

# Soft Sensing for MM<sub>3</sub>D Light

## @WeMake

### Introduzione

# Programma - Program

## [www.stitchandsolder.com/wemake](http://www.stitchandsolder.com/wemake)

- November 11
  - 11:00 - Benvenuto, Introduzione
  - 12:00 - Brainstorming e creazione team
    - 13:00 - Pranzo
  - 14:00 - Stampare flessibile
  - 15:00 - Sensoristica - Presenza, Pressione, Luce e anche di più.
  - 17:00 - Designing - Stampare con il filamento conduttivo e componenti elettroniche
    - 19:00 - Aperitivo
- November 12
  - 11:00 - Printing - Stampare con il filamento conduttivo e componenti elettroniche
    - 13:00 - Pranzo
  - 14:00 - Programming - Utilizziamo la TouchLib Library per Arduino, Teensy, and Photon.
  - 17:00 - Demo - Cosa hai stampato, perchè, come cambierai il mondo, come vuoi migliorare quello che hai fatto, prossimi passi
    - 18:00 - Saluti

# Introduzione

**Chi sei?** Who are you?

**Cosa fai?** What do you make?

**Cosa vuoi fare questo fine settimana?**

What do you want to make this weekend?

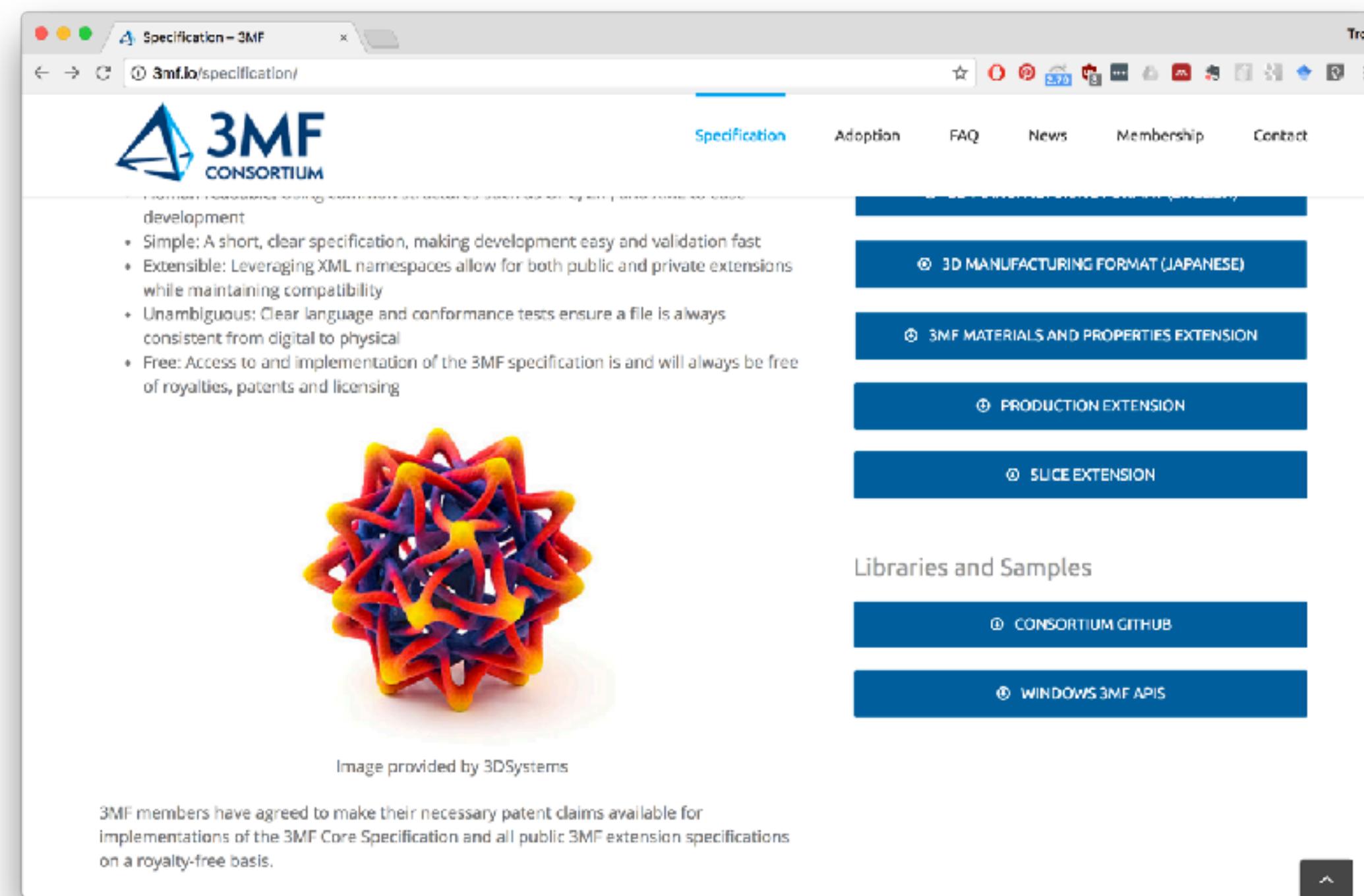
**Quali sono le tre cose che sai fare meglio come maker?** Name three things you are best at making?

**Quale sono le tue migliori conoscenze in making?**

If you had an MM3D printer, what would you make?

# 3MF and Mosaic

[mosaicmanufacturing.com/](http://mosaicmanufacturing.com/)

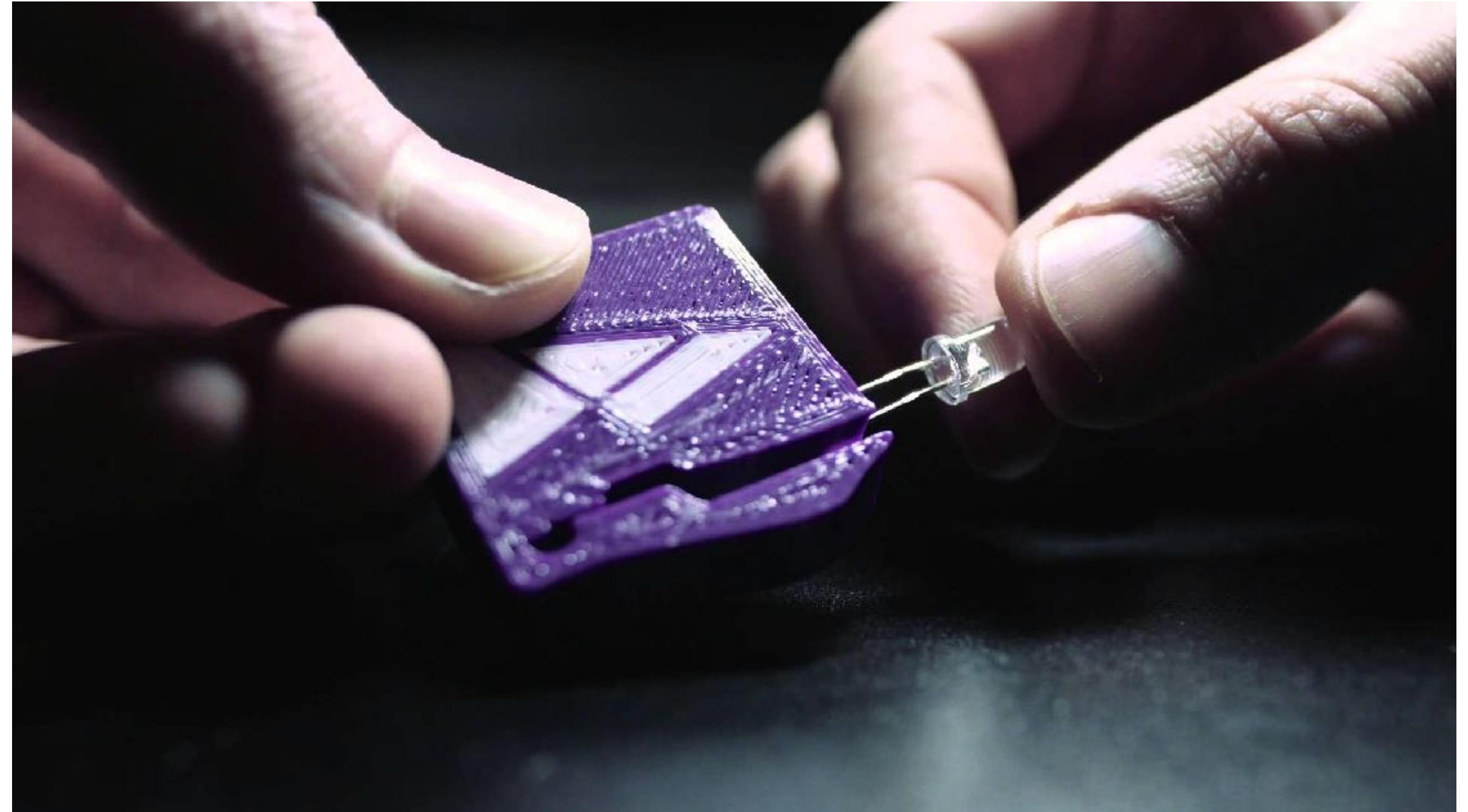


[3mf.io](http://3mf.io)



# Flashlight

- Mosaic Printer



<https://www.mosaicmanufacturing.com/>

# INSPIRATION

- "The existence of Arduino and similar tools – and, of course, the explosion of 3D-printing techniques – have drastically changed what we imagine sketching to be.

What is this trend? Is it good for our field?"

## Insights

- Making in the context of interaction design research refers to craft-like activities drawing on the core of traditional design practice.
- Making is necessary to explore non-idiomatic interaction concepts.
- Making helps structure collaborative projects with extramural partners.
- Making yields artifacts whose roles in the knowledge-producing discourse of a design research community are still unclear.



Jonas Löwgren, Linköping University

## ► WELCOME



Ron Wakkary



Erik Stolterman

## The Significance of Making

A fascinating trend in HCI is the growing interest in *making*, which has recently influenced most educational programs in interaction design and HCI. Making is now an established element in these programs, where students work with materials to shape and develop physical products while also exploring and tinkering with computational materials. The existence of Arduino and similar tools—and, of course, the explosion of 3D-printing techniques—have drastically changed what we imagine sketching to be. What is this trend? Is it good for our field? Though many believe this is an important development for HCI, it is less clear exactly how and why this is true. Jonas Löwgren explores some of these questions in this issue's cover

story, examining four reasons why making is significant in interaction design research. His discussion leads to some answers that, if taken seriously, could result in some substantial changes in many of today's HCI educational programs.

