Intro to Physical Computing

Jeff Feddersen, ITP/NYU

Class 1 Agenda

- Welcome!
- Class overview
  - Big picture
  - Course logistics
- Intro fantasy device project
- Quick workshop tour
- [Break]
- Fantasy device group project
- Distribute parts
- Connect Arduino (if we have time)

(required class)

2022 Pcomp with Jeff!

Purpose

Support/Expand/Enable creative expression…

…with technology…

…focused on physical, embodied interaction.

Method

“…with technology”

Programming Microcontrollers and Circuits

to be Cool*

“Enable creative expression…

“…focused on physical, embodied interaction.”

Circuits

Programming Microcontrollers and **Circuits** to be Cool*

- Electrical properties (voltage, resistance)
- Basic components and simple circuits
- Breadboard prototyping
- Testing and measuring
- Handling higher power

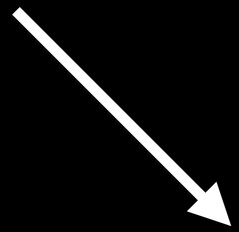
Microcontrollers

Programming **Microcontrollers** and Circuits to be Cool*

- Small cheap single-task computers
- Can sense and output voltages
- Fast (compared to us)

Programming

Programming Microcontrollers and Circuits to be Cool*



- Simple Development Tools
- Programming basics
  - Pseudocode
  - Variables, memory
  - Structure, control flow

