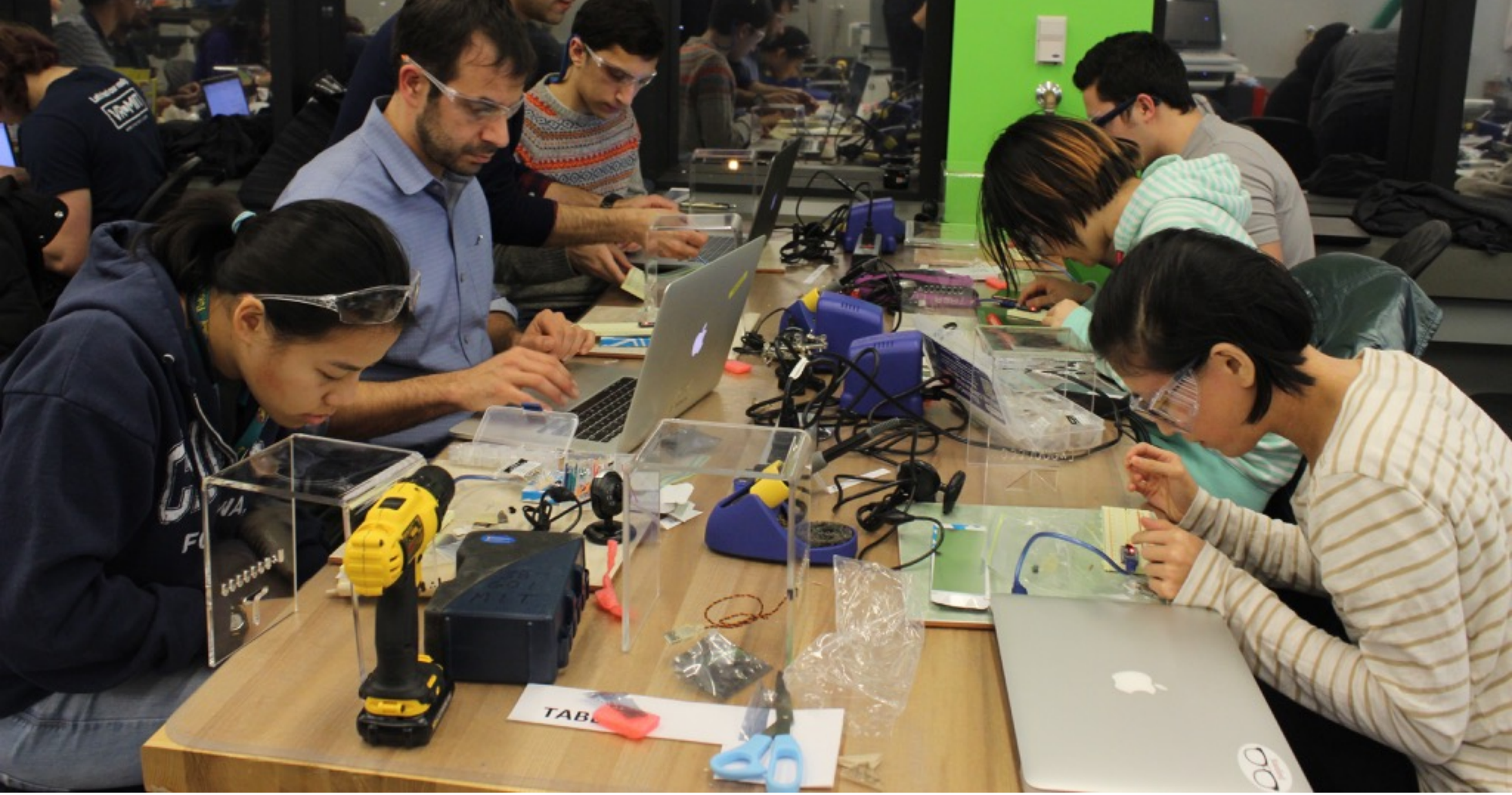


Some Organizational Stuff

6.810 Engineering Interaction Technologies

Prof. Stefanie Mueller | MIT CSAIL | HCI Engineering Group

class website

class website:

http://hamhash.com/available

enrollment

fill out the sign-up sheet:
(answers to skill questions do not have an influence on enrollment)

http://hamhash.com/when

<5 min>

class website:
http://hamhash.com/available

enrolled (max. 50 students)::

I will send an **email today**

with enrolled / waitlist notifications.

sign up for IDC workshop orientation

IDC Building & Workshop Access

building: no card required: Mo-Fr, 8-6pm (weekend closed)
building: with card access (granted after orientation): every day, 24 hours (but not the workshop)

workshop with shop manager: 9am - 5pm
workshop with TA: after 5pm depending on TA availability:

Monday: 5-10pm Lotta Blumberg (TA)
Tuesday: 5-10pm Loren Maggiore (LA)
Wednesday: no evening shop hours
Thursday: 5-10pm Xin Wen (UTA)
Friday: no evening shop hours
Saturday: 1-5pm Loren Maggiore (LA)
Sunday: probably no shop hours

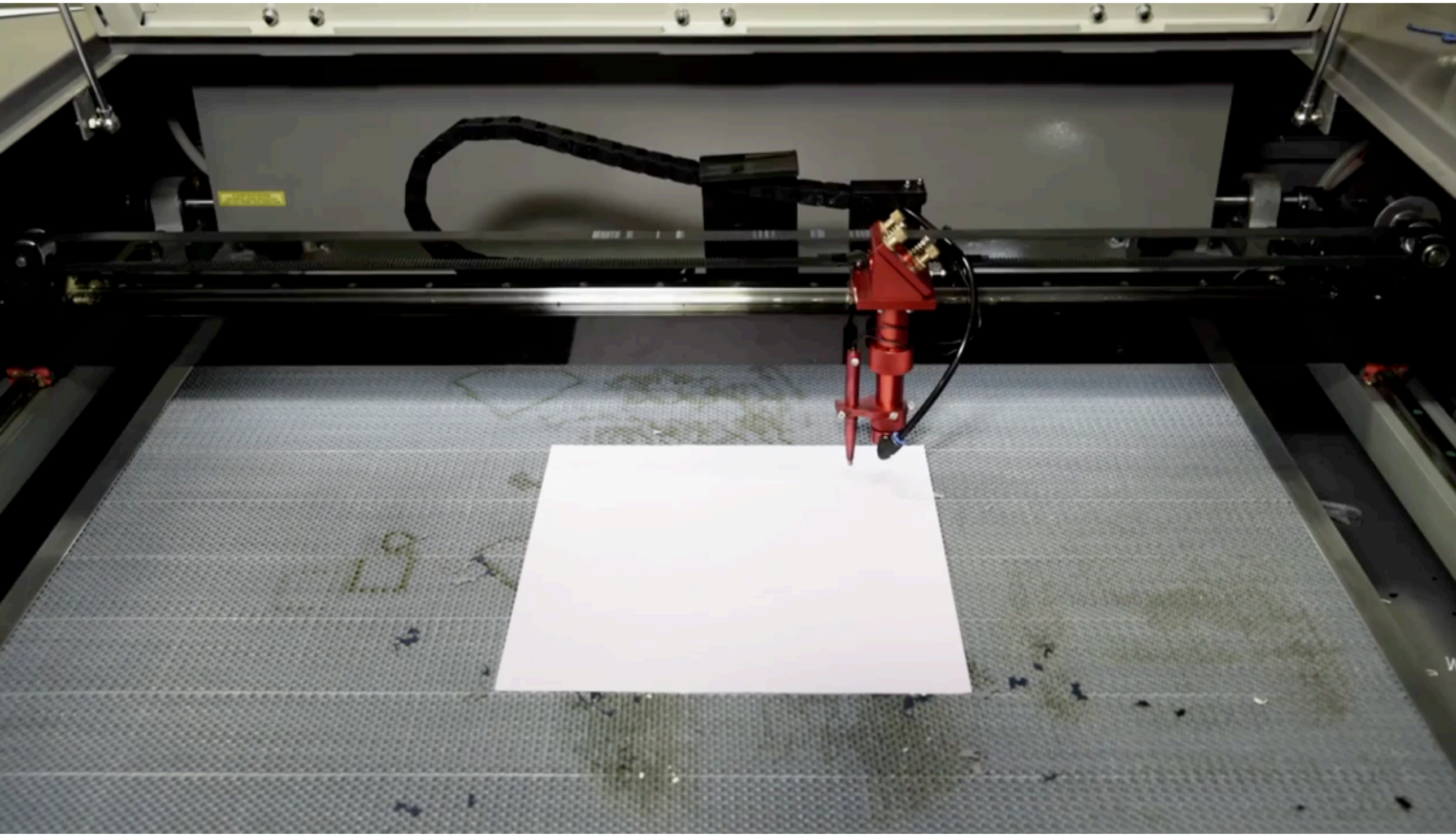
TA office hours

sign up for a 40 min
IDC workshop orientation:

http://hamhash.com/web

your todo’s
for this friday class

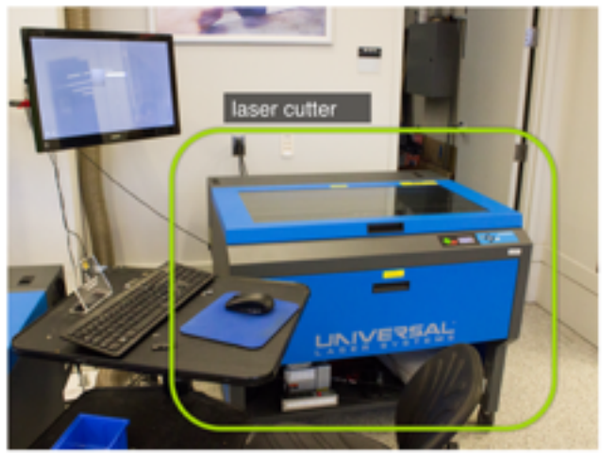
friday: laser cutting!

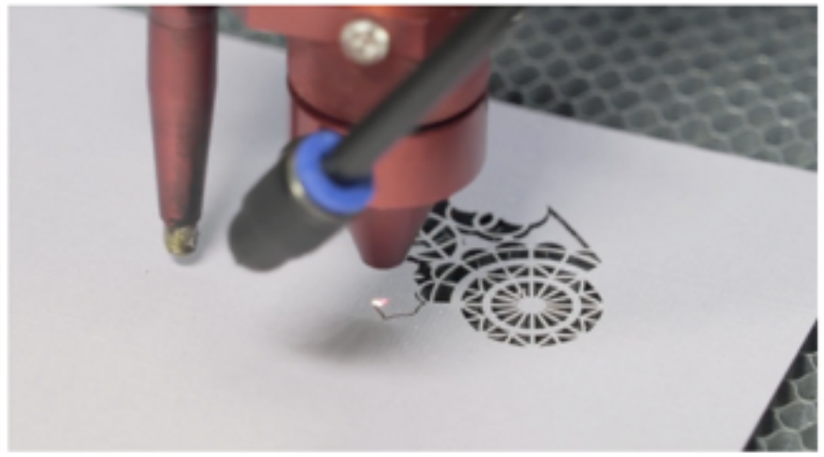


6.810 Engineering Interactive Technologies (fall 2018)

HW: Preparation for Laser Cutting

(due Friday, Sept. 7, 1pm)





Deadline: due Friday (September 7, 2018) at 1pm, upload a 2D drawing created with your drawing program here

2D Drawing Programs

wing program.

Recommended:

- Adobe Illustrator (but only 30 day test version)
- OpenDraw
- Inkscape

If your drawing program doesn't open because of your 'security preferences' (mostly on Mac), you can go to your systems settings (Apple -> System Preferences -> Security and Privacy, then at the bottom of the window say 'open anyway').

