EECS/BioE 106A/206A
Lab 1: Introduction to ROS
(Turtleism!)

Two people per lab station please!
Welcome to Lab!

Health is the #1 priority. If you are not feeling well, please let us know.

Covid Safety Rules

- Be respectful to everyone
- Keep your stations clean
- No food/drink in the lab
- Don’t work on the lab alone

Introductions

Name, pronouns, major/year, and thing you’re looking forward to in this class
Lab Schedule

Lab 1

Lab 2

Module A
Labs 3, 4 + Buffer Week

Module B
Labs 5, 6 + Buffer Week

Module C
Labs 7, 8 + Buffer Week
Lab Philosophy

- Learn how to program real robots using the **Robotic Operating System** (ROS)
- Get good at debugging both **hardware** and **software**
- **Have fun** getting your hands dirty with labs
- **Make friends!** Robotic or Human
  - Google
  - StackoverFlow
  - Tutorials
  - Blogs, etc

https://mashable.com/2015/08/24/baxter-robot-connect-four/
Don’t Be Intimidated

- It’s not magic, you got this!
- ... but just because it’s not magic doesn’t mean it’s trivial
- You can’t possibly know all of this already.
- Everyone is coming in with different kinds of expertise.
Lab Structure

1. Meeting
   Beginning of Class
   Go over material in the lab
   Review FAQs

2. Work on Lab
   Work with a partner on the labs

3. Help & Checkoff Queue
   Fill out a request for the help / checkoff queue
Lab Mechanics

- Form groups of 2 people
- Make Friends!
Any Logistical Questions?
Lab 1!
Key Takeaways

01
ROS

02
Lab Objectives
ROS - not really an “OS”

- An open-source, cross-platform pseudo-operating system intended for distributed robotics applications
- Not really an “operating system,” just a series of libraries that allow hardware and sensors to talk to each other asynchronously or synchronously via event-driven programming
- All coordinated by a master node

ROS Node Publisher

**Topic:** /example
**Message type:** std_msgs/String

ROS Node Subscriber

ROS Node Subscriber
TOPIC 1: sensor data
VALUES

SENSOR publishes
TOPIC 1
CONTROLLER (software) subscribes

TOPIC 2: motor commands

CONTROLLER publishes
ACTUATOR subscribes
ROS

**Nodes**
Processes that perform computation

**Topics**
Queues over which nodes exchange messages

**Publisher**
Node that sends message to a topic

**Subscriber**
Node that receives message from a topic
Key Takeaways

- **Set up a new ROS environment**, including creating a new workspace and creating a package with the appropriate dependencies specified.
- Use the `catkin` tool to build the packages contained in a ROS workspace.
- Run nodes using `rosrun`.
- Use ROS’s built-in tools to examine the **topics** and **services** used by a given node.
Tips

Save your code on GitHub, privately

The Internet is your best friend

Help/Checkoff Queue: https://tinyurl.com/fa23-106alab

Fun: How many Turtles did you count?
THANKS!

Does anyone have any questions?

just keep Swimming