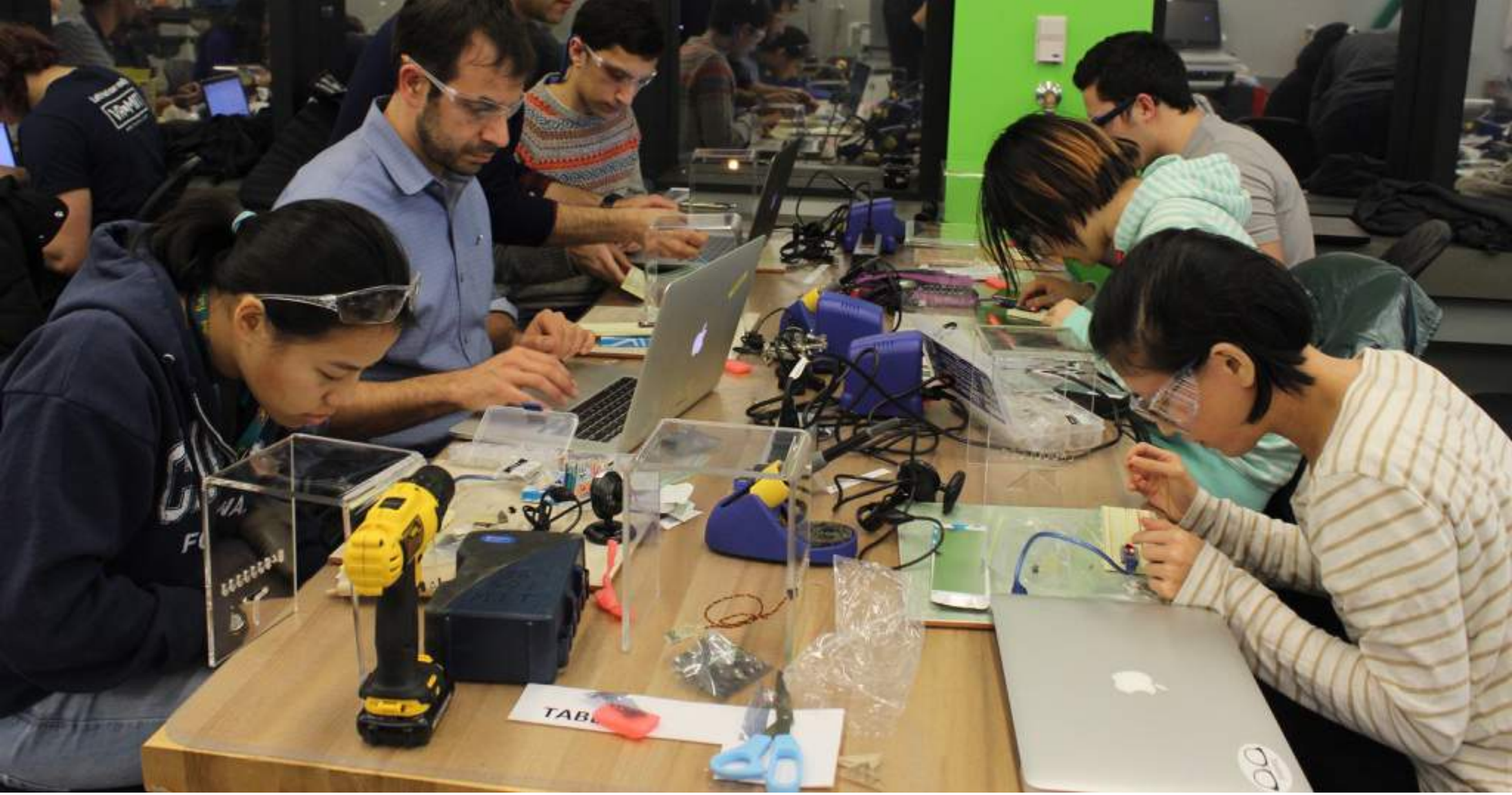


Course Overview

6.S063 Engineering Interaction Technologies

Prof. Stefanie Mueller | MIT CSAIL | HCI Engineering Group

instructor: Stefanie Mueller

Assistant Professor, MIT EECS / MechE

Research:

Human-Computer Interaction
& Rapid Prototyping

TA: Jared Counts

MEng, course 6.3

enrollment

admission::

at the end of this class,
we will pass around a sign up sheet.

you **must sign in today**
to stay enrolled in the class.

Signup Sheet

6.S063 Engineering Interactive Technologies (Fall 2017)

NAME	EMAIL	YEAR	PREREQUISITES (Check each one taken)			
			6.005	6.031	6.111	6.115

enrolled / waitlisted::

I will send an **email today**
with enrolled / waitlist notifications.

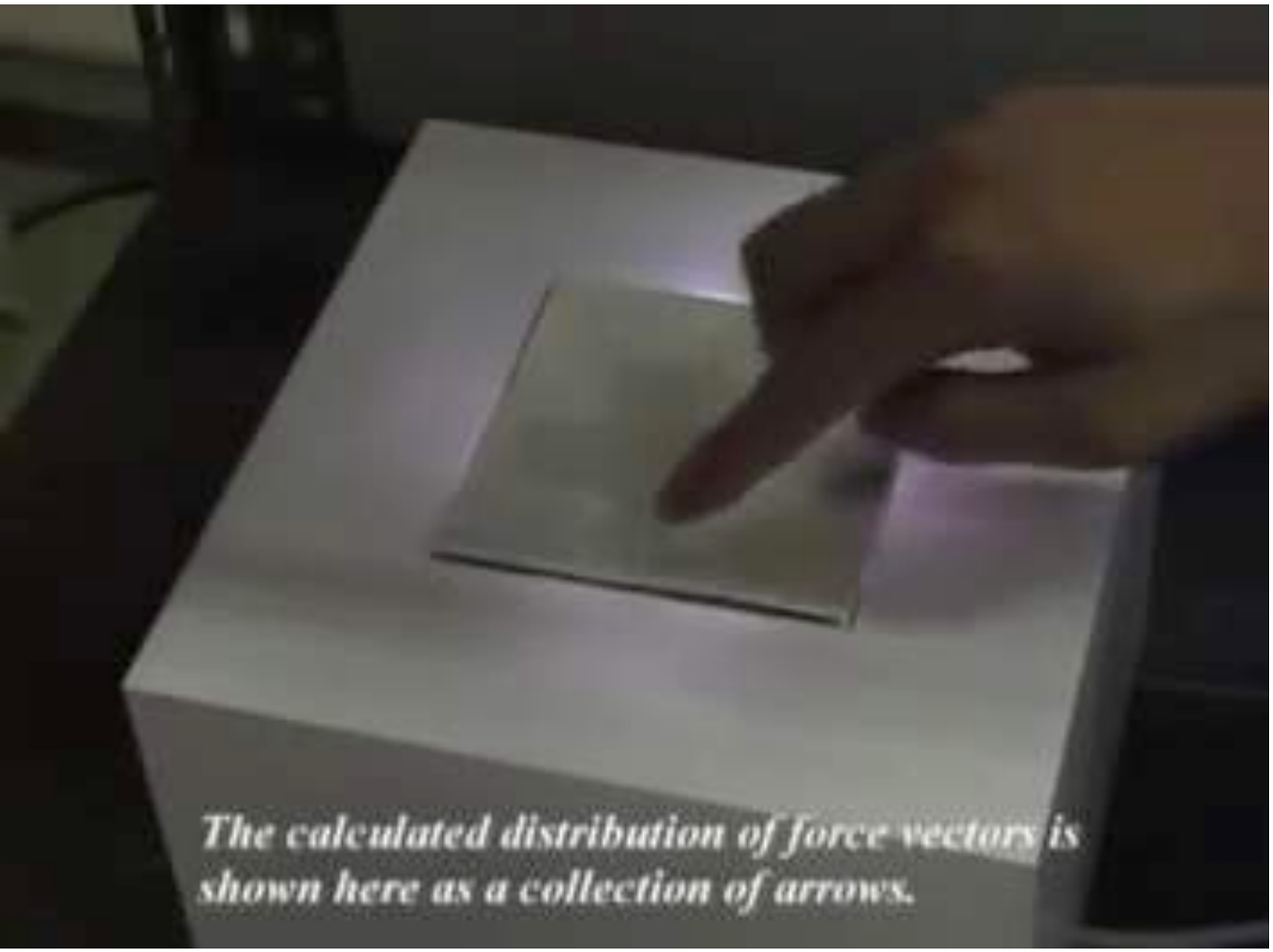
goal of this course

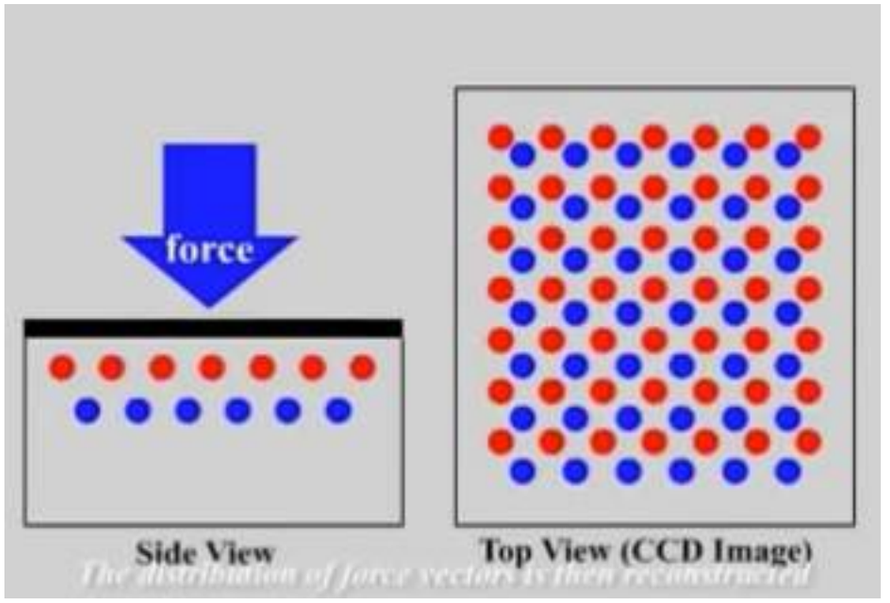
#1

learn

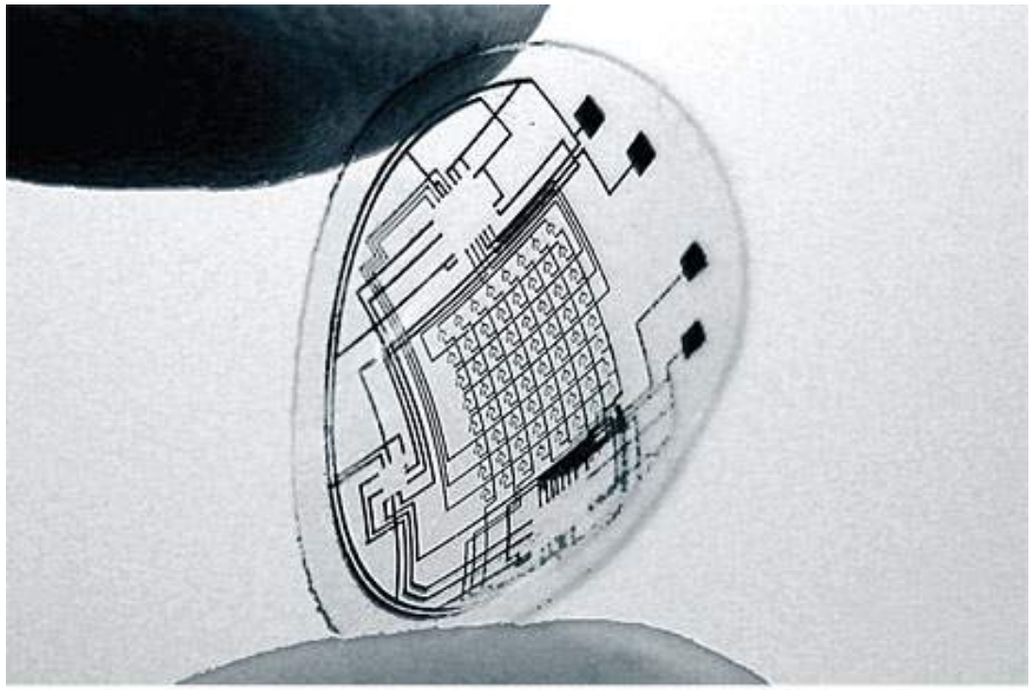
- about different **fields of interactive technologies**
- how the technology evolved over time
- how the underlying engineering concepts developed