to be Cool*

Programming Microcontrollers and Circuits **to be Cool***

to be Cool*

Programming Microcontrollers and Circuits **to be Cool***

*Up to you

Voice

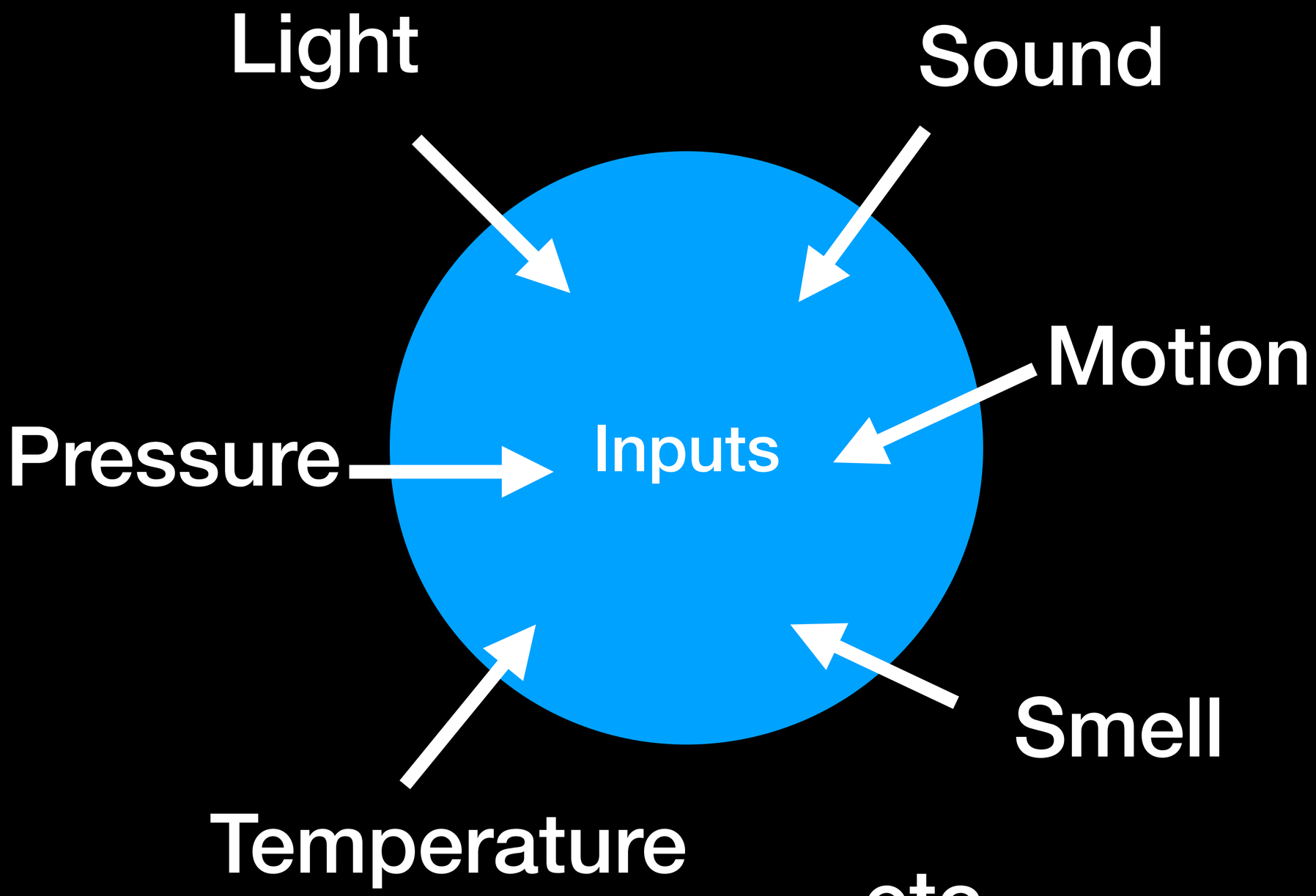
Metaverse

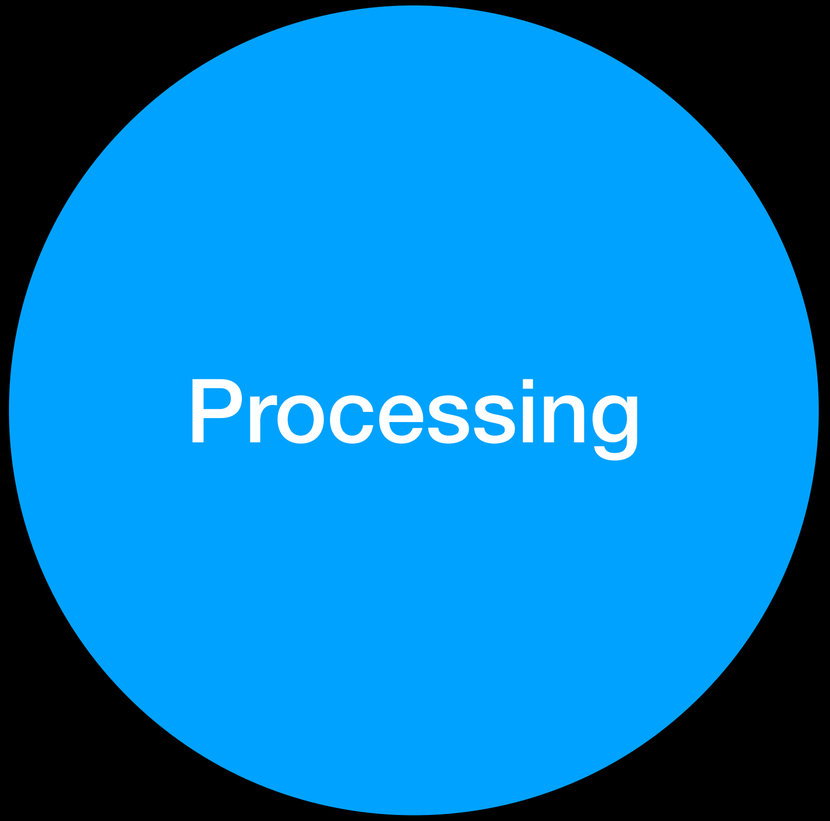
Brett Victor’s
“Pictures under glass”