It is obvious to us that there is an increasing number of researchers and practitioners questioning what constitutes our field/discipline/profession. The cover story is one example; Cameron Tonkinwise provides another in his Confessions column, where he challenges HCI researchers to engage with “big” issues. He writes, “Interaction design scholars, especially those with tenure, should be making public critiques of overarching directions in the ‘techonomy,’ not merely out of a kind

of civic duty that comes with the privilege of their tenured expertise, but also because the very expertise that their discipline cultivates depends on these critiques.” Something to think about!

We want to remind you that most of the articles in the magazine are also available online at <http://interactions.acm.org/>. There you can also read posts by our official bloggers, who offer exciting and provocative ideas about our field. Take a look!

And remember that we are always looking for new and intriguing texts. We know you have ideas and opinions that should be shared, so just get in touch with us!

Ron Wakkary and Erik Stolterman  
eic@interactions.acm.org

**It is obvious to us that there is an increasing number of researchers and practitioners questioning what constitutes our field.**



• Magazine  
*interactions* [Interactions Homepage archive](#)  
Volume 23 Issue 3, May + June 2016  
Pages 5-5  
ACM New York, NY, USA  
[table of contents](#) [doi>10.1145/2909879](#)

# Maker Interview Pilot

- Cosa fai? Capacitive lighting
- Come ti descriveresti?? (più di una, o altre classifiche sono benaccette) Professional, Educational
- Quali oggetti IoT possiedi? (Fashion, Home, Office...) NEST, Media Player, Audio System
- Ti piace creare oggetti IoT? Not really
- Qual'è la parte più difficile del processo per te? Printing
- Qual'è la parte più semplice del processo? Electronics
- Quando compri cose/oggetti per la tua casa e ufficio cosa cerchi? (Forma, Materiale, Comportamento?) Natural materials, Wool, Cotton, Wood
- Se avessi una stampante 3D che potesse stampare in vari filamenti, stampare sensori ed elettronica integrata facilmente, cosa faresti? Lighting
- Di che materiale/i realizzeresti questo oggetto/i? Something softer and textile.
- Che sensori useresti? Cap Sense, Accelerometer, Dangling from a string, spinning. Velocity and energy
- Quali attuatori useresti? RGB, Haptic (Surprising)
- Cosa stamperesti se potessi fare qualsiasi forma? Circuit board problems. Lumins Color. It depends on the interaction Spheres lend there way to the color sphere. CIE LUV CH - Cone Shaped.
- HCome cambieresti questo oggetto per tua madre o qualcun'altro? IDK

# Domande della Ricerca

## Research Questions

**Com'è possibile aiutare i makers nella stampa in multi-material / elettronica/luce?**

**Come possiamo incoraggiare i makers a pensare all'interazione?**

**Come possiamo includere materiali altamente conduttivi nella stampa 3D per creare circuiti complessi?**

**Cosa può servire a un maker da un software che comprende/capisce i collegamenti e l'elettronica?**

How can we enable maker communities to make using multi-material 3D printing/electronics/lighting?

How do we encourage makers to think about interaction?

How do we bring highly conductive materials into 3D printing for complex circuits?

What does a maker need from software that understands the Electronics and wire pathways?

# Thematic Network Graph



# Progetto EU

## MultiM3D

*Fieldlab Multi-materiaal 3D Printing*

Projectplan  
versie 29-02-2016

- INTERAZIONE
- SENSORI
- LUCE
- MM 3D



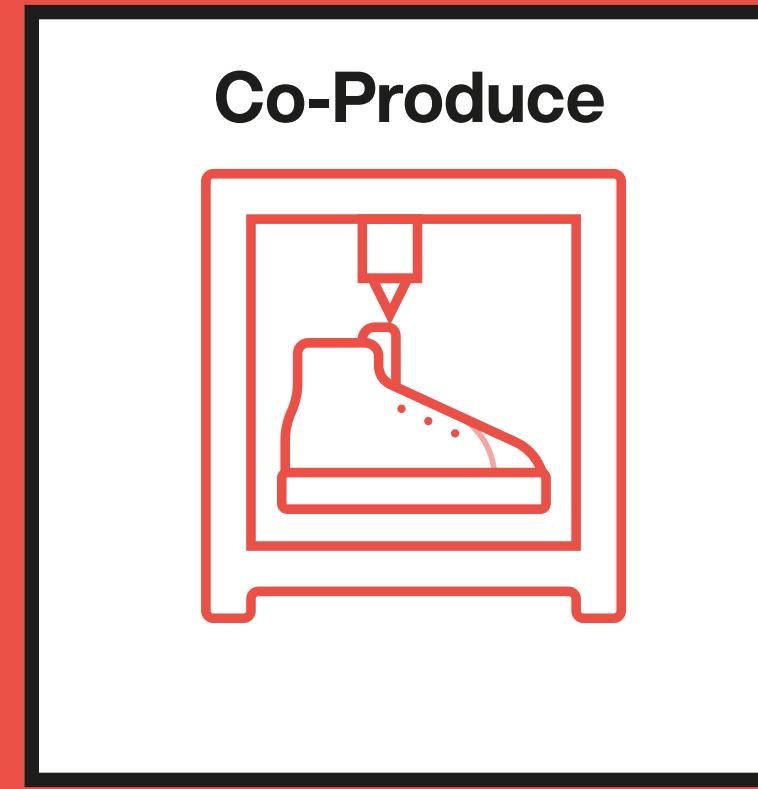
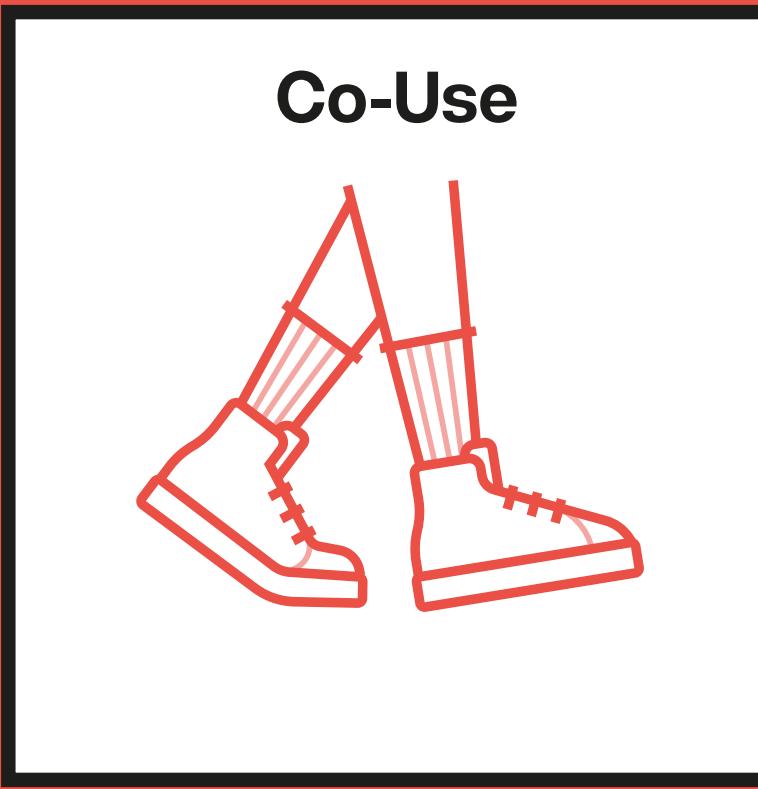
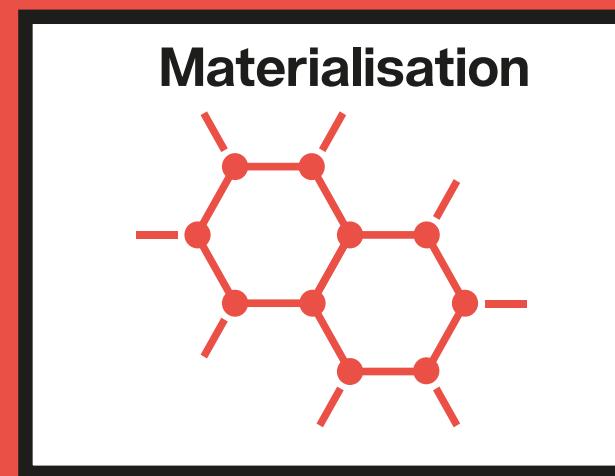
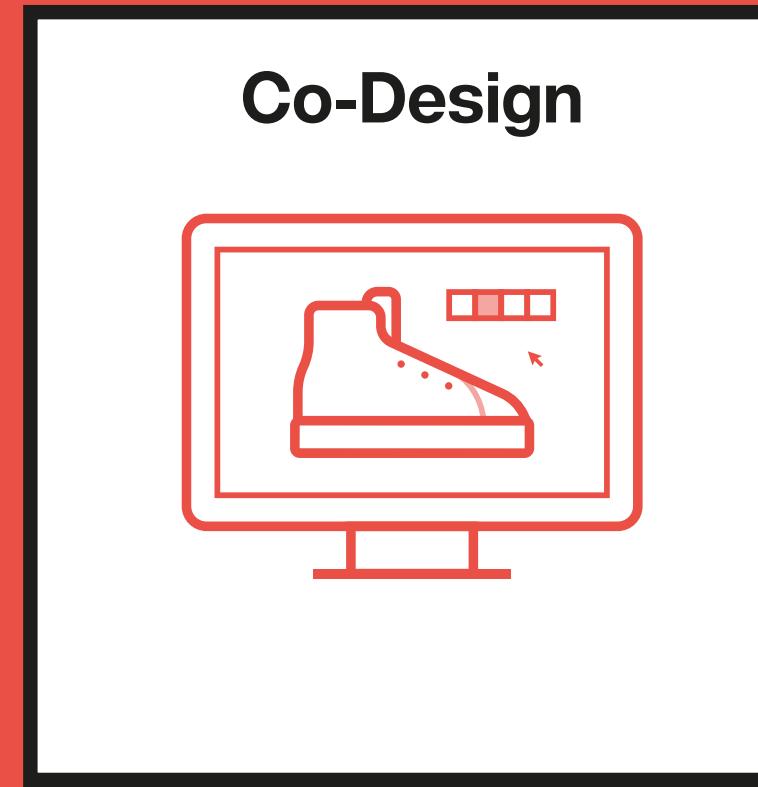
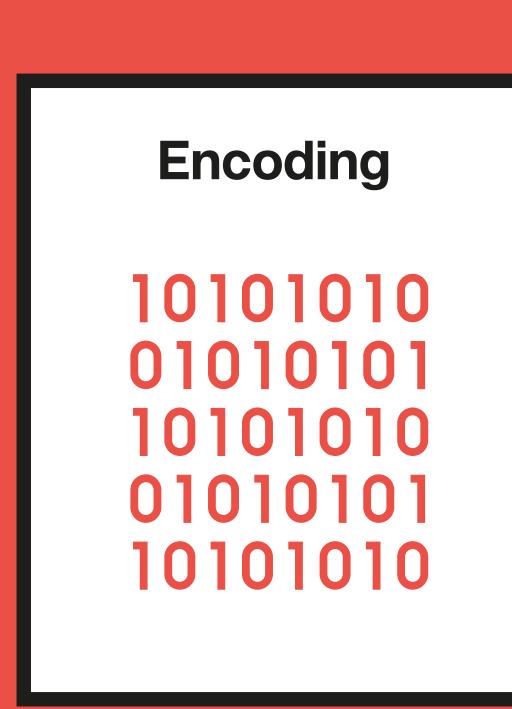
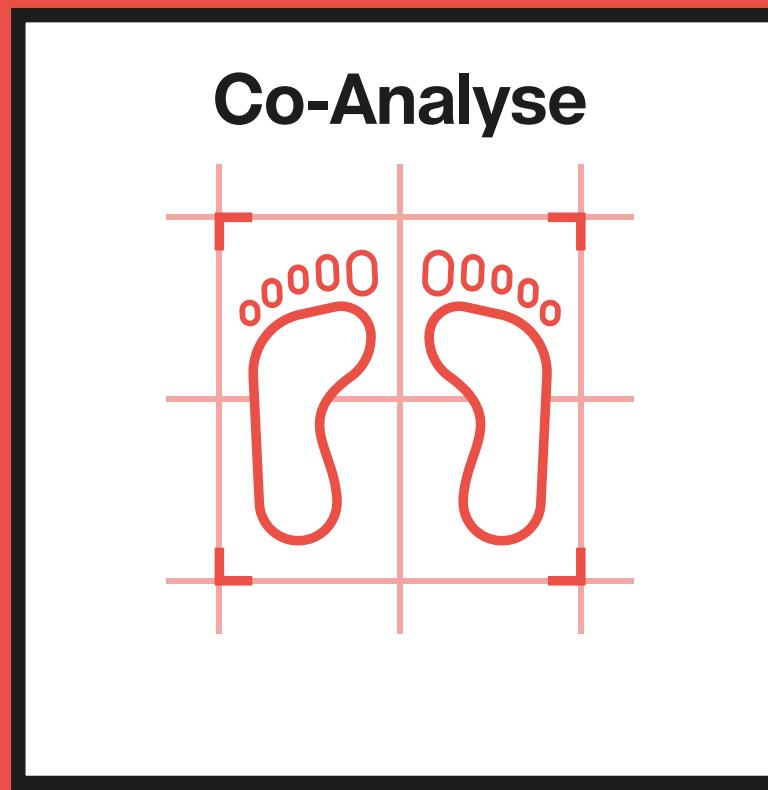
A CANON COMPANY



