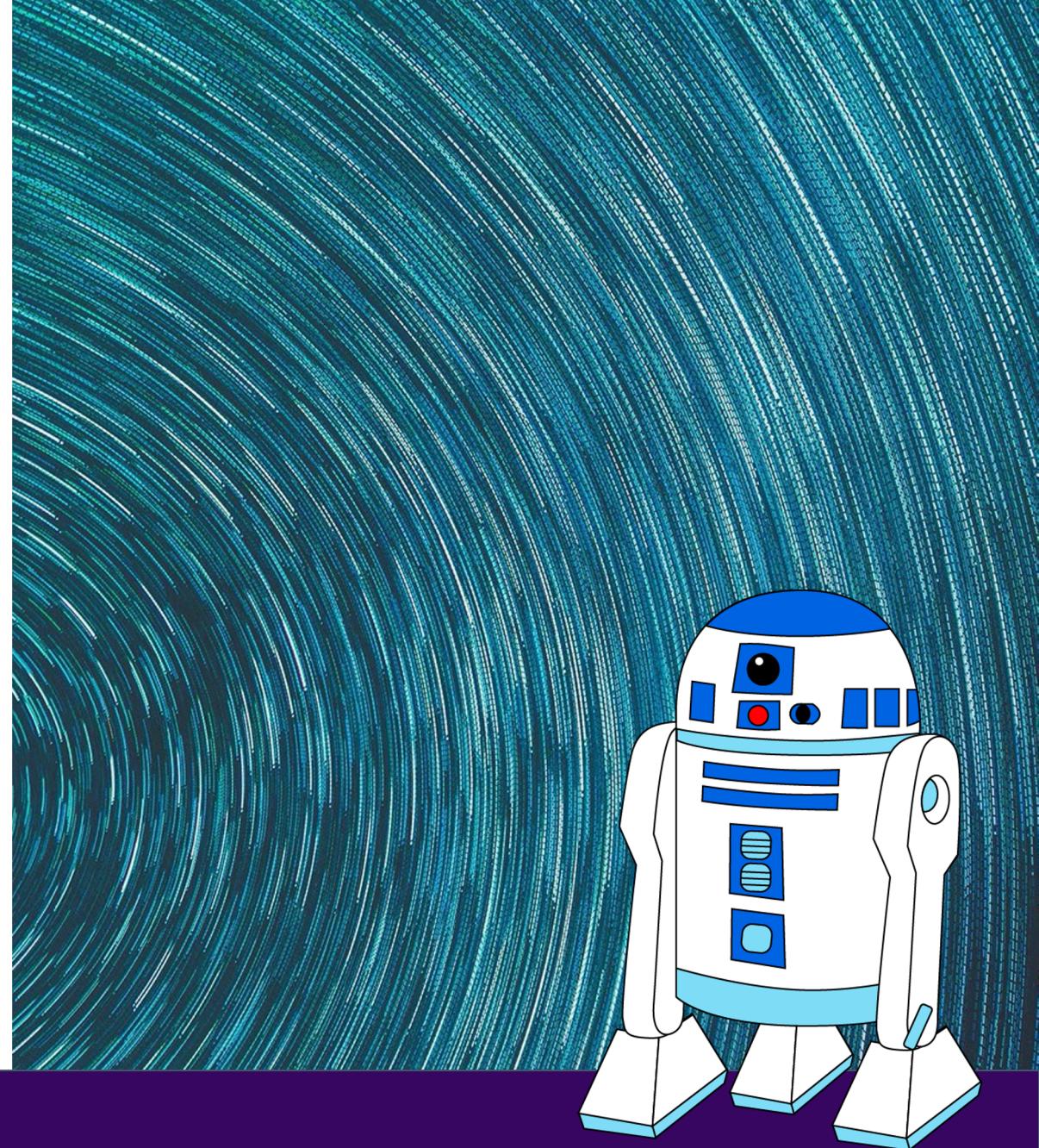


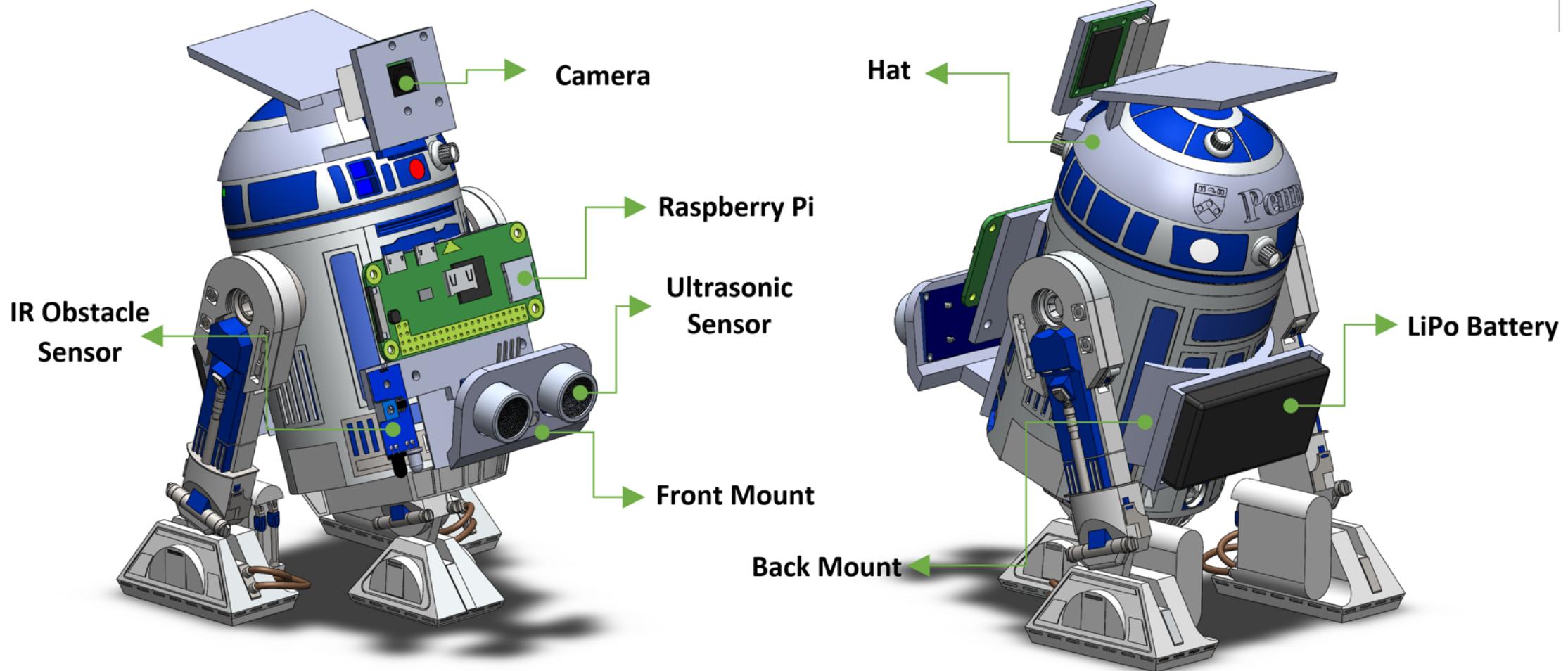
CIS 421/521:  
ARTIFICIAL INTELLIGENCE

# R2D2 Assignments