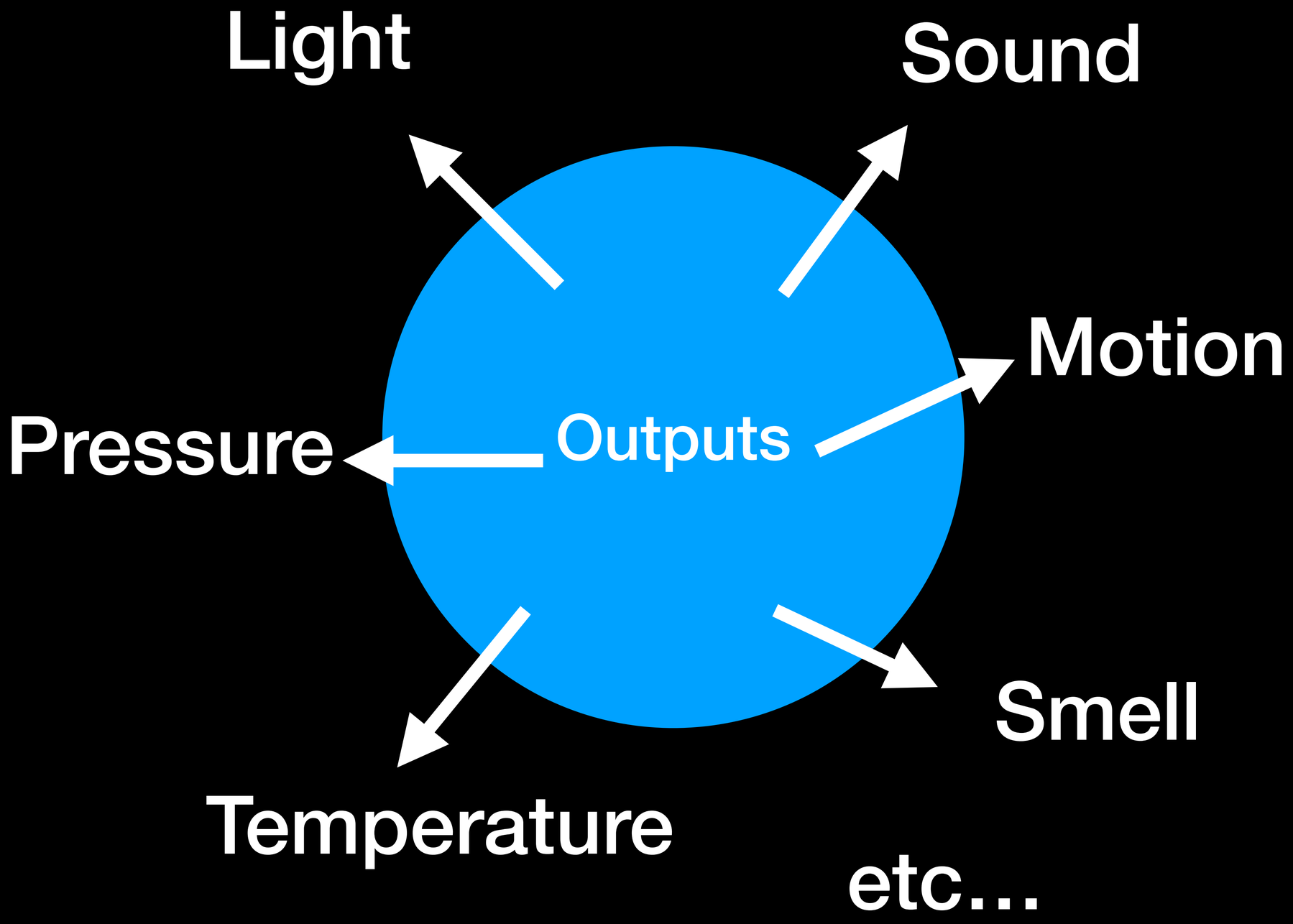
amazon

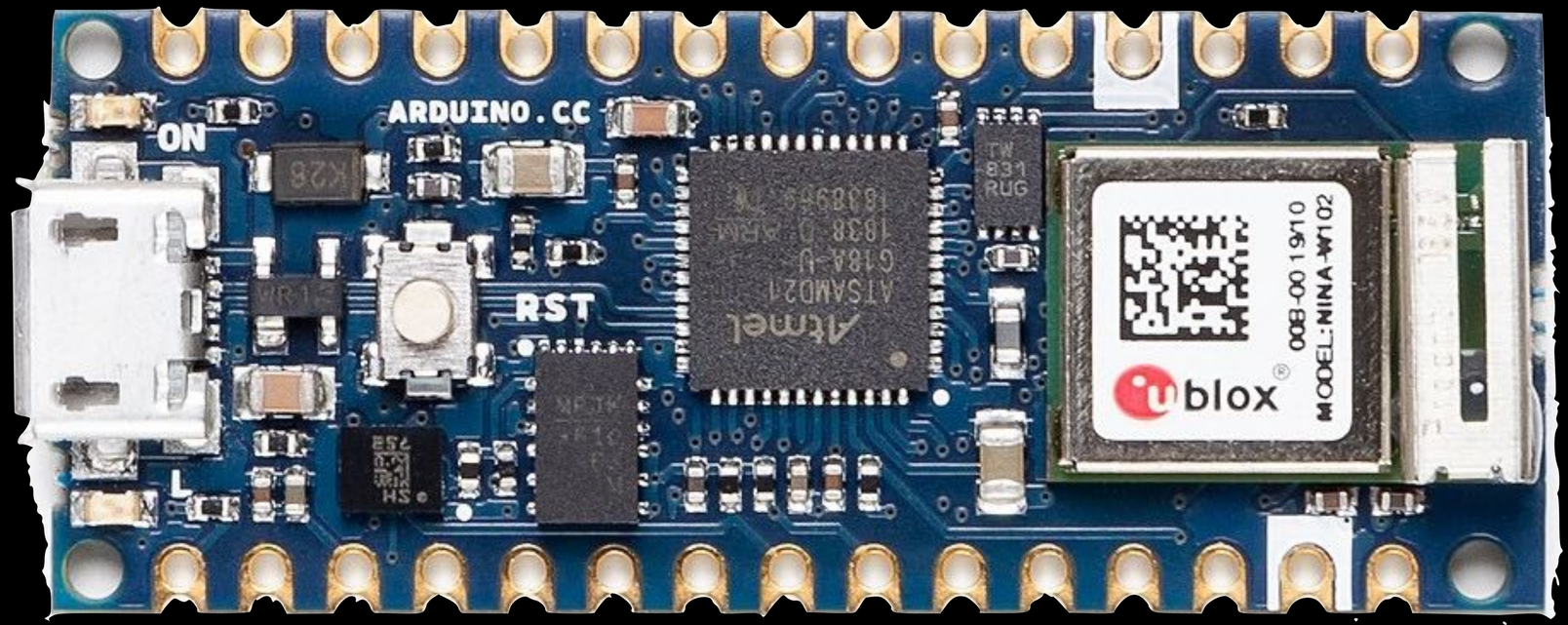
amazon

amazon


Light
Sound
Motion
Pressure
Inputs
Smell
Temperature
etc…


