uses, they should grow beyond rather than within the lab, and they are expected to benefit the inventors, labs, and networks that contribute to their success

http://fab.cba.mit.edu/about/charter/

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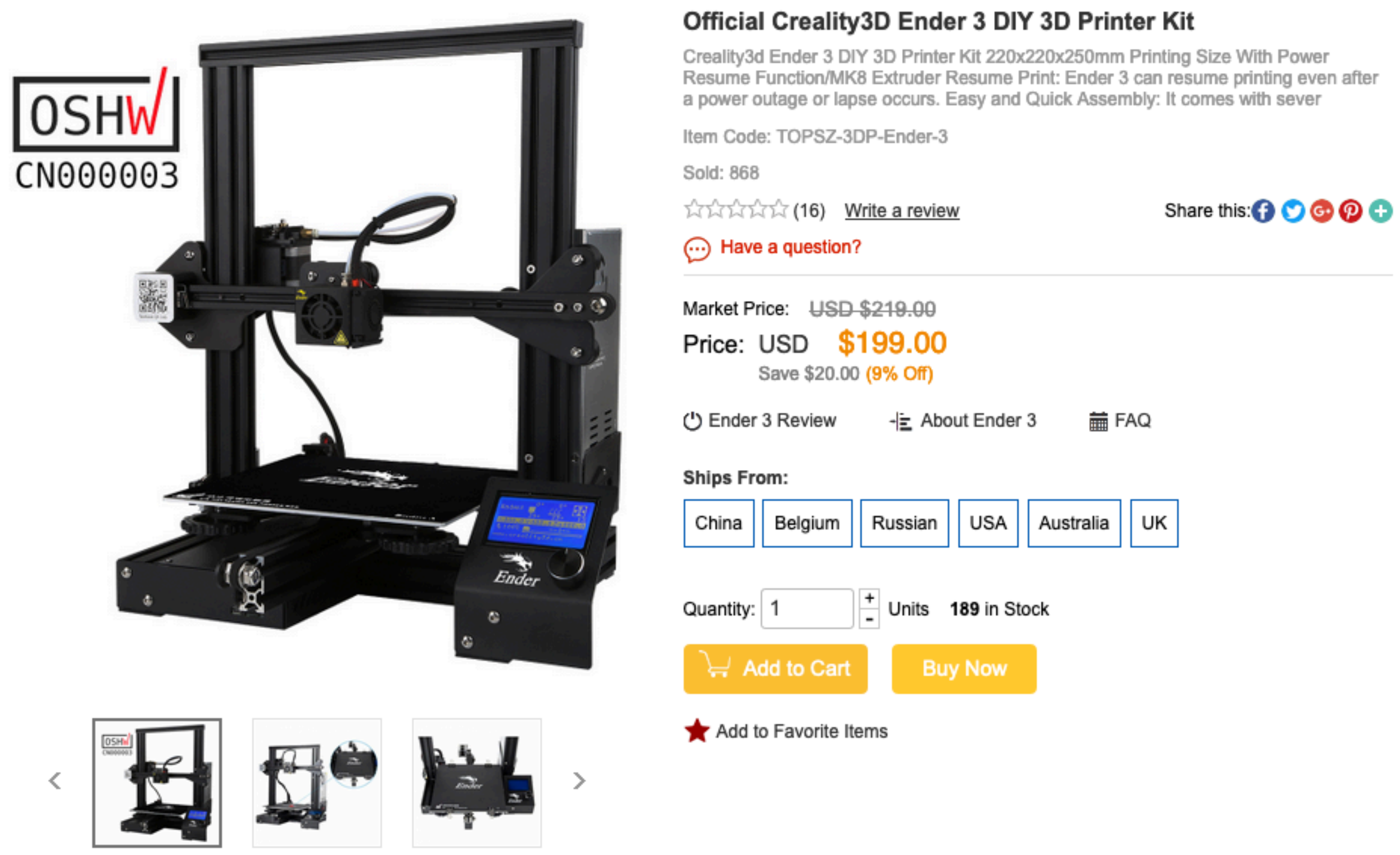
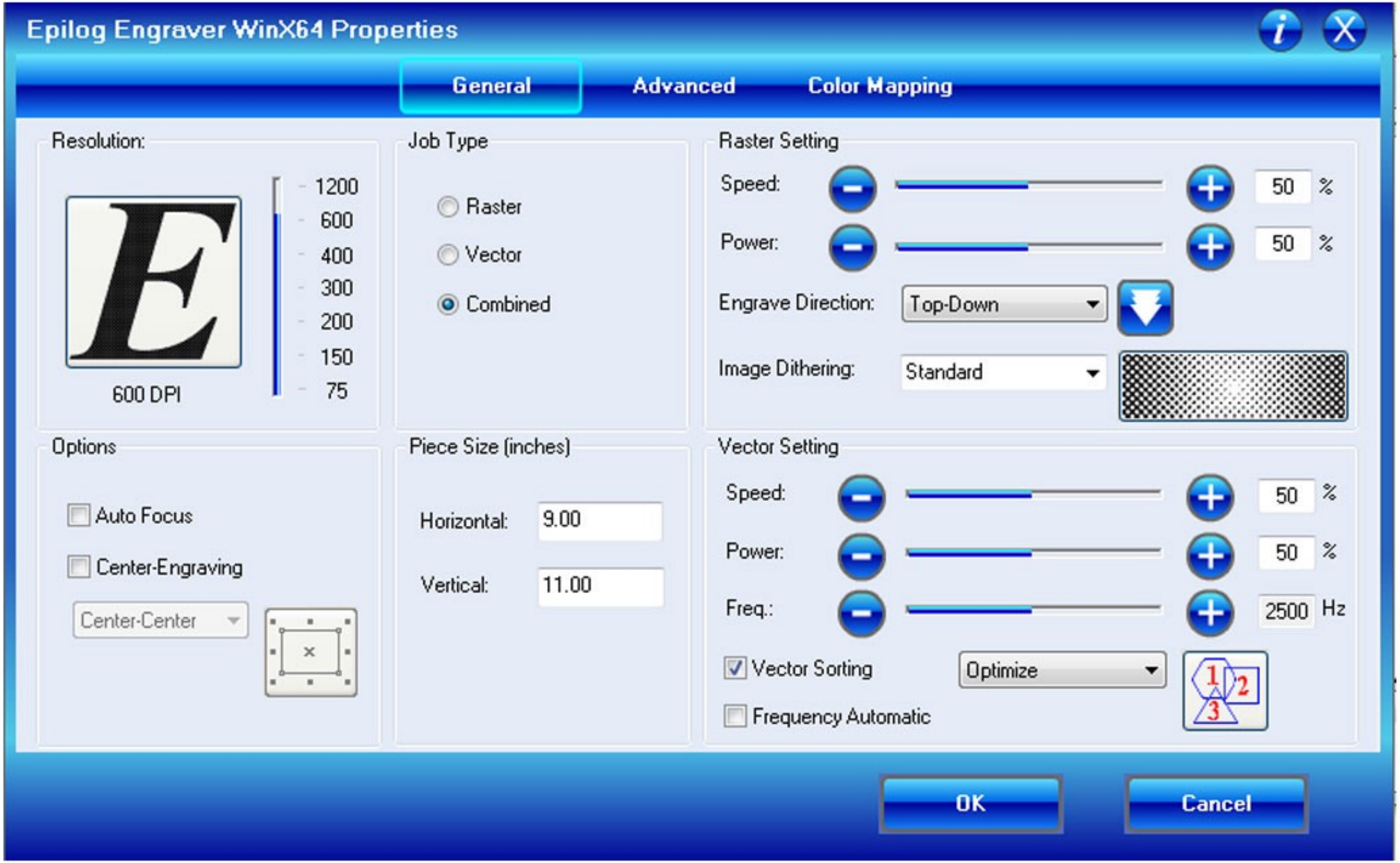
How do we connect this to HCI research?