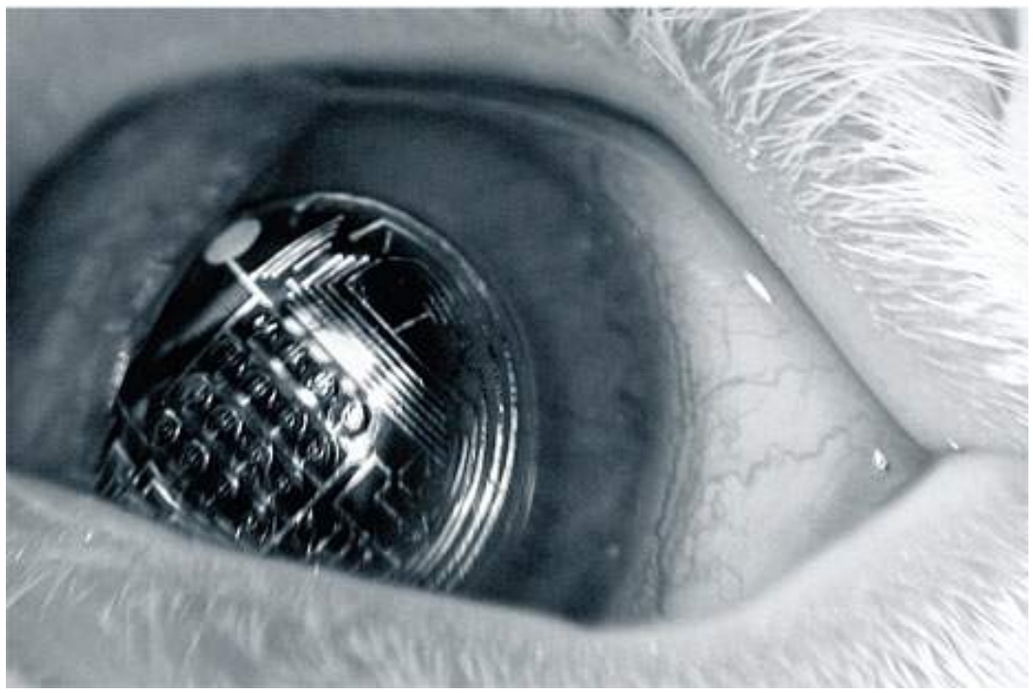
multi-touch technology, augmented reality, haptics, shape changing interfaces…





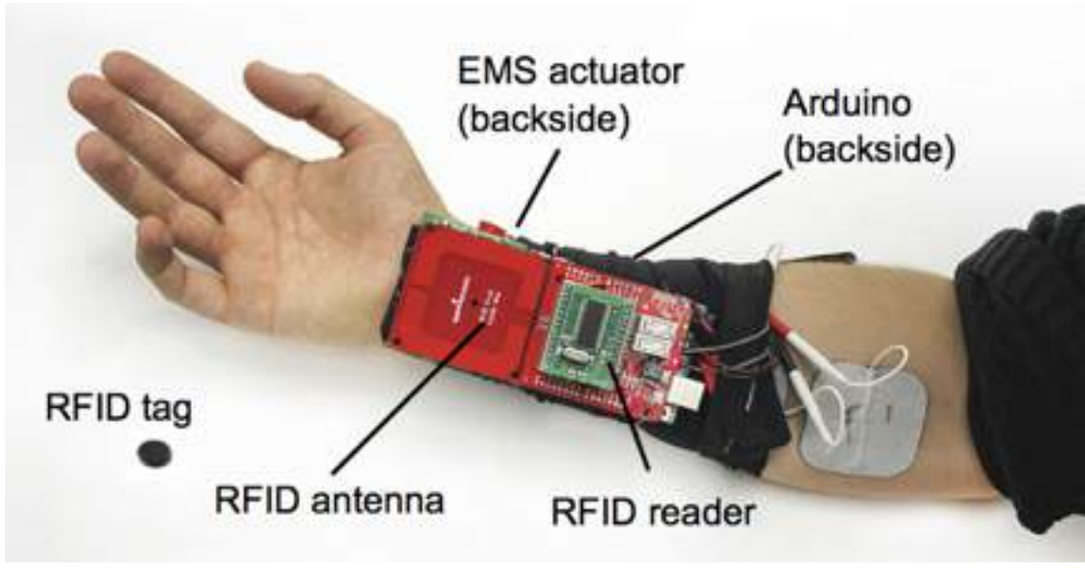
multi-touch technology



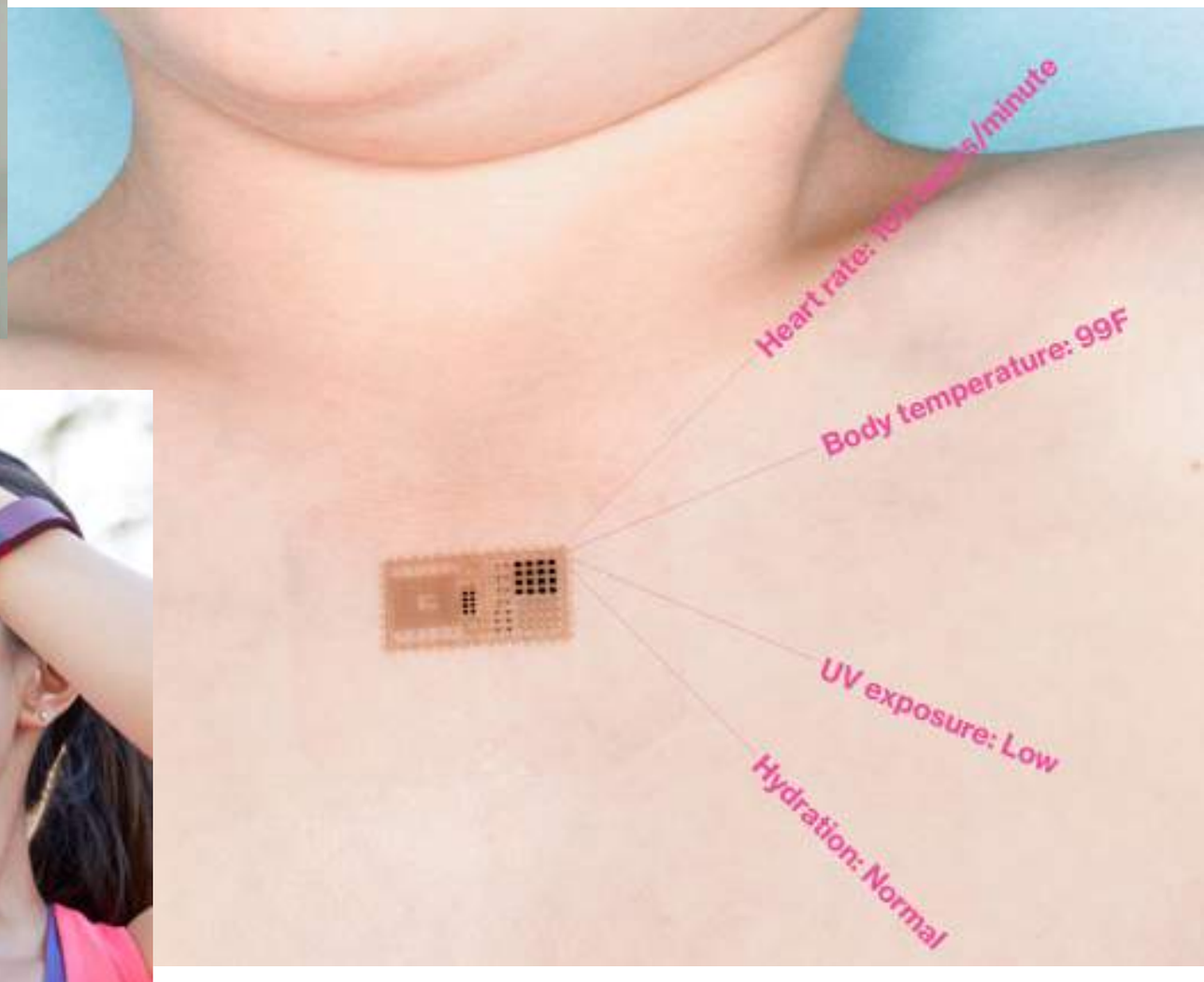


augmented reality

LIFE


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

haptics



wearable computing

brain computer interfaces

sound interfaces

shape changing interfaces

natural user interfaces

telepresence systems

[…]

what would be the **benefit** of
knowing how tech developed over the last 30 years?

<30s brainstorming>

what would be the **benefit** of knowing how tech developed over the last 30 years?

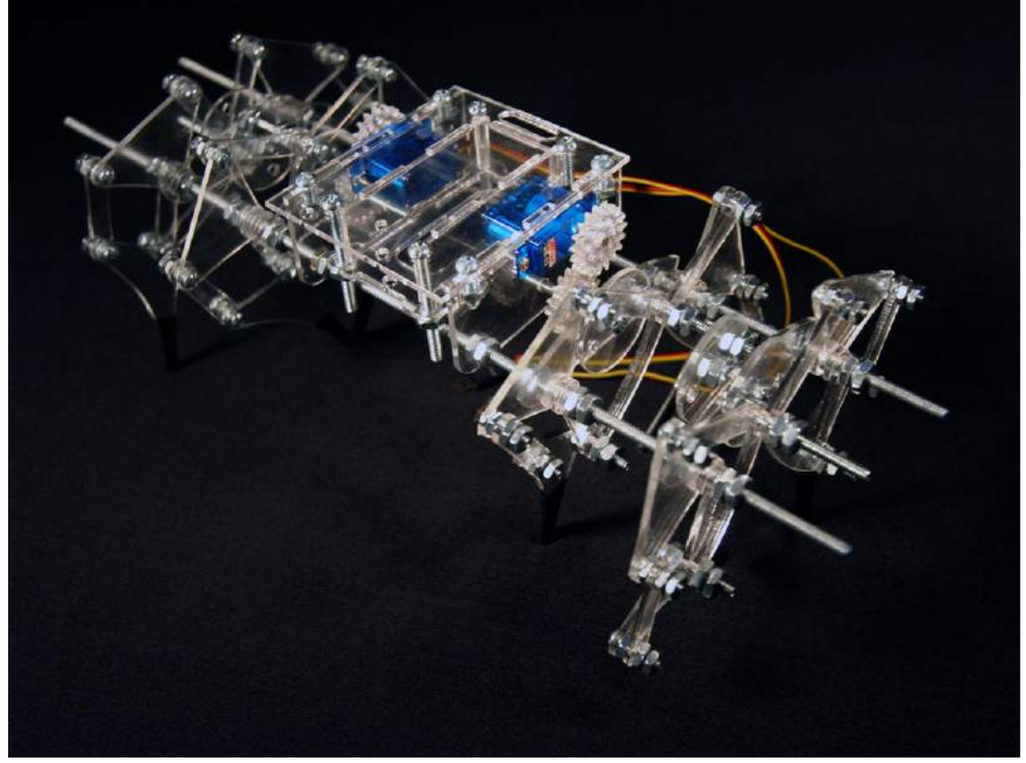
- be able to **predict** what comes next
- **invent** the next big tech
- useful if you want to have a **startup** or for **research**