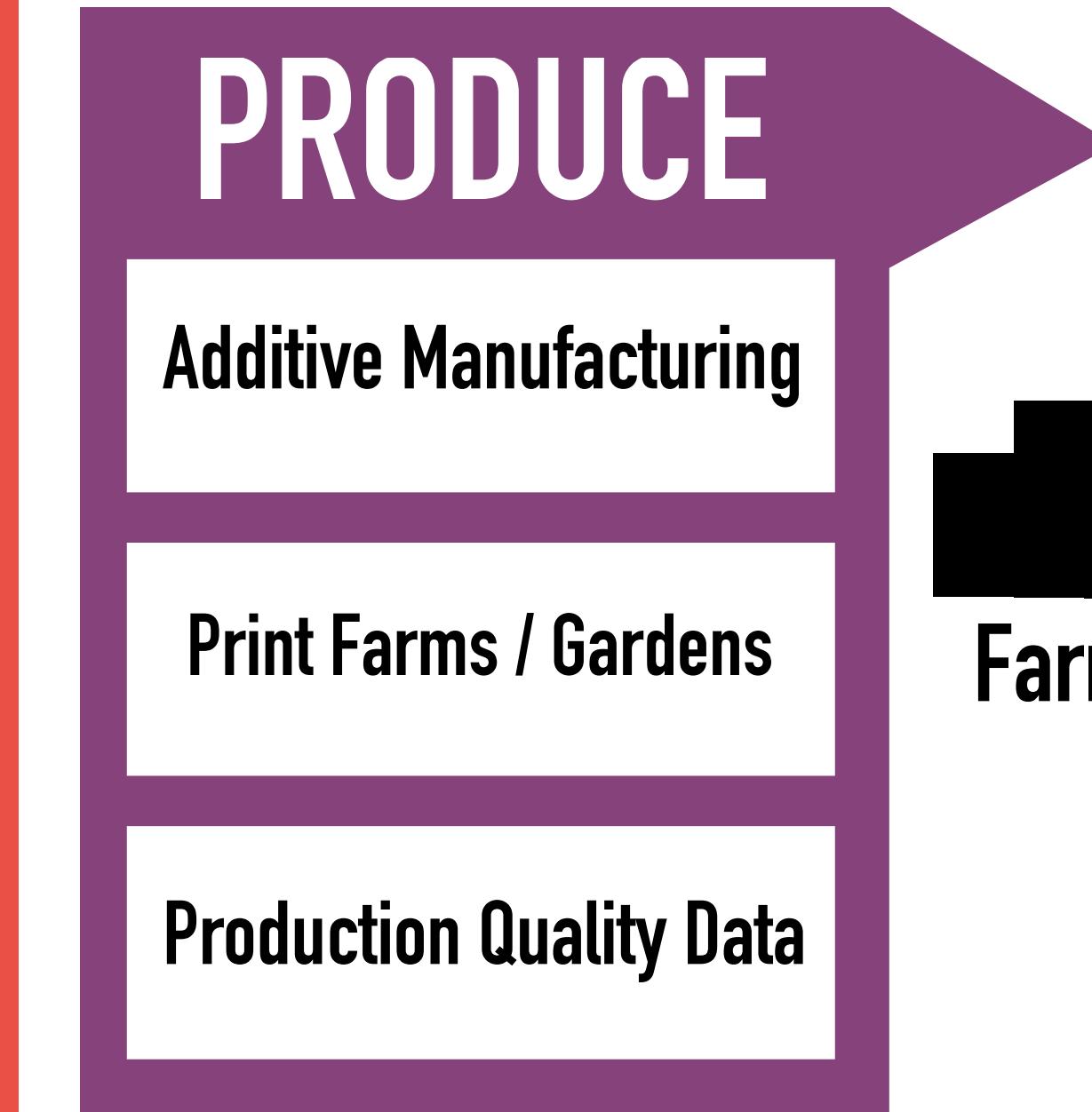
# **Past Work & Early Research**



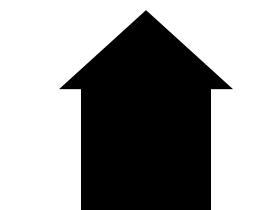
# Ultra Personalized Product Service Systems