Source: re:publica 2019 (CC BY-SA 2.0)



https://www.creality3donline.com/creality-ender-3-3d-printer_p0019.html – 3rd June 2019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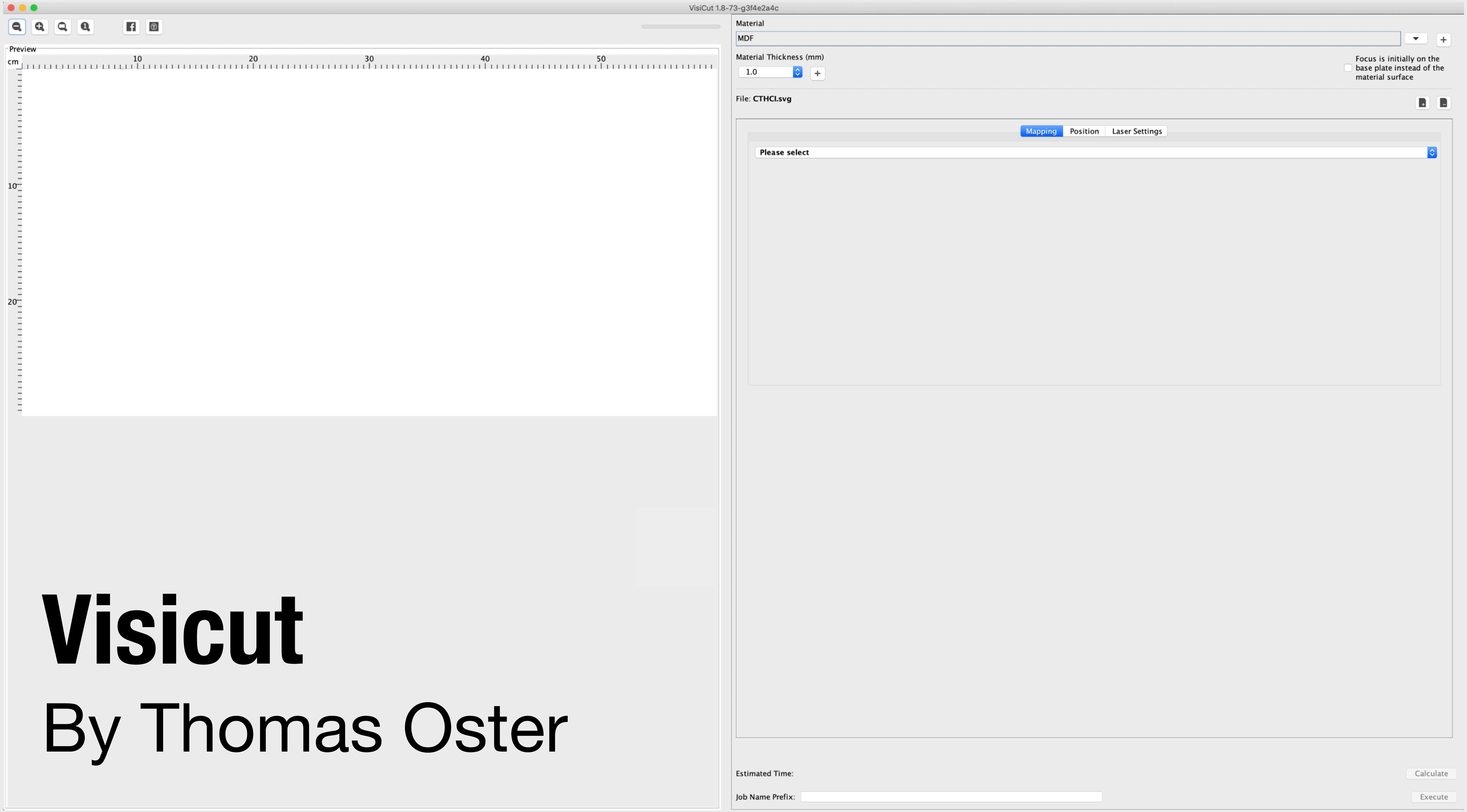
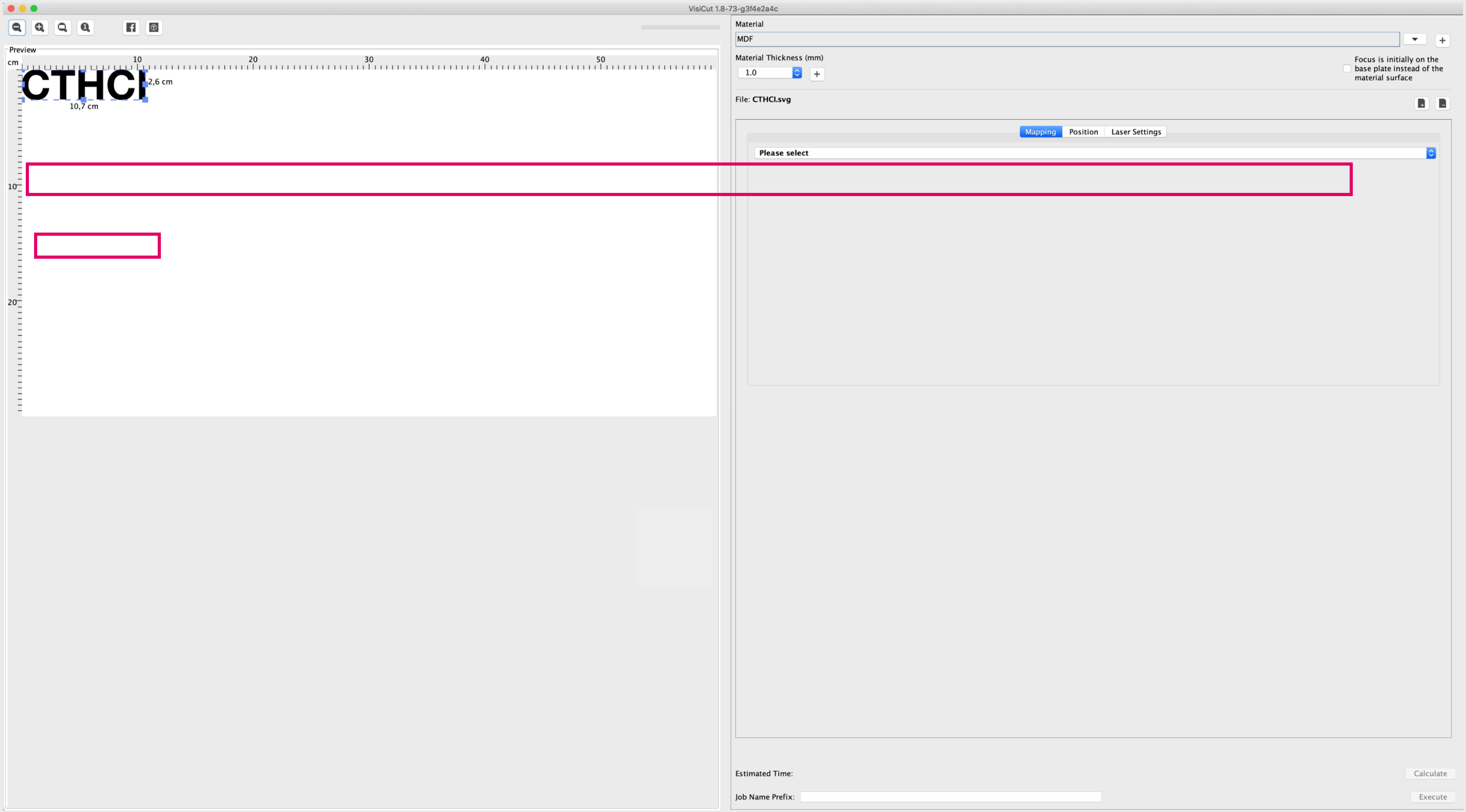
Visicut