#2

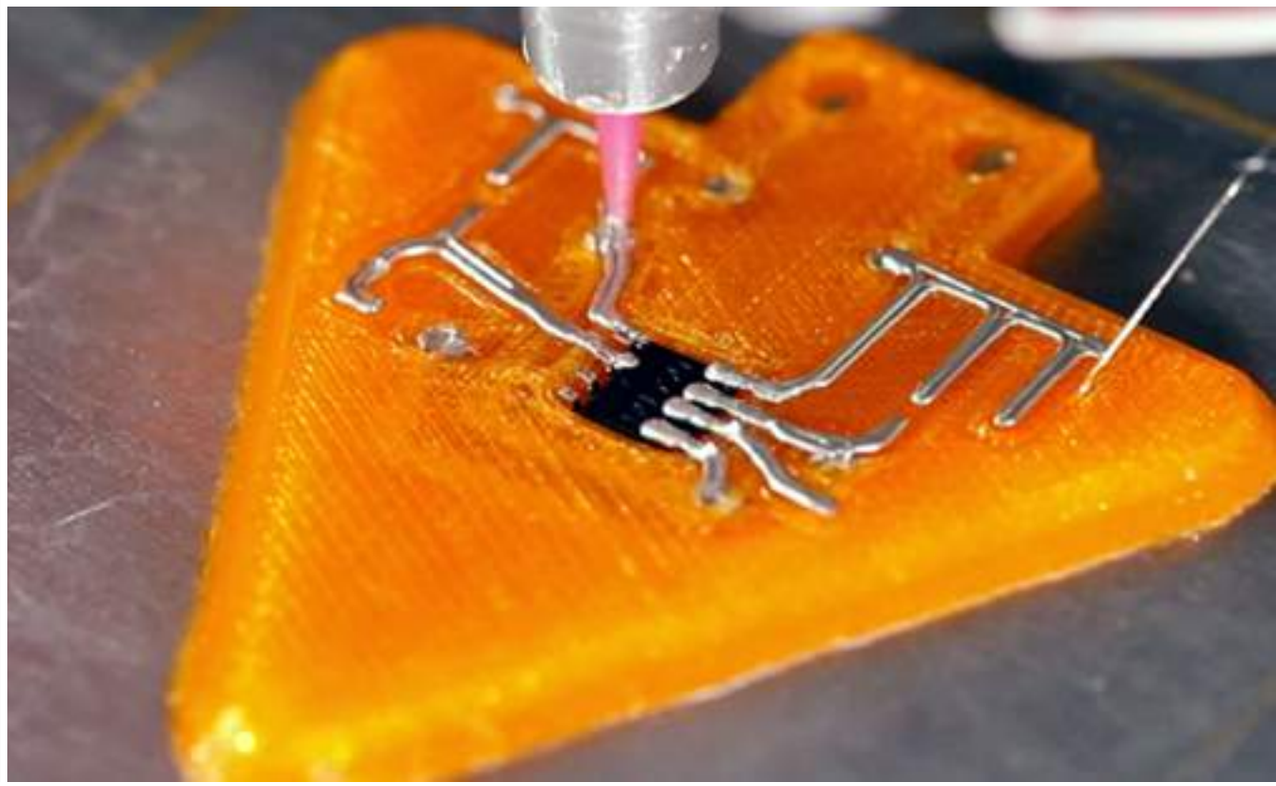
learn

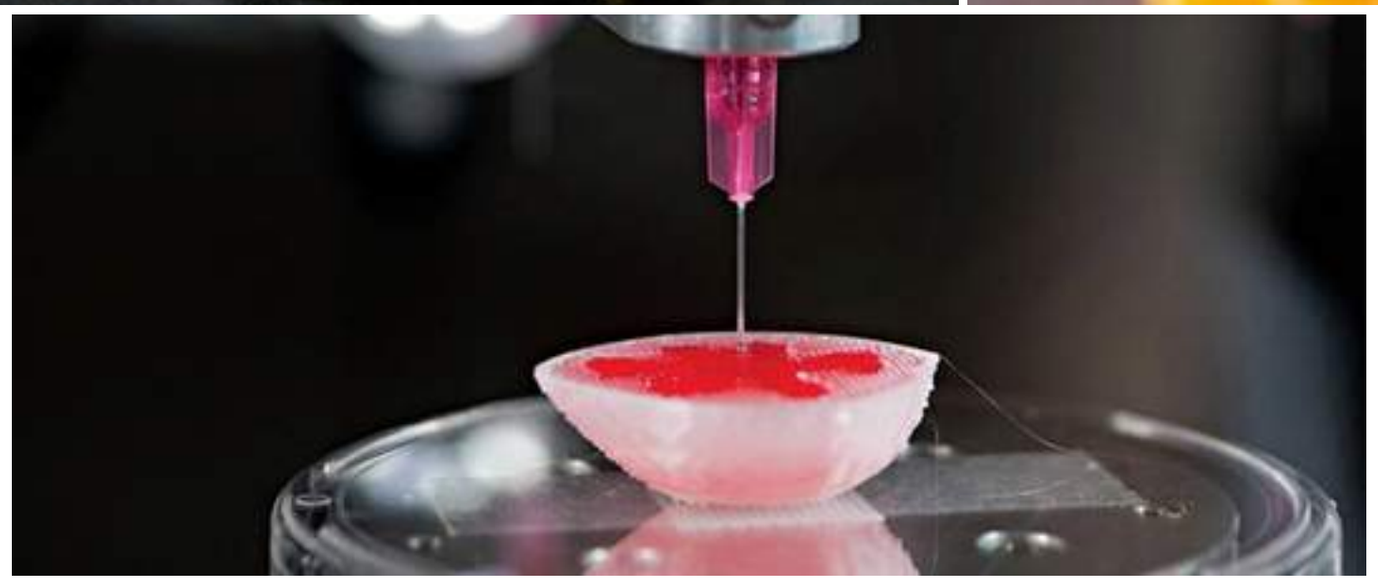
- practical **engineering skills**
- required to build those interactive technologies yourself.