6.810 Locations for Laser Cutting on friday (Sept. 7)

Last edit was 2 days ago

100% $ % .0 .00 123 Arial 10

fx

	A	B	C	D	E	F	G
7	**Location 1:**						
8	**Stefanie's Labspace**						
9	**32-211 (don't take the elevator, take the small staircase opposite the Dreyfoos elevator and we are just around the**						
10	**run by: Dishita Turakhia & Doga Dogan (Stefanie's PhD students)**						
11	student 1:						
12	student 2:						
13	student 3:						
14	student 4:						
15	student 5:						
16	student 6:						
17	student 7:						
18	student 8:						
19	student 9:						
20	student 10:						
21	student 11:						
22	student 12:						

we will split across IDC, EDS, and my lab space!

locations for class:

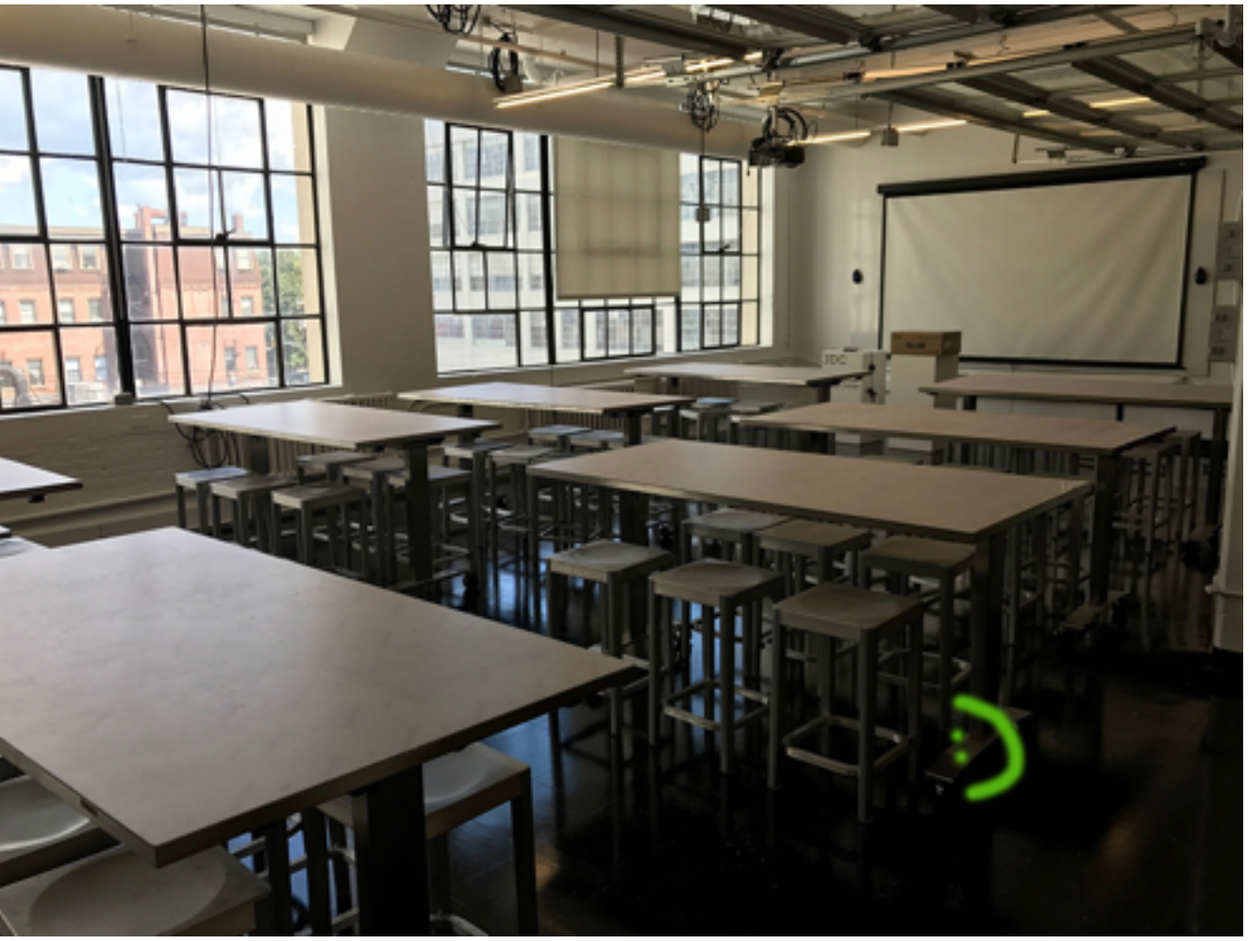
- default: IDC
- IDC names: garage, courtyard, front and middle conference room
- sometimes class is in EDS, or my lab-space

Schedule

This schedule is provisional and might change in the next weeks.

Week	Date	Topic	Room	Notes
1	Sept 5 (wed)	• lecture: Course Overview • lecture: Multitouch Technology • in class sign up for: Workshop Orientation and fill out: Skills Survey • after class: we will email you if you are enrolled, check final enrollment list here	IDC garage	
	Sept 7 (fr)	• HW1 due 1.00pm: install a 2D drawing tool for laser cutting • skills lab: laser cutting (check location here) • in class: fill out the team partner survey • HW2 due 2.30pm: version 1 of business card (we do it in-class)	IDC garage, EDS, and Stefanie's labspace	

International Design Center (IDC)



N52-387

Engineering Design Studio (EDS)

38-501

wear closed shoes!

(no flip flops, sandals)