By Thomas Oster

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10,7 cm
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Job Name Prefix:
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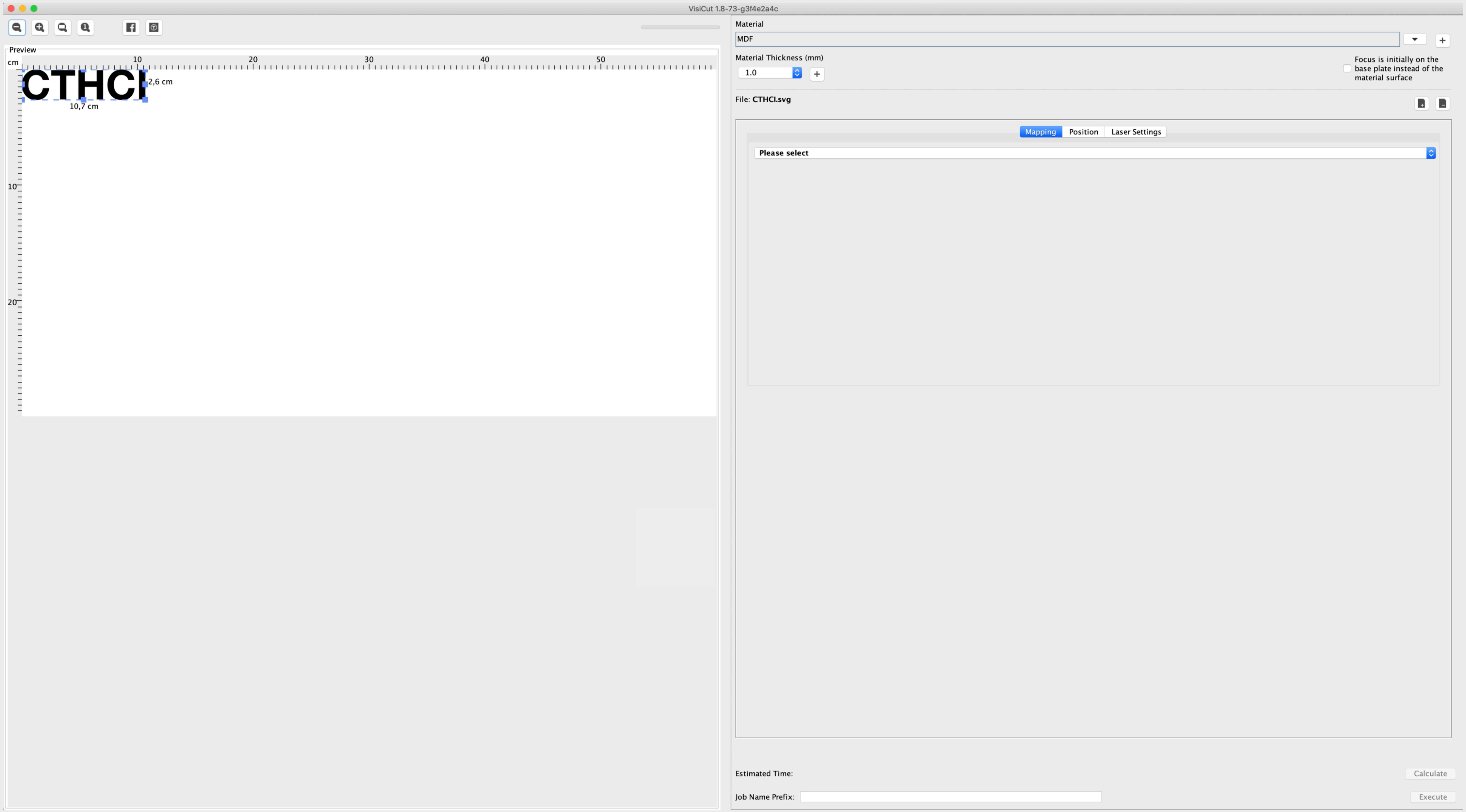