laser cutting, 3D printing, electronics, breadboarding…

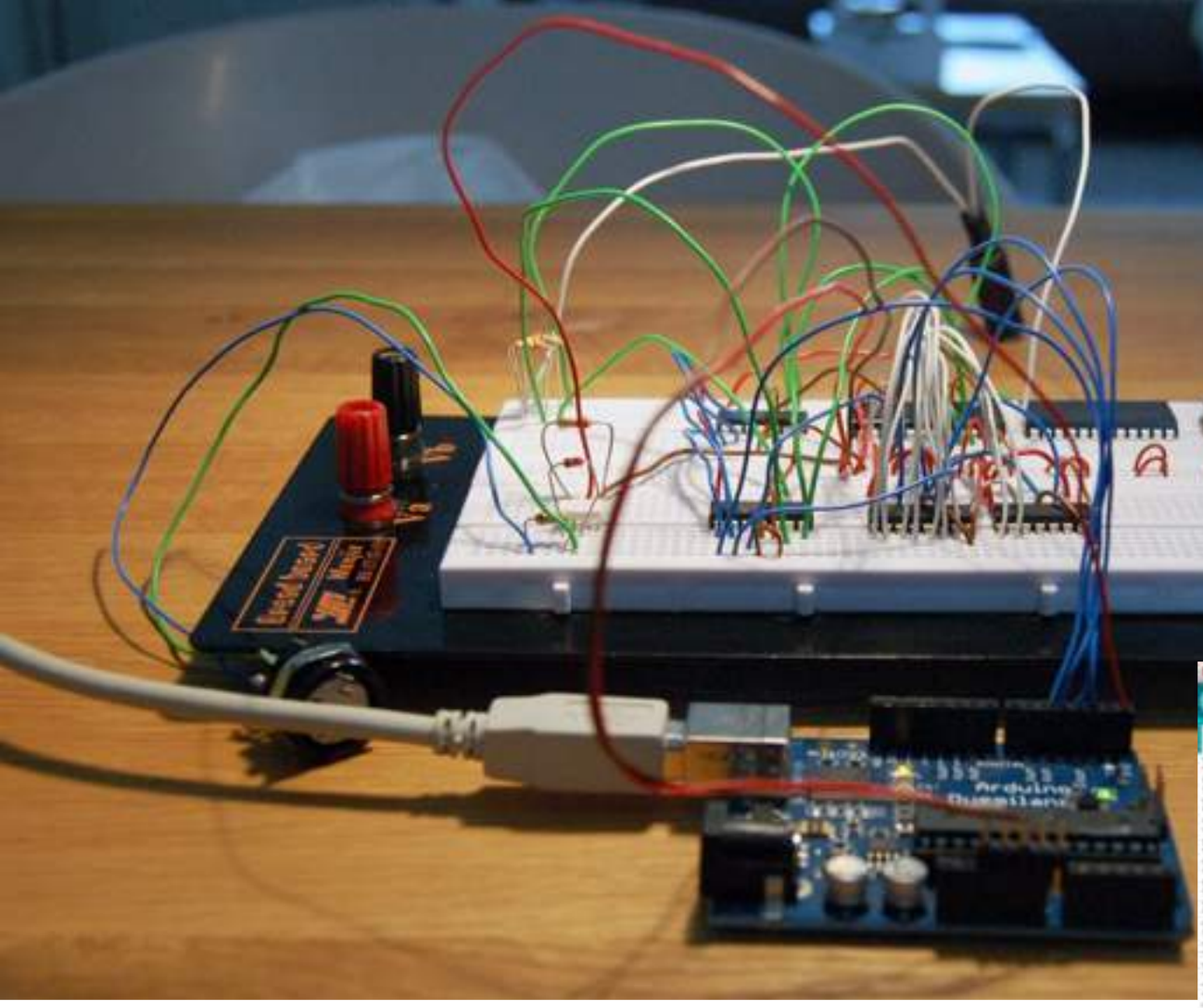


laser cutting





3D printing



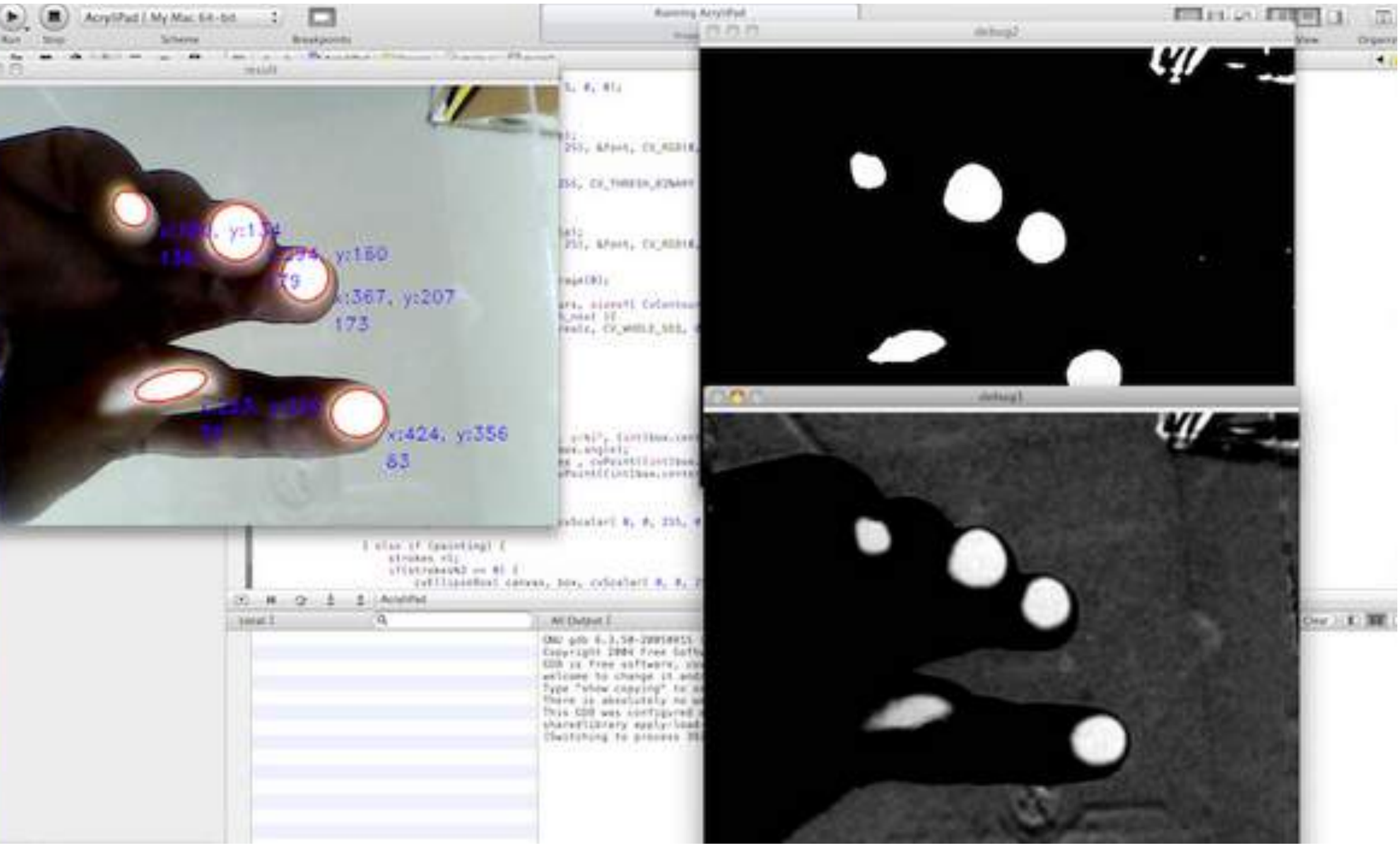
ObstacleAvoidance | Arduino 1.5.6-r2

ObstacleAvoidance

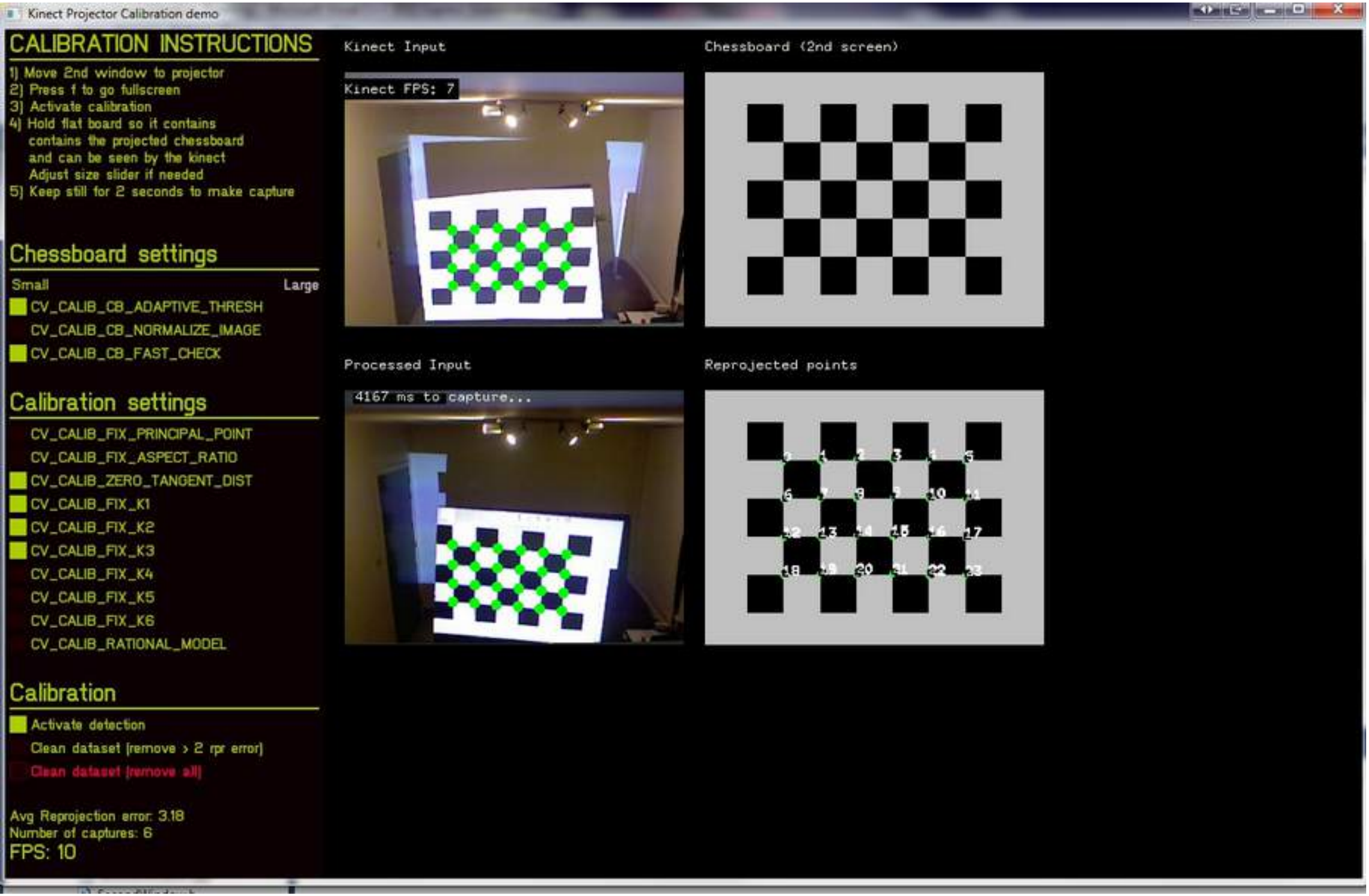
```
124
125 void setup() {
126         srand(millis());
127         Serial.begin(9600);
128
129         bot.attach();
130         bot.debug(true);
131
132         bot.setTurningSpeedPercent(80);
133
134         pinMode(leftWhiskerPin, INPUT);
135         pinMode(rightWhiskerPin, INPUT);
136 }
137
138 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.

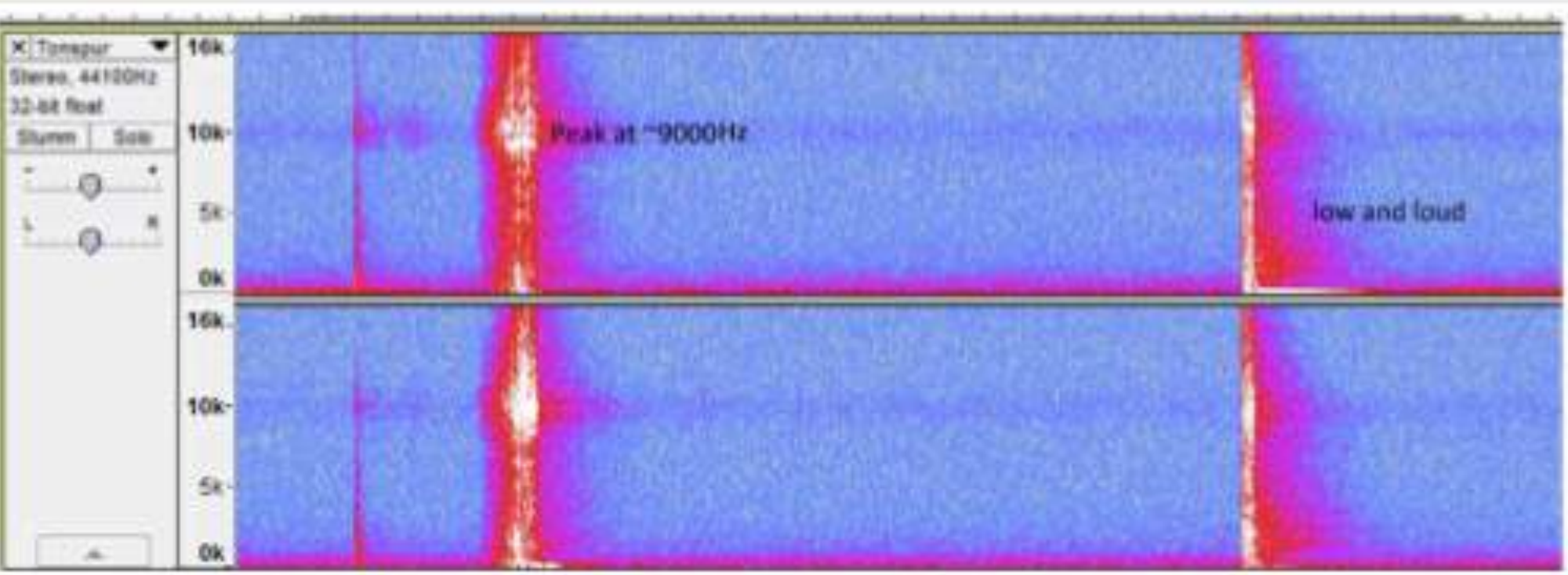
```
/var/folders/1v/84fnd63d37sg6gp312q332sw0000gn/T/build4867331055628351831.tmp/ObstacleAvoidance.cpp.eep
/Applications/Arduino.app/Contents/Resources/Java/hardware/tools/avr/bin/avr-objcopy -O ihex -R .eeprom
/var/folders/1v/84fnd63d37sg6gp312q332sw0000gn/T/build4867331055628351831.tmp/ObstacleAvoidance.cpp.elf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