As it Relates to the PhD research

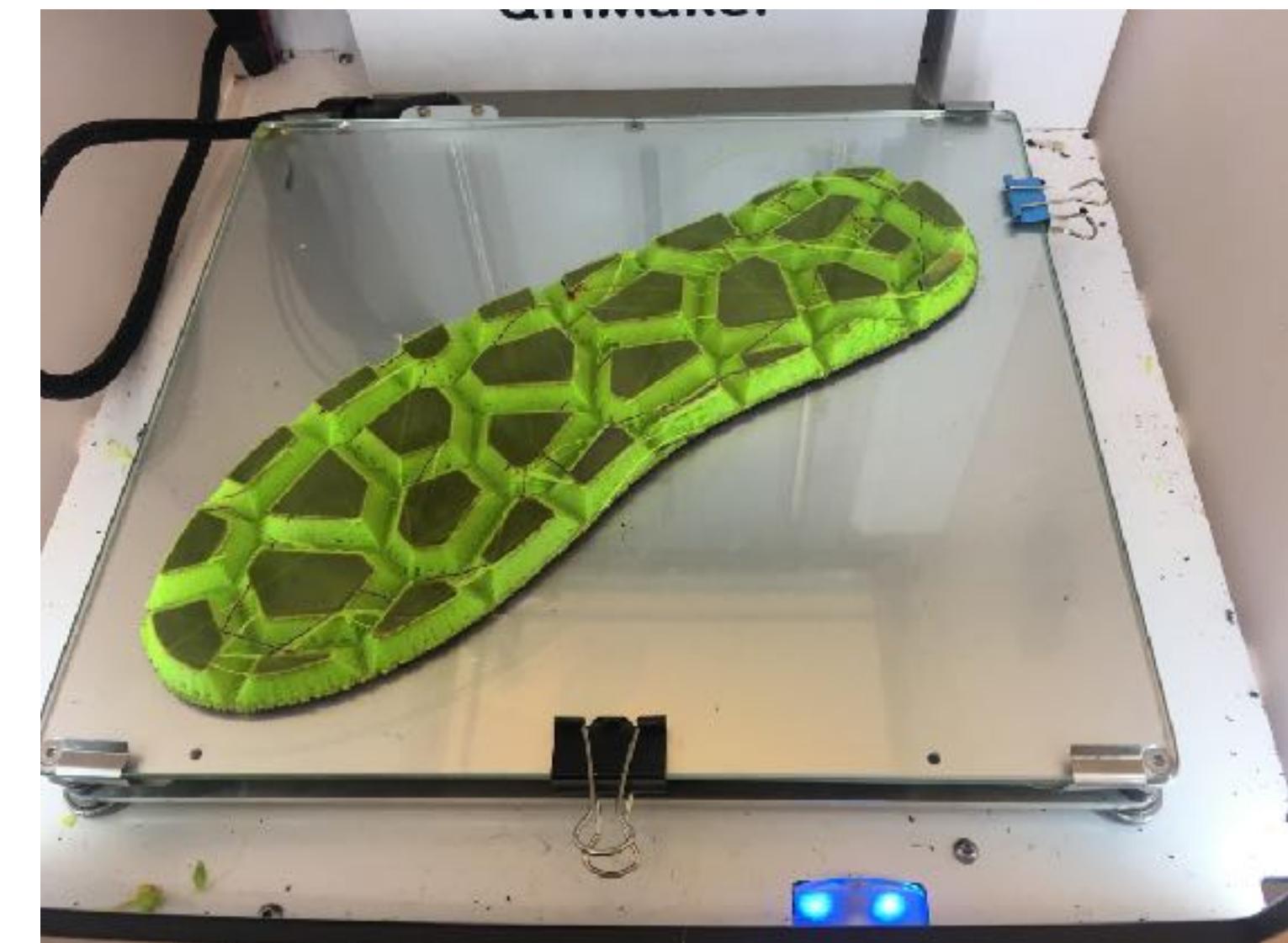
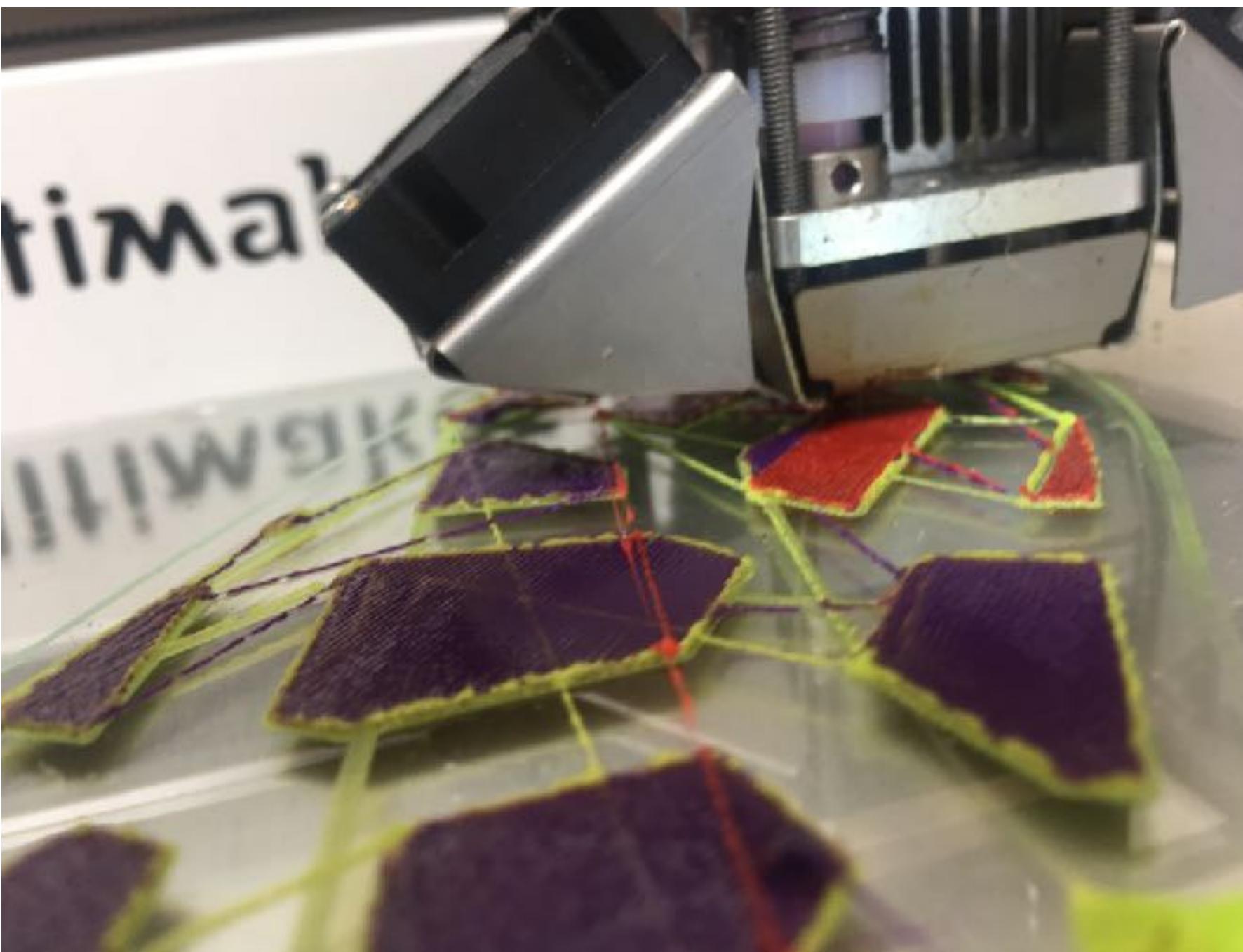
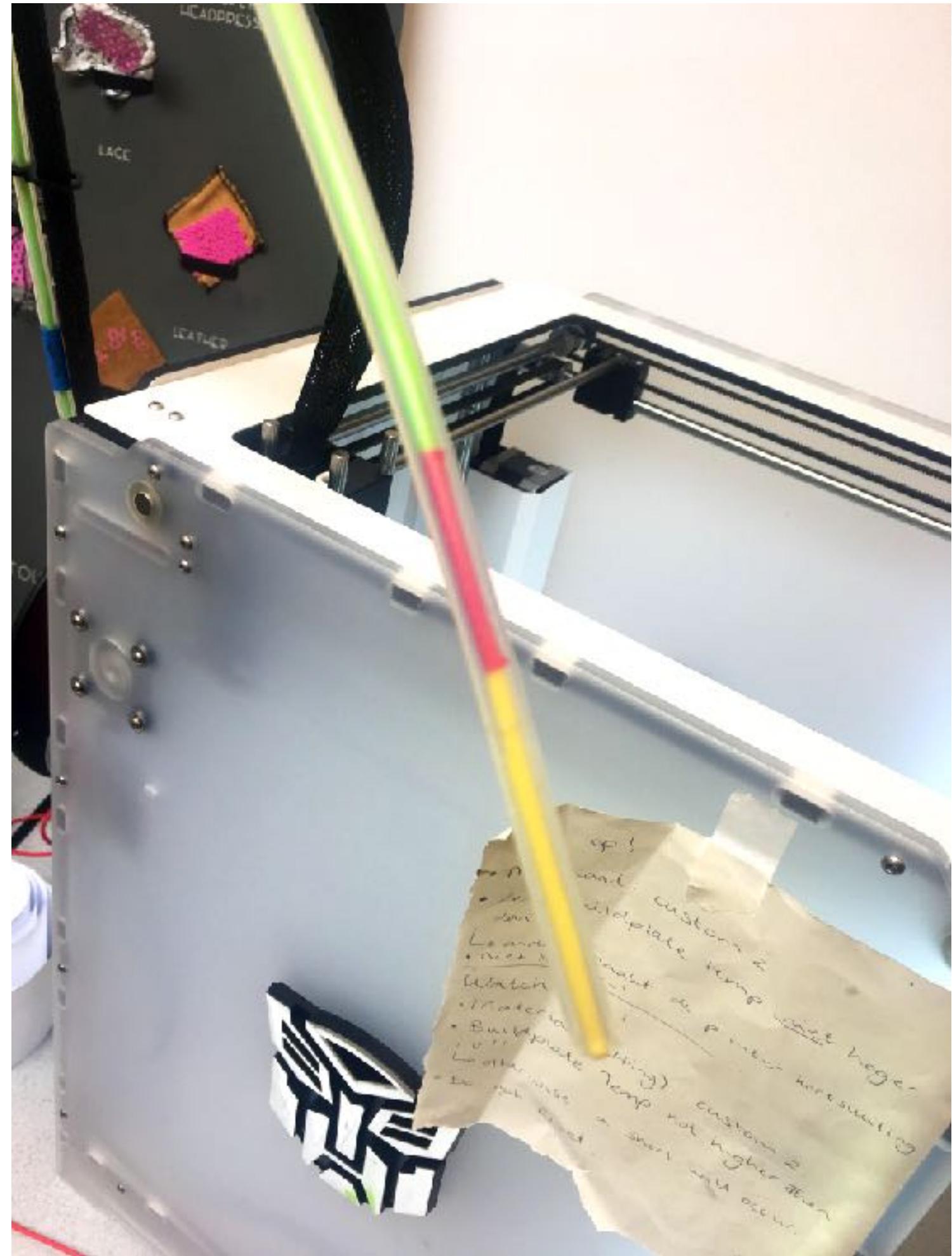