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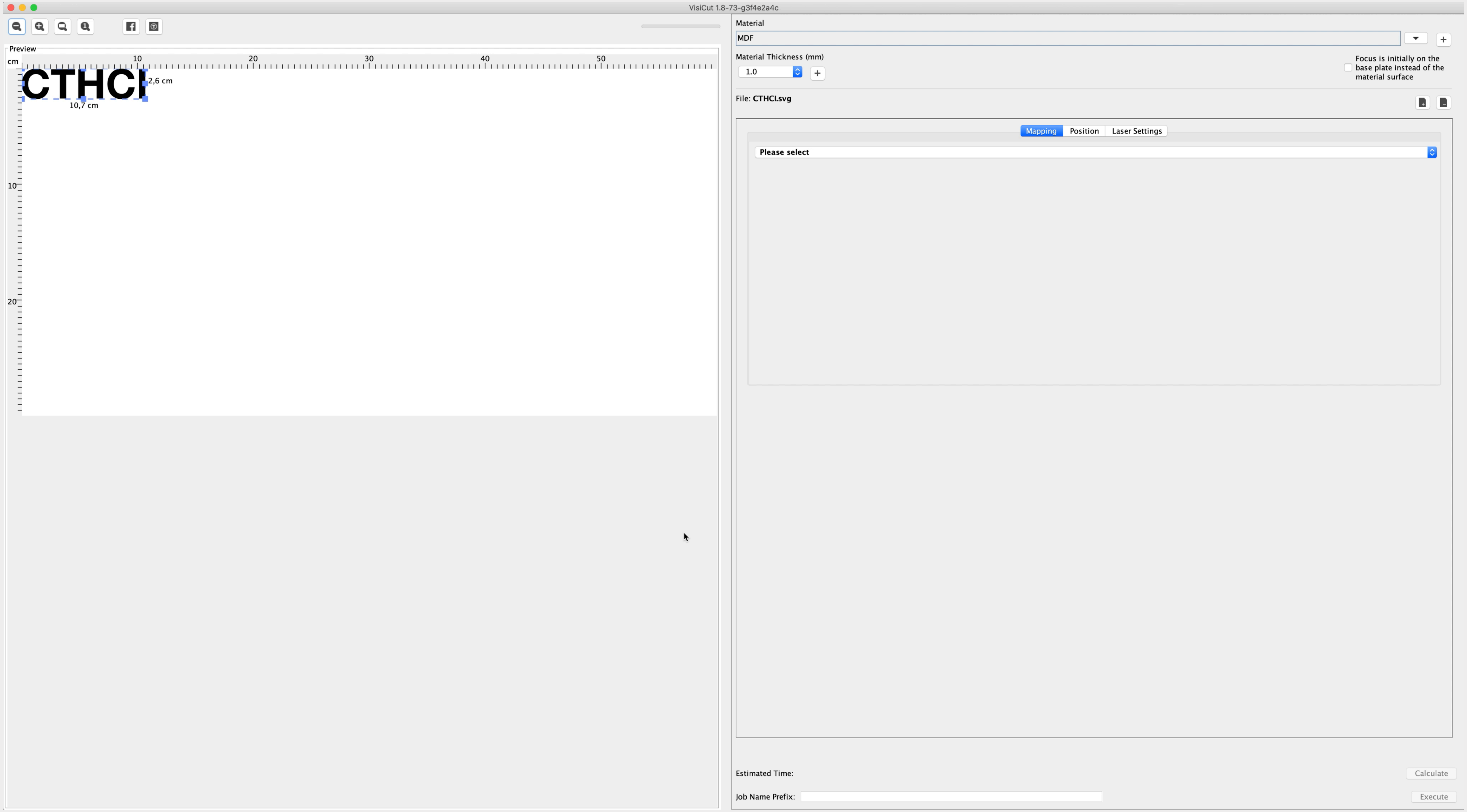
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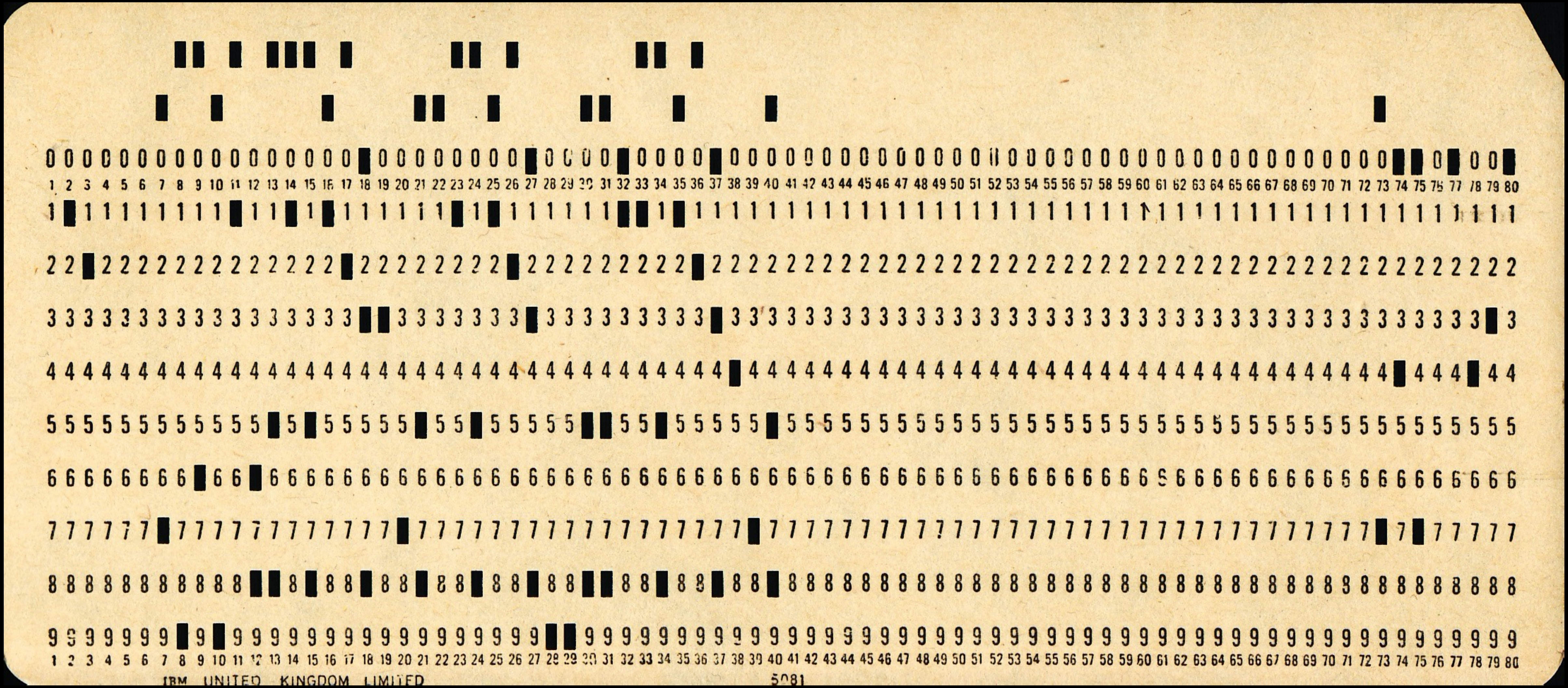
IBM UNITED KINGDOM LIMITED
5081

If we go back to the beginnings of interactive computing, early computer users were probably reasonably happy placing their punch cards into the reader and waiting for their out-put to arrive hours later—which is pretty much where 3D printing stands today

- Patrick Baudisch, Personal Fabrication in HCI: Trends and Challenges, AVI'16

ReForm: Integrating Physical and Digital Design through Bidirectional Fabrication

Christian Weichel
John Hardy
Jason Alexander
Hans Gellersen

From Lancaster University

UIST'15

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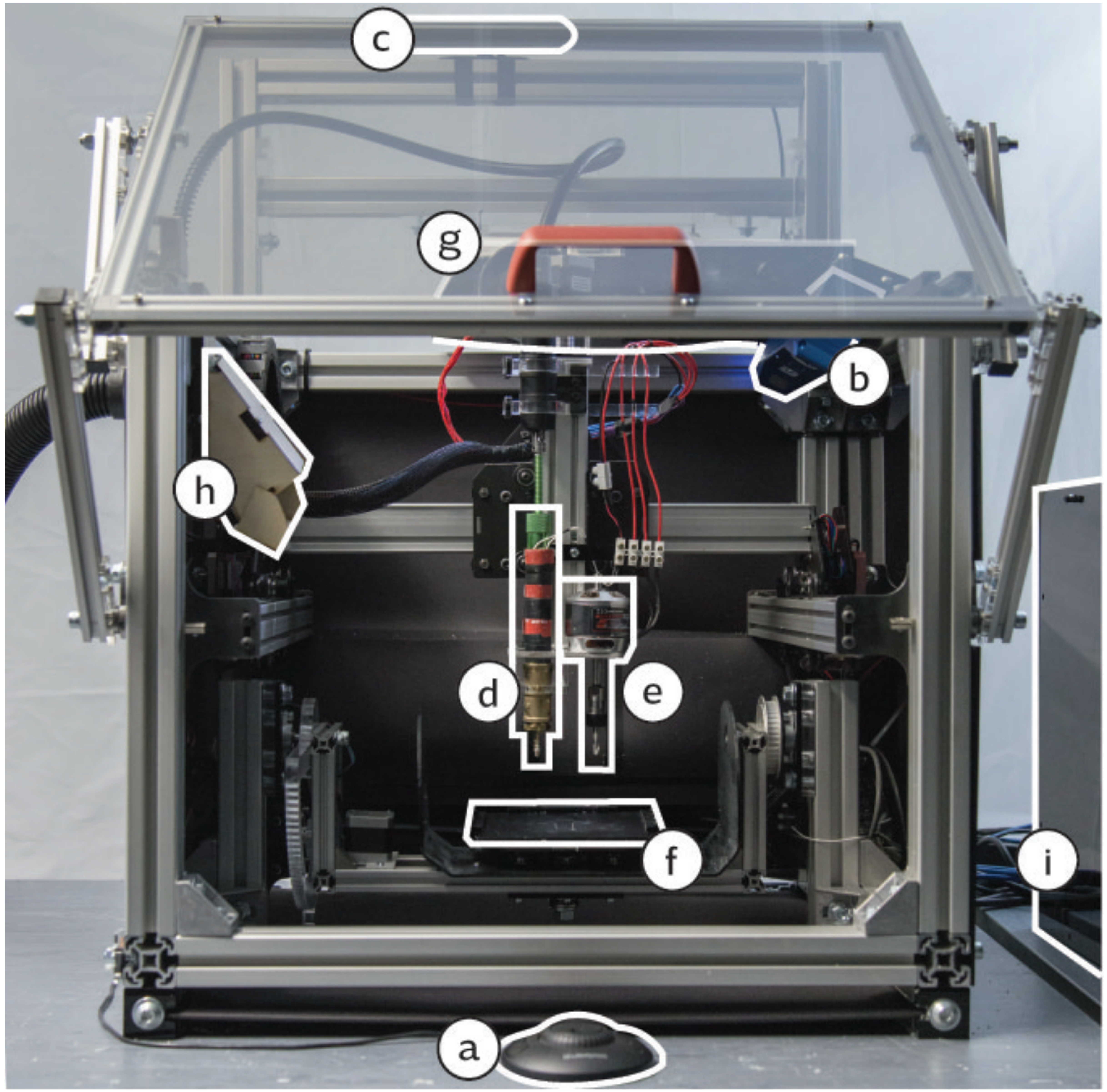
John Hardy
Jason Alexander
Hans Gellersen