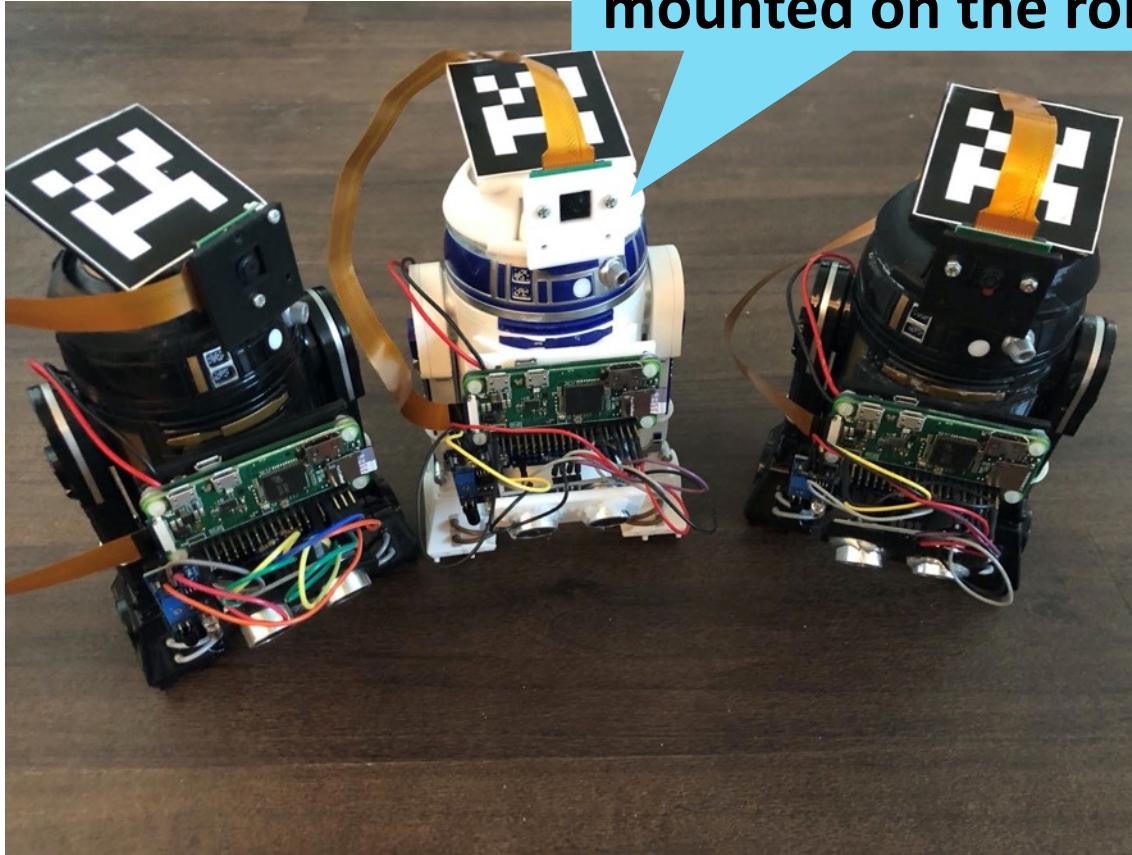
Professor Chris Callison-Burch



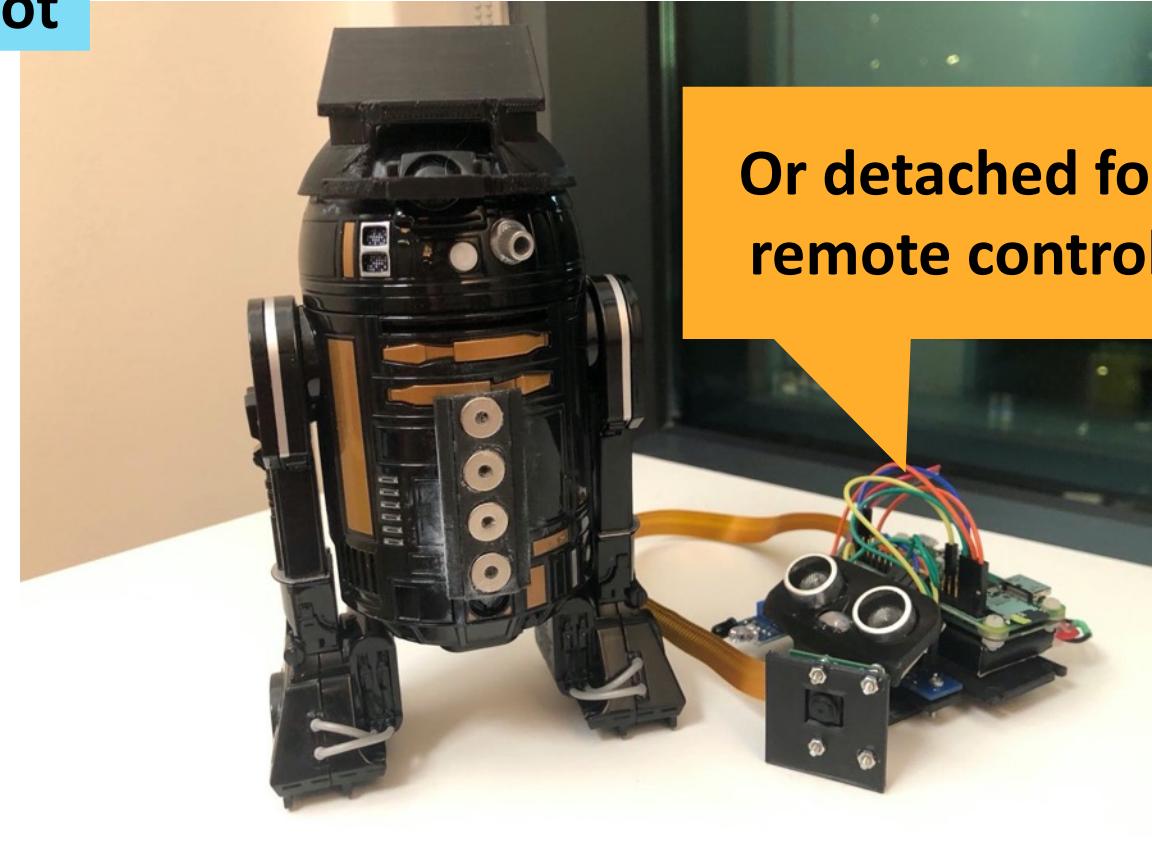
# Programmable Toy Robots + Custom Sensor Packs