Processing


Light
Sound
Motion
Outputs
Pressure
Smell
Temperature
etc…

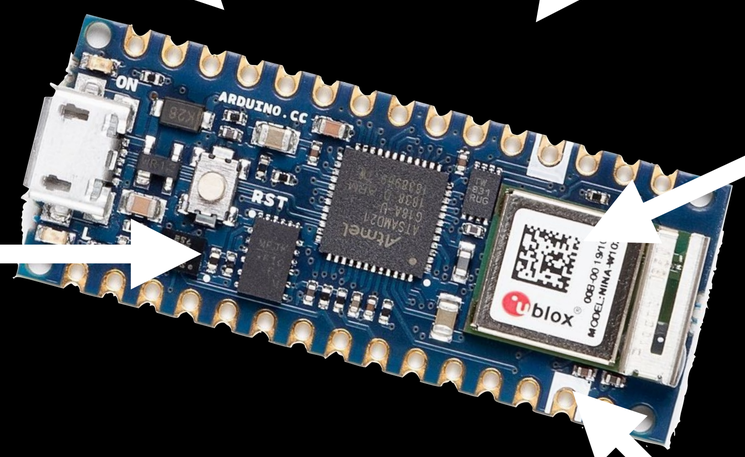

ARDUINO.CC
ON
RST
L
ATSAMD21
Atmel
TW
831
RUG
ublox