Lancaster University

ReForm

Integrating Physical and Digital Design through Bidirectional Fabrication

video: Robert Potts and Daniel Morrell (Ourus LTD)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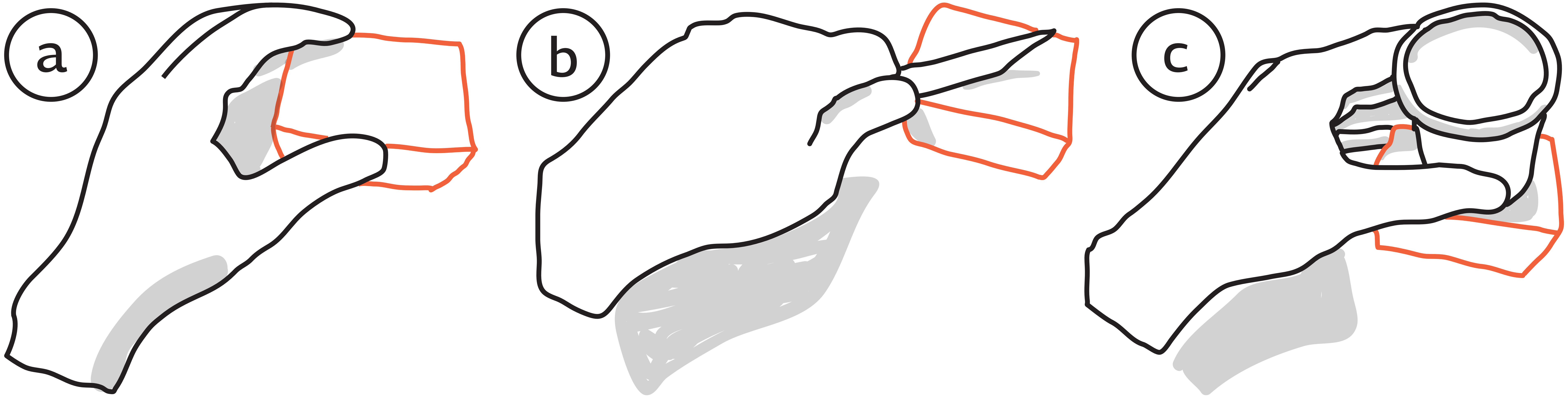
Bidirectional Fabrication

Physical Shaping



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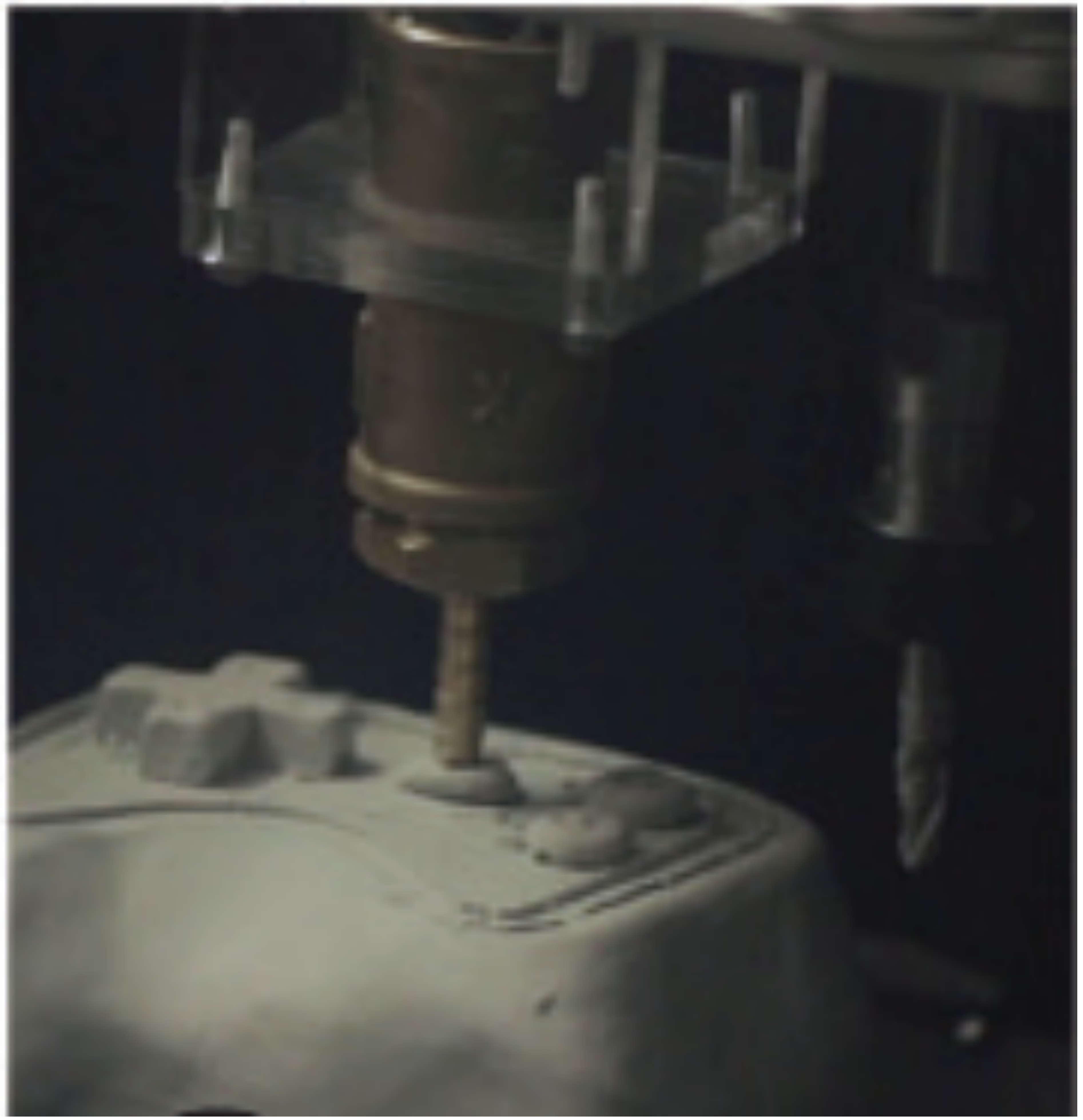
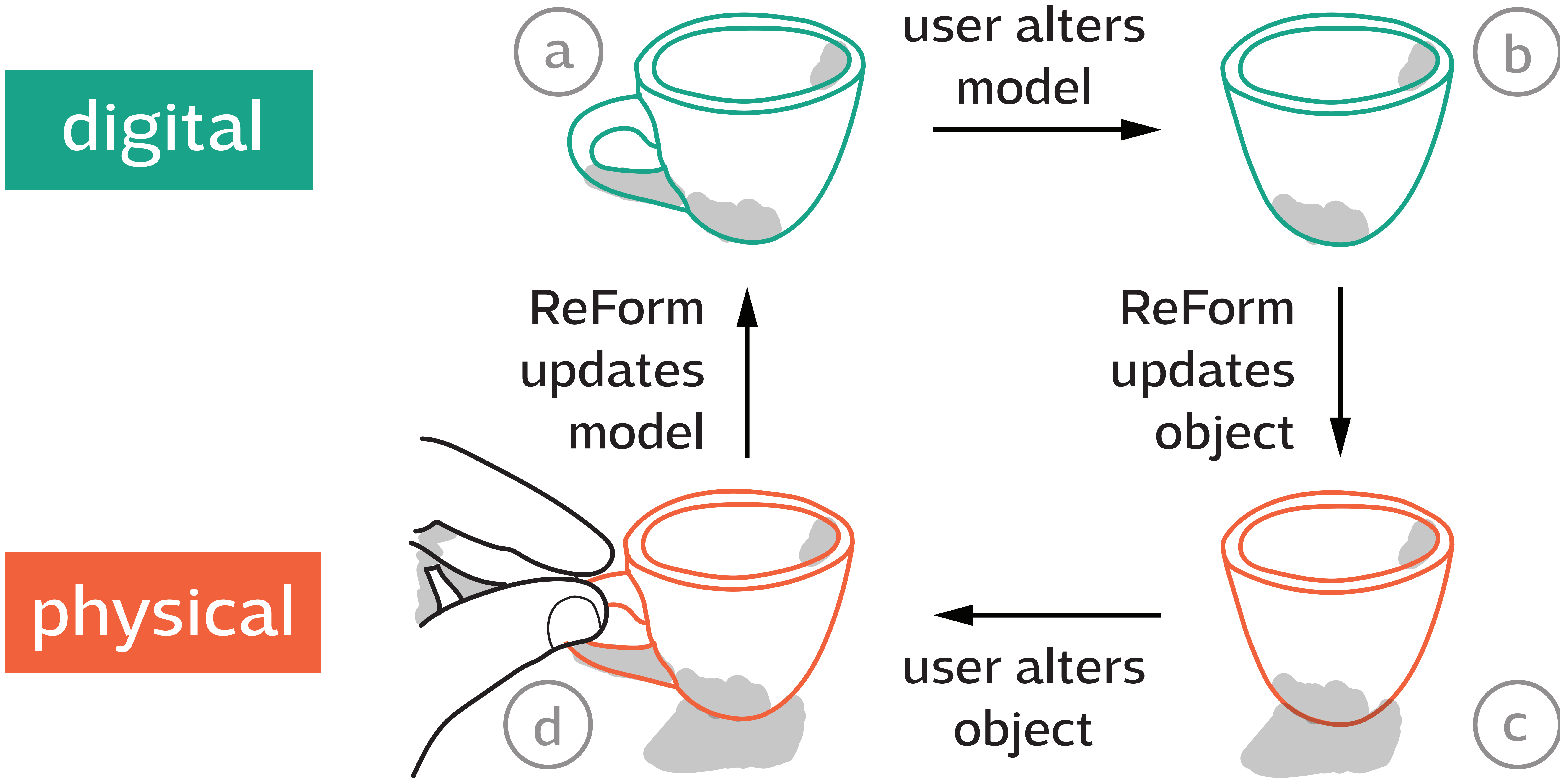