# 3D printed mount

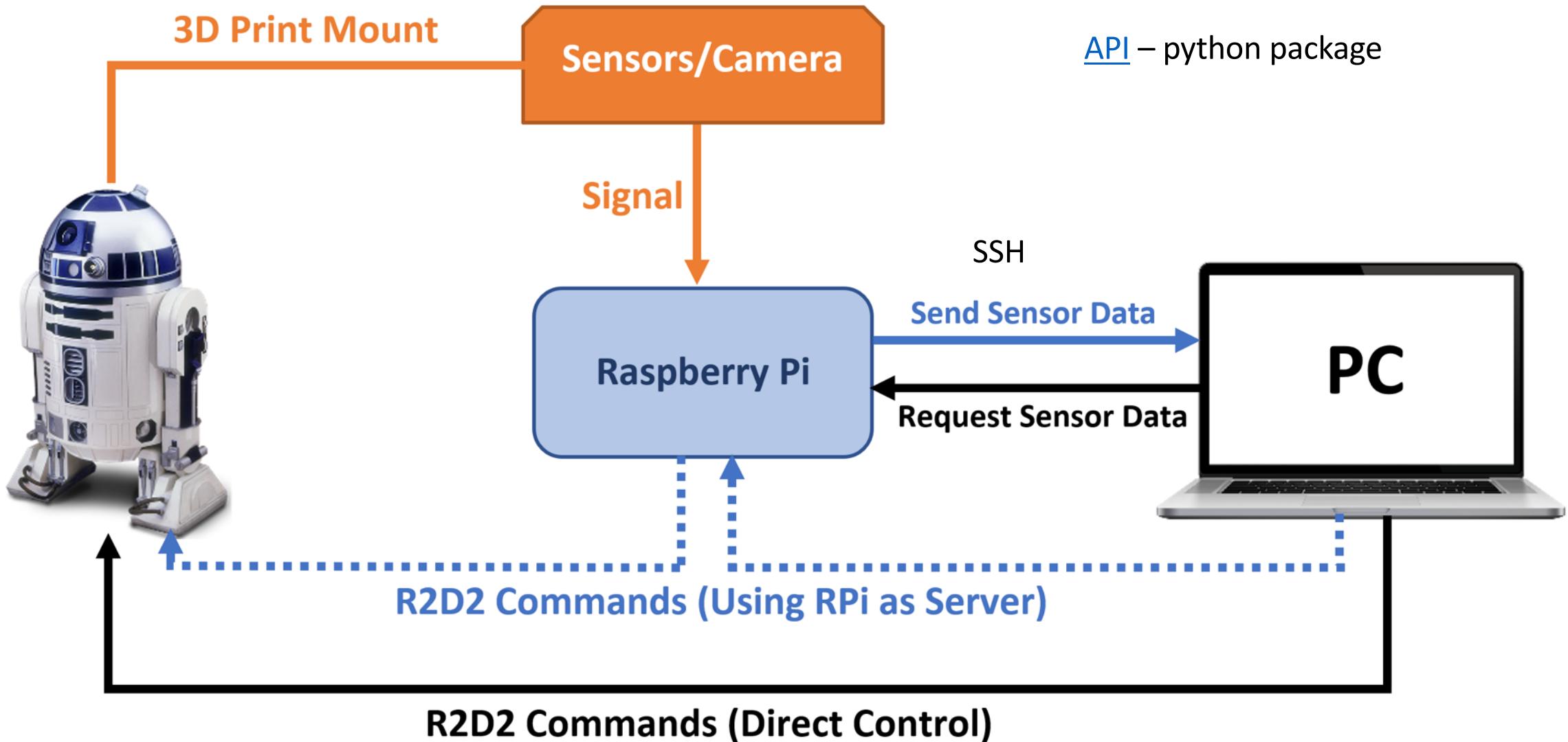


Sensors can be  
mounted on the robot



Or detached for  
remote control

# Control Logic



# HW1: Programming Robots with Python

Drive Polygon



HUD –  
Patrol Mode



Drive with  
Keyboard

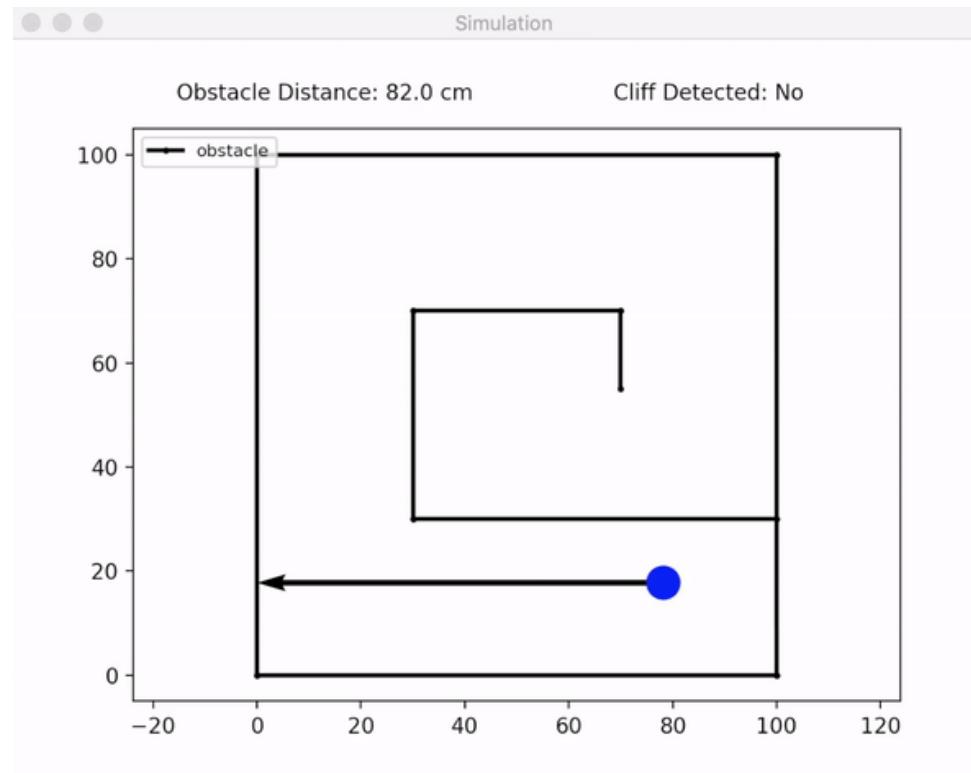


Morse  
Code

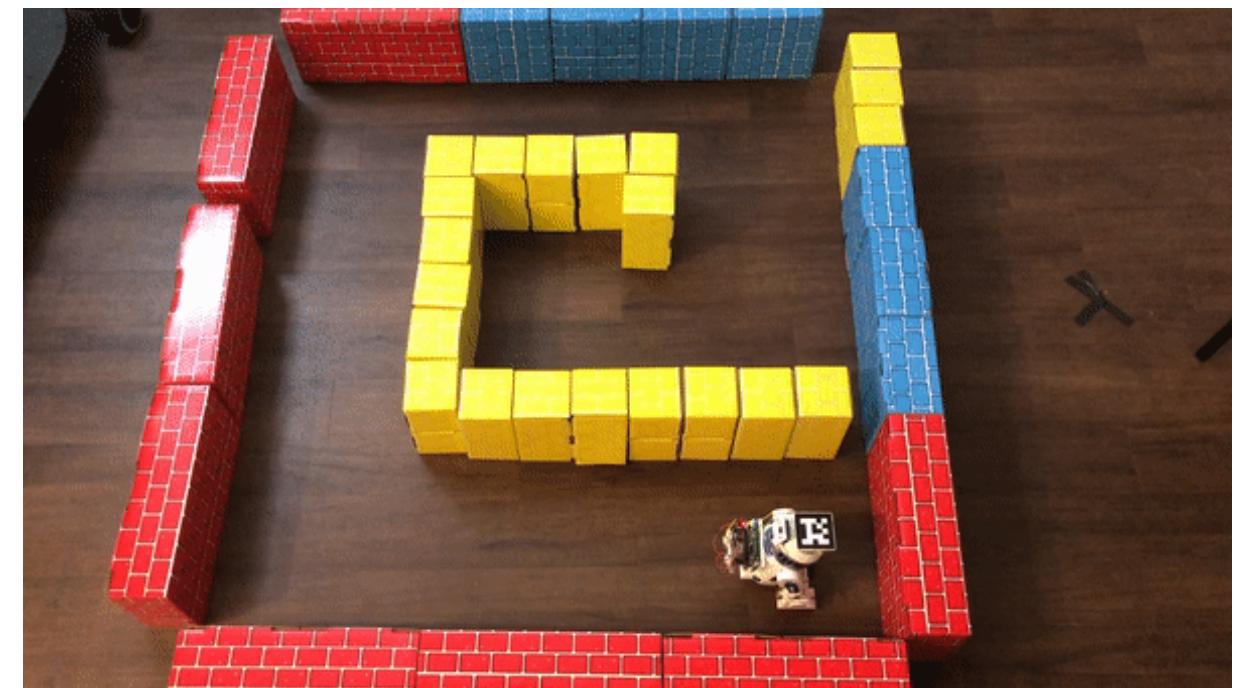