staff

instructor: Prof. Stefanie Mueller

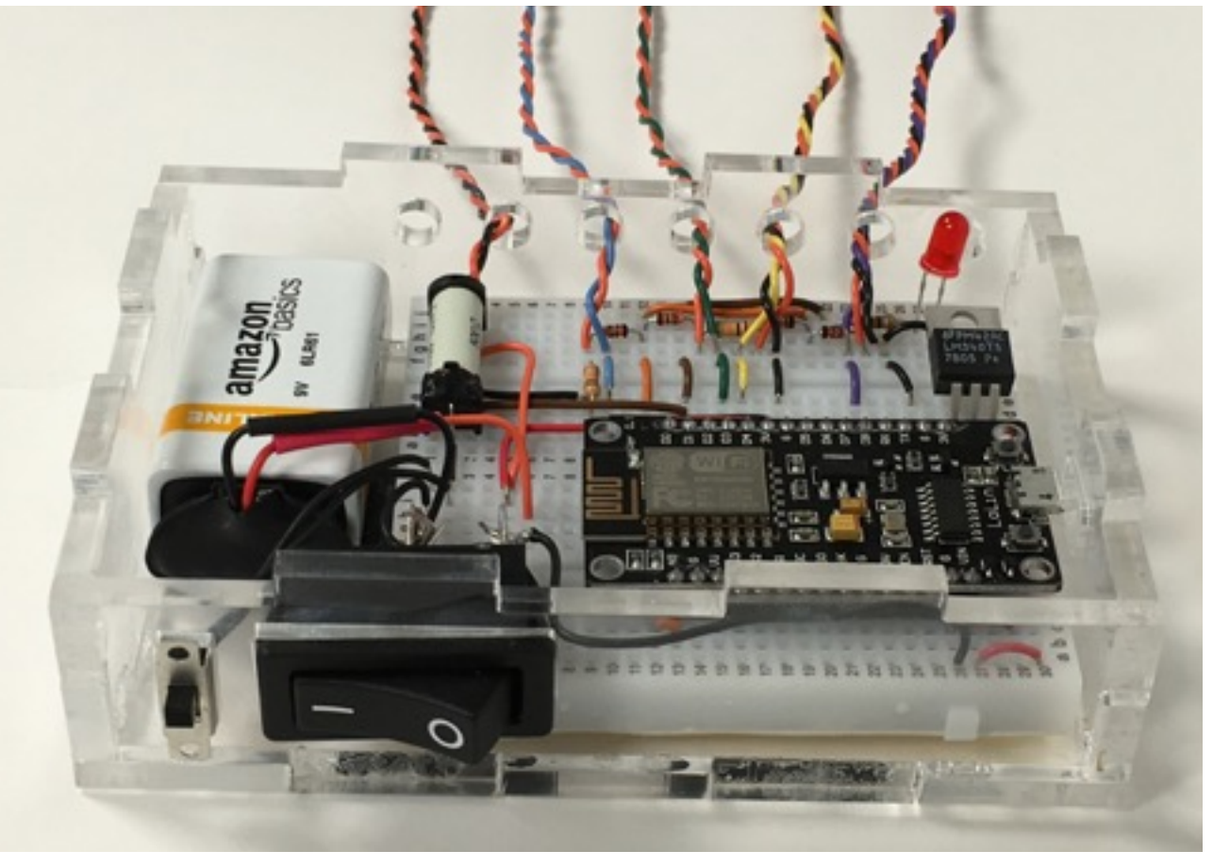
MIT EECS / MechE

TA: Lotta-Gili Blumberg

took the course last year when it was 6.S063

UROPed with me, now MEng-ing

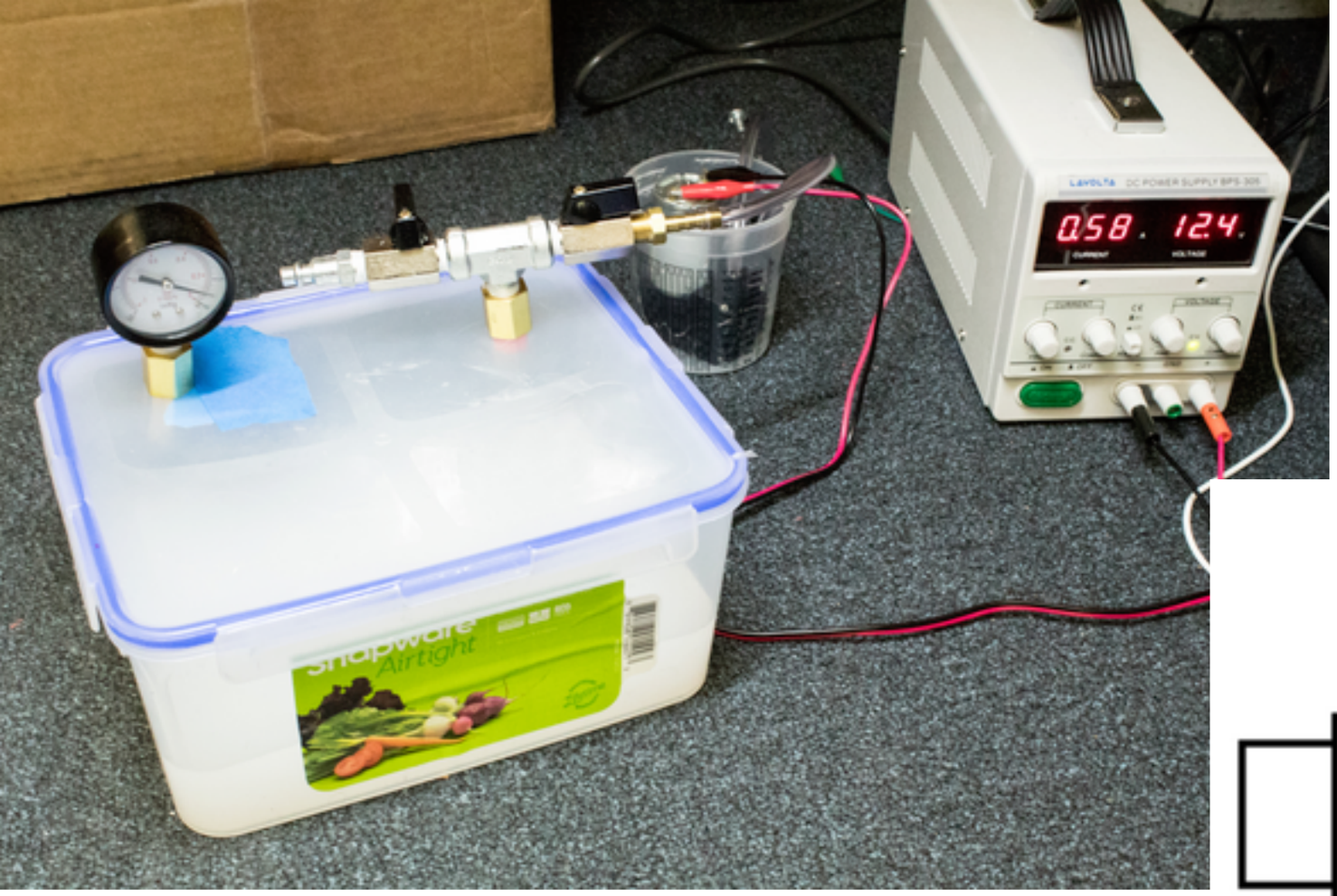

MIT
PHYSICS

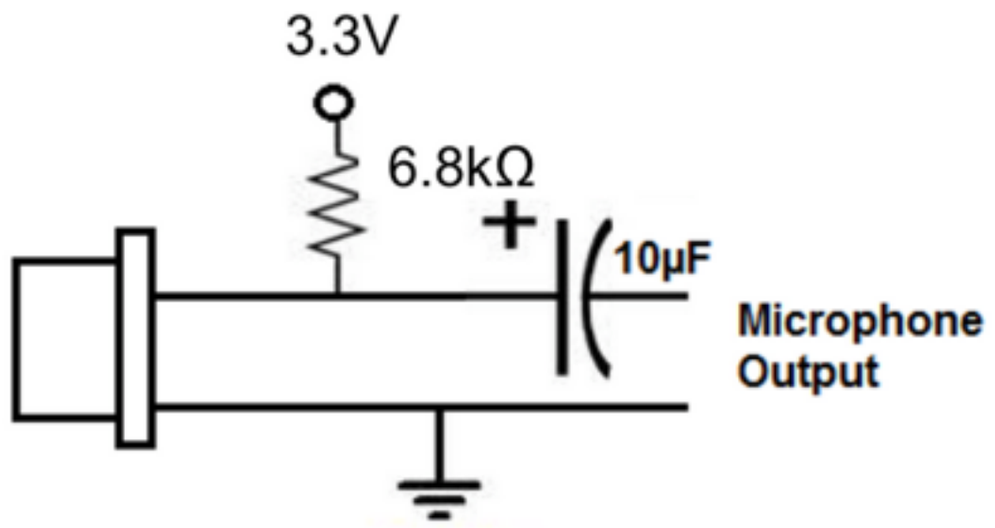

amazon basics

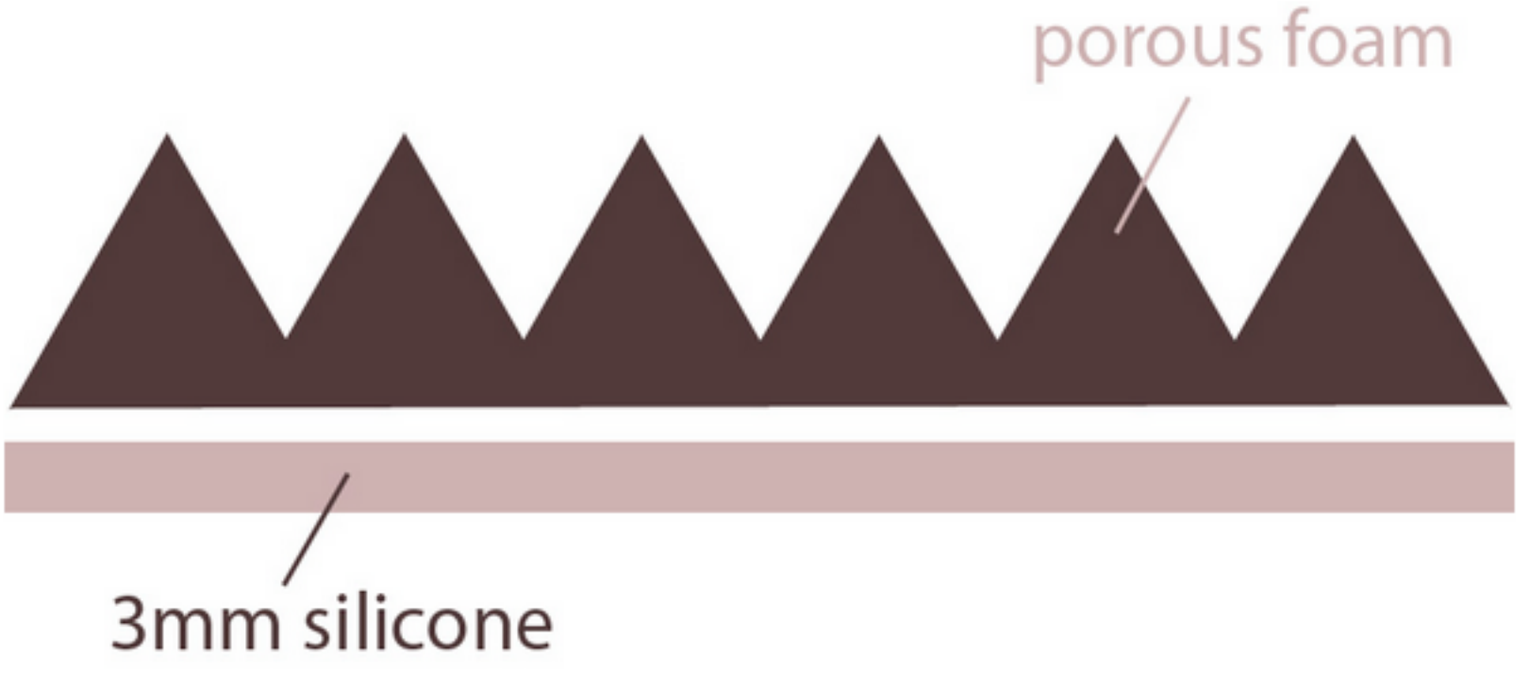
UTA: Xin Wen

took the course last year when it was 6.S063

UROPed, SuperUROPed


Snapware
Airtight

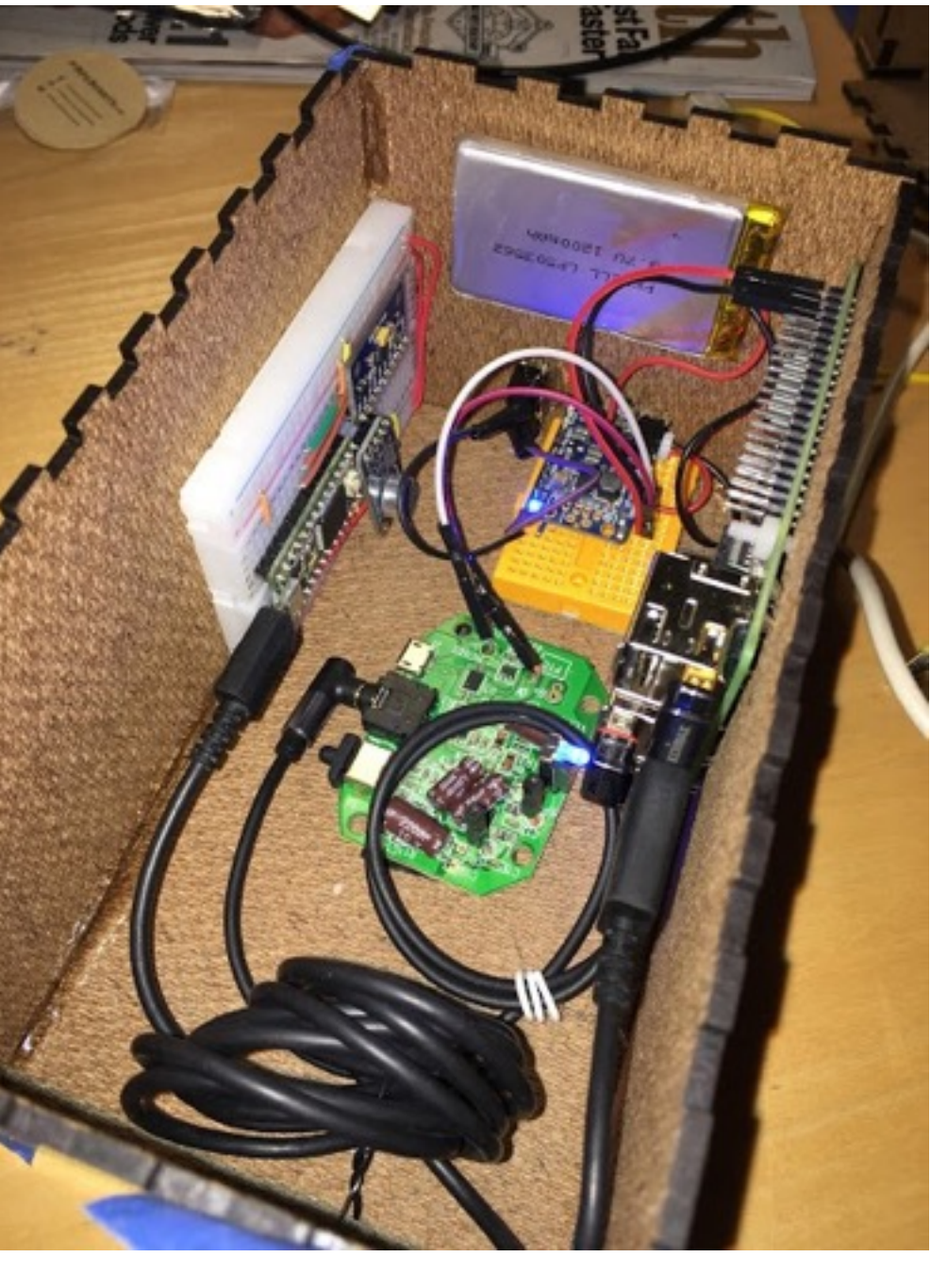

3.3V
6.8kΩ
10µF
Microphone
Output


porous foam
3mm silicone

LA: Loren Maggiore

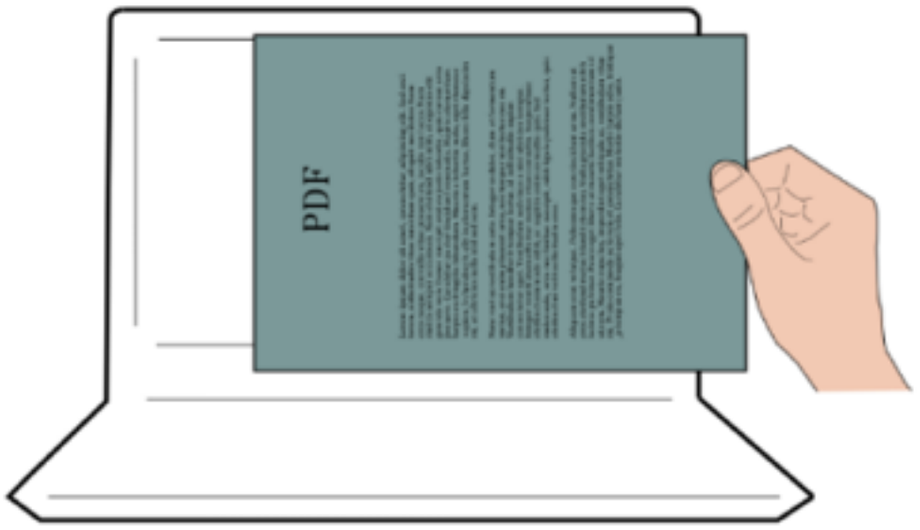
took the course last year when it was 6.S063

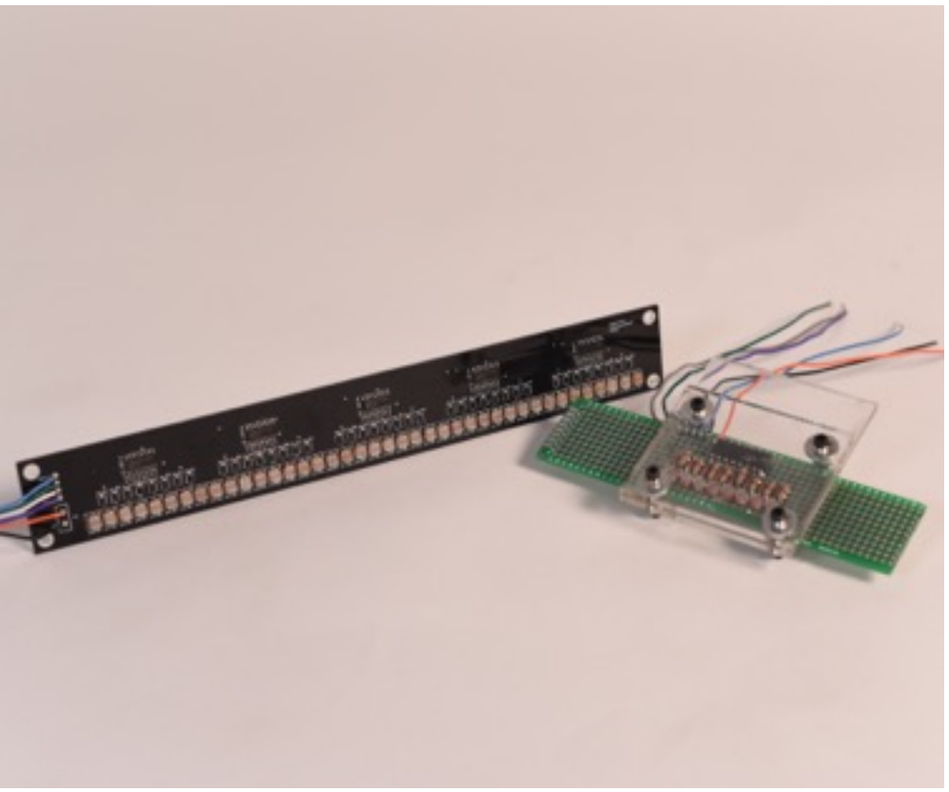
UROPed

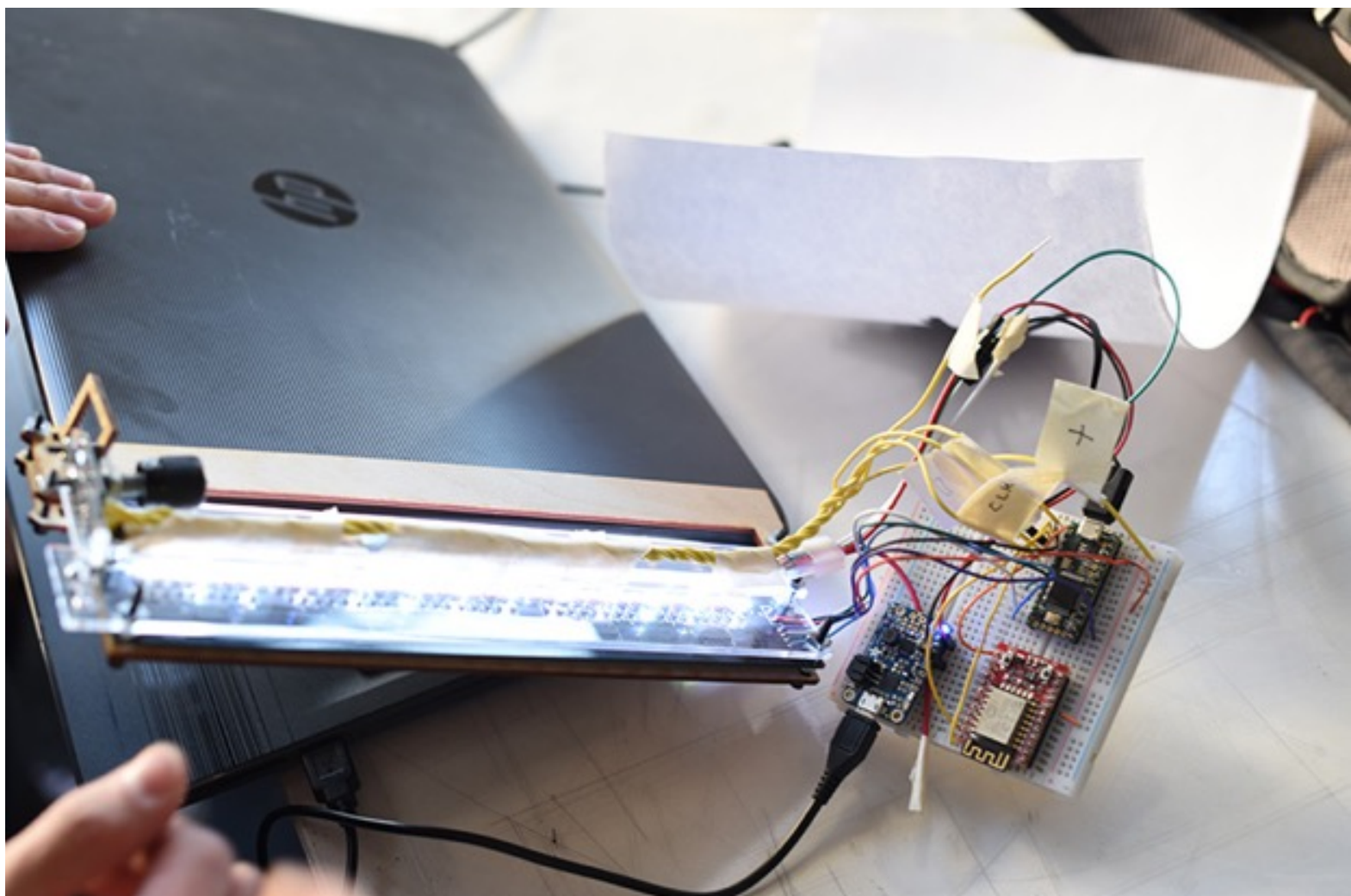


LA: Mark Chounlakone

took the course last year when it was 6.S063


PDF





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Friday: no evening shop hours
Saturday: 1-5pm Loren Maggiore (LA)
Sunday: probably no shop hours