MODEL:NINA-W102

Light

Sound

Motion

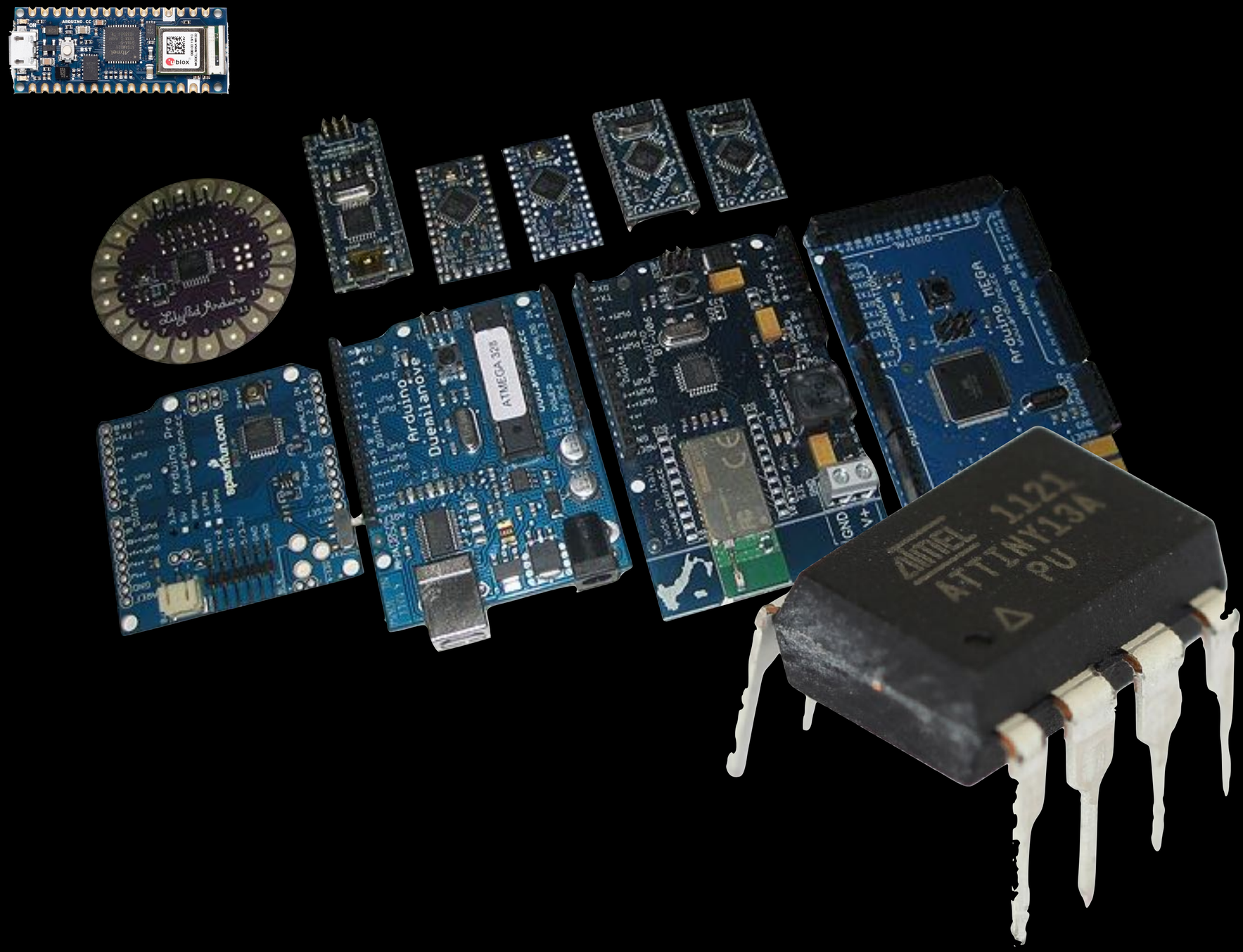
Pressure

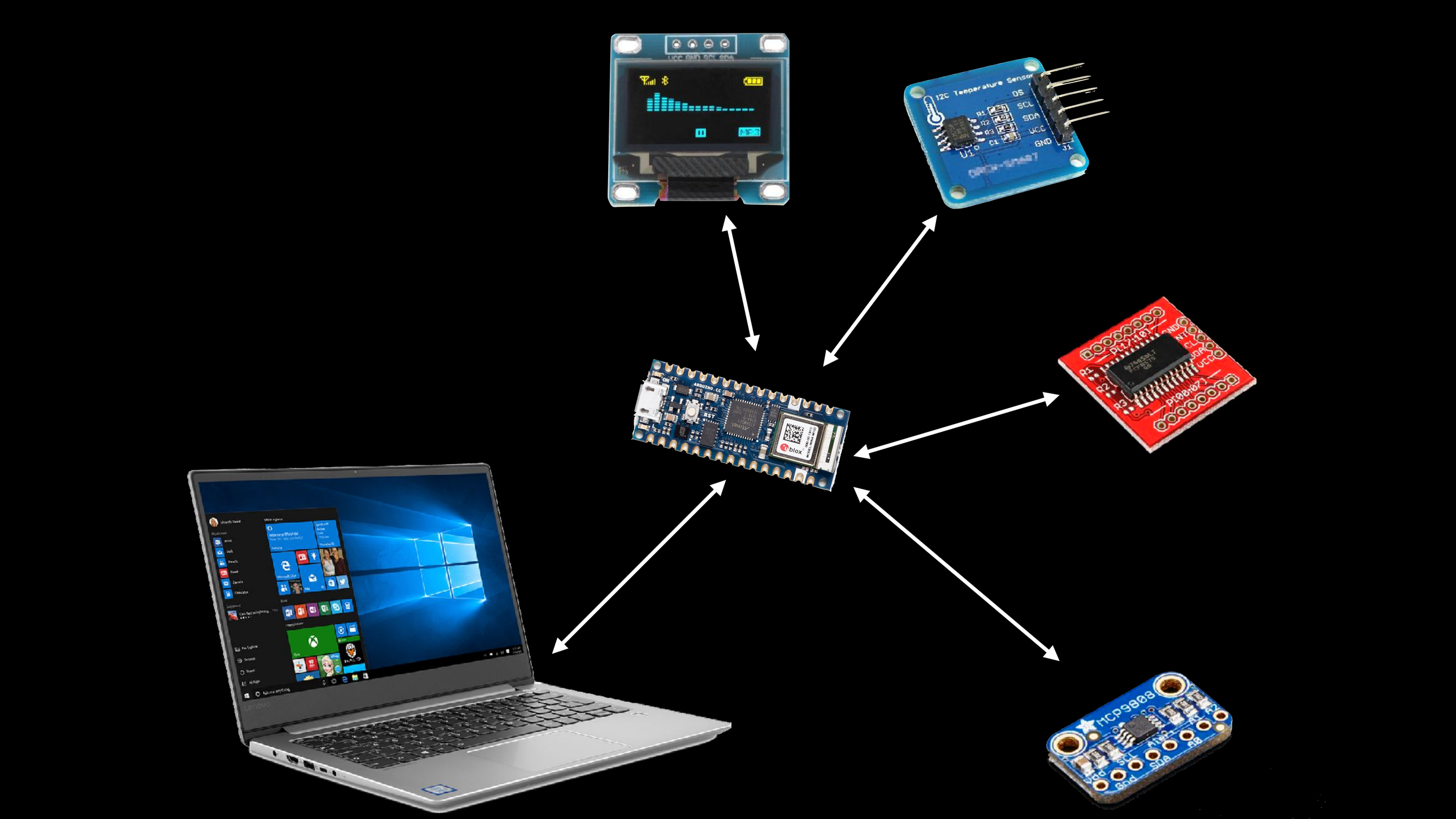


Smell

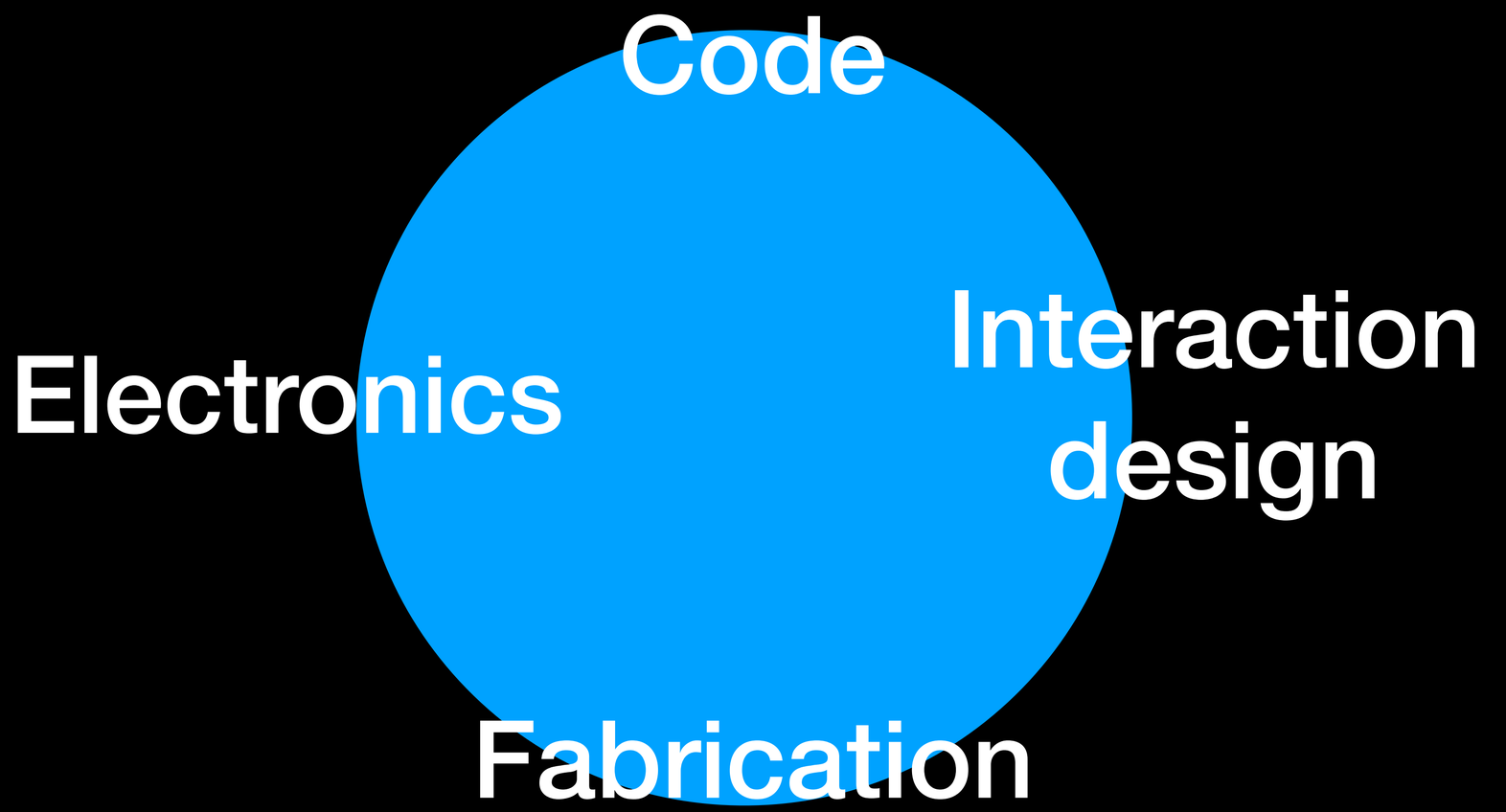