# HW2: Obstacle and Cliff Avoidance

Simulation

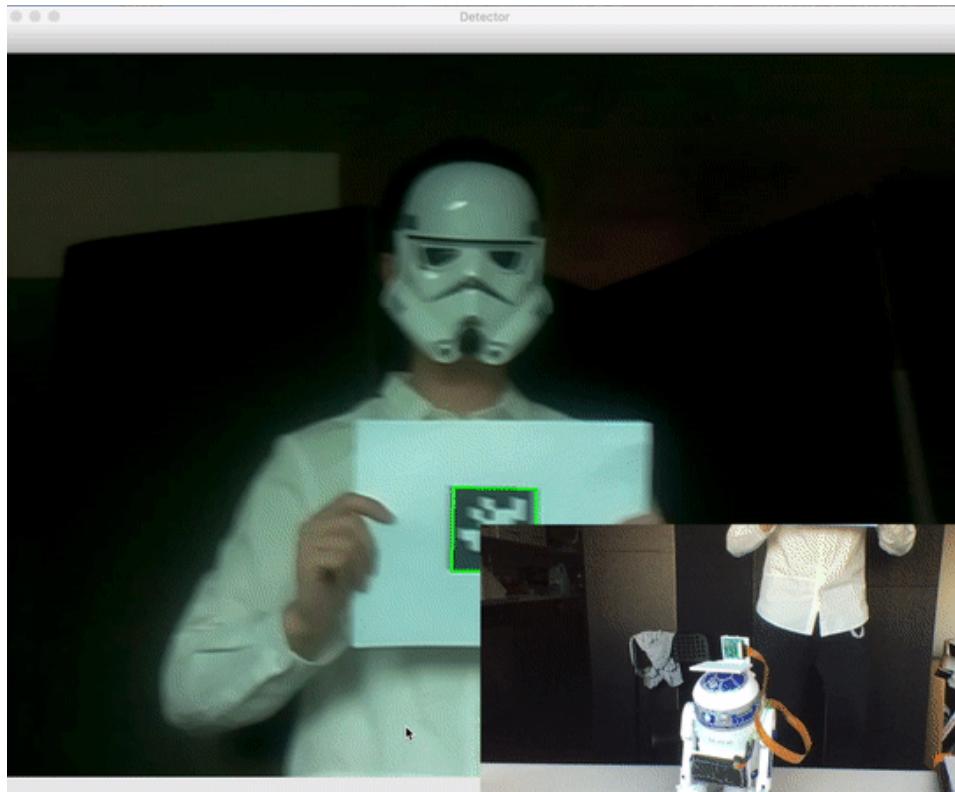


Test on Real Robot

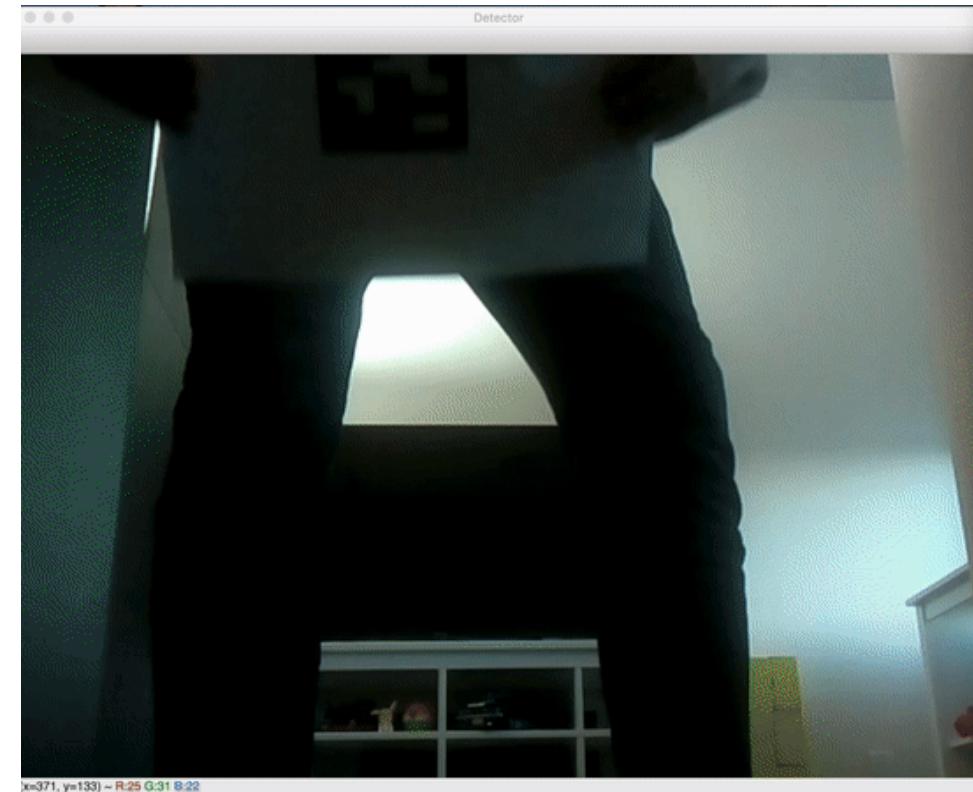


# HW2: Tracking and Following

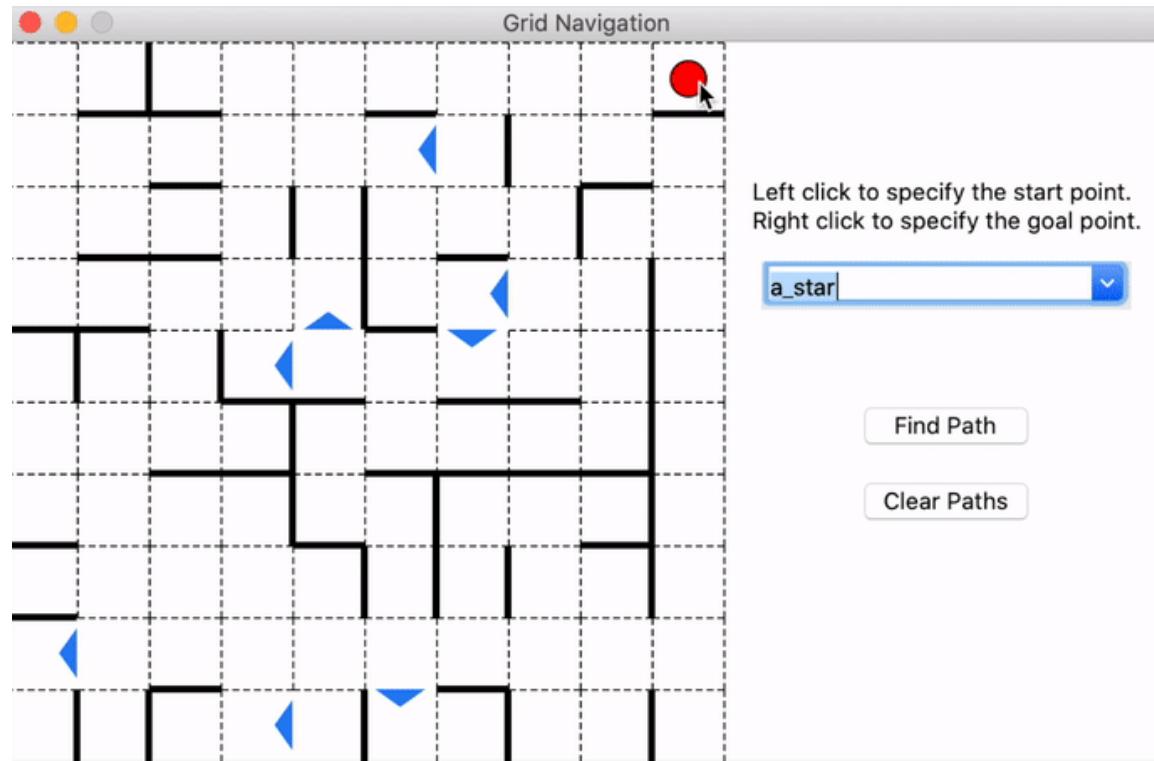
Tracking



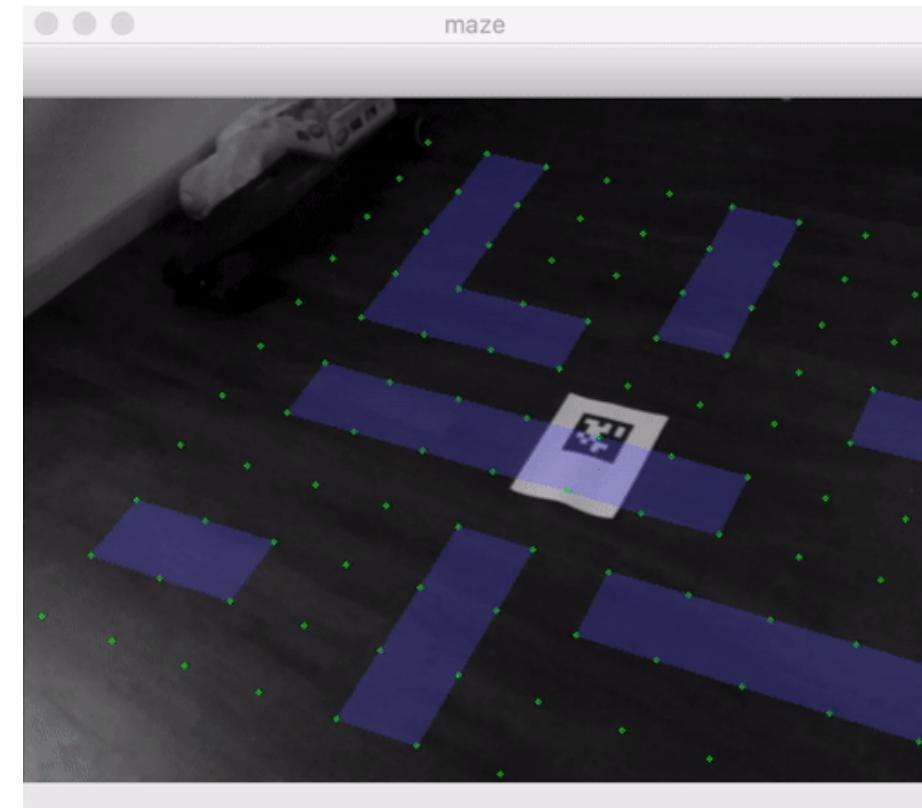
Following