Scalar  
Production



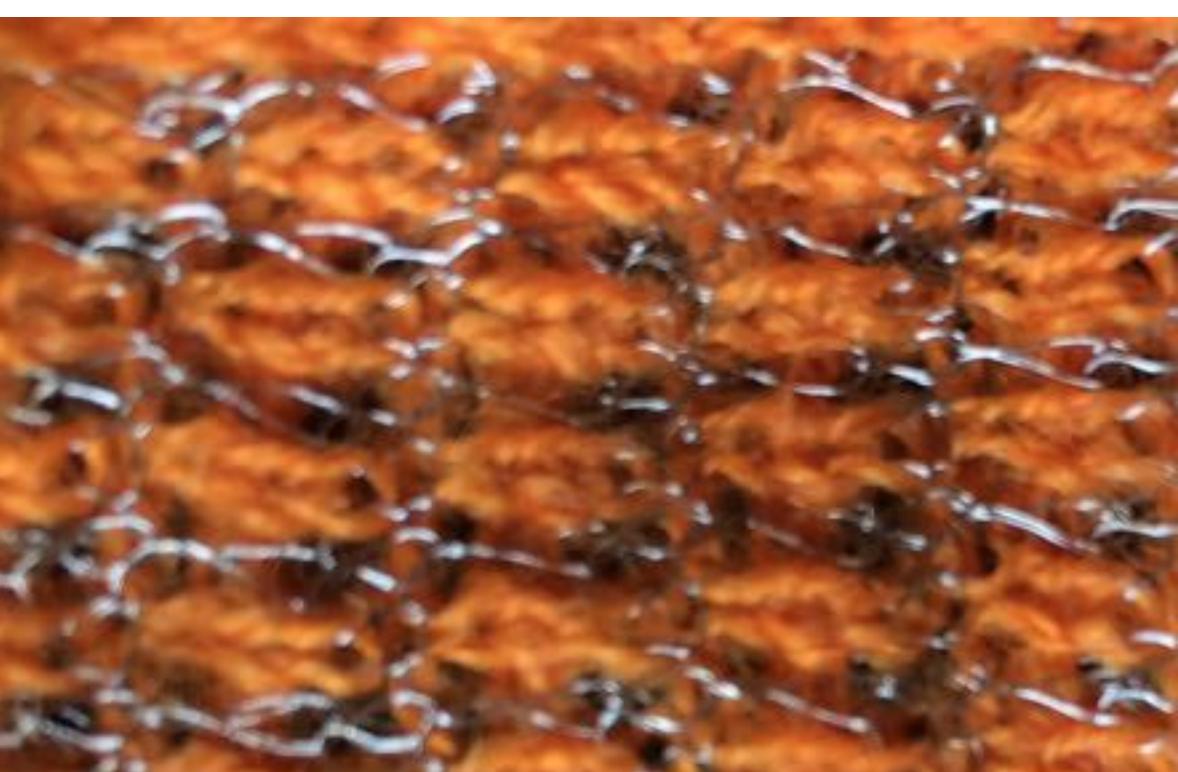
Garden

# Multi Filament Bowden

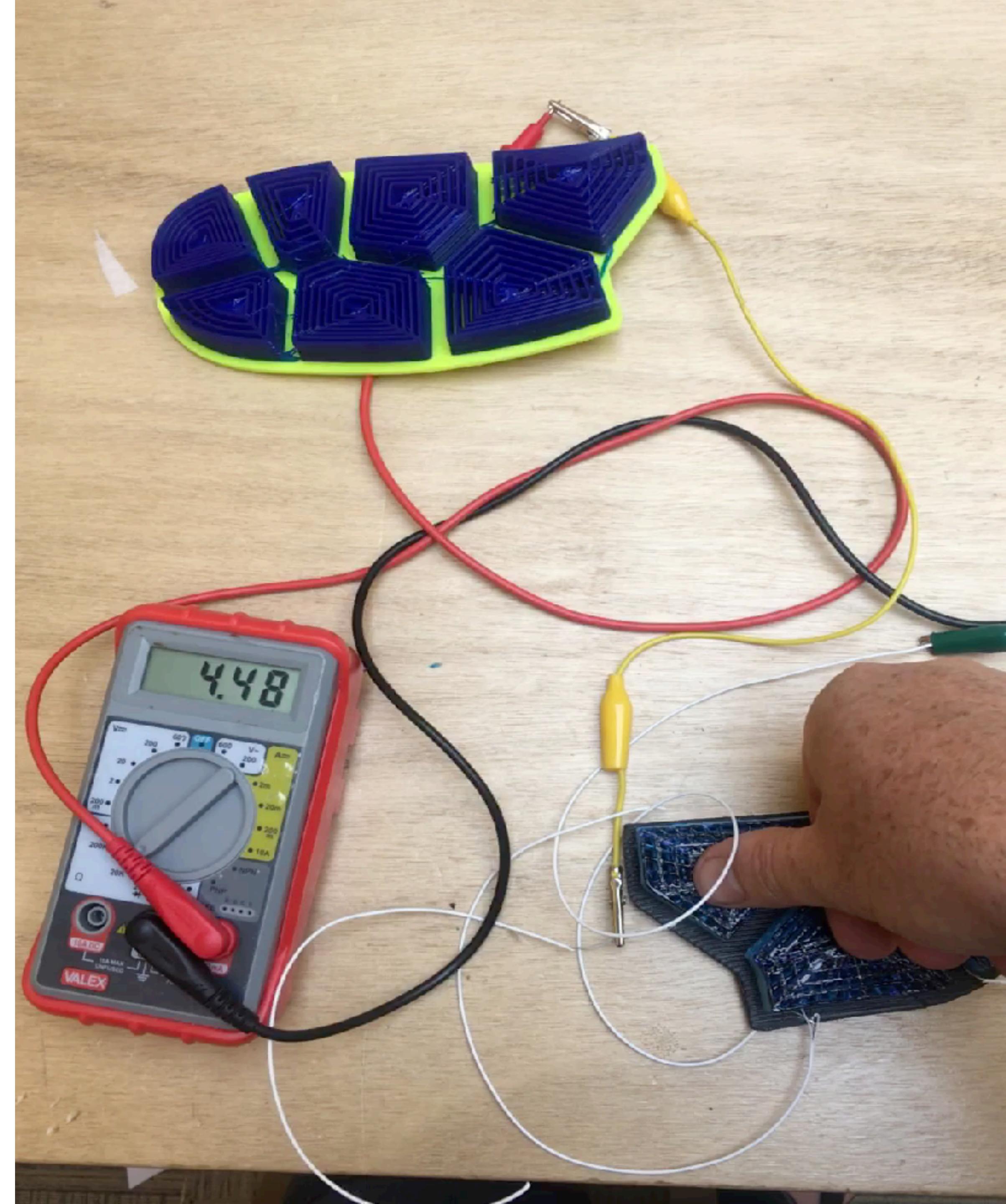


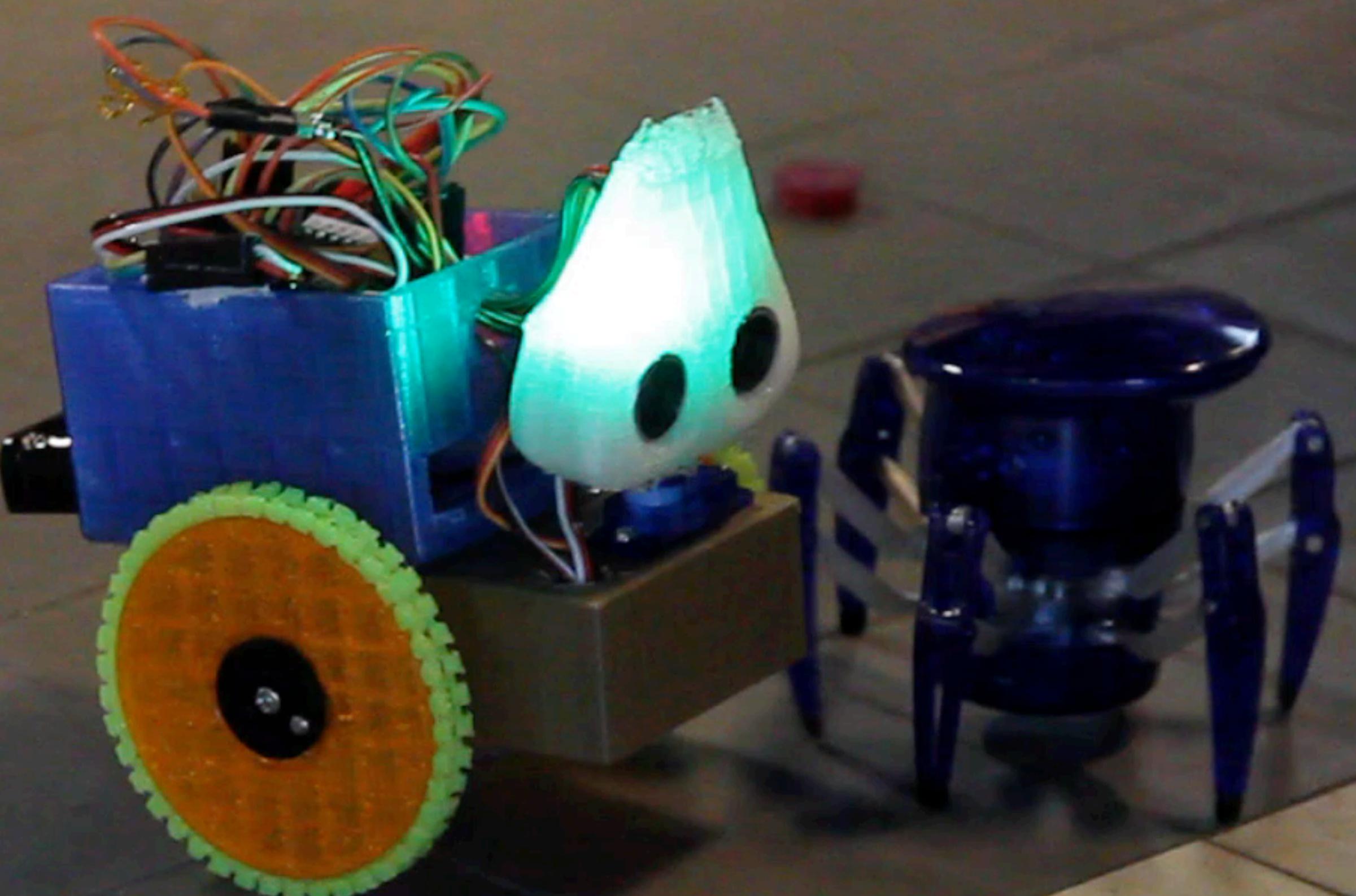
# Electronic Textiles

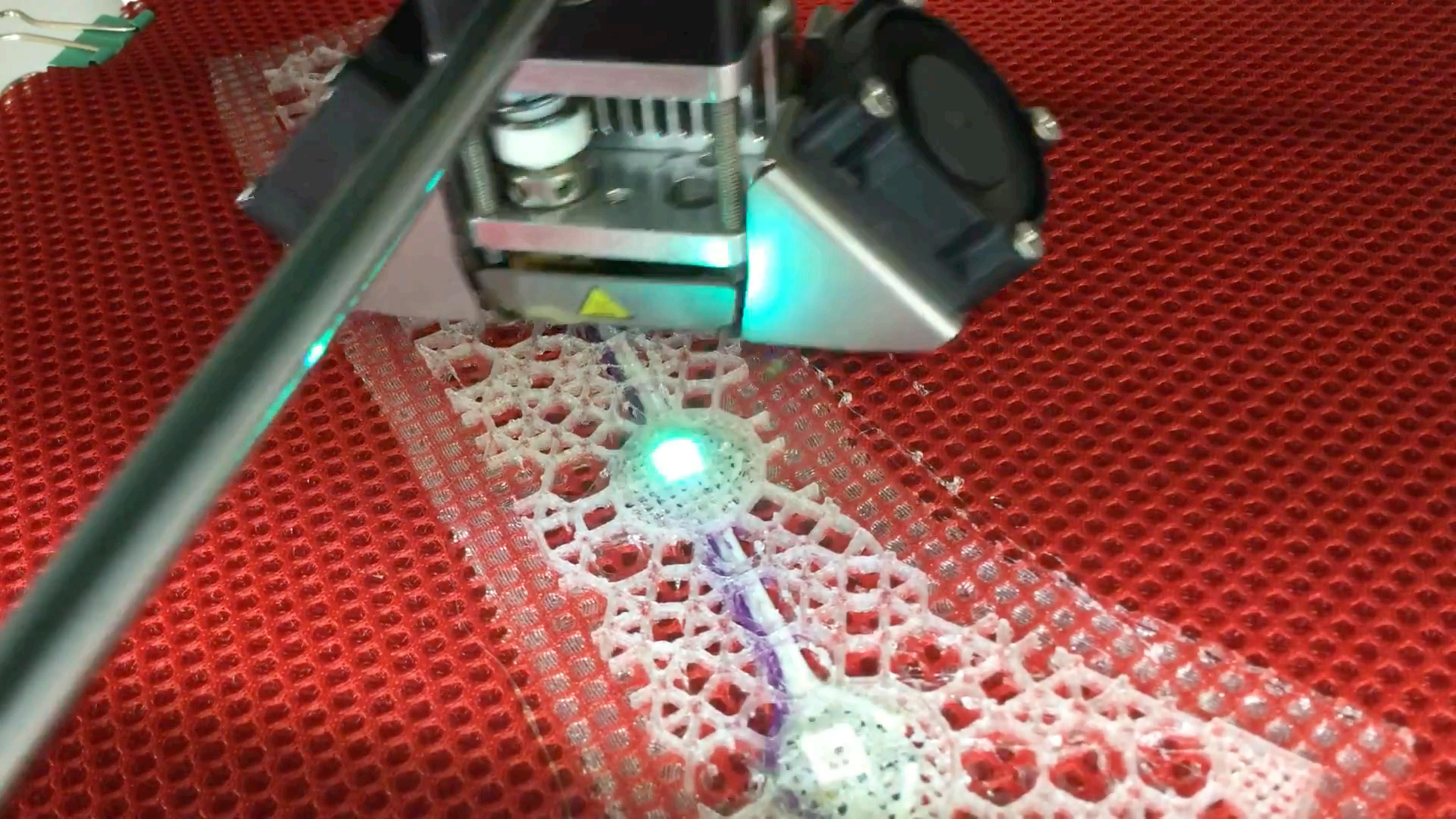
- Plug & Wear
- Energy Harvesting Textile



# Sensor Printing

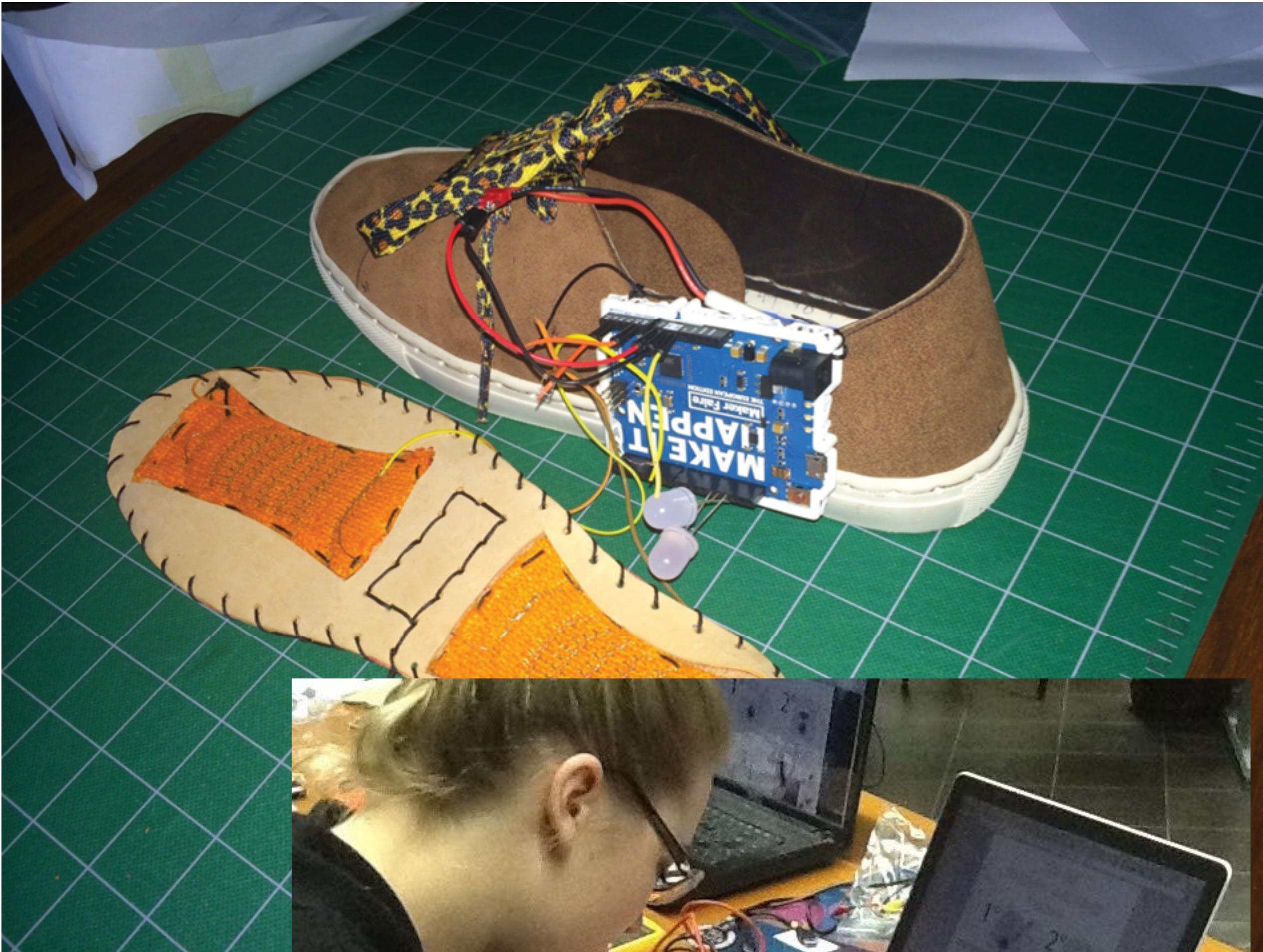






# Maker workshops

- Code in Motion
- Wearables 4 Italy
- Maker Faire Rome
- Institute of European Design
- ISIA and Less is Next
- SUPSI



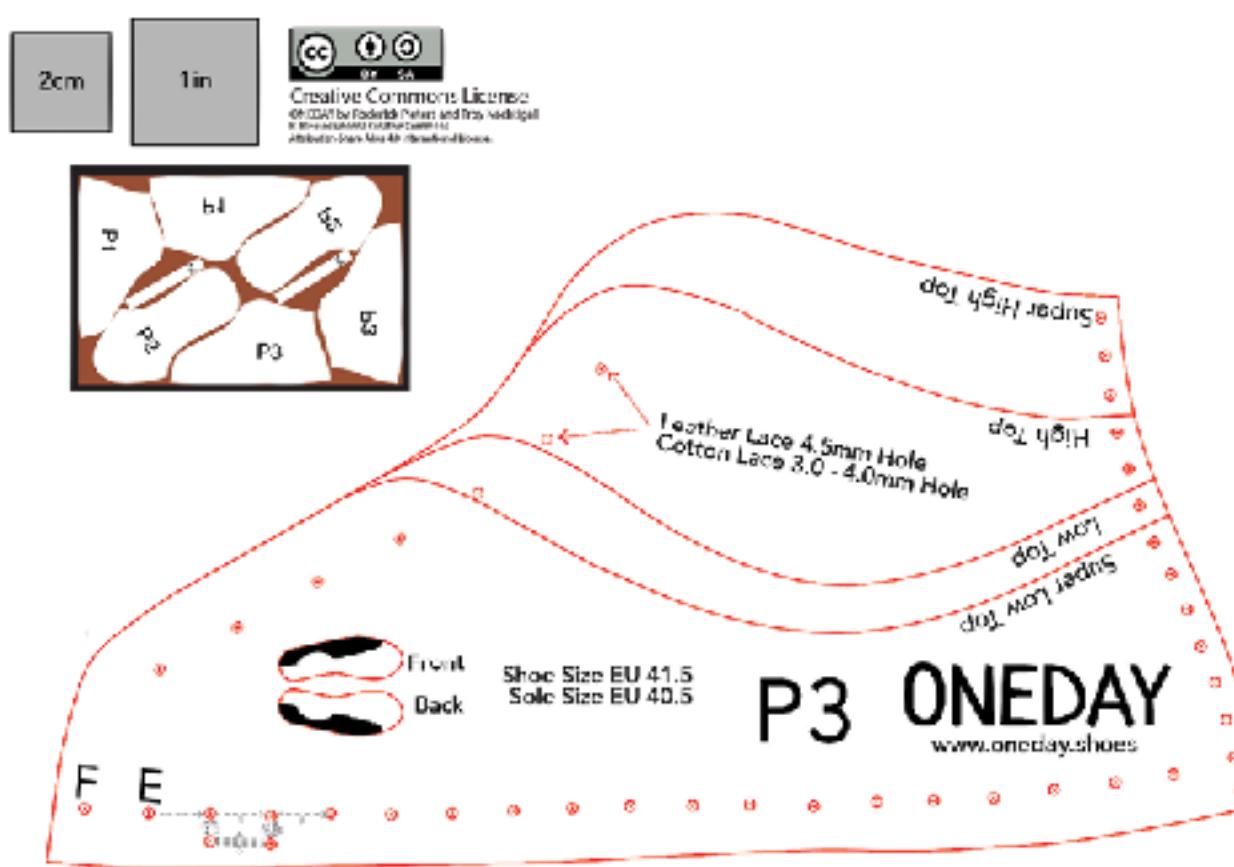
# Spike



# ONEDAY Shoes



ONEDAY  
make your own sneakers





# Solemaker



Sneakers



3D Print



Users



Soles



Design



Foot behaviour



Sensors



Algorithm



Social



Makers



Bounce



Fit



Weight distribution



Materials



Designers



Walking



Foot topography



Podiatrists



Materialize



Most shoes are made to decades old shoe forms that are created for an "average" person. Solemaker starts from a scan of your foot shape and pressure data to create a sole unique to you.