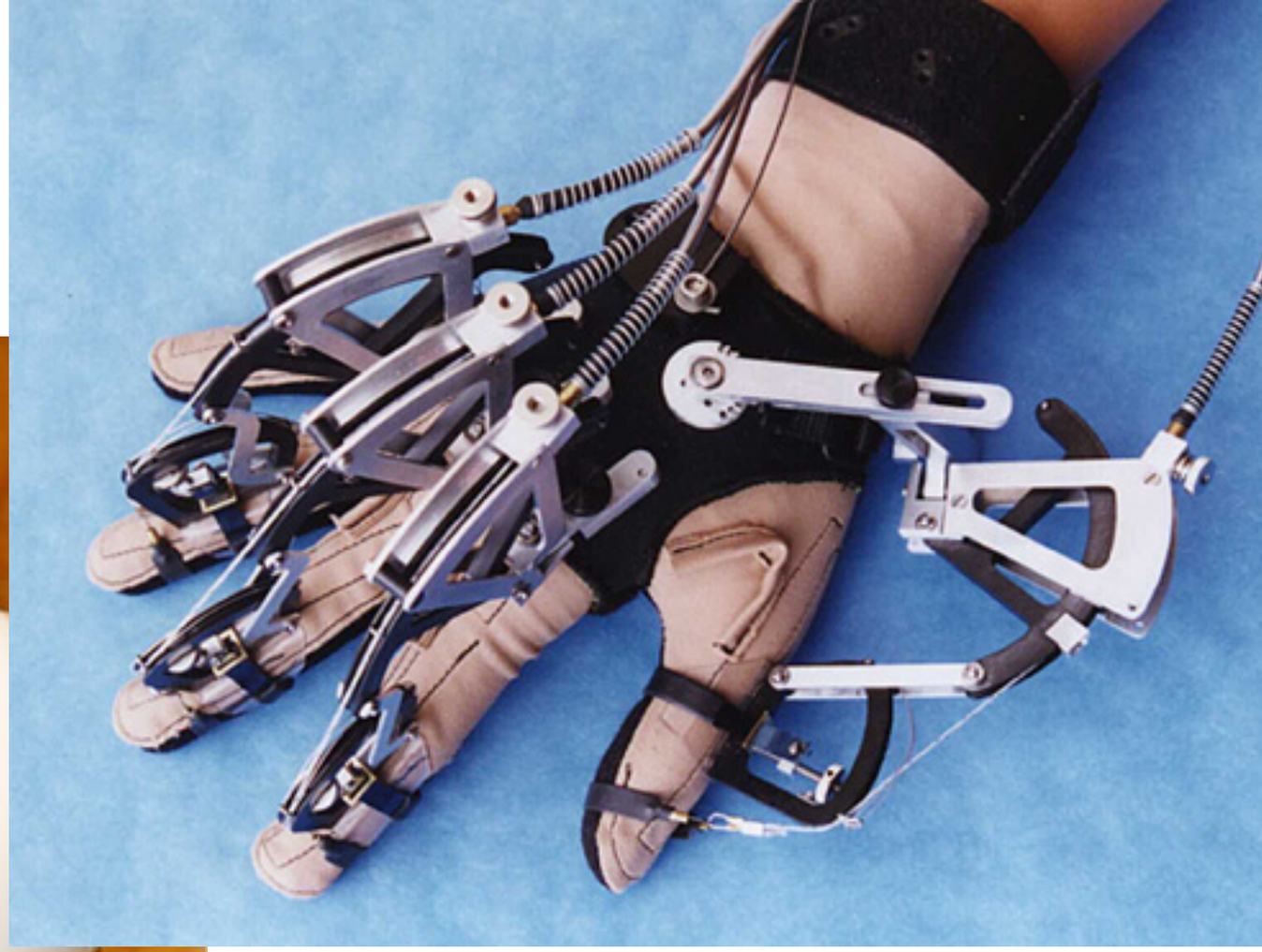
TA office hours

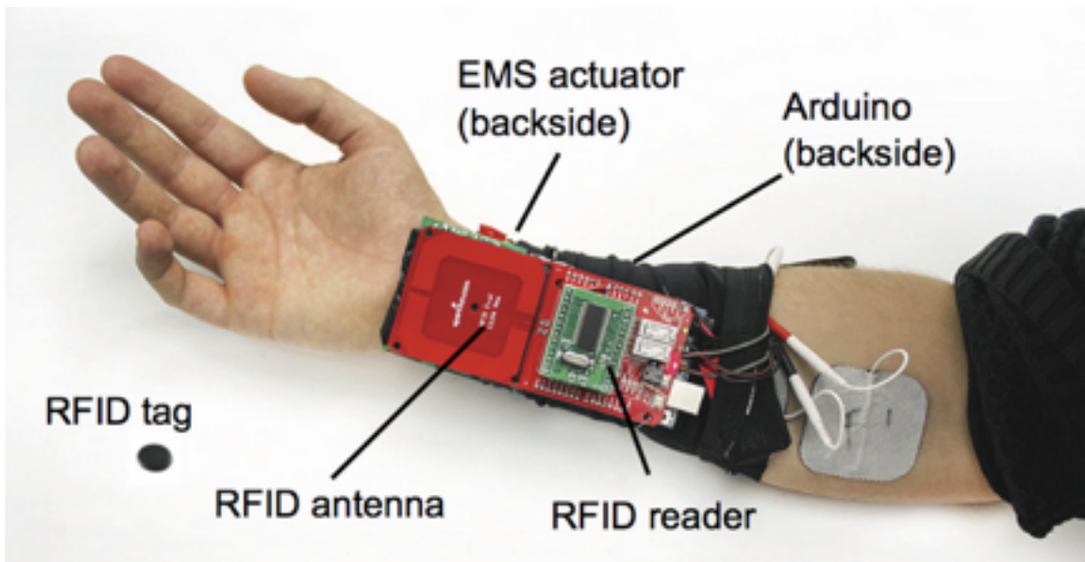
course structure

wednesdays:
new interactive technology

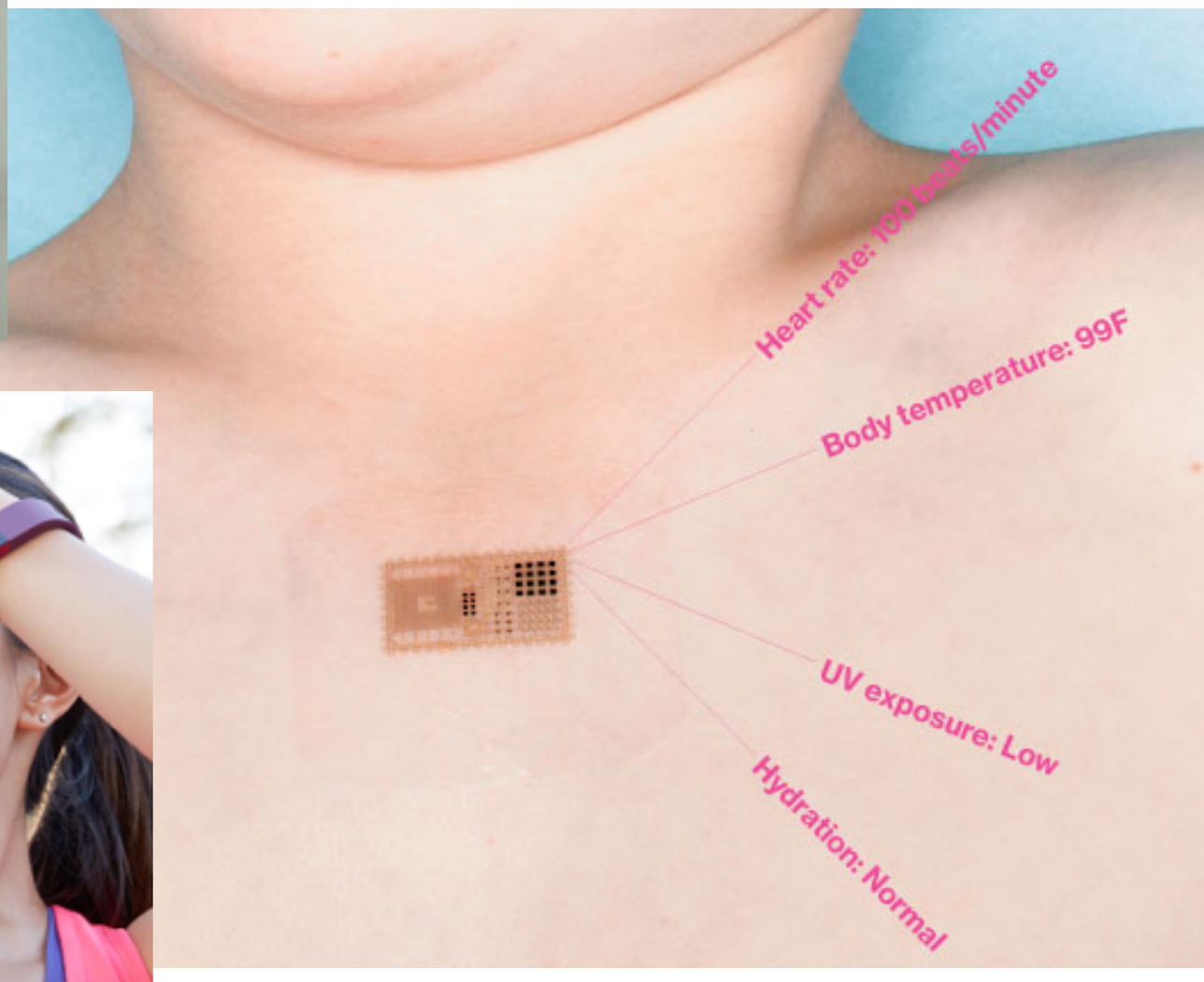
brain computer interfaces


LIFE



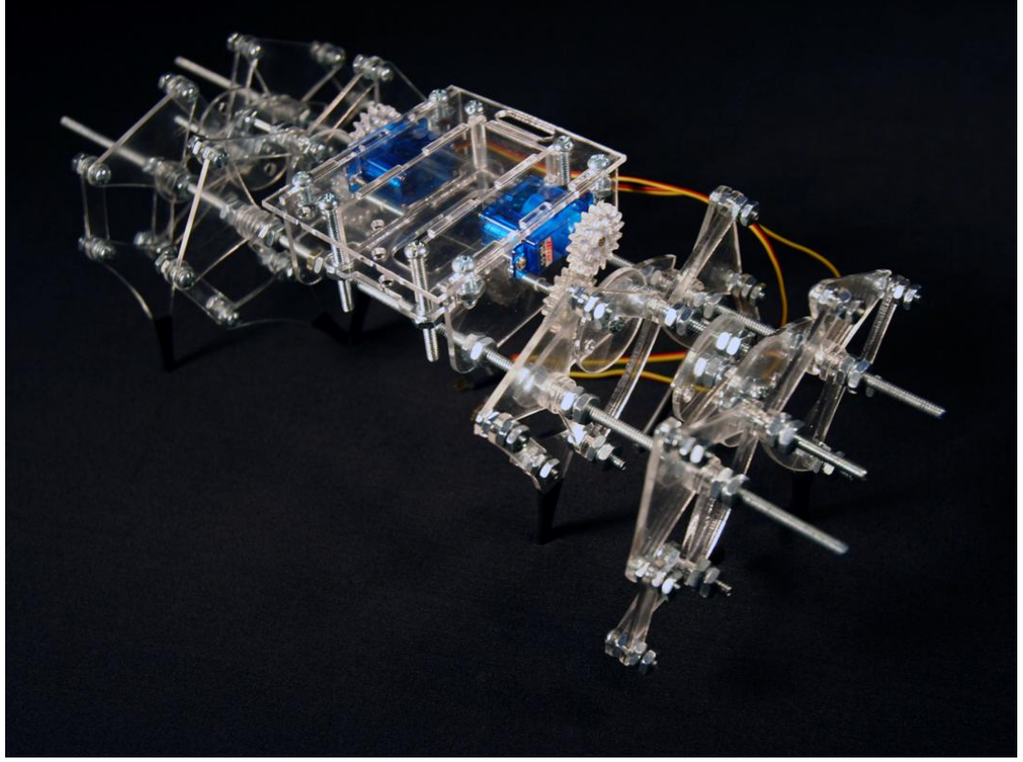

EMS actuator
(backside)
Arduino
(backside)
RFID tag
RFID antenna
RFID reader

haptics

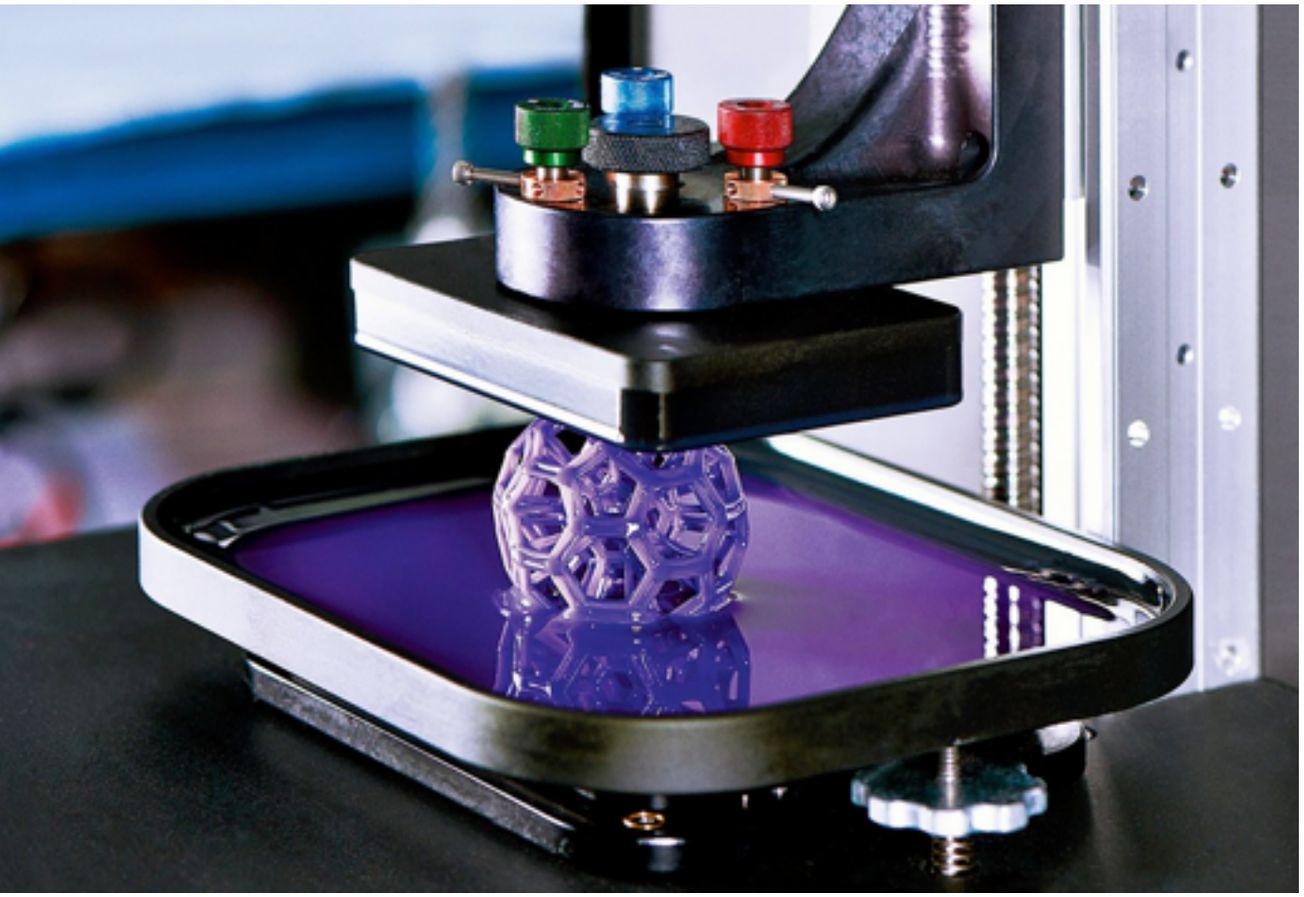


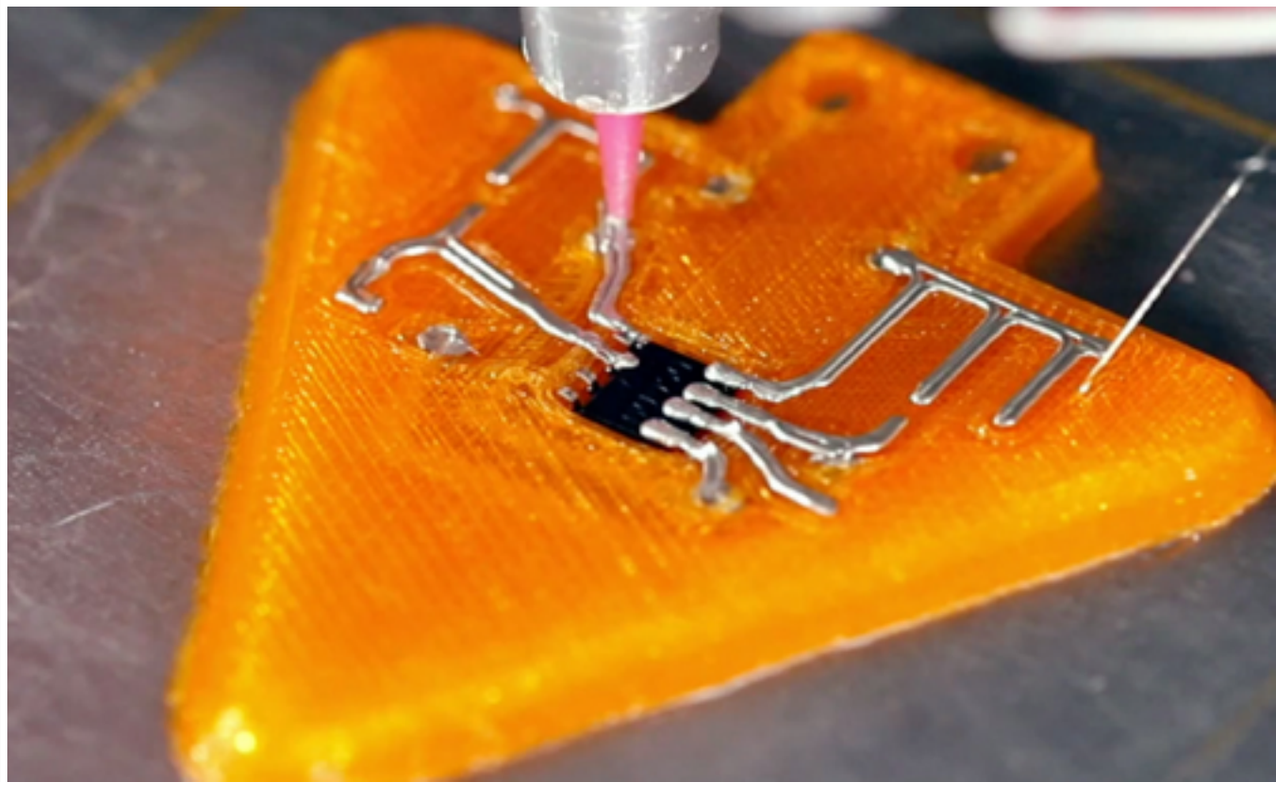
wearable computing

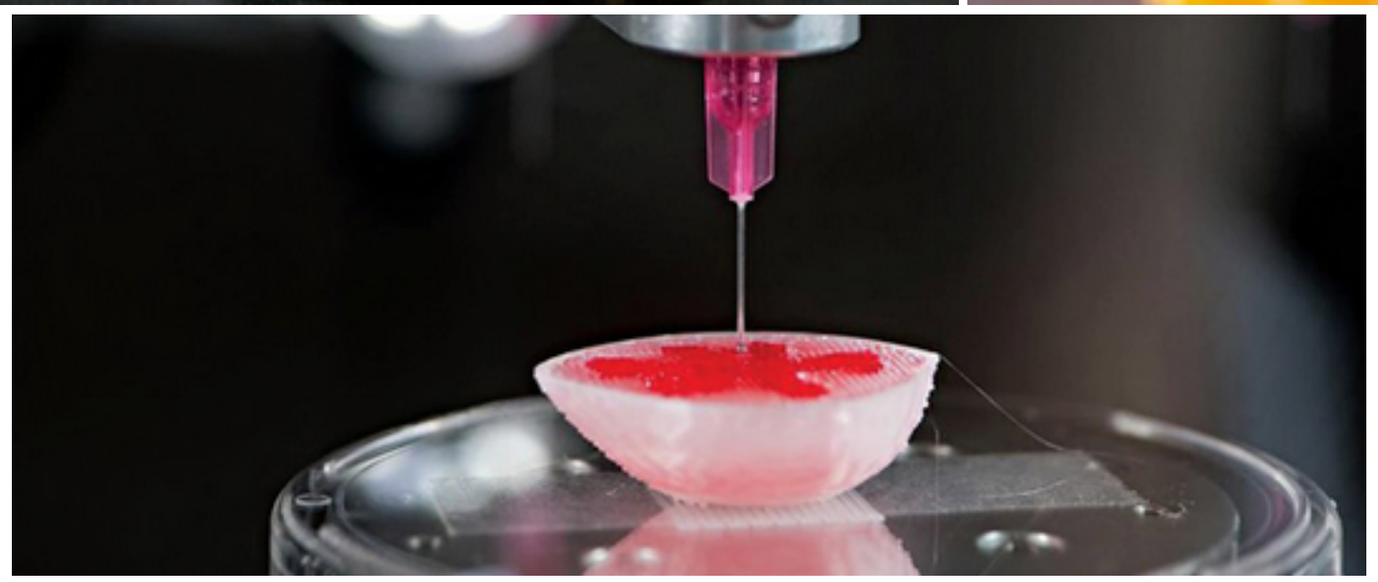
fridays:
different skills labs



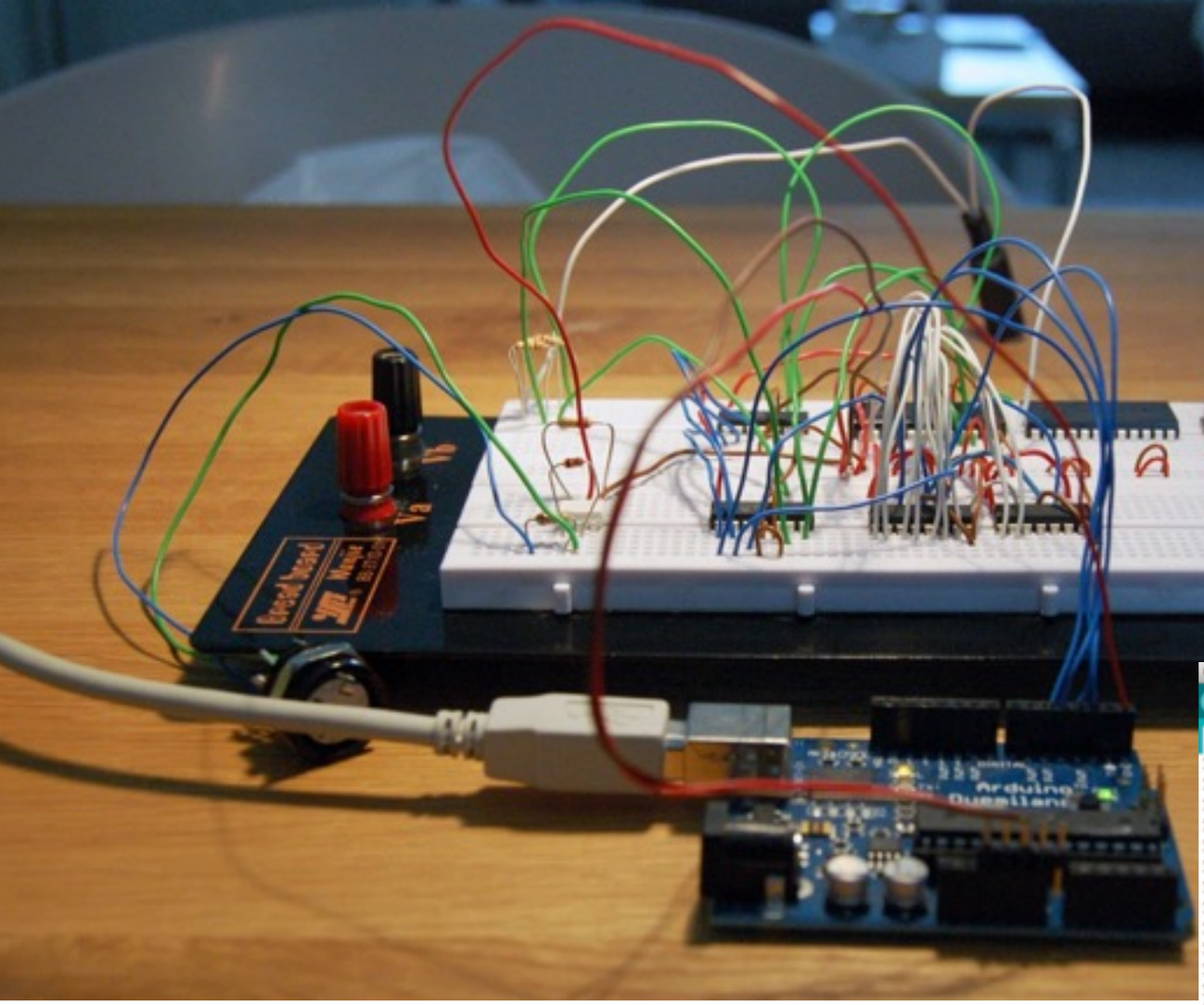
laser cutting







3D printing



ObstacleAvoidance | Arduino 1.5.6-r2

ObstacleAvoidance

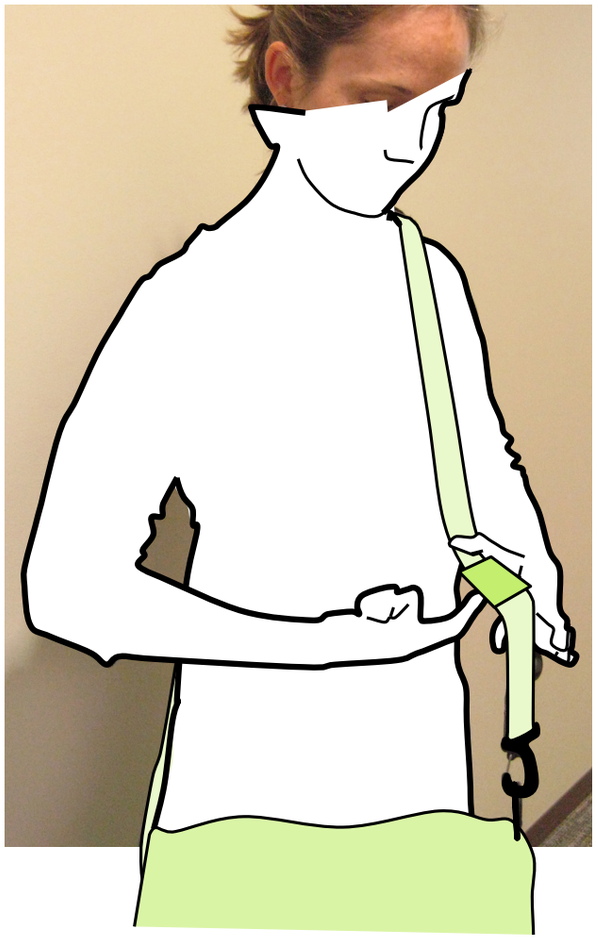
```
124
125 void setup() {
126         srand(millis());
127         Serial.begin(9600);
128
129         bot.attach();
130         bot.debug(true);
131
132         bot.setTurningSpeedPercent(80);
133
134         pinMode(leftWhiskerPin, INPUT);
135         pinMode(rightWhiskerPin, INPUT);
136 }
137
138 void loop() {
139         if (!bot.isManeuvering()) {
140                 bot.goForward(speed);
141
142                 // call our navigation processors one by one, but as soon as one of them
143                 // starts maneuvering we skip the rest. If we bumped into whiskers, we sure
144                 // don't need sonar to tell us we have a problem :)
145                 navigateWithWhiskers() || navigateWithSonar() ; // || .....
146         }
147 }
148
```