computer vision with openCV



camera - projector **calibration**



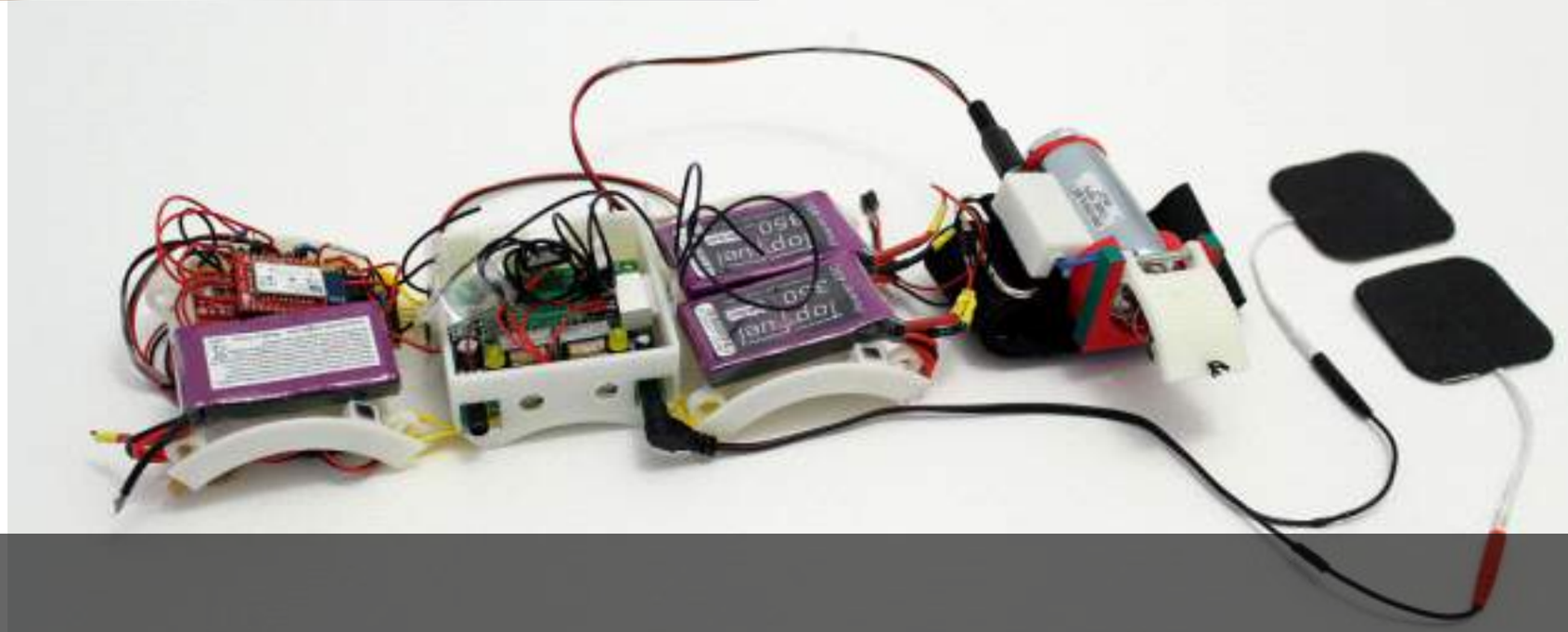
signal processing

#3

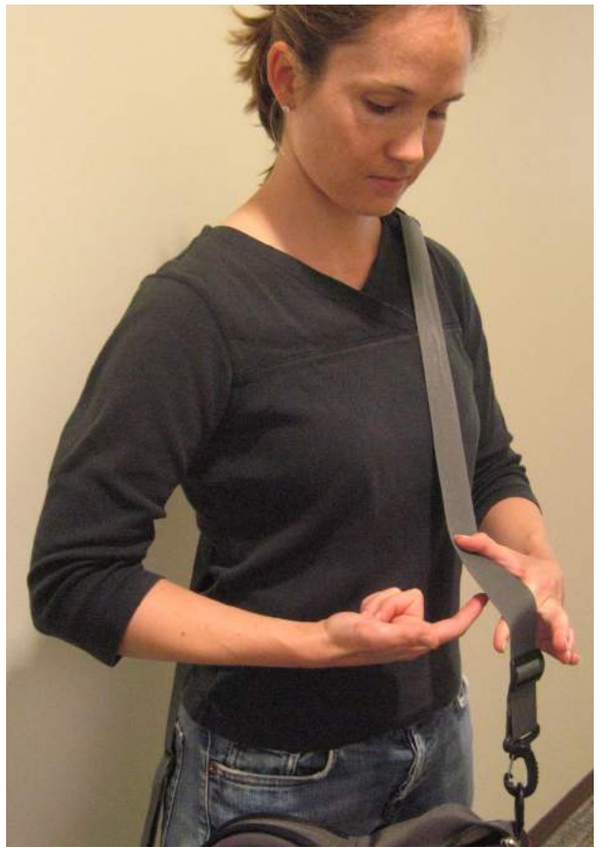
learn

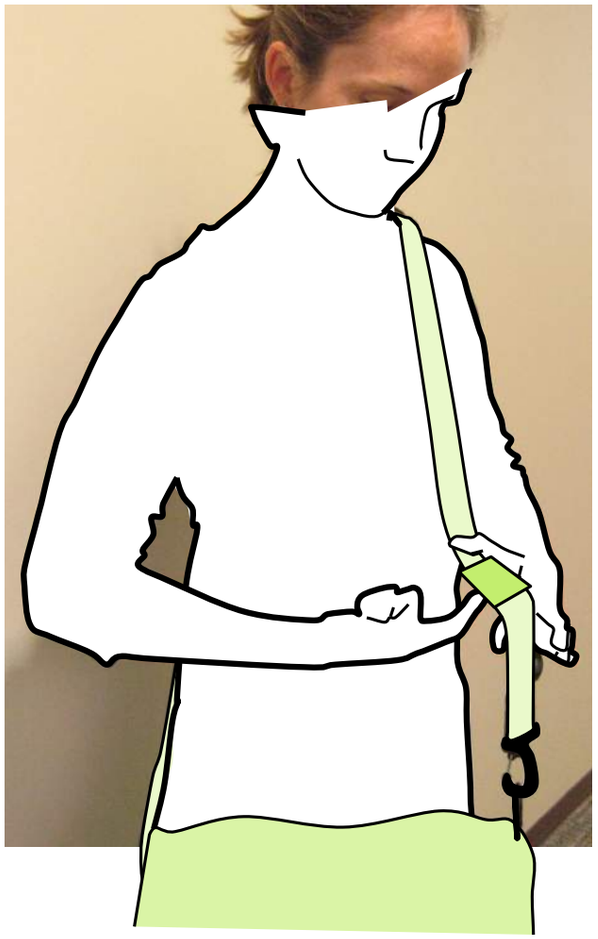
- about how to **showcase your work**
- either for a research paper or an industry demo

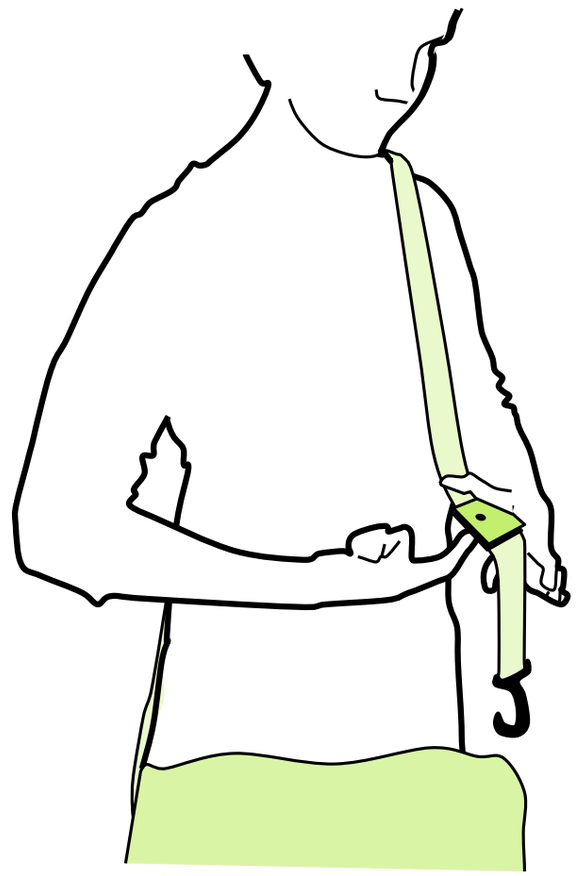
photography, rotoscoping, video recording / editing,
webpage design, press training

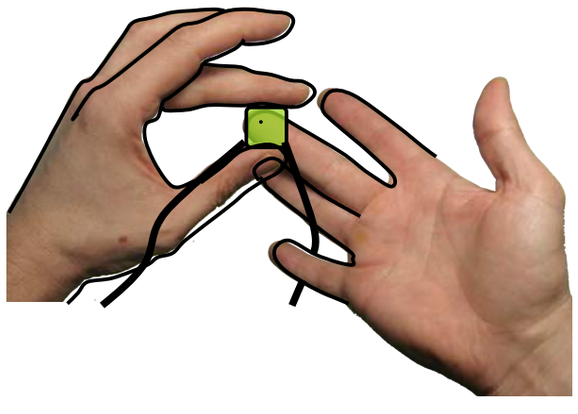


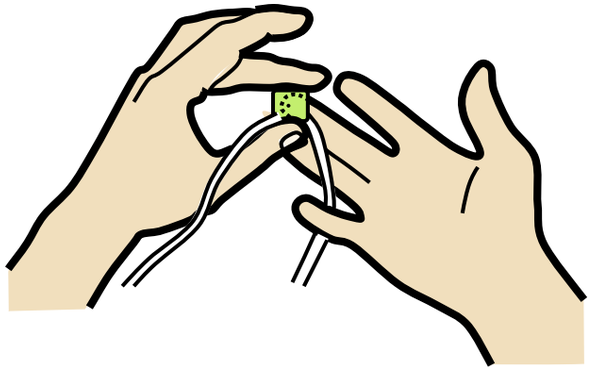
photography





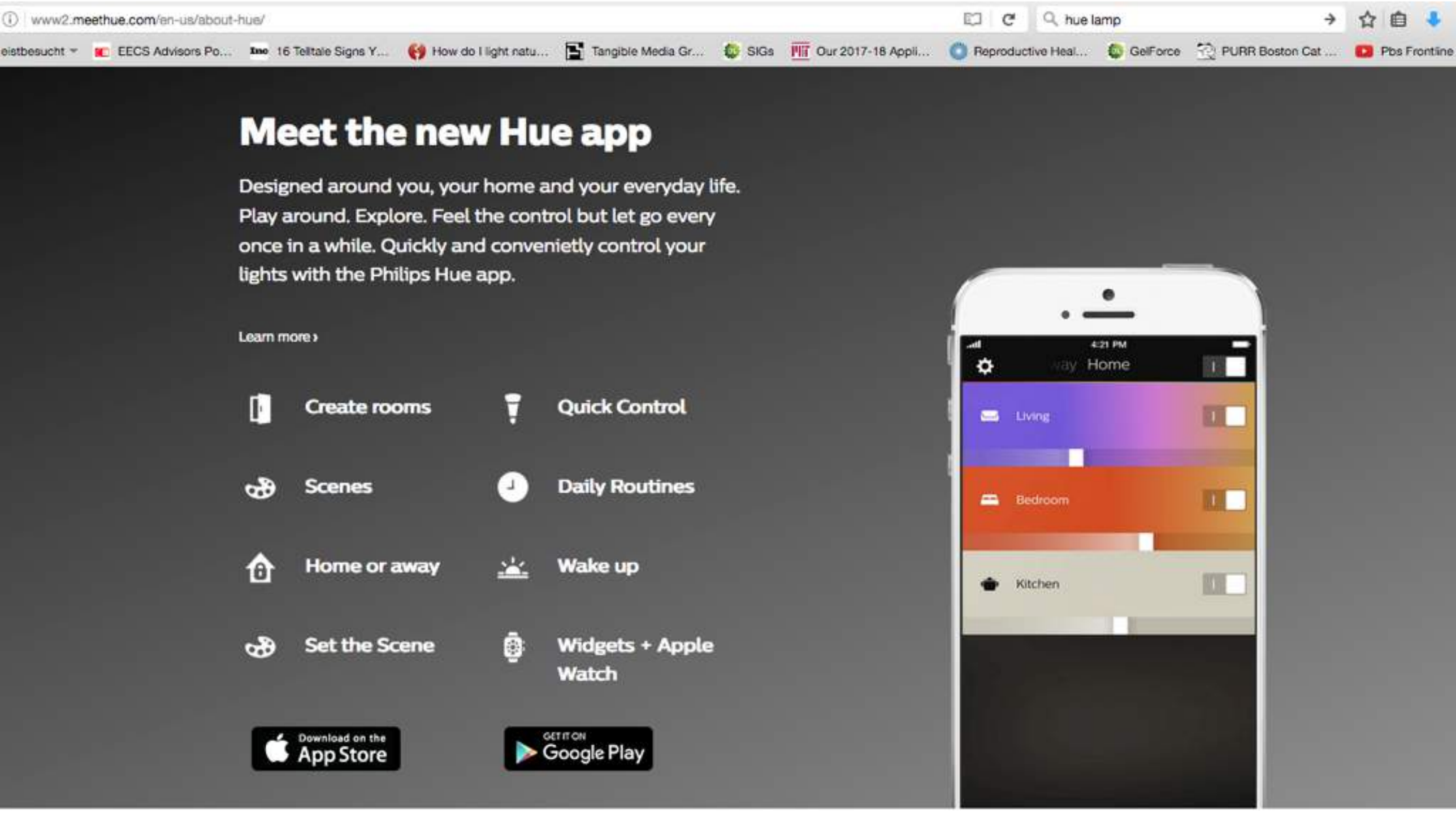






rotoscoping and information graphics

video recording / editing



webpage / poster design

New Scientist

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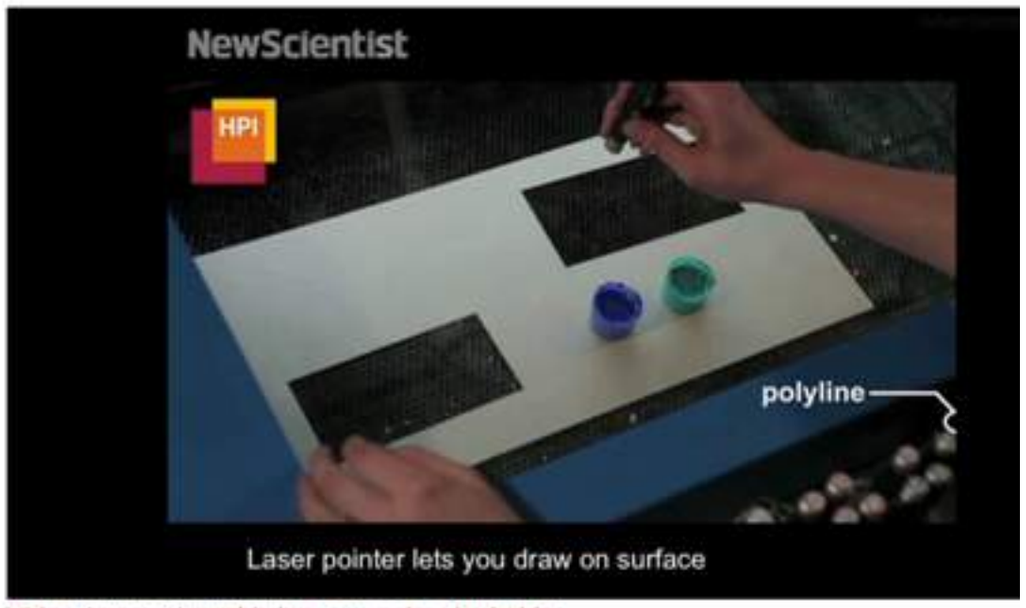
0