Temperature

etc…

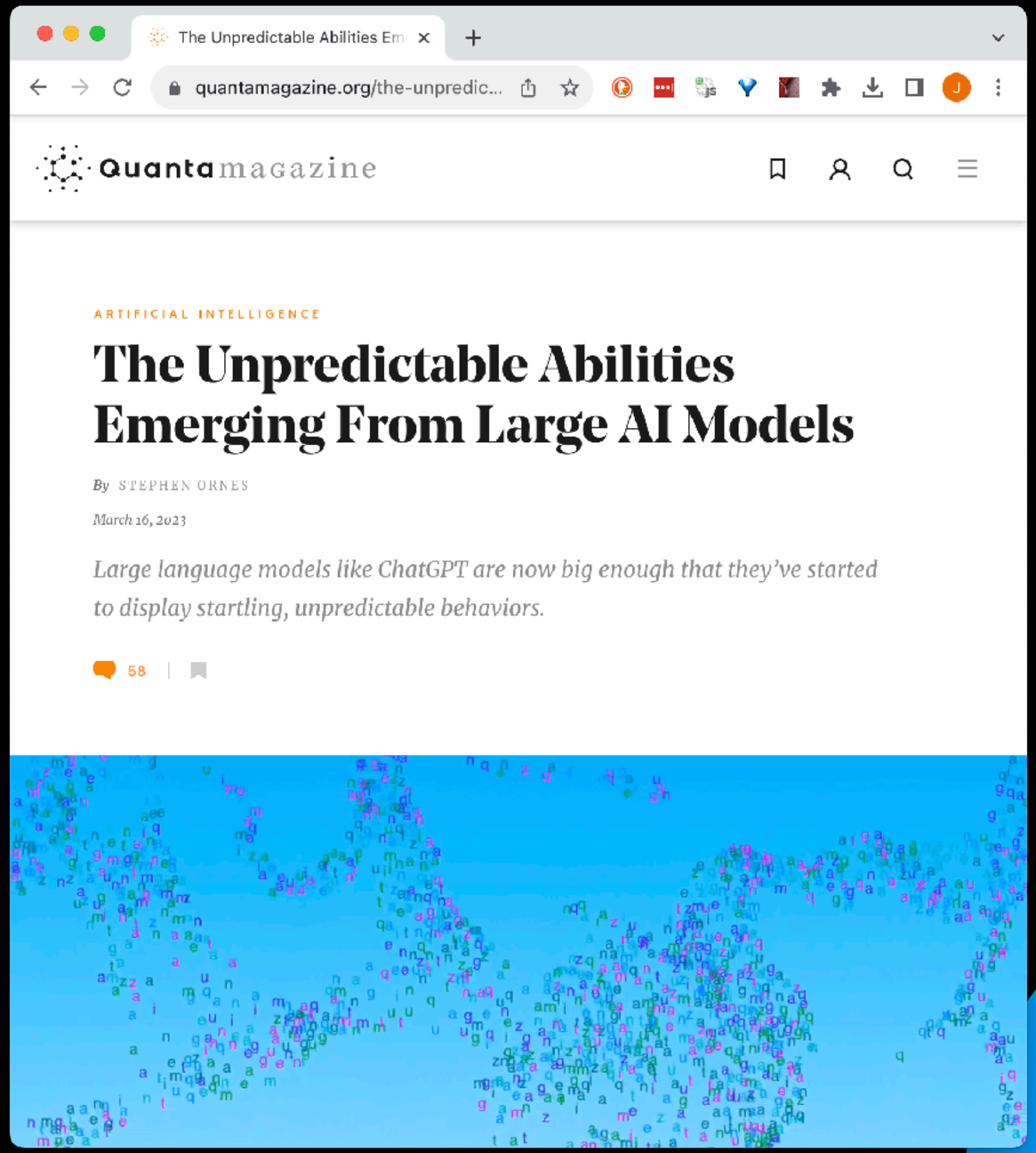

ARDUINO.CC
blox
Arduino Pro
sparkfun.com
Arduino Duemilanove
ATMEGA 328
Arduino MEGA
ATTINY13A
PU