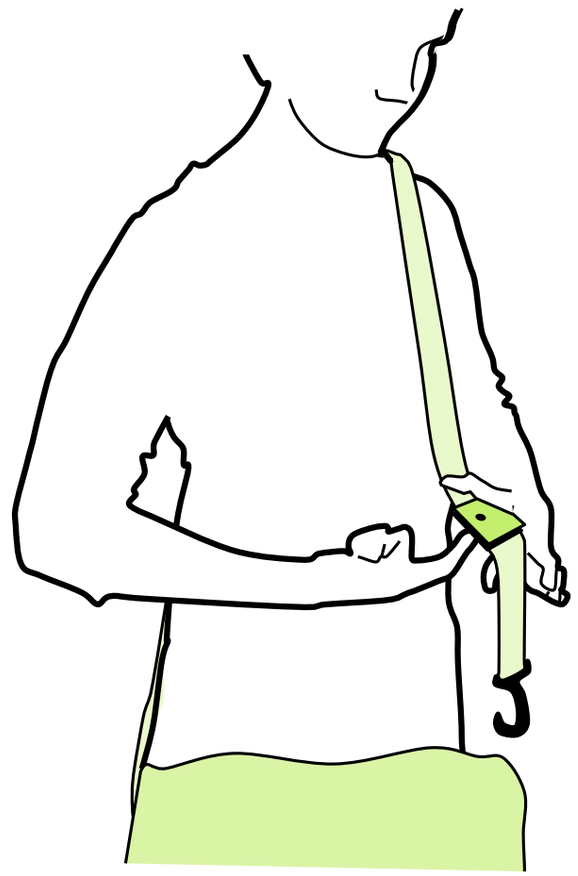
Done Saving.

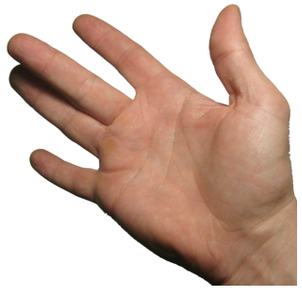
```
/var/folders/1v/84fnd63d37sg6gp312q332sw0000gn/T/build4867331055628351831.tmp/ObstacleAvoidance.cpp.eep
/Applications/Arduino.app/Contents/Resources/Java/hardware/tools/avr/bin/avr-objcopy -O ihex -R .eeprom
/var/folders/1v/84fnd63d37sg6gp312q332sw0000gn/T/build4867331055628351831.tmp/ObstacleAvoidance.cpp.elf
/var/folders/1v/84fnd63d37sg6gp312q332sw0000gn/T/build4867331055628351831.tmp/ObstacleAvoidance.cpp.hex

Sketch uses 11,068 bytes (34%) of program storage space. Maximum is 32,256 bytes.
```

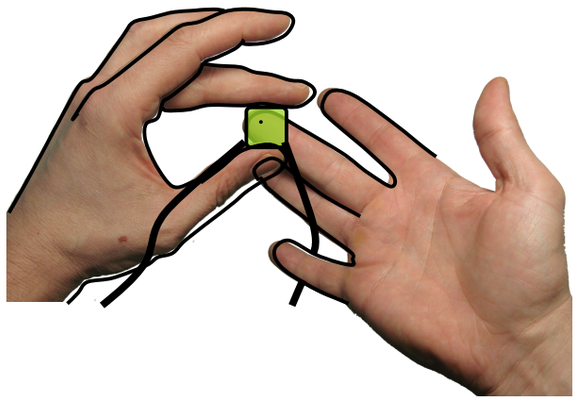
145 Arduino Uno on /dev/tty.usbserial-DA00K9