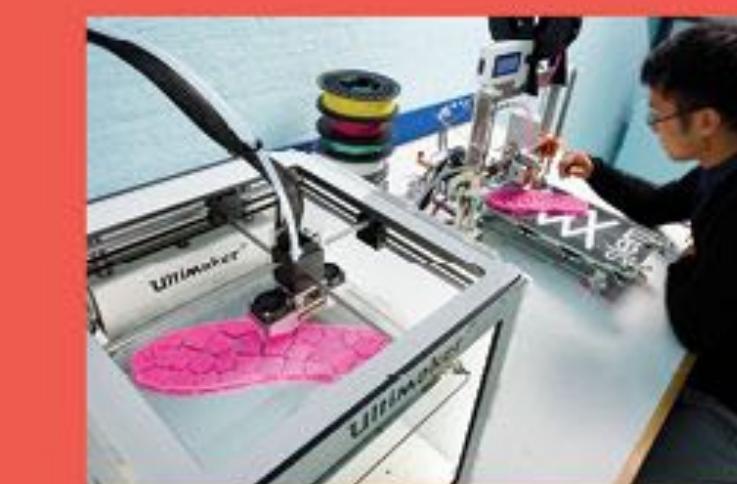
While some advanced shoe stores might look at how you walk, Solemaker invites you to think about how you walk and make changes to your sole. This might be you and your podiatrist, designer, maker or all together.



Beyond thinking about needs, Solemaker gives you the possibility to experiment and create sole designs that are uniquely your own. Using a series of algorithms, the sole is dynamically generated in real time. The files to produce your shoes are created straight from the data, no 3D file is needed.



These shoes were made to be worn. Rugged enough for daily street wear, we envision a future where Solemaker shoes can be seen everywhere. woow



While generic soles are made in far off places, Solemaker creates individual soles with dynamic densities created for you. Bypassing typical 3D Software, Solemaker programs the material behavior by generating code directly. Using Filaflex, a robust yet flexible thermoplastic the sole becomes a flexible 4D platform.



The completed shoe is uniquely yours, yet retains a classic style. In our research we have already began realizing a near future where other styles of shoes from different designers can be made with the same system.



Assembly is easy. In an hour with needle and thread it is possible to sew them together without a last. A heat gun can be used to seal the edges of the shoe to prevent water from entering.



We didn't forget the whole shoe either. Solemaker creates the "Uppers" of the shoe as well. While this is often done in one design for millions of copies, Solemaker provides laser cutting files. This allows for materials that you choose from your maker community.

We want you to wear shoes made specifically for you. [www.Solemaker.io](http://www.Solemaker.io) brings you all the files needed for creating ultra-personalized shoes in your community. A scan of your foot shape and weight distribution serve as a start point to a series of shoes made to your feet, needs and lifestyle.

Solemaker demonstrates a look into a future where the shoes can be a subscription service and with each passing pair the wear will be measured and the material recycled to create a better fitting shoe. Each shoe is created with code that dynamically programs the sole material to the shape and weight distribution of the foot.

Solemaker allows everyone to make shoes at a FabLab or Maker Space close to them. We created [www.Solemaker.io](http://www.Solemaker.io) so that anyone anywhere can create a pair of shoes to be made locally.

Solemaker is created by:

- Troy Machtigall - Head Designer and Researcher, TU/eindhoven
- Prof. Dr. Leo Feijen - Professor, Design Intelligence, TU/eindhoven
- Dr. Stephan Wensveen - Professor, Wearable Sensors, TU/eindhoven
- Dr. Oscar Tomico - Professor, Wearable Sensors, TU/eindhoven
- Admex Shoenen - Electrical Engineer, /dseenz Lab, TU/eindhoven
- Bart Pruijzenboom - Interaction Designer, TU/eindhoven
- Henry Lin - Interaction Designer, Simon Fraser University
- Erwin Hoogendoorn - Programmer, TU/eindhoven
- Max Pinsky - Graphic Designer
- Fiona Basilio - Guru, FabLab Toscana
- Sigríður Helga Hauksdóttir - Podiatrist, SIKH Heelwijk
- Theodora Kyrgia - UX Designer, TU/eindhoven
- Ruben Lekkerkerk - Shoe Designer, SIKH Heelwijk

**ArcInTexETN**



slem

**DJ**  
DESIGN  
UNITED

**TU/e**  
Technische Universiteit  
Eindhoven  
University of Technology  
Where innovation starts

# **Design Probe of the Maker Community**

# Phenomenon 1 - Circuit integration

- Tinkercad Circuits
- [circuits.io](https://circuits.io)
- 123 Circuits

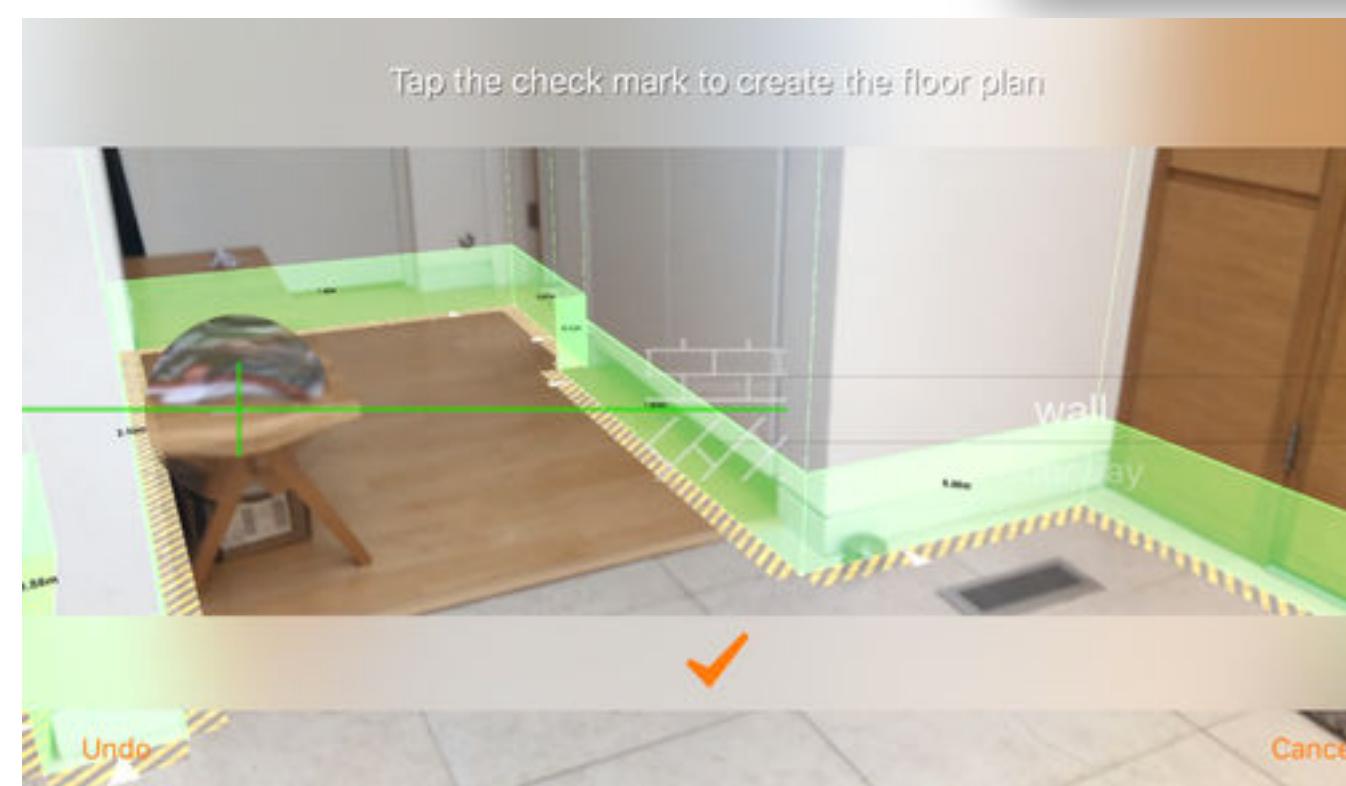
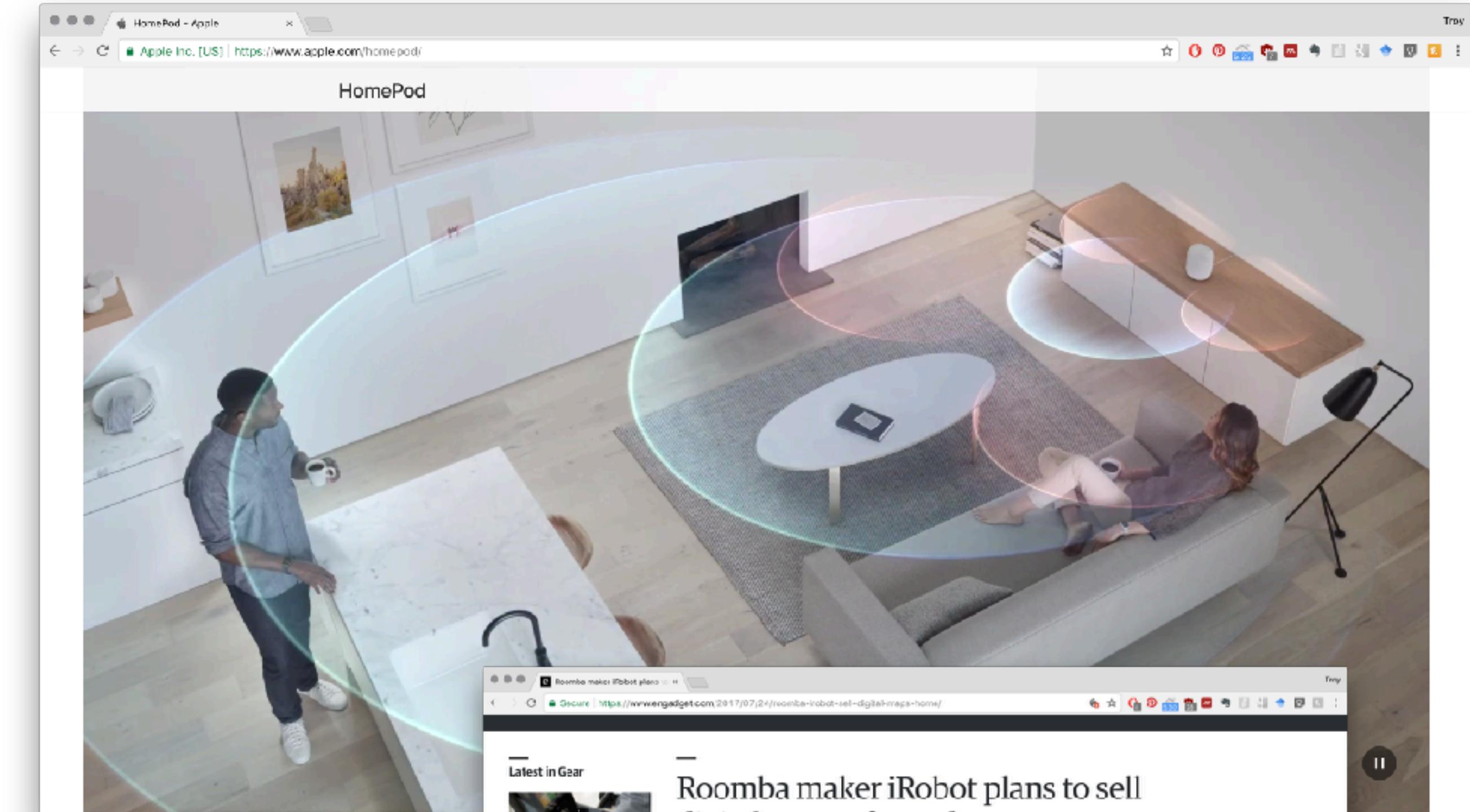
The image displays two screenshots of web-based circuit simulation platforms.