# HW3: Navigation with Shortest Paths

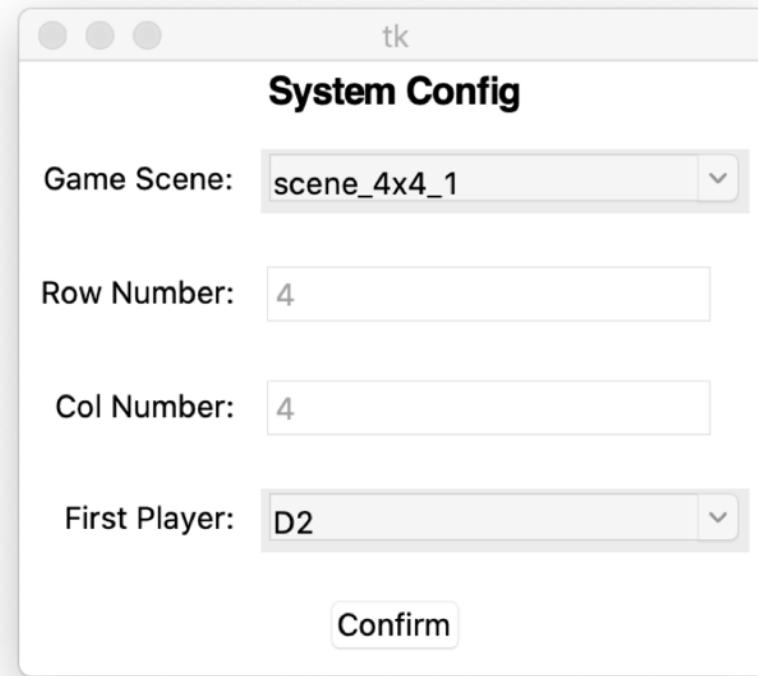


GUI

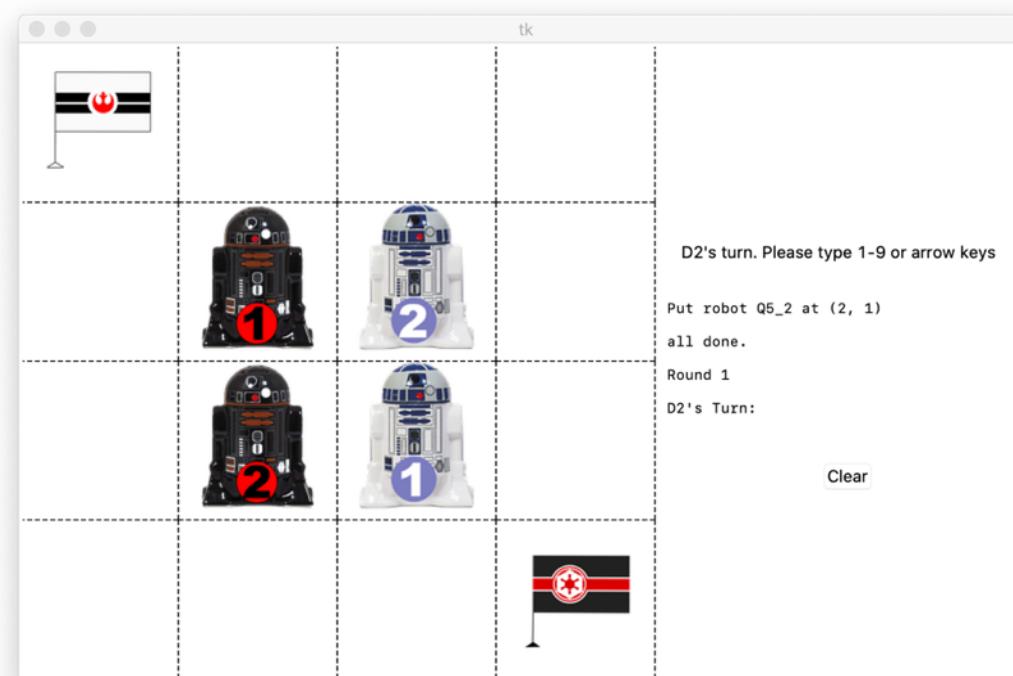


AR Path Planning

# HW4: Game Playing and Adversarial Search

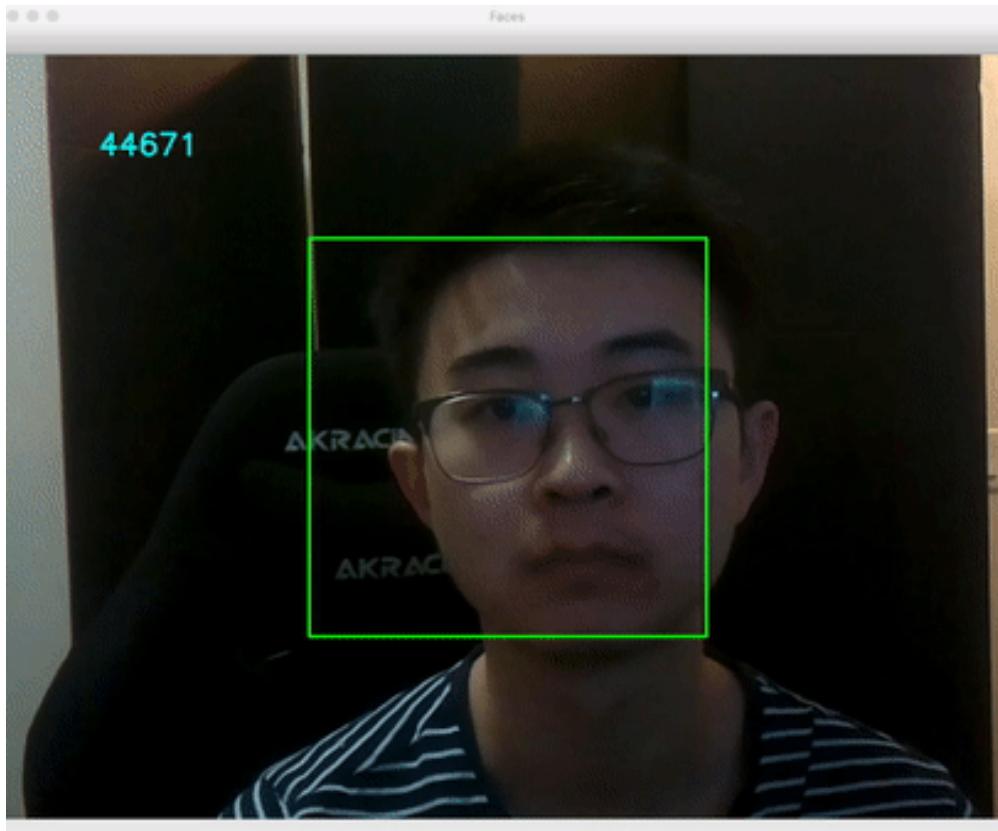


System Configuration

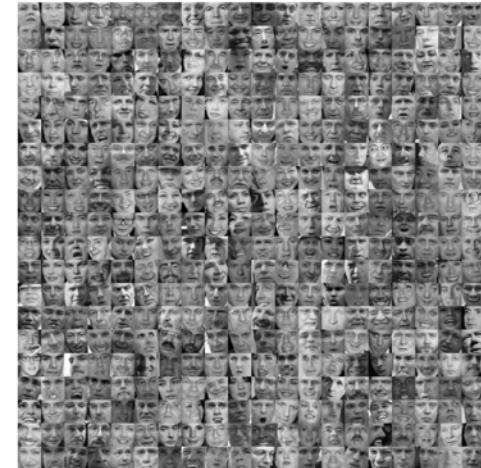


Game Board

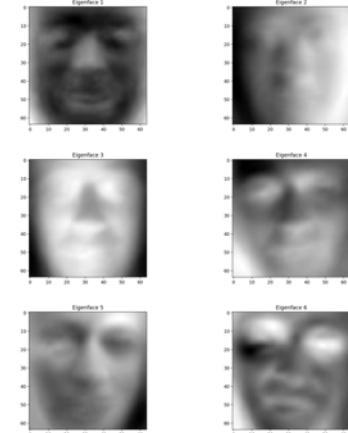
# HW5: Deep Learning and Face Detection



Face Dataset