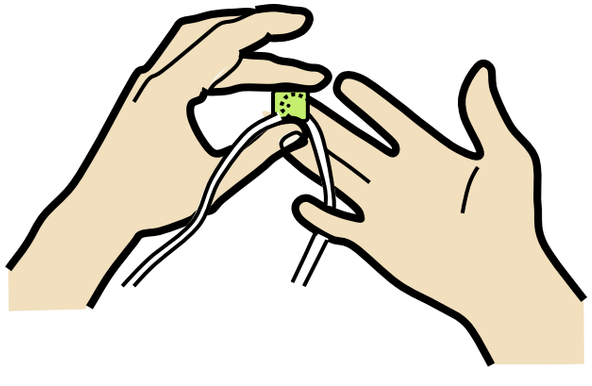
electronics



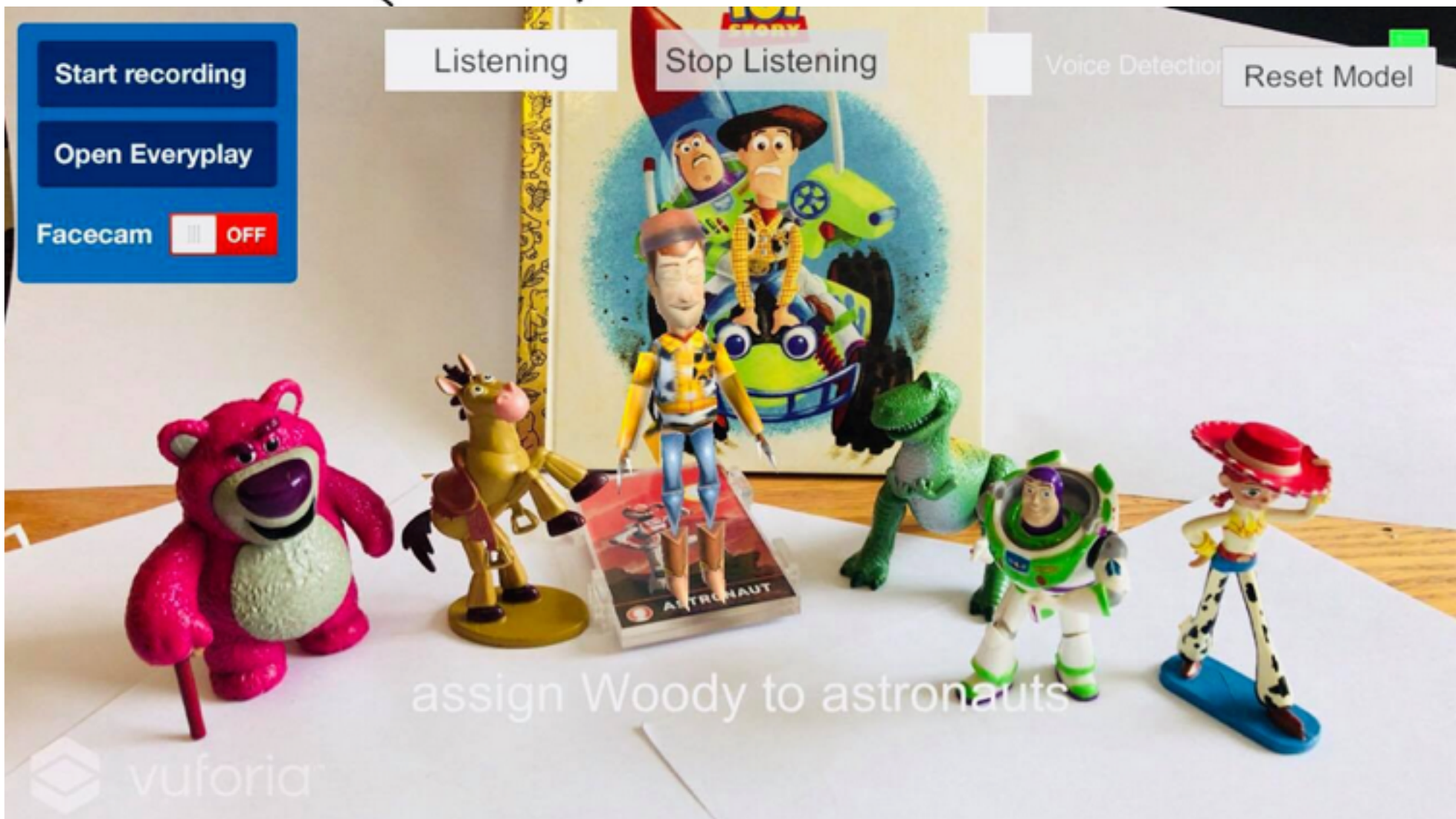


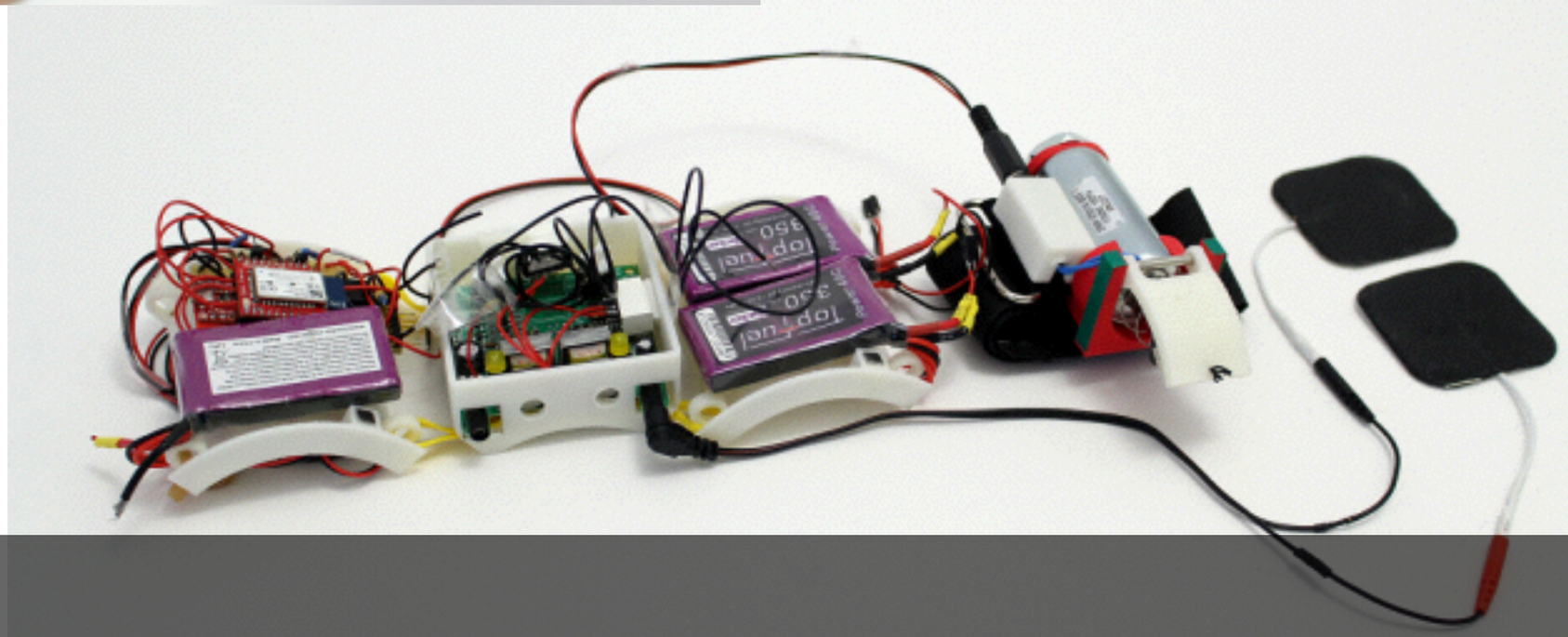




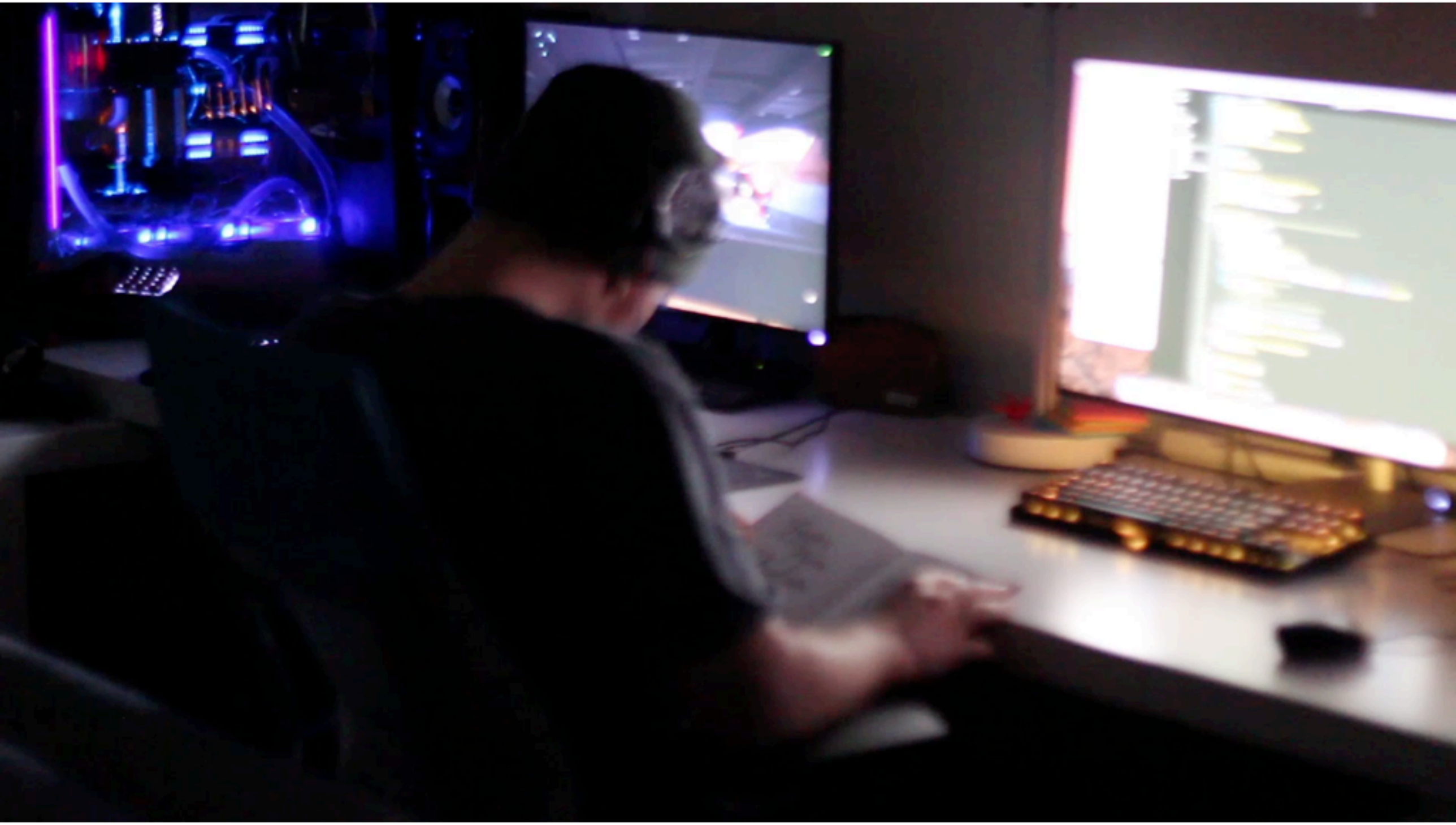


rotoscoping and information graphics


Start recording
Open Everyplay
Facecam
OFF
Listening
Stop Listening
Reset Model
assign Woody to astronauts
vuforia



photography



video recording / editing

New Scientist

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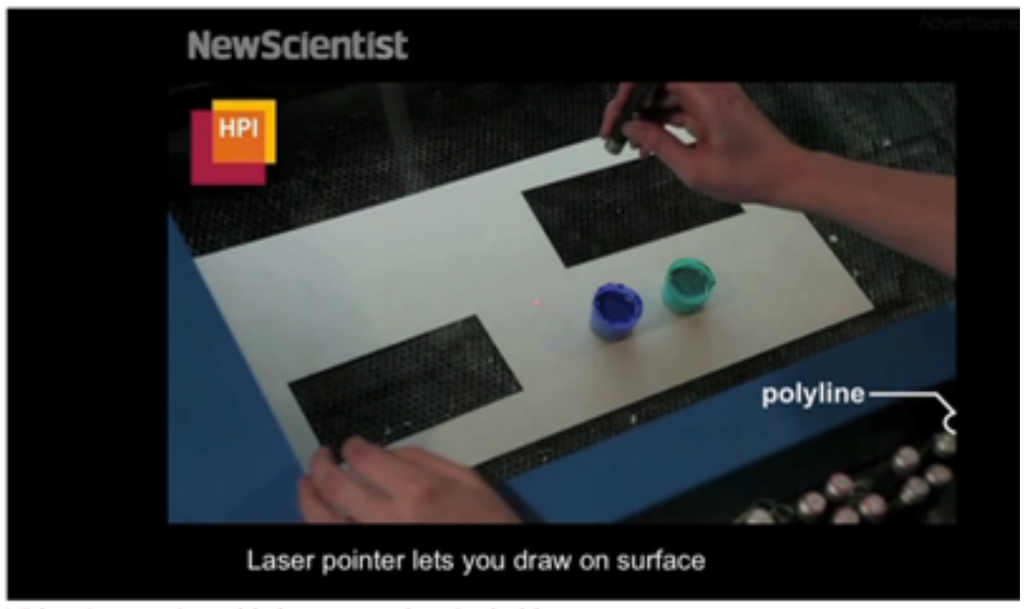
0

INNOVATION 19 July 2012

Freehand laser cutter creates instant flat-pack design



Video: Interactive table lets you make a jar holder

By Colin Barras

You could call it the rebirth of the 2D printer. A new device generates flat pack-like designs in seconds using a laser pointer and a laser cutter – the latest addition to the new field of "interactive fabrication", which promises to further help ordinary consumers become product designers.

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Laser Origami

One of the highlights from the Computer Human Interaction conference recently in Paris was laser origami. Among the delegates showing off the latest in interfaces and gesture control was a group demonstrating…

Available now

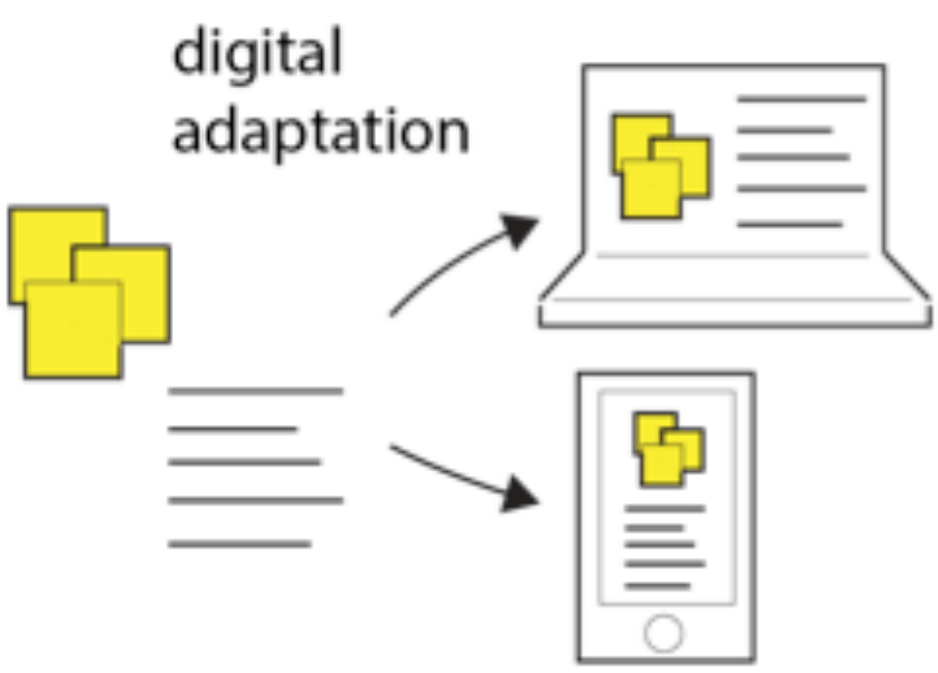
18 minutes

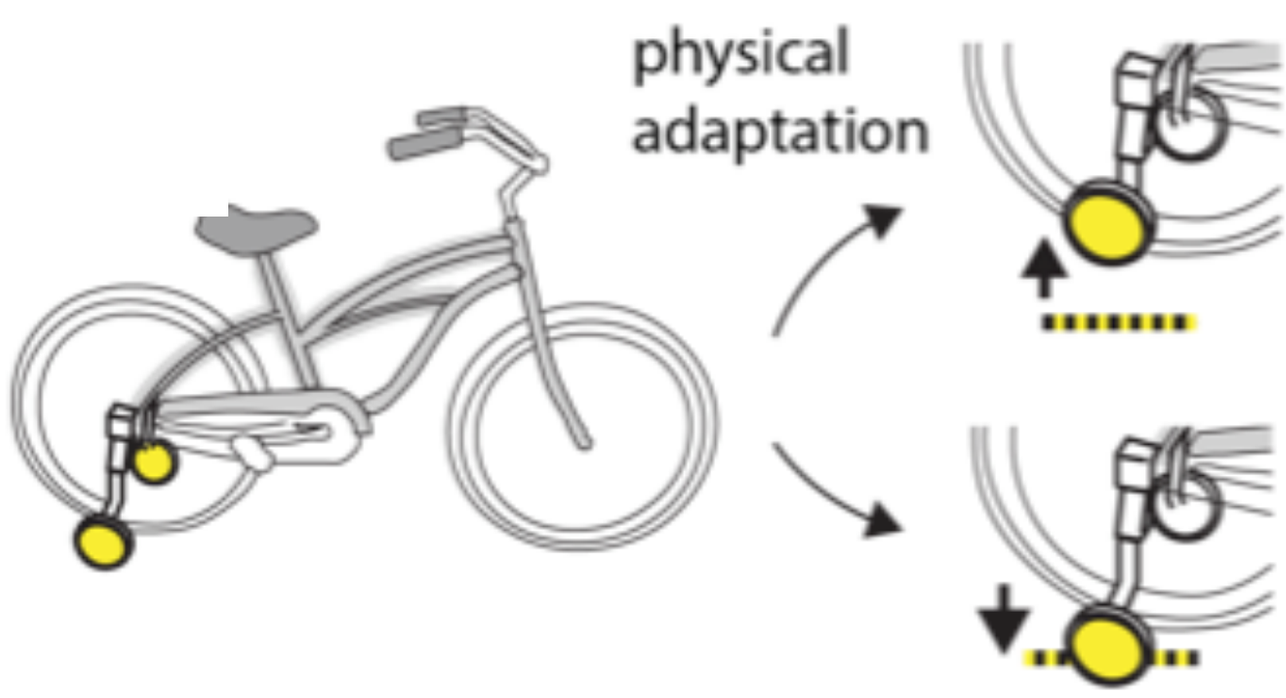
Show more

press training

group project
(2 students per team)