**circuits.io Screenshot:** The top screenshot shows the circuits.io homepage. It features a central message "A hub for every goal." with a subtext about starting with simple experiments or going straight to PCB Design. Below this are three buttons: "Open Electronics Lab Hub" (green), "Open Circuit Scribe Hub" (blue), and "Open PCB Design Hub" (grey). To the right is a screenshot of a complex circuit board design with various components and connections. The browser's address bar shows "Secure | https://circuits.io".

**Tinkercad Learn Screenshot:** The bottom screenshot shows the Tinkercad Learn homepage. It features a large penguin icon on the left and a blue Arduino Uno microcontroller on the right. In the center, there's a call-to-action button "I want to learn about..." and a "Step-by-Step Lessons" section with icons for "3D Design" and "Circuits". The browser's address bar shows "Secure | https://www.tinkercad.com/learn/".

# Phenomenon 2 - Space Maps

- Space Mapping
- [circuits.io](#)
- Room Scan



**Roomba maker iRobot plans to sell digital maps of your home**

But will consumers want to share their home layout with everyone?

Rob LeFebre, @robfe 67,743 in Robots 19 Comments 1481 Shares

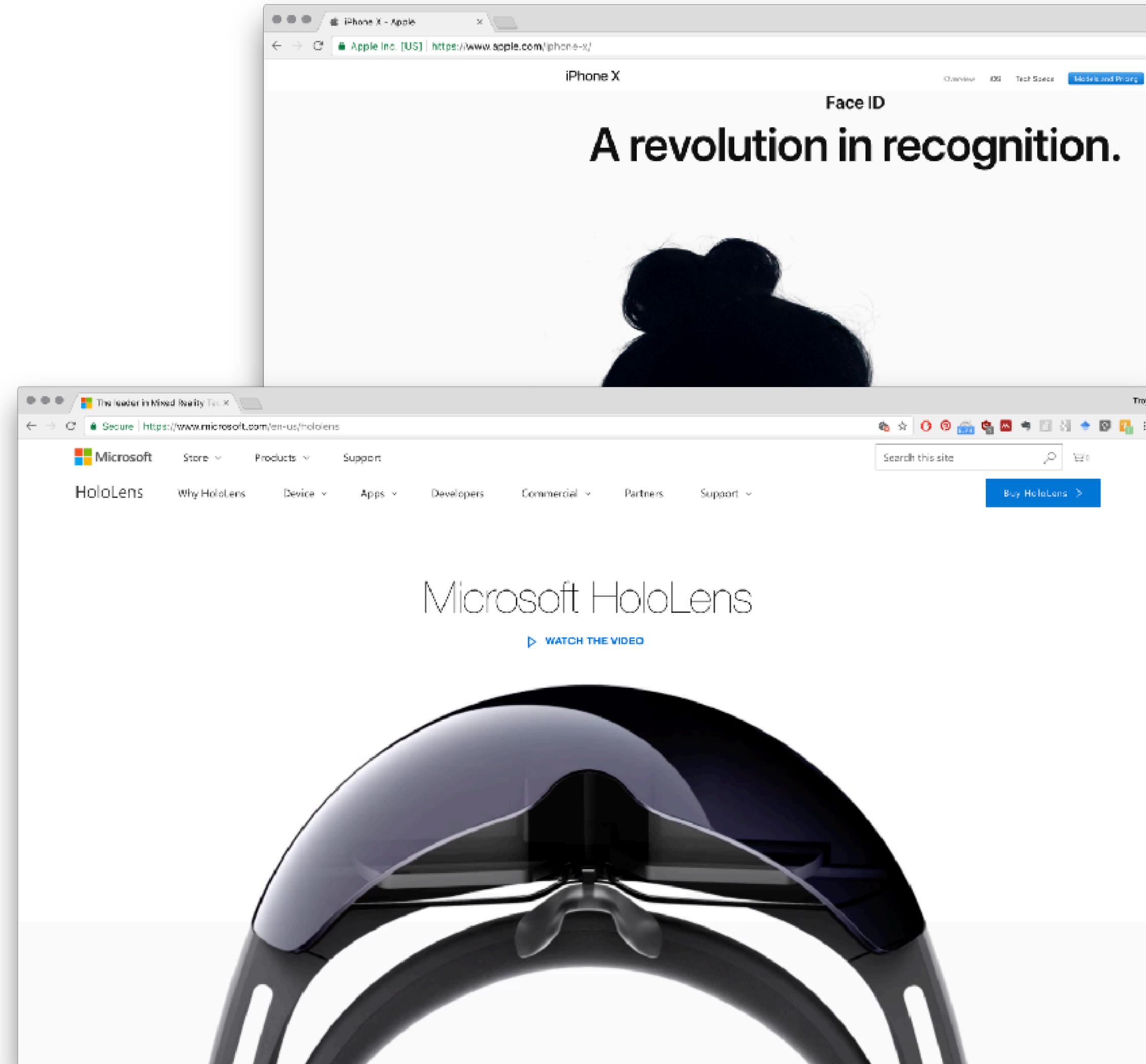
Apple's fitness-focused watchOS 4 is available for download 6m ago

Senate passes bill requiring easy access to public government data 12m ago

HTC Vive ditches the PC thanks to Chirp's cloud VR Devin Rader /nO/

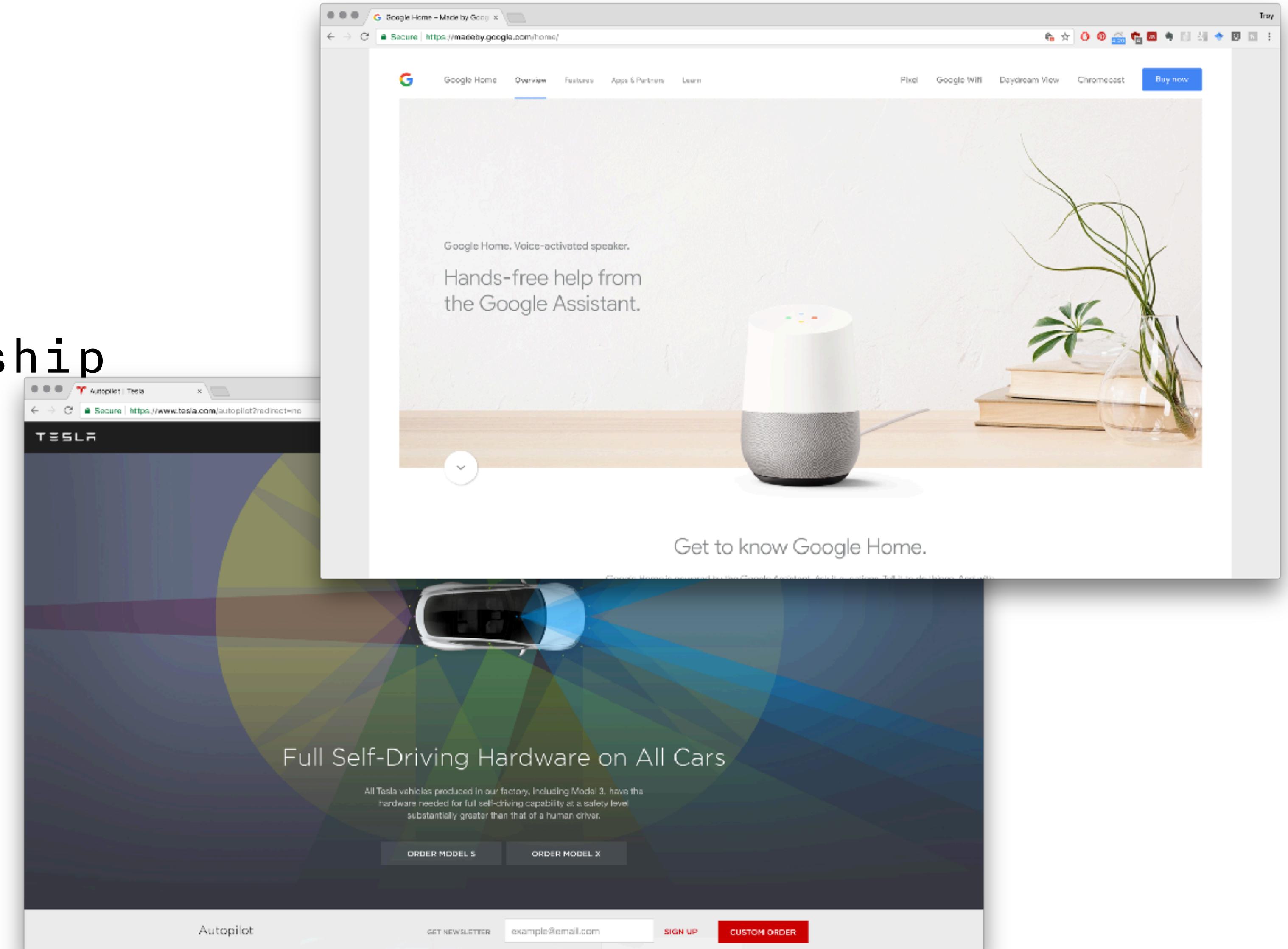
# Phenomenon 3 - MR/AR

- iPhone X Prime Sense
- Microsoft Holo Lens
- Oculus Rift



# Phenomenon 4 - Cocoon of Alterity

- Self Driving Cars
- AI Home Assistants
- Symbiotic Relationship



# Obiettivi

- Learn how to print MM3D Soft Sensors
- Learn to Print on Fabric.
- Learn to control interactions with the Photon
- Create a few drawings of ideas of interaction.
- Create a demo (o due/tre) of the technology.