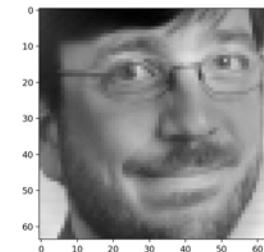


Eigenface

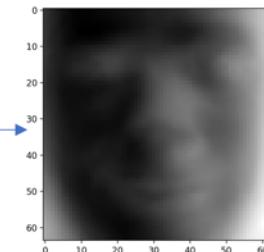


PCA

Original Image

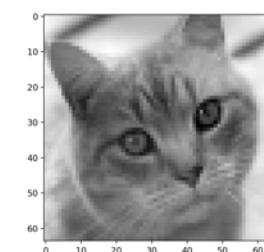


Face Space Reconstruction

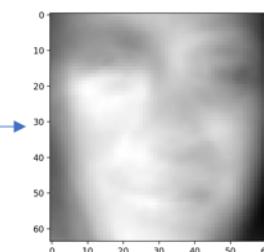


Distance

31436

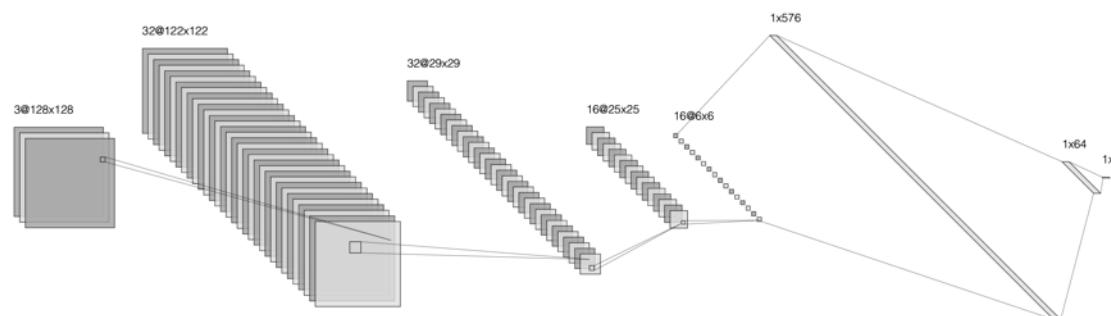


Projection