Print


digital
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a
user alters
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b
ReForm
updates
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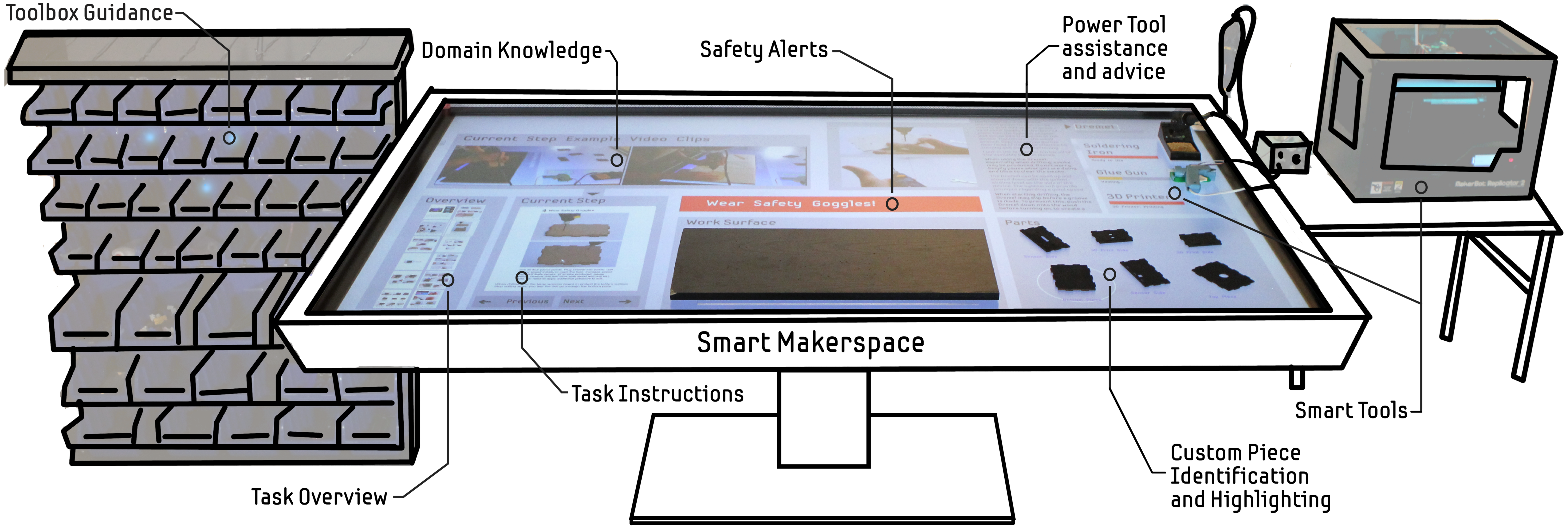