I2C Temperature Sensor
OS
SCL
SDA
VCC
GND
ARDUINO.CC
blox
MCP9808

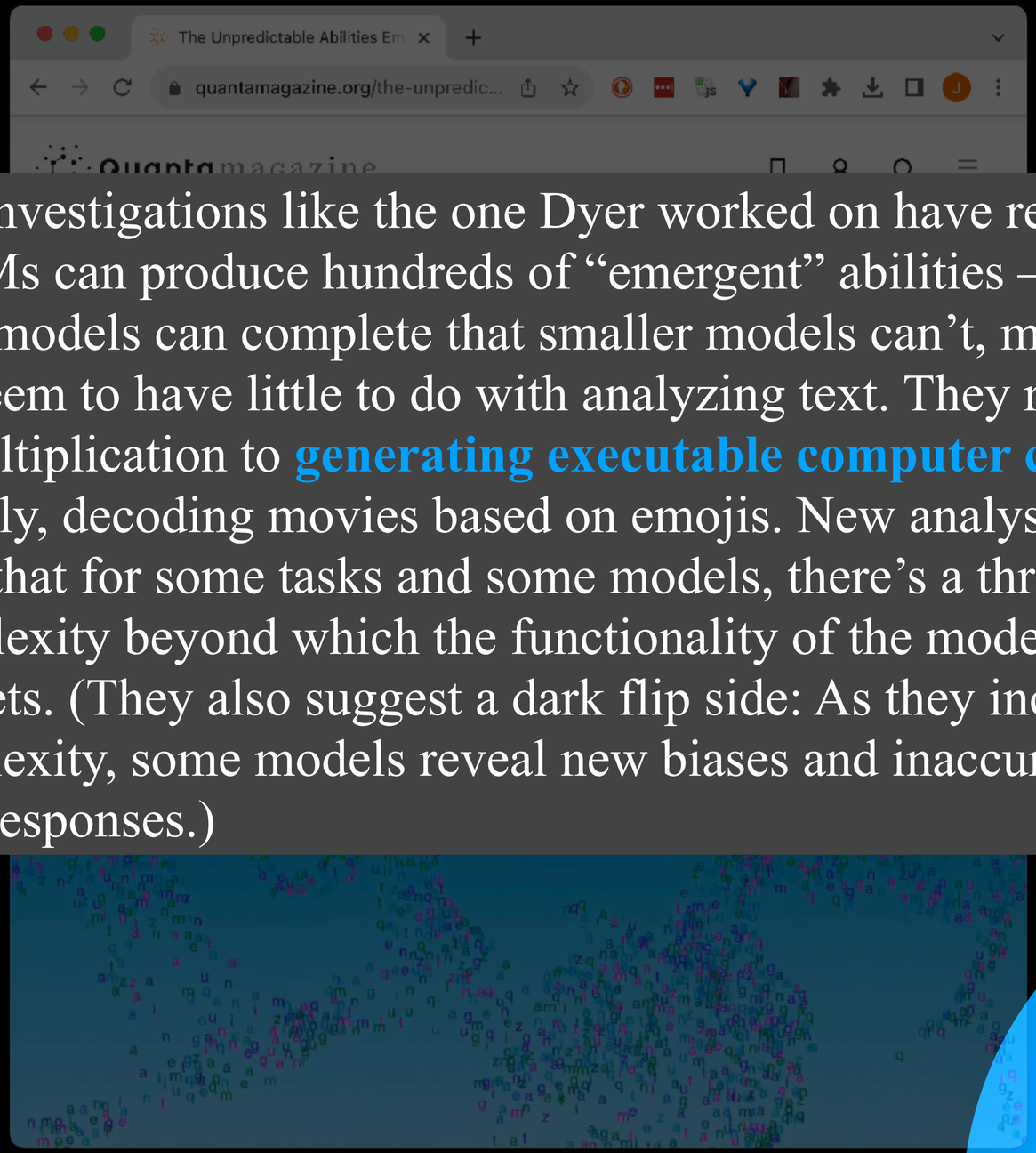
- Methods for handling larger projects
- Fabrication
- Play testing and User Testing
- Presenting and documenting


Code
Electronics
Interaction
design
Fabrication

Code

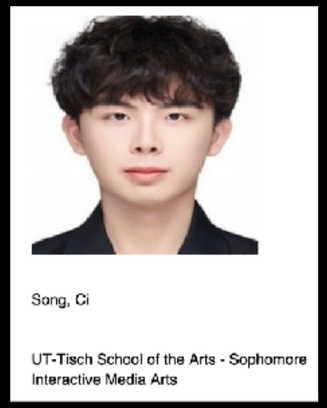

The Unpredictable Abilities Em
quantamagazine.org/the-unpredic...
Quantamagazine
ARTIFICIAL INTELLIGENCE
The Unpredictable Abilities Emerging From Large AI Models
By STEPHEN ORNES
March 16, 2023
Large language models like ChatGPT are now big enough that they've started to display startling, unpredictable behaviors.
58

Code



Recent investigations like the one Dyer worked on have revealed that LLMs can produce hundreds of “emergent” abilities — tasks that big models can complete that smaller models can’t, many of which seem to have little to do with analyzing text. They range from multiplication to **generating executable computer code** to, apparently, decoding movies based on emojis. New analyses suggest that for some tasks and some models, there’s a threshold of complexity beyond which the functionality of the model skyrockets. (They also suggest a dark flip side: As they increase in complexity, some models reveal new biases and inaccuracies in their responses.)

https://www.quantamagazine.org/the-unpredictable-abilities-emerging-from-large-ai-models-20230316/