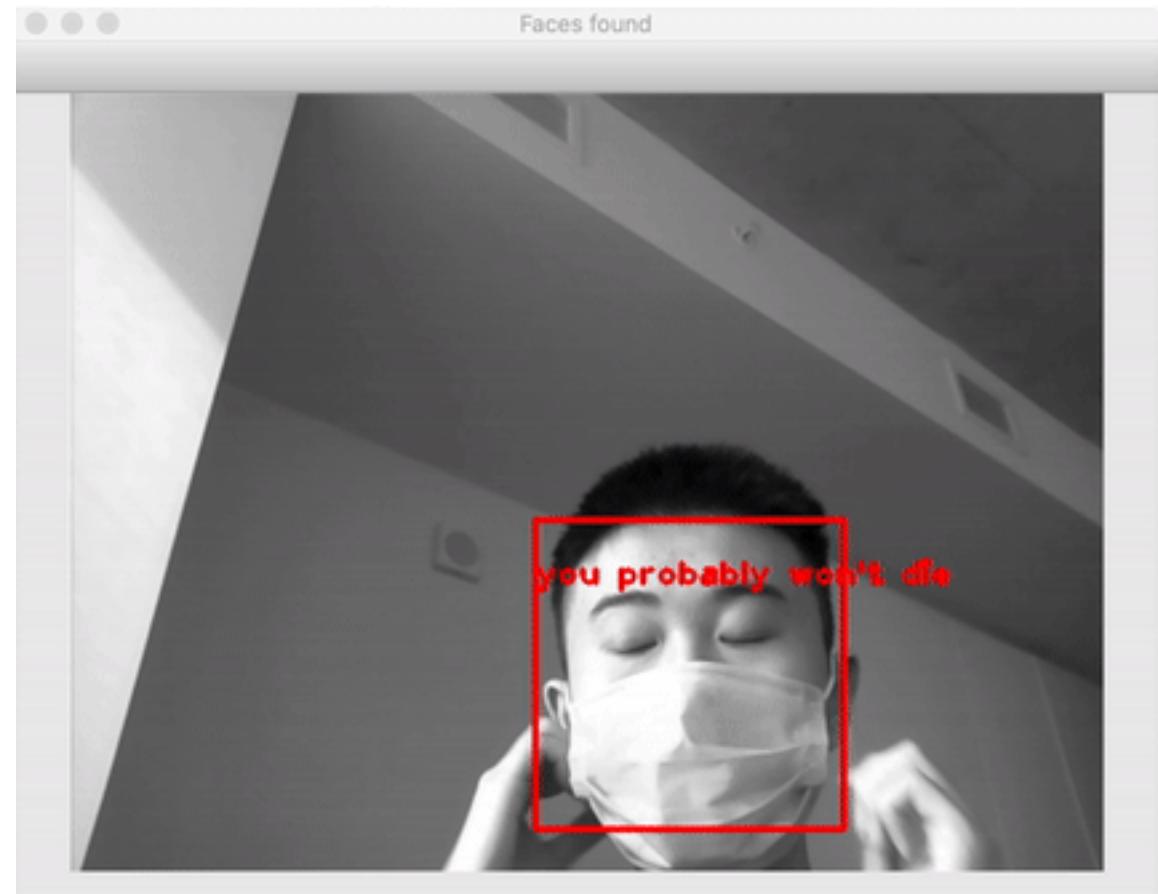


96954

# HW5: Deep Learning and Mask Detection



Build a CNN Network and  
Use ImageNet



# HW6: Natural Language Processing

## Lights API

```
set_back_LED_color(self, r, g, b)  
set_front_LED_color(self, r, g, b)  
set_holo_projector_intensity(self, intensity)  
set_logic_display_intensity(self, intensity)
```