Smart Makerspace: An Immersive Instructional Space for Physical Tasks

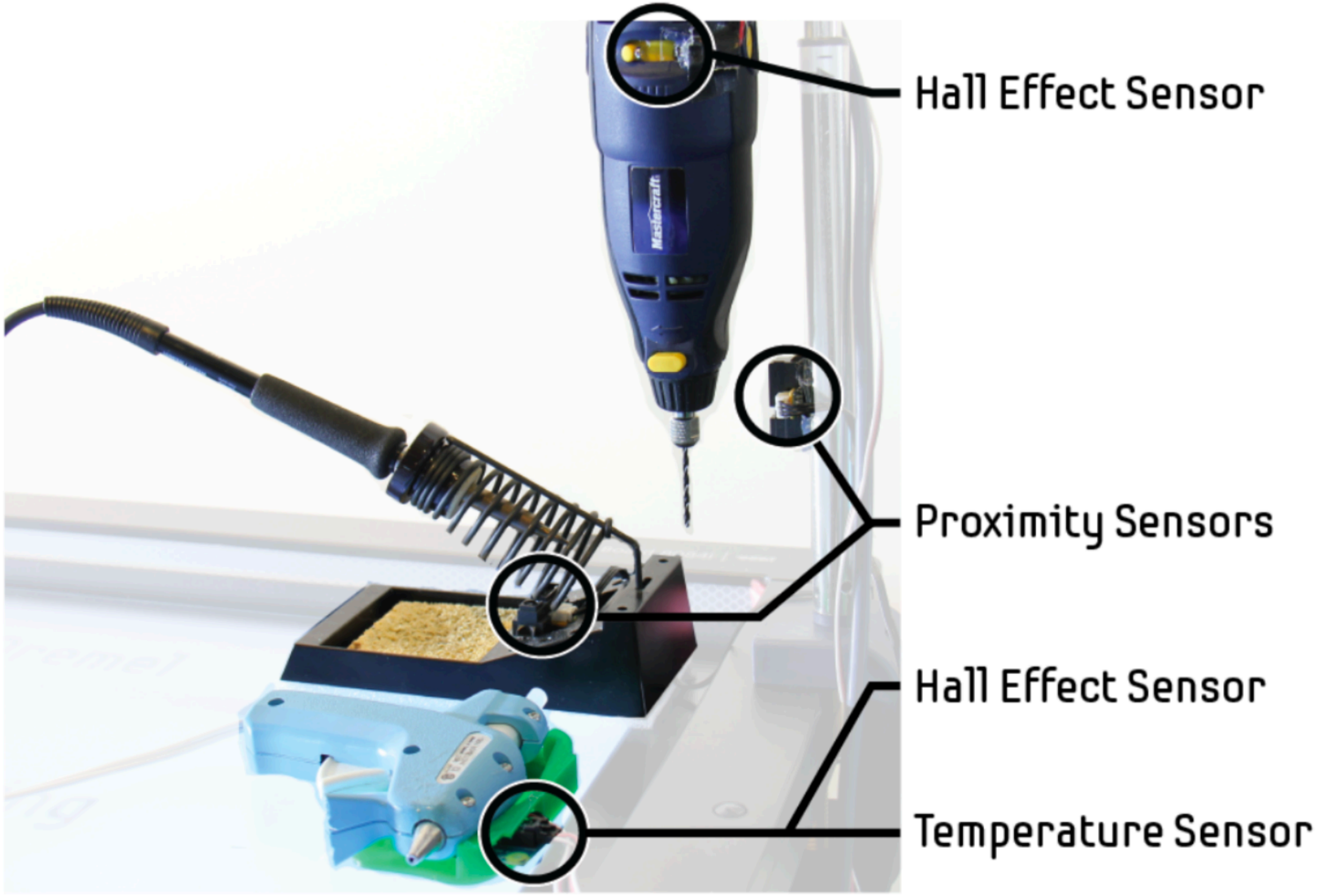
Jarrod Knibbe
Tovi Grossman
George Fitzmaurice

From Autodesk Research & University of Bristol

ITS'15

Smart Makerspace

An immersive instructional space for physical tasks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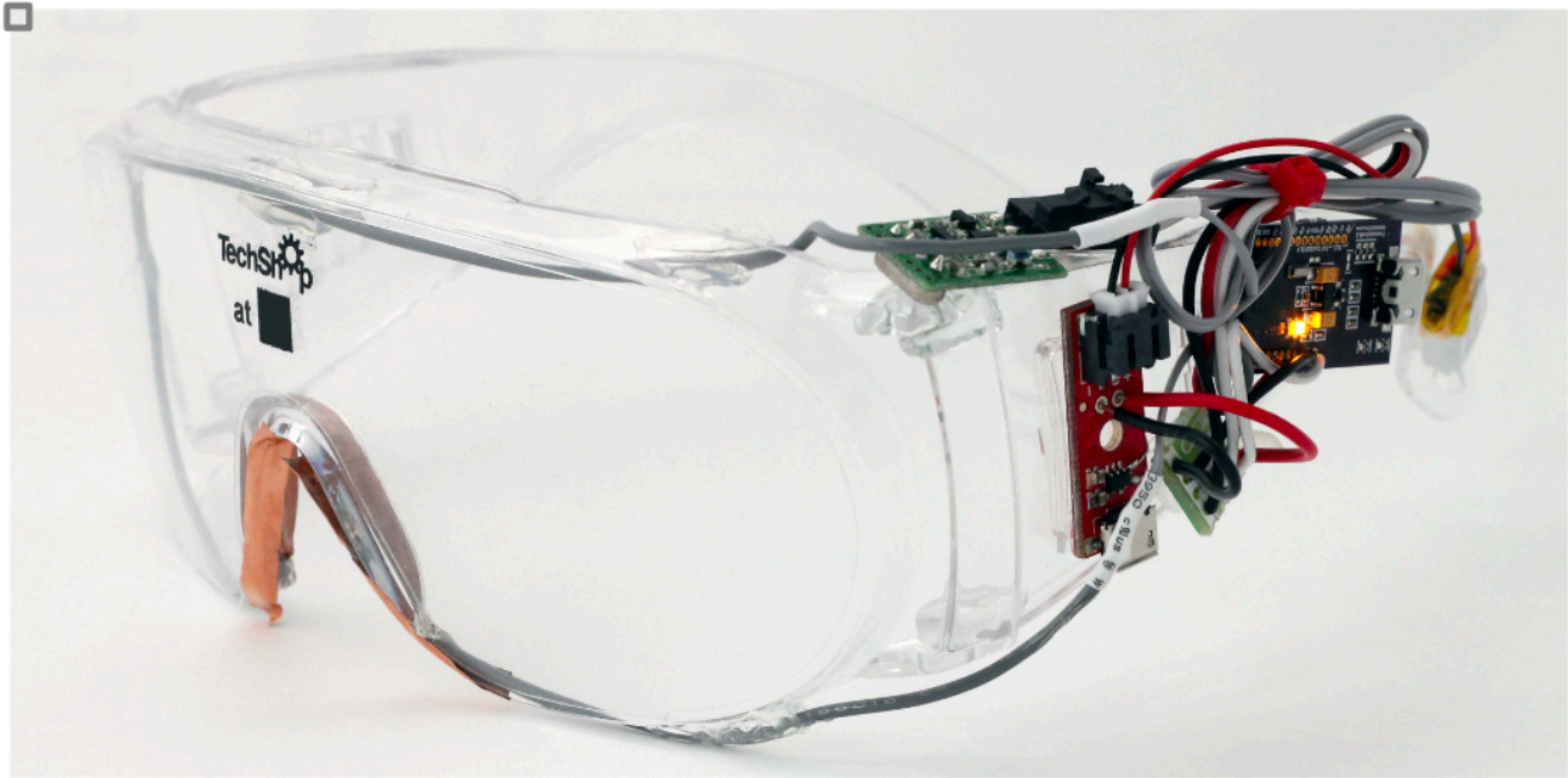
Proximity Sensors
Hall Effect Sensor
Temperature Sensor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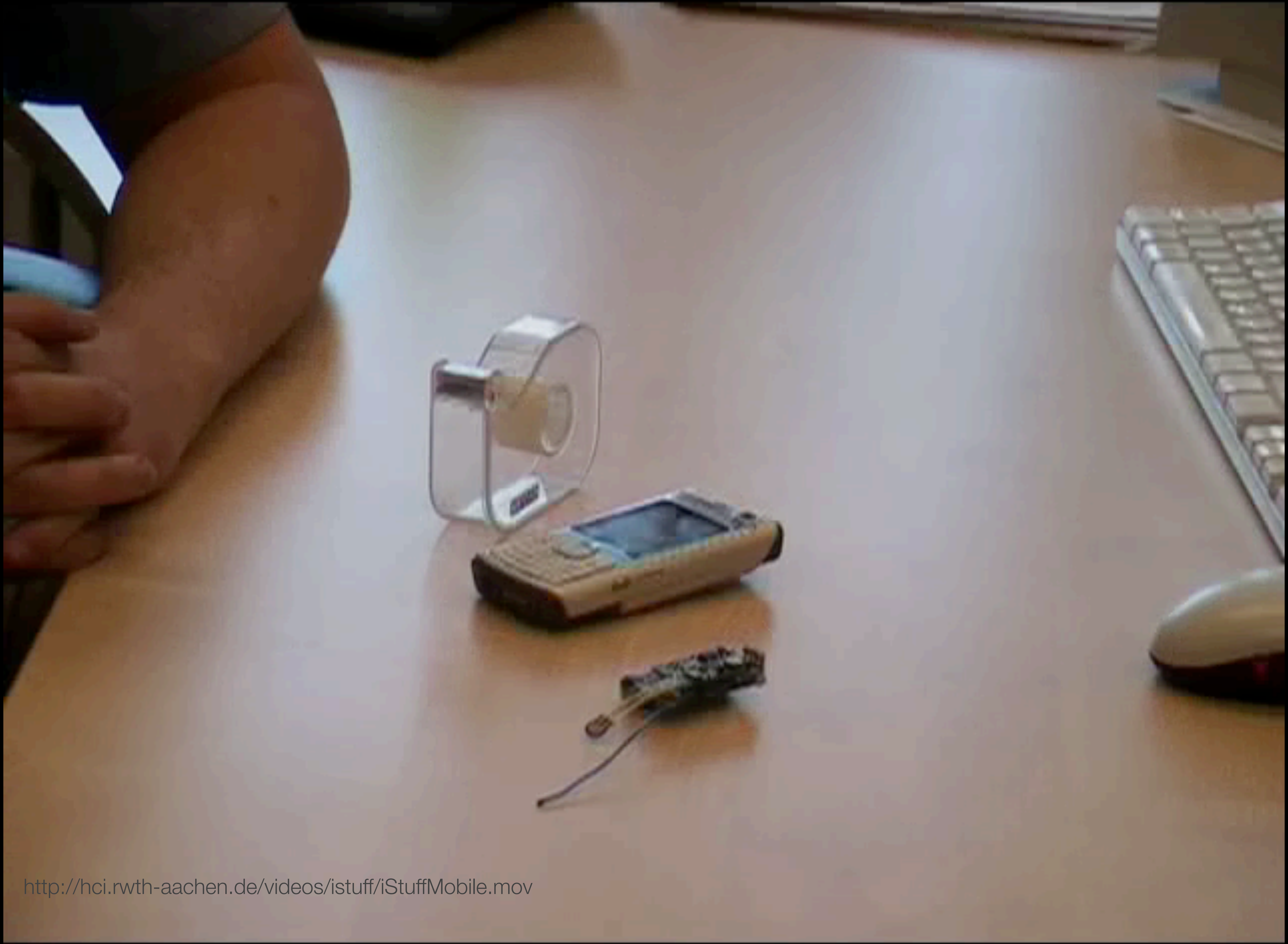