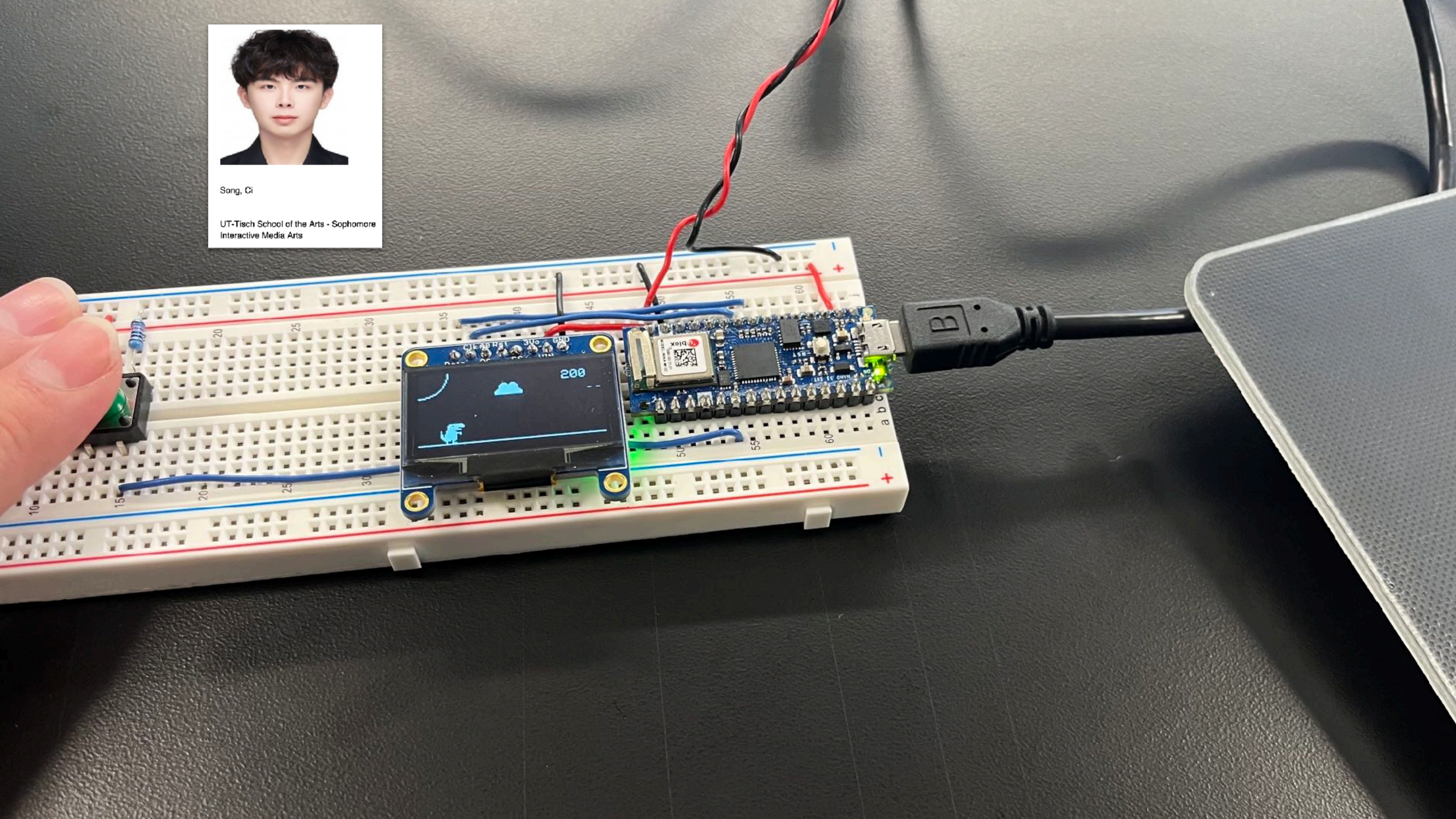


Song, Ci

UT-Tisch School of the Arts - Sophomore
Interactive Media Arts

Ci was an undergraduate student in my IMA Energy course last year.

He had a little pomp experience, and wanted to make a solar-powered video game for the class final.



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Here is my chat history with ChatGPT4 re: Arduino Dinosaur Game

User: how to make a Dinosaur Game in Arduino and display it on Monochrome 1.3" 128x64 OLED Graphic Display with a bottom to play the game

ChatGPT: *To create a simple dinosaur game on an Arduino and display it on a 1.3" 128x64 OLED Graphic Display, you'll need the following components:*

1. Arduino board (e.g., Arduino Uno or Nano)
2. Monochrome 1.3" 128x64 OLED Graphic Display (e.g., SSD1306-based)
3. A pushbutton
4. Breadboard and jumper wires
…

Feel free to modify the code to improve the game or add extra features like different obstacles, variable jump heights, or a high score feature.

User: **could you make the cactus more randomly**

ChatGPT: *Sure! You can use the `random()` function to generate random distances between the cacti. Here's an updated version of the code that introduces random spacing between cacti:*

```cpp
#include <Wire.h>
…
```

User: **why is the shape of the cloud look like a heart**

ChatGPT: *You're right, the cloud shapes in the code might resemble a heart due to the position of the circles used to create the cloud. We can adjust the cloud shape to make it look more like a traditional cloud by adding more circles and changing their positions. Here's the updated `displayClouds()` function with a more cloud-like shape:*

```cpp
…
```

Excerpt of about 50 pages of interaction Ci reported

Fantasy Device

Physical Interaction
Goal/purpose

Resources

Syllabus

https://itp.nyu.edu/physcomp/
Schedule, assignments, labs, videos

Residents

Bianca and Gracy, with help from Maya and Shuang.

Drop-in Office Hours

Mine, other professors, residents.

Other students

If you can, do your homework at ITP and learn by osmosis!

Help Sessions

Mondays 4-5:30PM and Thursdays 2-3:30PM

Help session info^^ Starting Thursday 9/7/23