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

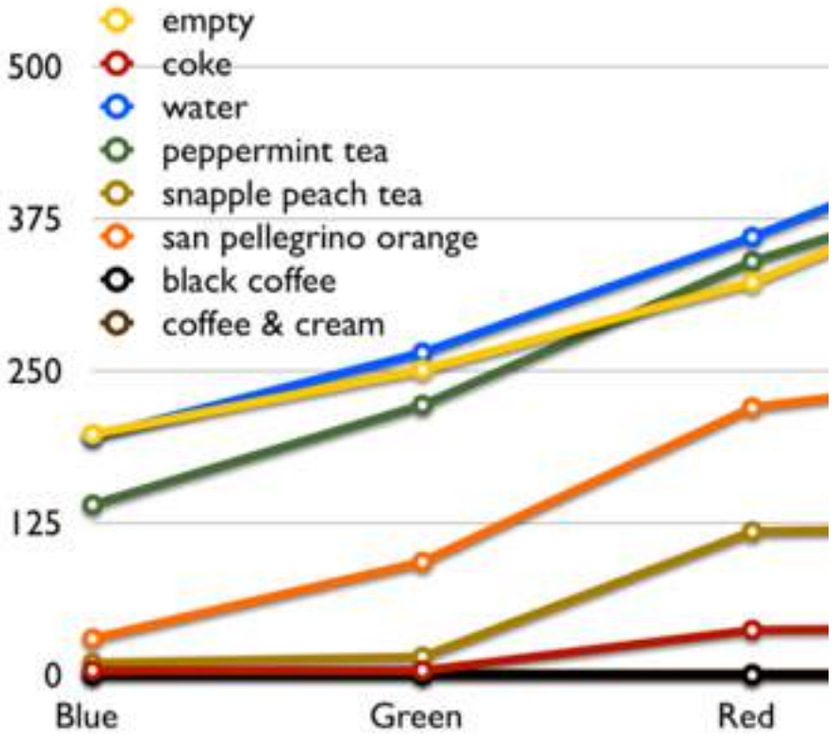
Show more

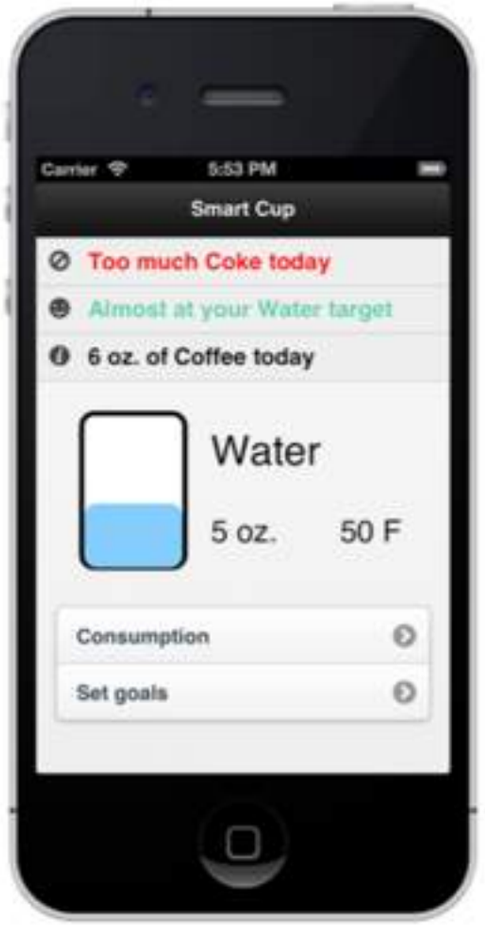
press training

open ended project

you will **build** an interactive device…

and **present** it ‘kickstarter style’





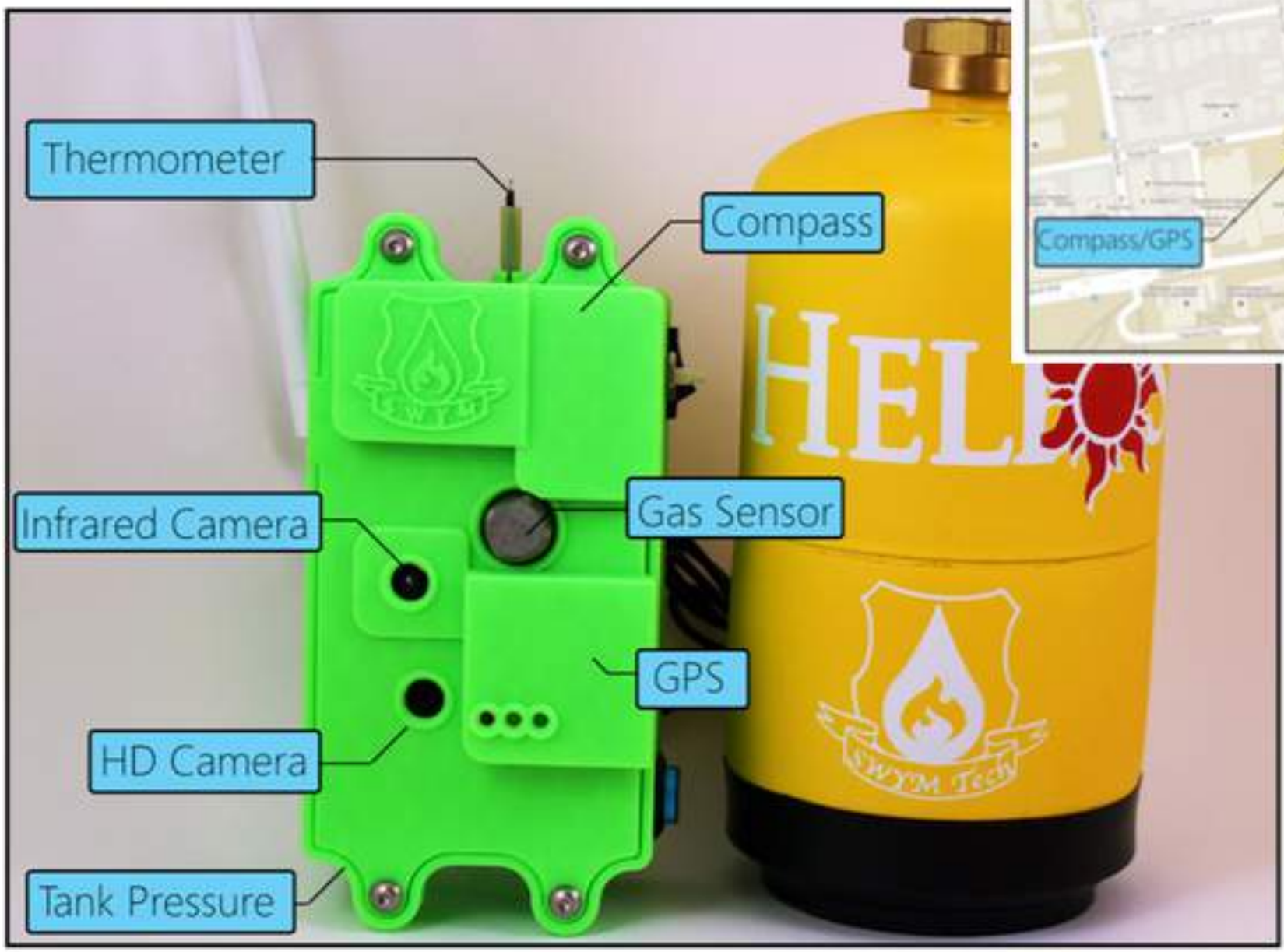
Smart Cup

Amy Pavel
Steve Rubin
Elliot Nahman
Sean Chen

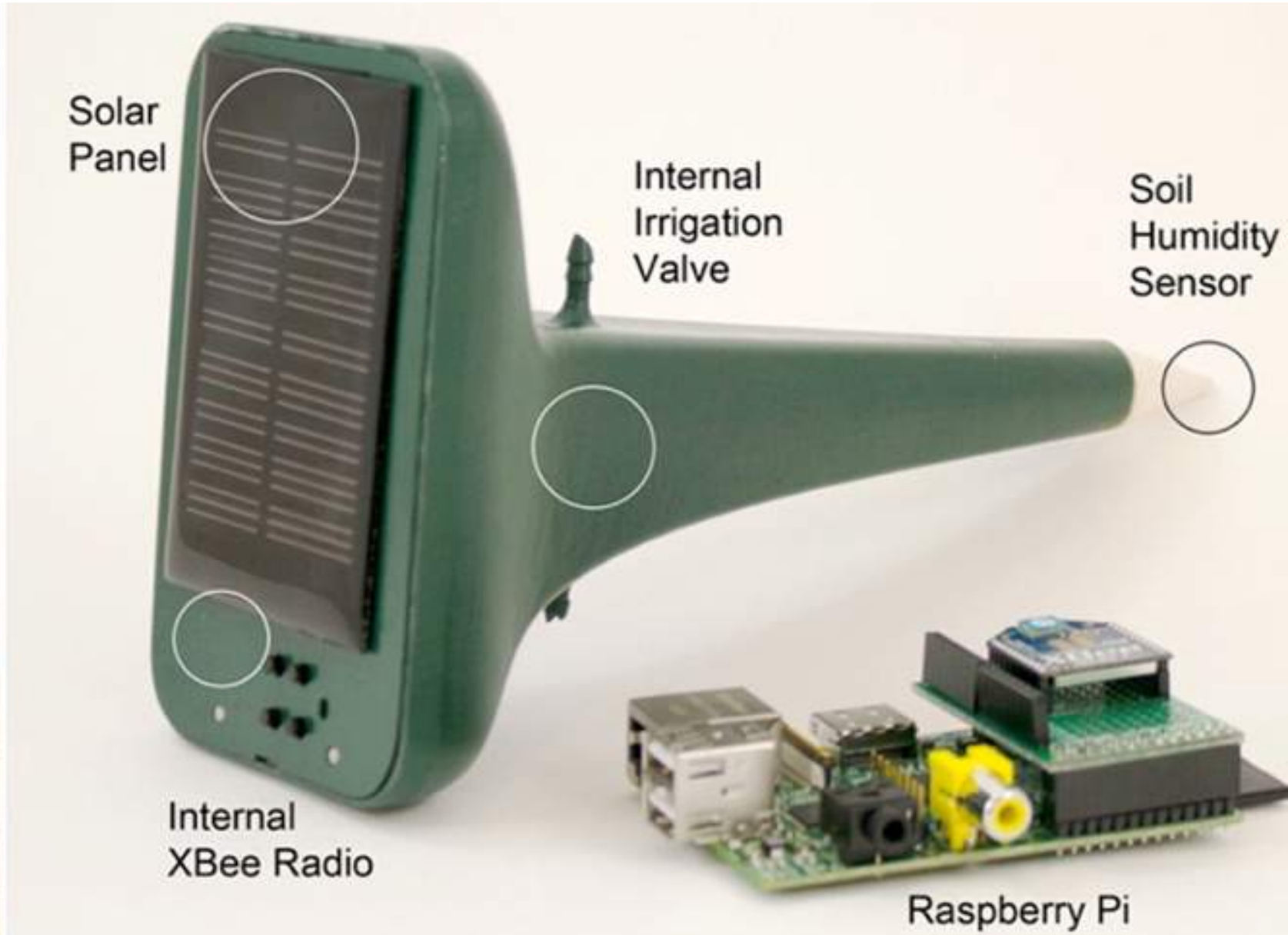
flow
Zach Wasson
Jackie Leverett
Tim Lee
Shower Quick Stats
Request Shower