inspired by
digital adaptive interfaces





Adaptive Physical Tools

sense user performance -> adapt accordingly

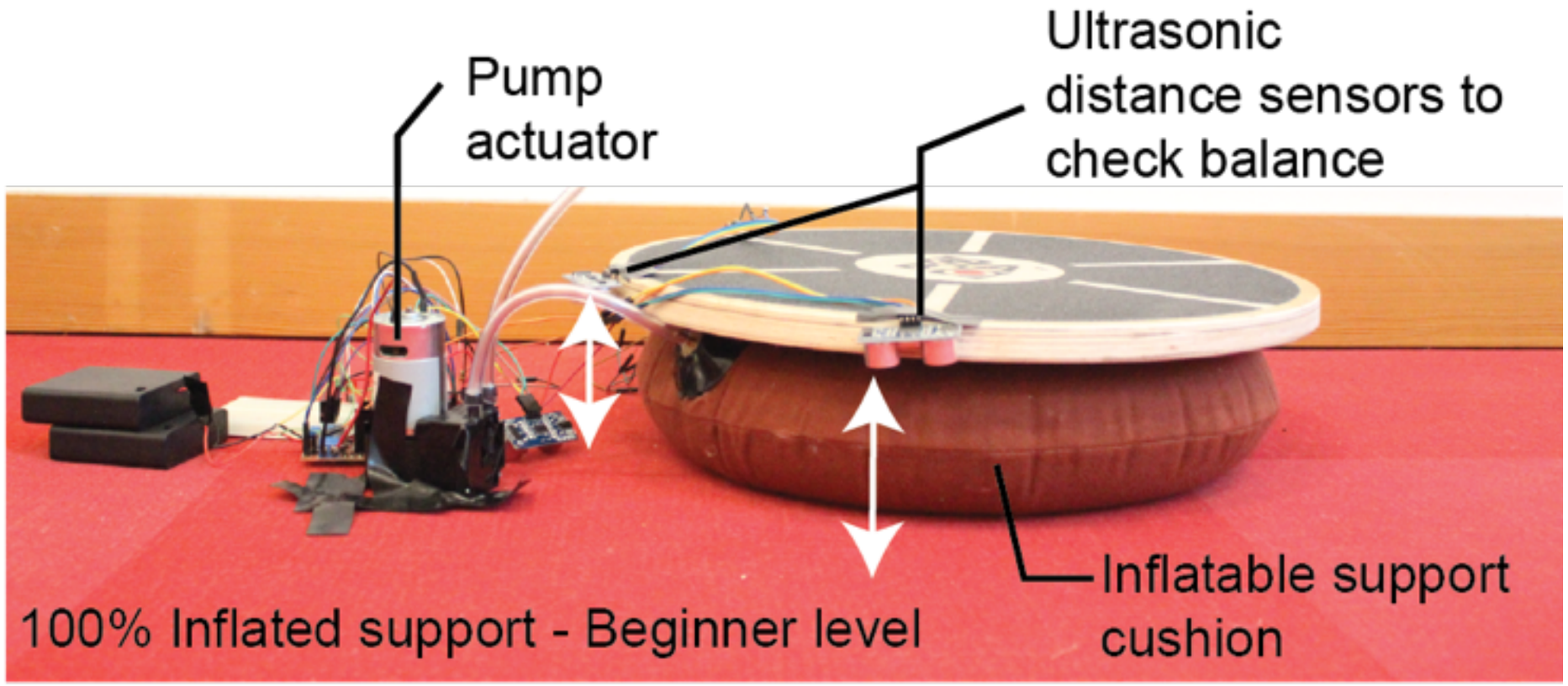
example:
Adaptive Bike

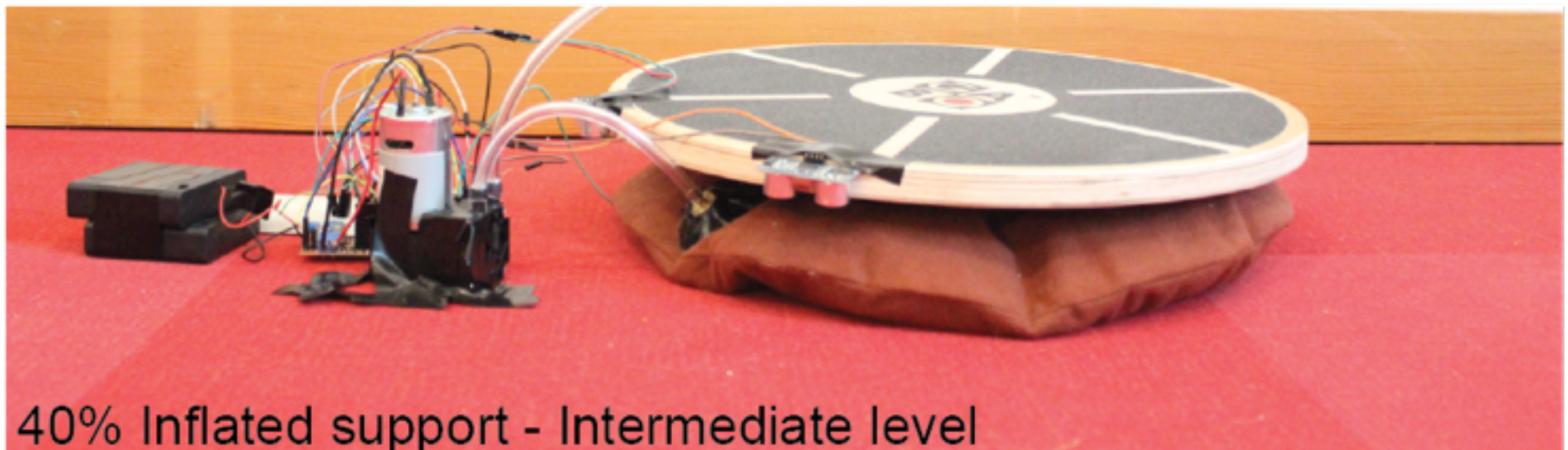
example:

Adaptive Wobbleboard for rehabilitation

example:

Adaptive Wobbleboard for rehabilitation



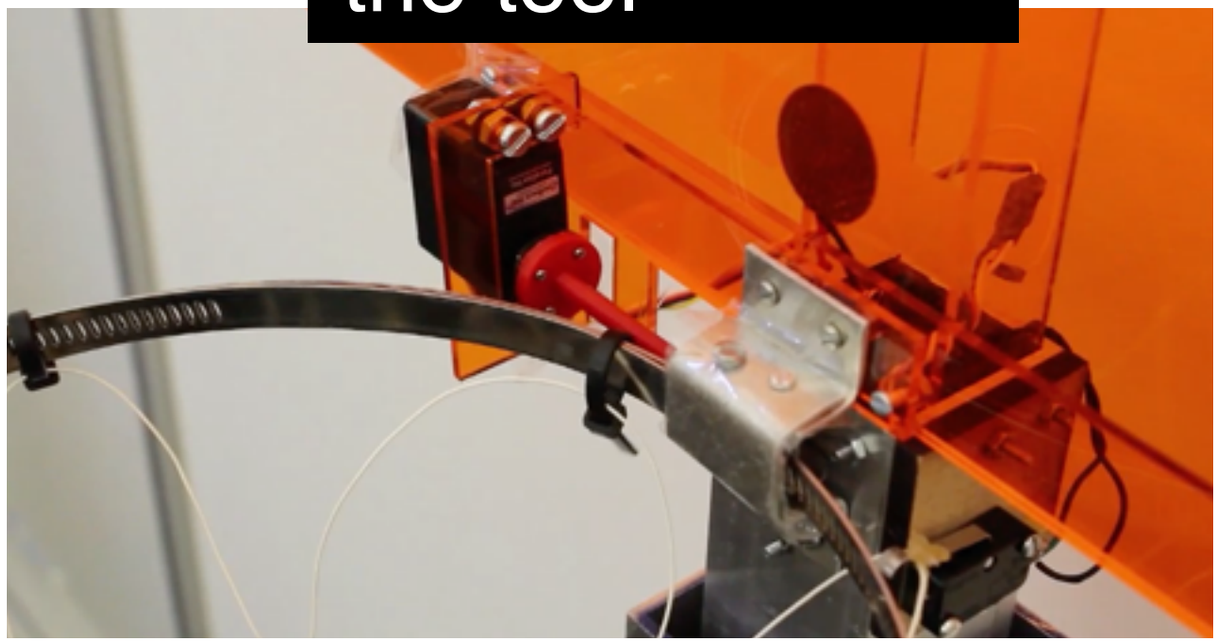


example:
Adaptive Bike

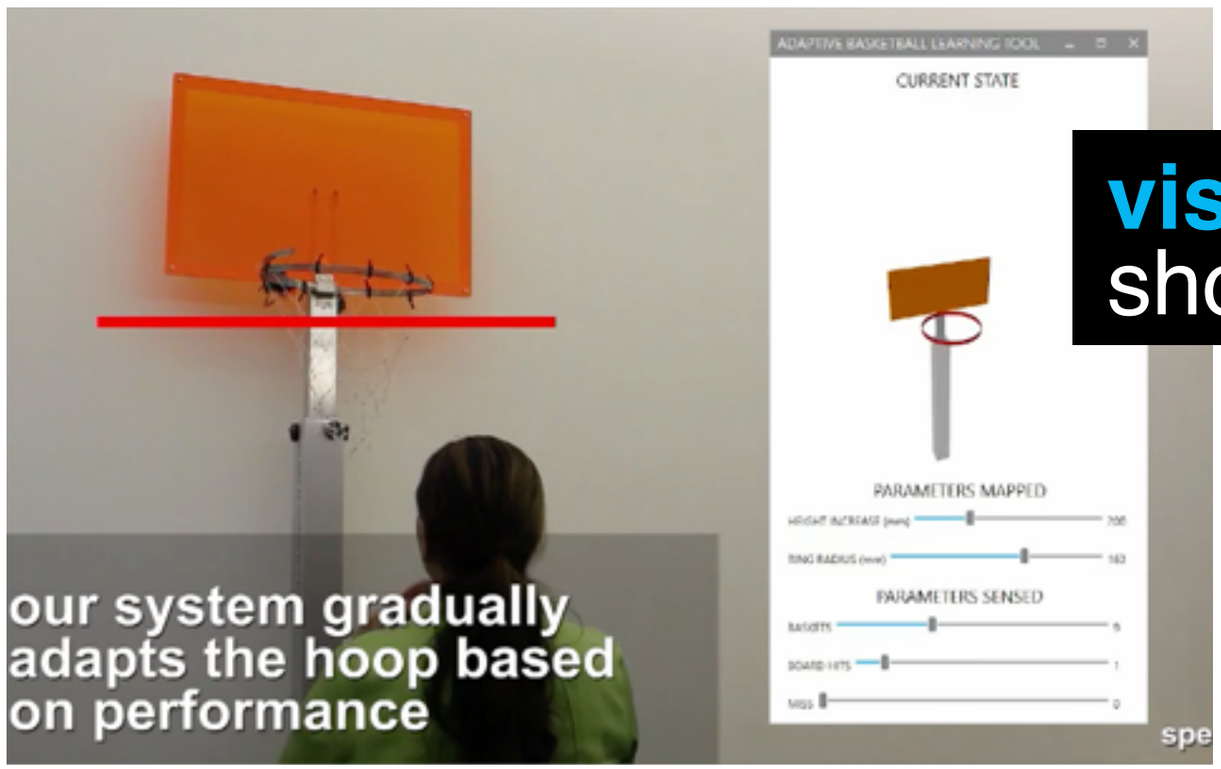
project components:

sensors detect user performance

actuators adapt the tool



what and how you build it is up to you



visualization shows progress

deliveries:

- a website showcasing your work
- a video of your prototype
- photos of your prototype
- a rotoscope (conceptual drawing) of your idea
- results of a user study
- code and build files

project budget

- project **$100 per team**
- + **micro-controller, breadboard etc.**

buying materials

- enter your parts into our spreadsheet
- Lotta then orders it for you

free resources

- we will have a bunch of things on stock for you to use + 3D printing material etc.

grading:

- **50% group project**
- 40% problem sets
- 10% homework & in-class participation
- no exams, no nanoquizzes

homework for next wednesday:

Using 3D Printing and Actuation to Adapt Physical Tools to Facilitate Motor Skills Learning

Dishita Girish Turakhia, Yini Qi, Lotta Blumberg, Kevin Reuss, Stefanie Mueller
MIT CSAIL, Cambridge, MA, USA
{dishita, qyn, blumberg, kreuss, stefanie.mueller}@mit.edu

ABSTRACT
Many motor skills that people learn throughout their lives involve mastering a physical tool, such as riding a bike, writing with a pen, or playing basketball. To reduce the level of difficulty, learners use physical learning aids, such as training wheels for a bike, that provide physical support. To date, these learning aids only come in predefined levels: For instance, training wheels are either mounted or taken off. This jump from beginner to expert level makes the transition difficult for learners.

In this paper, we address this challenge by adapting the physical tool according to the learner's progress. For instance, while learning to ride a bike, we monitor learners' balancing skills and as they improve, we gradually lift the training wheels to reduce support and increase the difficulty. Thus, our approach enables a step-by-step transition from beginner to expert level that, similar to existing adaptive learning systems for math and language skills, is personalized for each individual learner.

To illustrate our idea, we built an end-to-end system that allows designers to setup adaptable tools that physically change when a learner's skill level increases. Our system uses sensors integrated with the tools to measure progress; parametric 3D modeling to adapt the tool; and then either actuation or refabrication to deploy the physical change.

Author Keywords: personal fabrication; adaptive learning.

ACM Classification Keywords: H5.2 [Information interfaces and presentation]: User Interfaces.

INTRODUCTION
Adaptive learning systems (ALS) aim to achieve an optimal learning curve by allowing every learner to learn with their own personalized system made specifically for their strengths, weaknesses, and learning pace [23]. To accomplish this, ALS continuously monitor the learner's performance and adapt the level of difficulty of the task based on their progress. ALS have been implemented extensively in

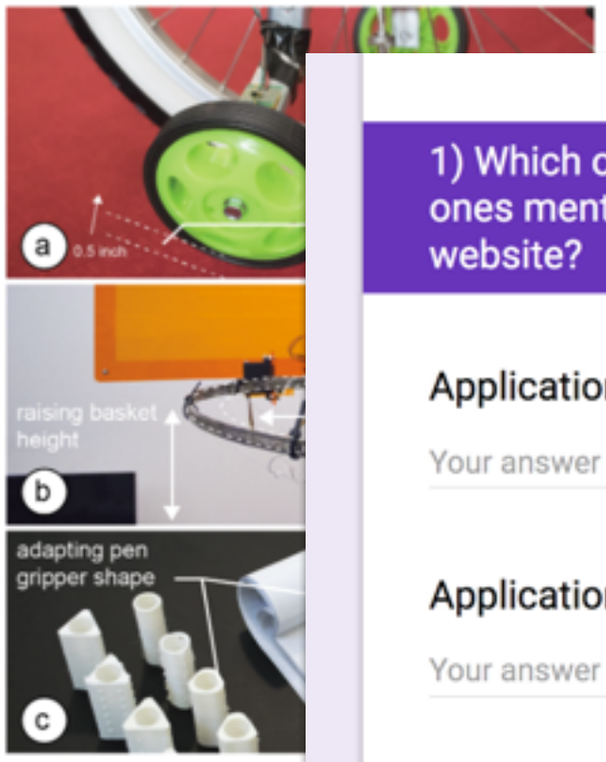


Figure 1: We adapt the ph
learner's progress: (1) Ridi
ance improves, we graduall
the training wheels off the
widen the hoop for beginne
they learn to score basket
easy-to-hold triangular grippers for beginners and gradually change the shape to cylindrical as learners improve their grip.

online education. For instance, the *DreamBox* [5] learning system tracks students' performances and adjusts the level

read paper
+ fill out form

1) Which other application areas can you think of besides the ones mentioned in the paper and on the group project website?

Application Area #1: *

Your answer

Application Area #2: *

Your answer

Application Area #3: *

Your answer

this is a new course!

this is a new course!

this is the **second time we give this course,**
not everything will be perfect
but **we will try our best!**

questions?

end.