http://hci.rwth-aachen.de/videos/istuff/iStuffMobile.mov

Badge Maker

by Moritz Messerschmidt

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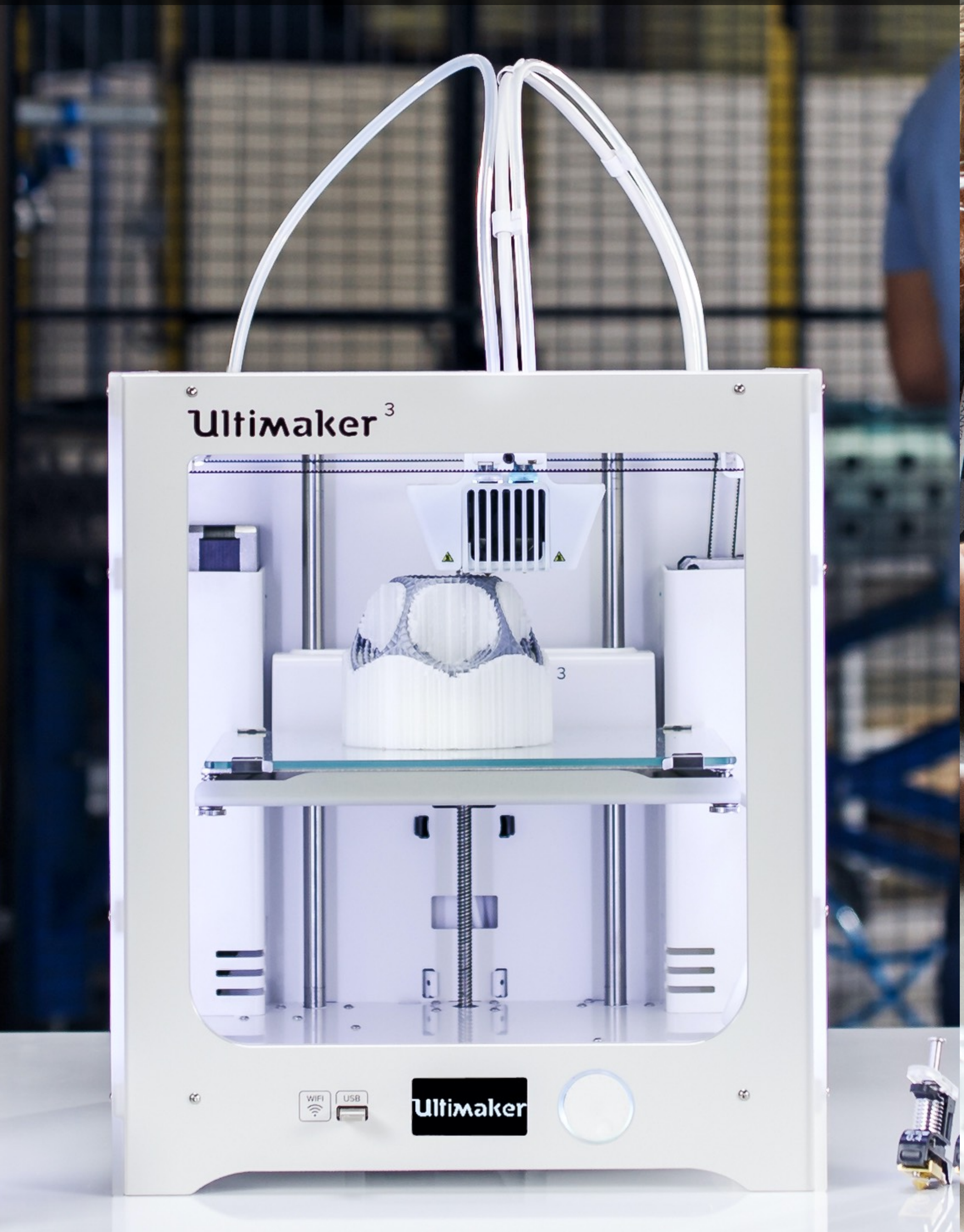

Source: Ultimaker Ultimaker Press Room Images

Source: re:publica 2019 (CC BY-SA 2.0)

Knibbe, et al., Smart Makerspace: An Immersive Instructional Space for Physical Tasks, ITS'15