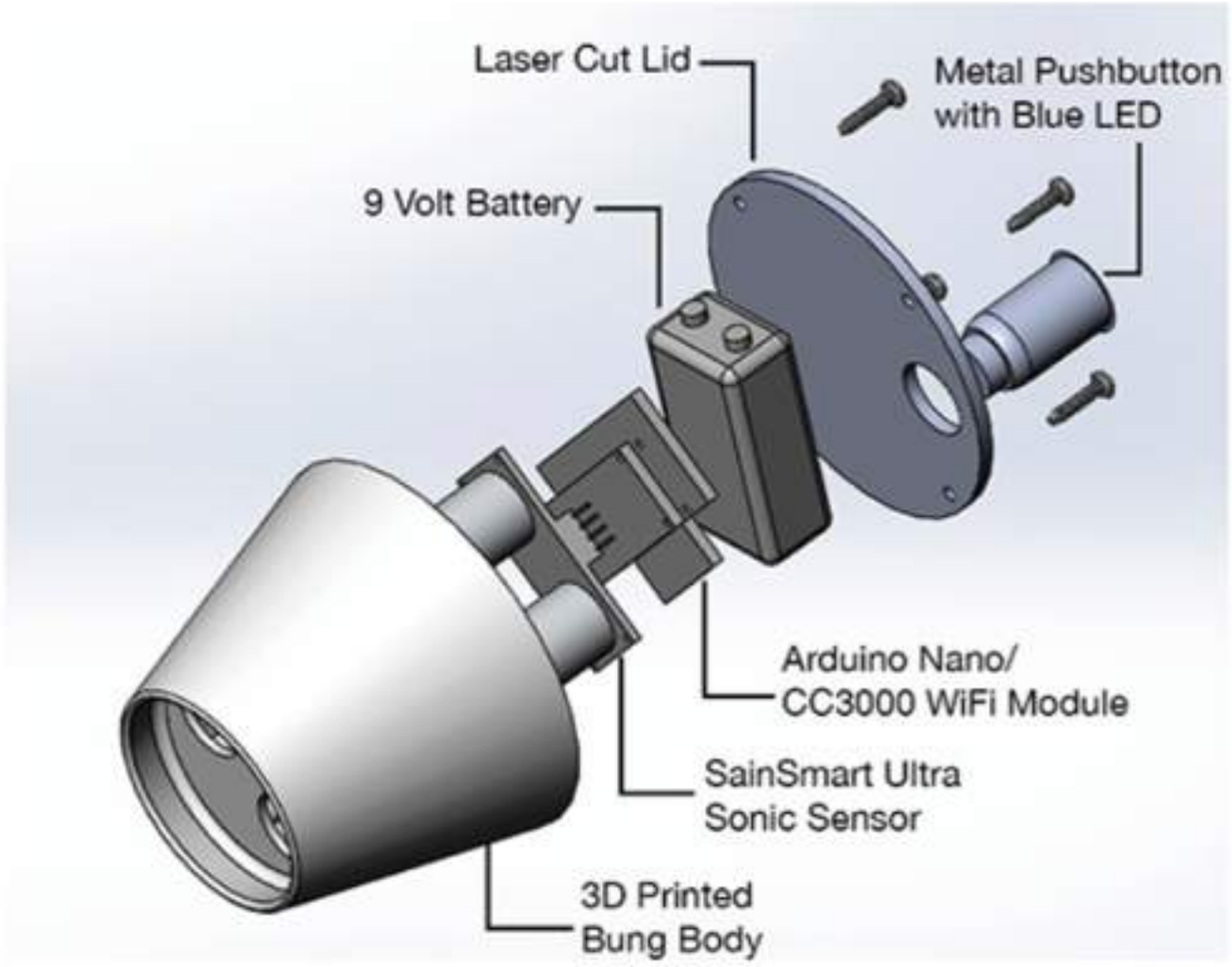
HELIOS

Keeping Firefighters Safe



Will Porter
Simon Scott
Yi Tong
Mitchell Karchemsky


Solar
Panel
Internal
Irrigation
Valve
Soil
Humidity
Sensor
Internal
XBee Radio
Raspberry Pi


Laser Cut Lid
Metal Pushbutton
with Blue LED
9 Volt Battery
Arduino Nano/
CC3000 WiFi Module
SainSmart Ultra
Sonic Sensor
3D Printed
Bung Body

büng
the autonomous barrel gauge
barrels
Name Bung Type Contents Liters Updated
BSG-74 1 bourbon Red & Green Organic Colorado Pear Brandy
AB-FO122-01 2 Whiskey Field Blend Apple Brandy 6 2013-12-10 08:34:05 UTC
Big Barrel 3 bourbon
Marta's Barrel 4 bourbon
Vasco's Barrel 5 bourbon
Field Blend Apple Brandy: readings
30
25
20
15
10
05
00
0 1 2 3 4 5 6
Comments For Field Blend Apple Brandy
New Comment
Justin:
nummy yummy

büng

open ended project:

teams of **1-2 students**

requirements for final prototype:

must involve some **laser cut / 3D printed parts**

must involve some custom **electronics**

must involve some **code** you wrote and **data via wifi**

must be **interactive** (senses user input + does sth with it)

must **solve real-world problem**

deliveries #1:

- **everything required to replicate** your prototype
    - laser cut / 3D printable files
    - all electronics you used and where you bought them
    - the code that runs your prototype

deliveries #2:

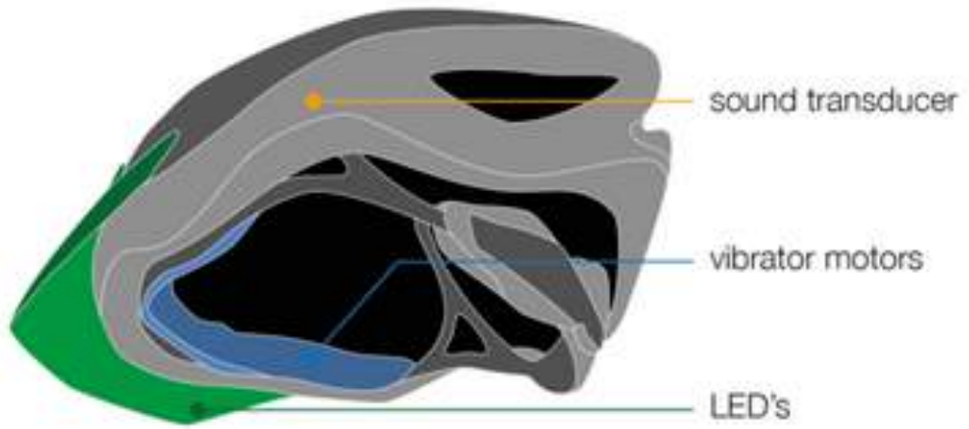
- **a website** showcasing your work
    - a video in which you pitch your prototype
    - quality photos of your prototype
    - presentation graphics (e.g. a rotoscope)
    - log of your weekly progress at the bottom

http://jicorrea.com/sensory-helmet/

Opportunity

Using the navigation tools from smartphones and digital technology located in the bicycle helmet, it is possible to create ways to direct cyclists through those last hundred meters.

Smartphone application for setting up ride



Helmet with embedded technology

Improved bicycle navigation

sensory helmet: http://jicorrea.com/sensory-helmet/

we will make time in class to

- find a team mate
- brainstorm ideas
- collect feedback
- do initial prototyping
- …

but it's helpful to **start collecting ideas now.**

project budget

- project budget of **$50 per student**
- + **micro-controller with wifi module**
- **breadboard** and some other basic components

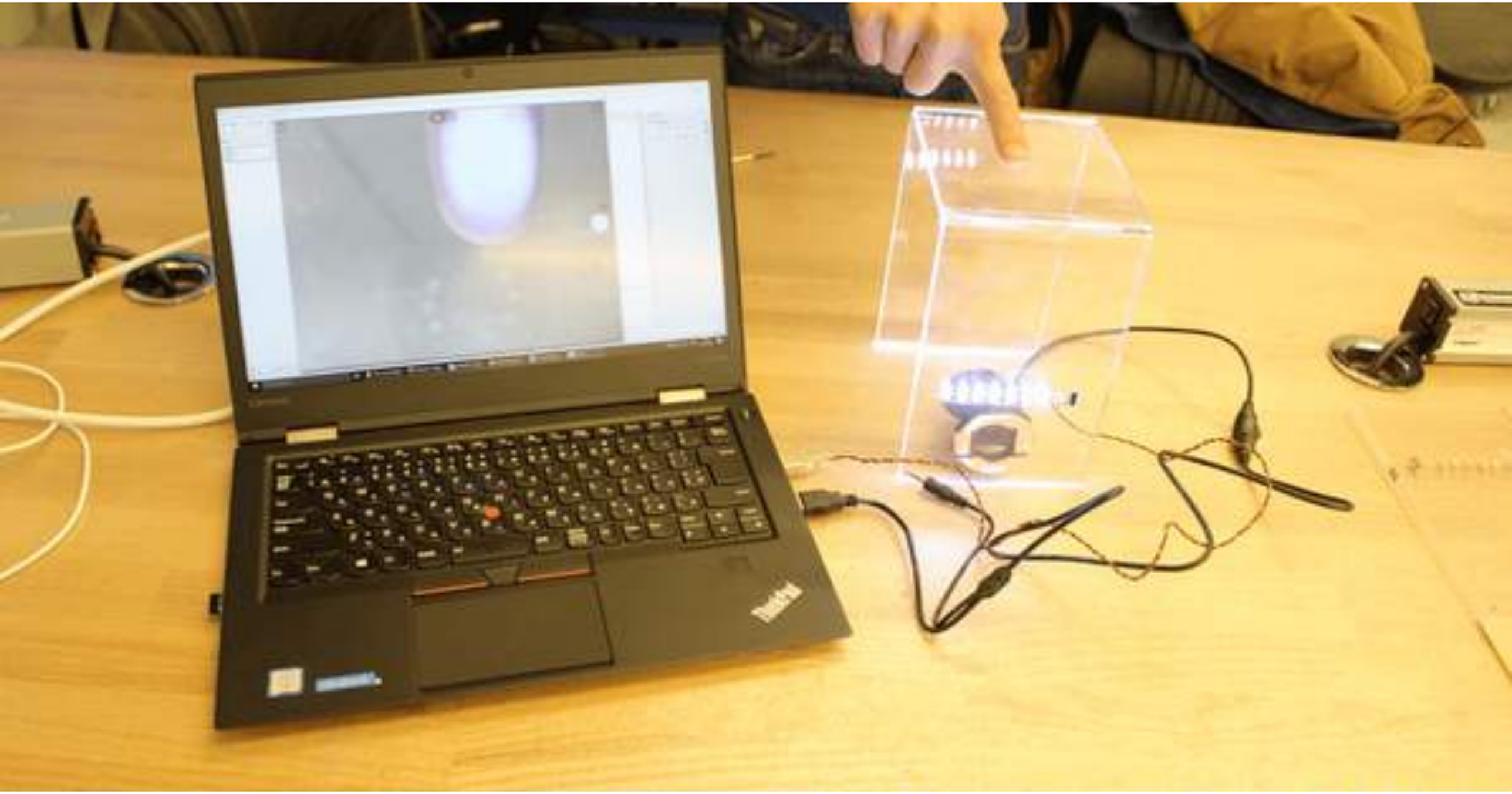
reimbursement

- give Jared your receipts
- put your name on them
- you will get a check in return