Control your robot by  
speaking natural language  
sentences

Translate  
commands into  
Python

## Light sentences

```
light_sentences = [  
    "Change the intensity on the holoemitter to maximum.",  
    "Turn off the holoemitter.",  
    "Blink your logic display.",  
    "Change the back LED to green.",  
    "Turn your back light green.",  
    "Dim your lights holoemitter.",  
    "Turn off all your lights.",  
    "Lights out.",  
    "Set the RGB values on your lights to be 255,0,0.",  
    "Add 100 to the red value of your front LED.",  
    "Increase the blue value of your back LED by 50%.",  
    "Display the following colors for 2 seconds each: red,  
    orange, yellow, green, blue, purple.",  
    "Change the color on both LEDs to be green.", ]
```

# Sensor Packs

Part Name	Unit Price (\$)	Qty
3D Print Mount	7.45	1
Pisugar Battery	32.99	1
Raspberry pi	14	1
Camera & Cable	9.59	1
Ultrasonic Sensor	1.49	1
IR Obstacle Sensor	0.73	1
Perfboard	2.5	1
Screws & Nuts	0.2	7
Magnets	0.27	9

Total: 72.15



Materials for 100 Sensor Kits



Yue Yang's workstation

# Getting Started with R2D2 Extra Credit

If you are in Philadelphia:

1. Make an appointment to pick up a robot and sensor pack from Yue Yang
2. You will need to return it at the end of the semester in working order

If you are living elsewhere:

1. Order a **Sphero R2D2** (\$80-\$100) and ship it to yourself or your partner
2. Give us your mailing address and we will send you a sensor pack



# HW: Read Chapter 1 & 27

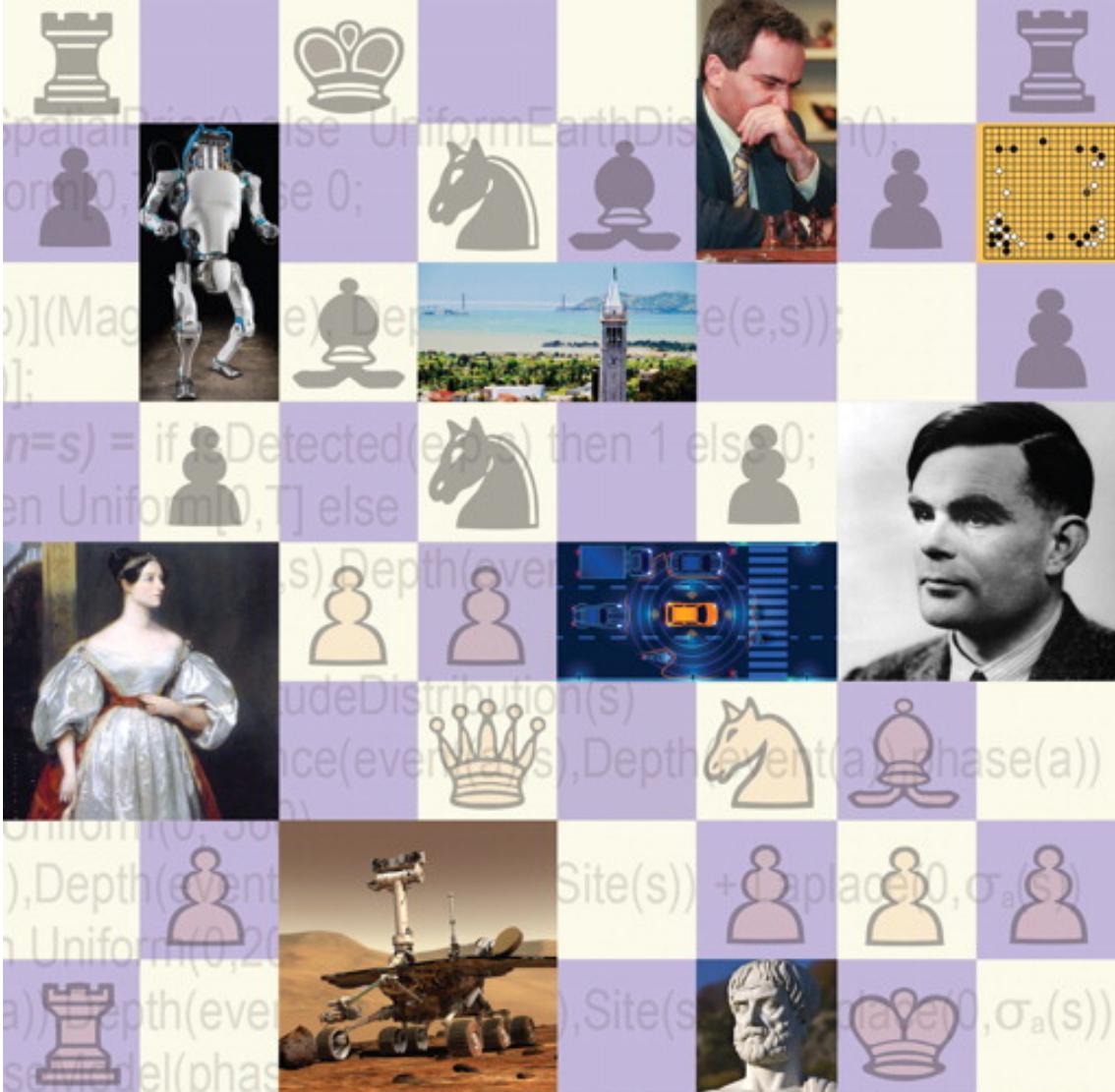
Please read:

- Chapter 1, Section 1.1
- Chapter 27.1 and 27.2 of the textbook.

The required readings will be posted on the course website in the schedule tab.

<http://artificial-intelligence-class.org/>

The website will have all of the lecture recordings, homework assignments, and course policies.



**Artificial Intelligence**  
A Modern Approach  
*Fourth Edition*

# For Fun: Try a Turning Test from my PhD students

<https://roft.io/>

Real or Fake Text?

13 completed



Continuation of text:



Life doesn't work the way we desire it to.



It's not that the universe is against us.



Such naivety does not account for our future.



The rest of it works against us, and developing our character and direction will undoubtedly help us explain why."



- Hunter S. Thompson "The price of freedom is eternal vigilance."

Your task is to decide at what point (if at all) the text you see begins to be written by a computer. Please click the blue button **as soon as** you are confident. Don't be surprised if some excerpts are entirely human-written. You will be awarded 5 points if you guess correctly, with decreasing amount of points if you guess after the true boundary.

Human-Written Prompt:

The world isn't always compliant with our wants.

# Next Two Lectures

## A Brief Introduction to Python

The first Python programming HW has been released. It is due Tuesday Sept 15. Find it on the course web site:

<http://artificial-intelligence-class.org/>