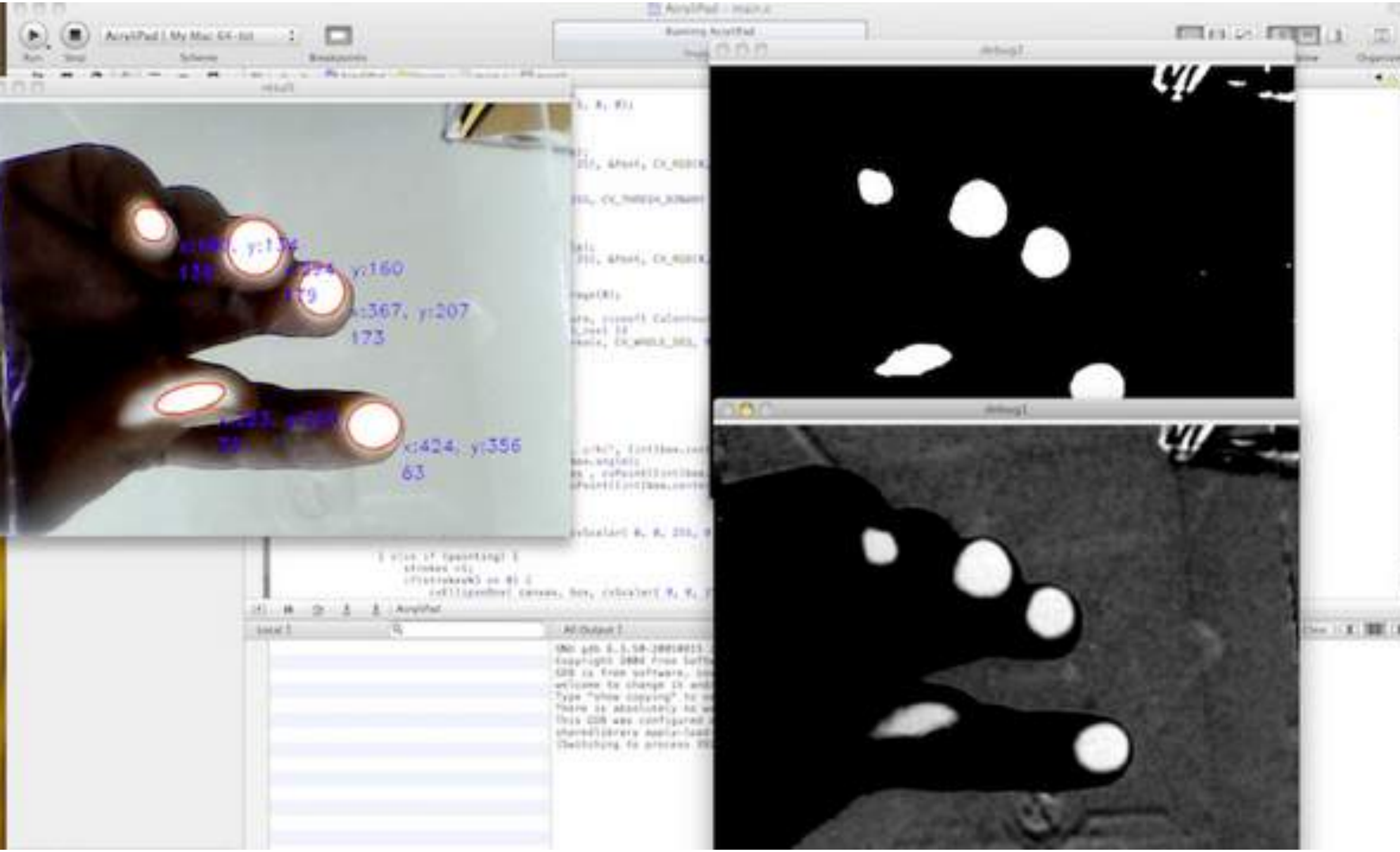
free resources

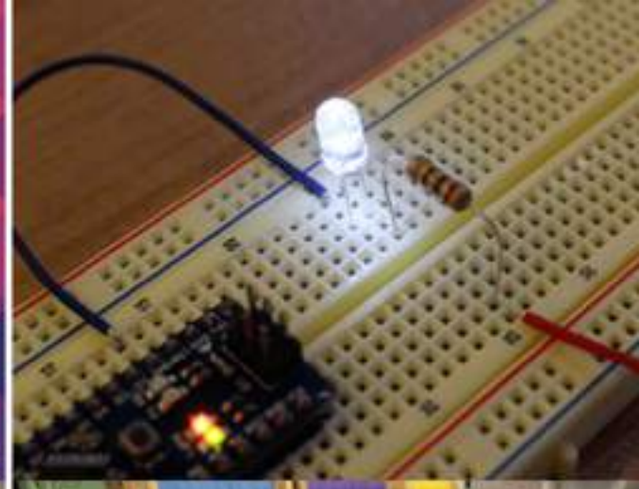
- 3D printing at IDC is free
- EDS has many basic electronics on stock

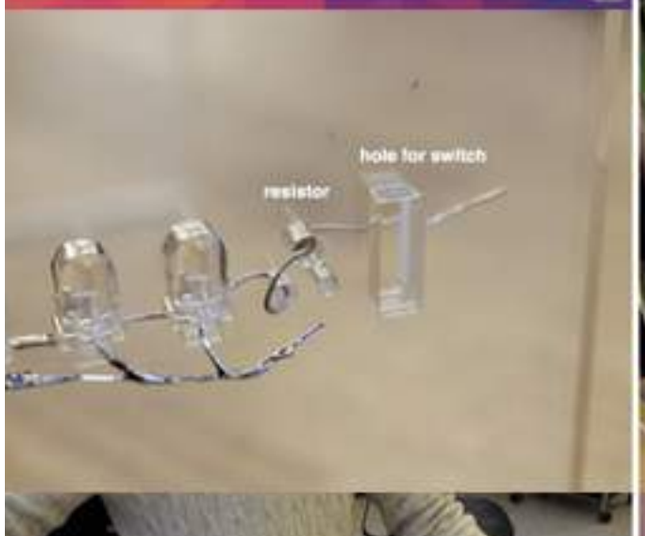
laboratory assignment / problem set

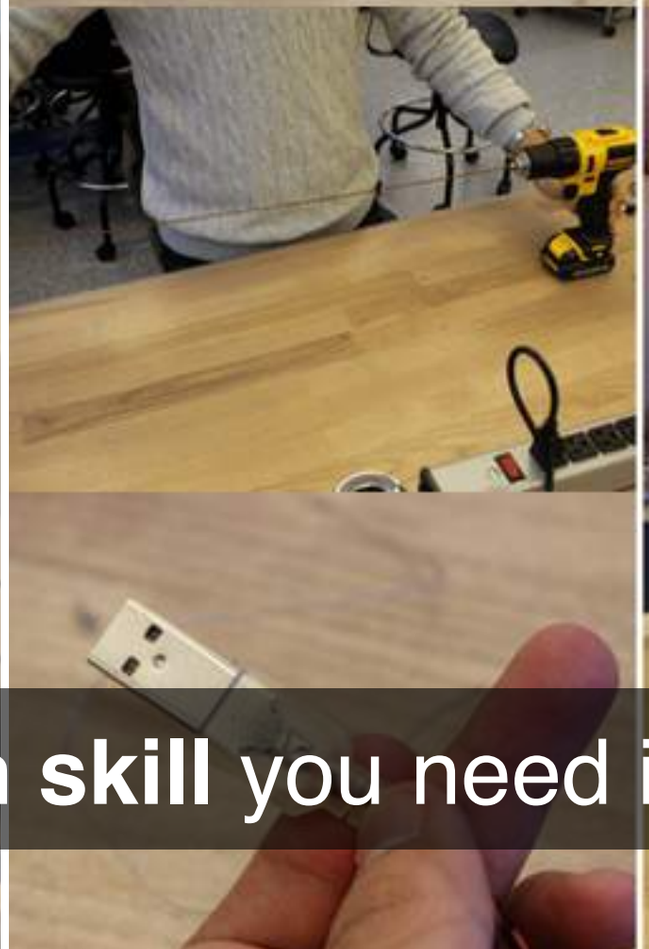
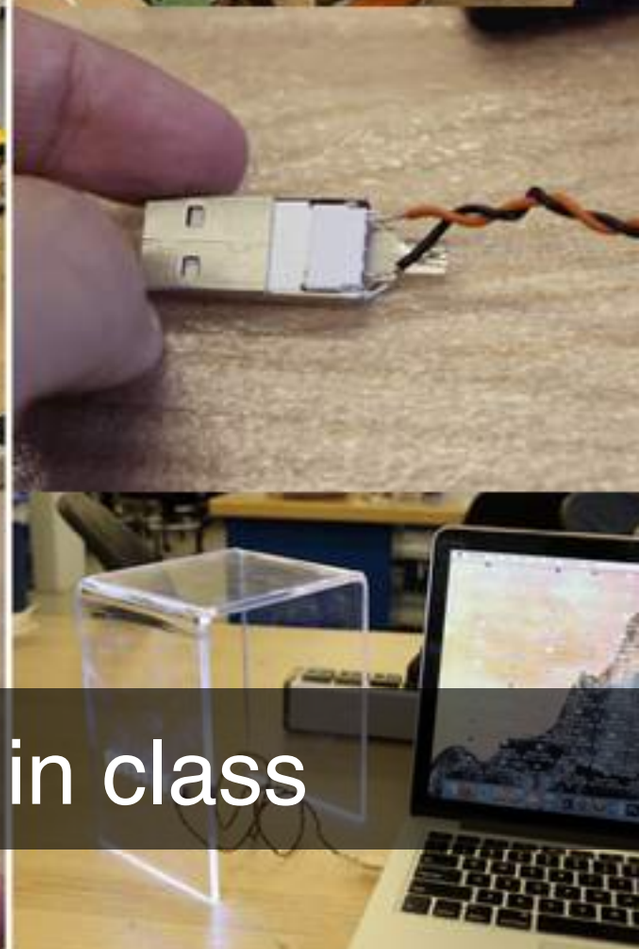


pset: laser cut + electronics + computer vision code


x:367, y:207
123
x:424, y:356
83





we will do an **exercise for each skill** you need in class

we give you all materials **on friday**
including the micro-controller

grading

no written exams

50% group project

warm up for your group project

40% laboratory assignments / problem set

10% nano-quizzes

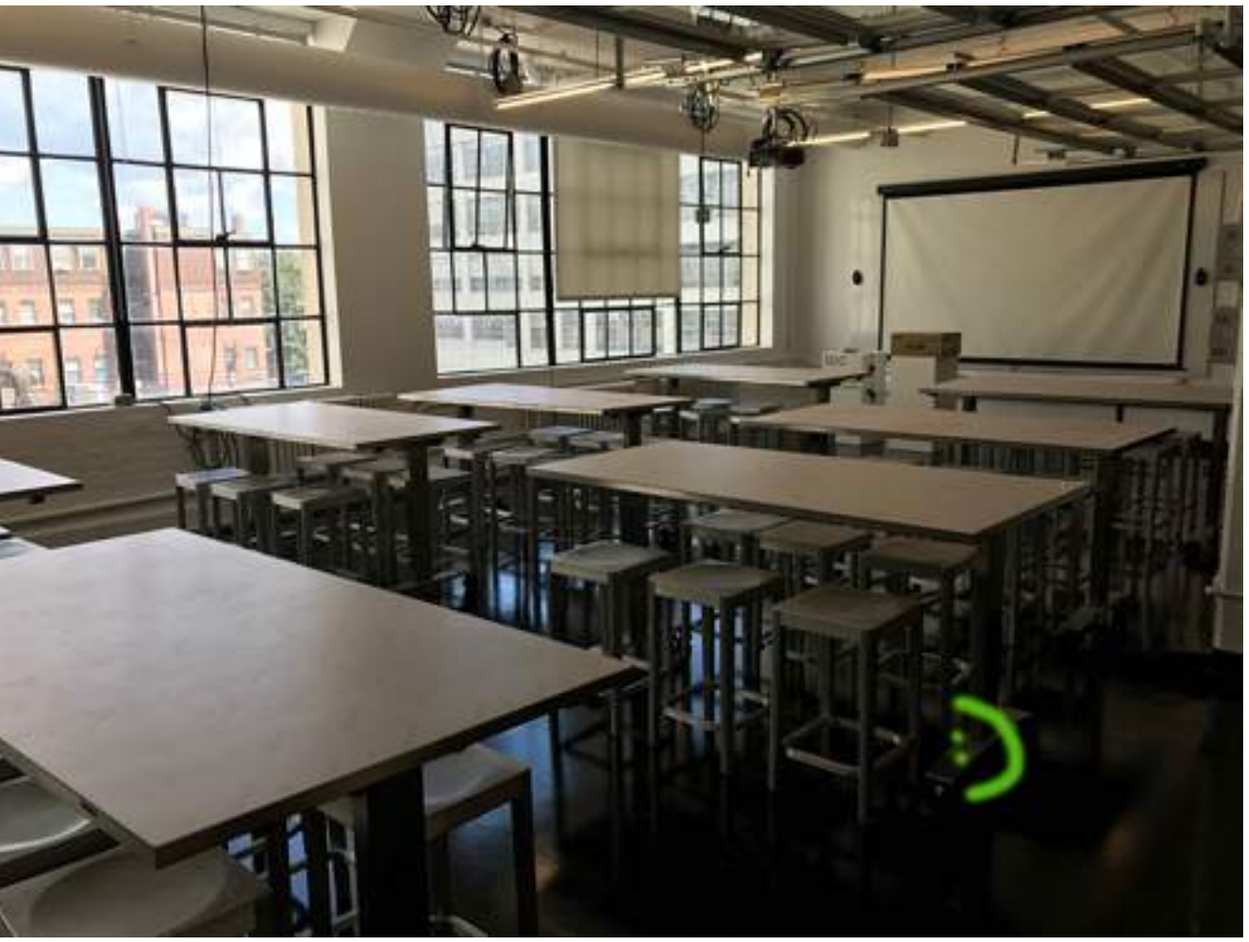
not every week, I will announce it

home works

- pass / no pass
- **small exercises,** will be helpful for group project
- **install software / setup controller,** need this for class

location

International Design Center (IDC)



N52-387

Engineering Design Studio (EDS)

38-501 (this friday!)

both have a workshop!

class resources

class website with slides:
http://hcie.csail.mit.edu/engineering-interactive-technologies.html

piazza:
post questions on piazza
do not email us!

office hours:
my office hour is Mondays, 4-5pm.
TA office hours tbd.

this is a new course!

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

(if you like to have everything perfect
this is not the course for you—please come back next year.)

questions?

let’s take a **5 minute break!**

let’s take a **5 minute break!**

end.