Safe First

In: Wear Eye Protections

Out: Unplug Batteries

ENGR 4421: Robotics II

Review and Preview

01/14/2025

Course Information

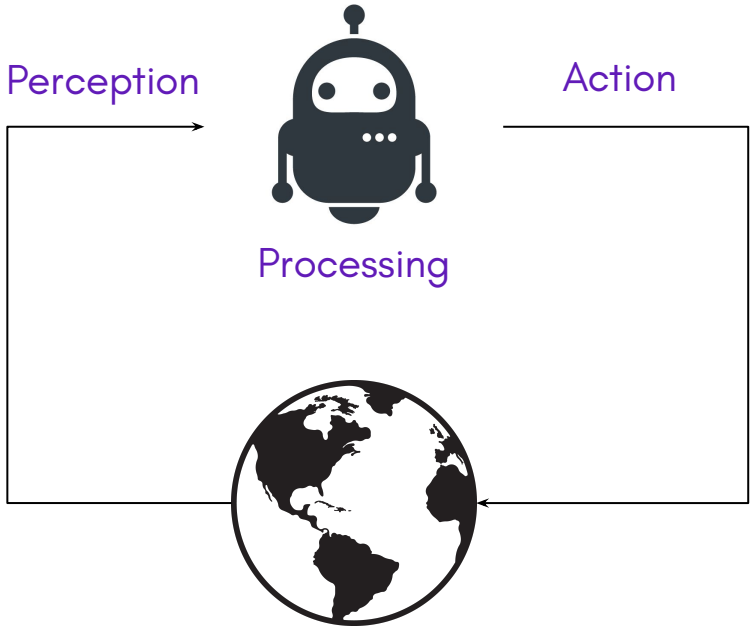
- Hours: 10:50 AM – 1:30 PM, Tuesdays & Thursdays
- Location: LSCA 105
- Office Hour: 10:00 AM – 12:00 PM, Wednesdays @ LSCA 105
    - Look for me in LSC 110 / LSC 013 if not in the classroom
- Wifi: BotSpot (physicsrules)

Course Resources

- Course page: https://linzhanguca.github.io/robotics2-2025
- Textbook: https://docs.ros.org/en/jazzy/index.html
- HomeR repository: https://github.com/linzhangUCA/homer
- Simulation tutorial: https://github.com/linzhangUCA/ros2_demo_robot

What is a Robot

A robot is an autonomous machine capable of sensing its environment, carrying out computations to make decisions, and performing actions in the real world.

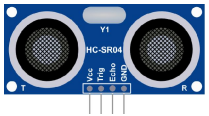


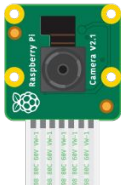
Upgrades

- Mechanical: Updated bed design.
- Electrical: Printed Circuit Board (PCB).
- Software: Ubuntu + Robot Operating System (ROS).
- Processors: Raspberry Pi 5 (computer) & Raspberry Pi Pico 2 (microcontroller).
- Power Management: Dedicated power supply board for RPi 5.
- Sensors: RPLIDAR A1.

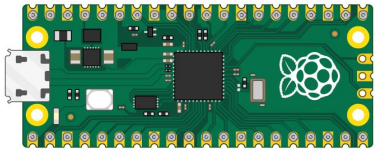
Components from Robotics 1

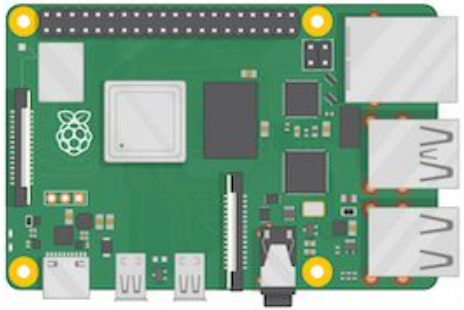
Perception





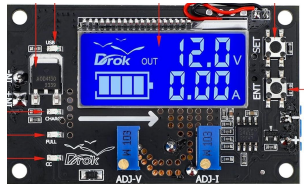
Processing





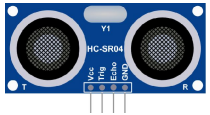
Action

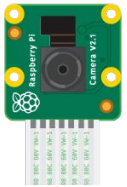
Power



Upgraded Components

Perception





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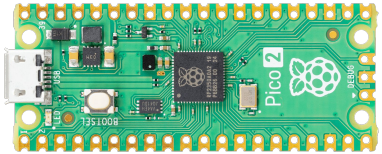
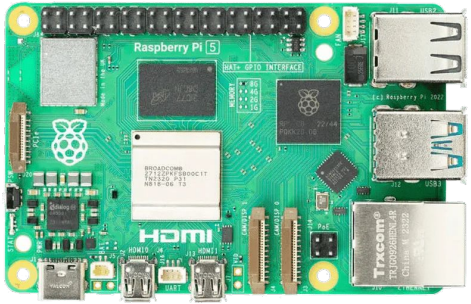
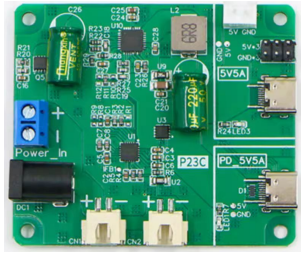


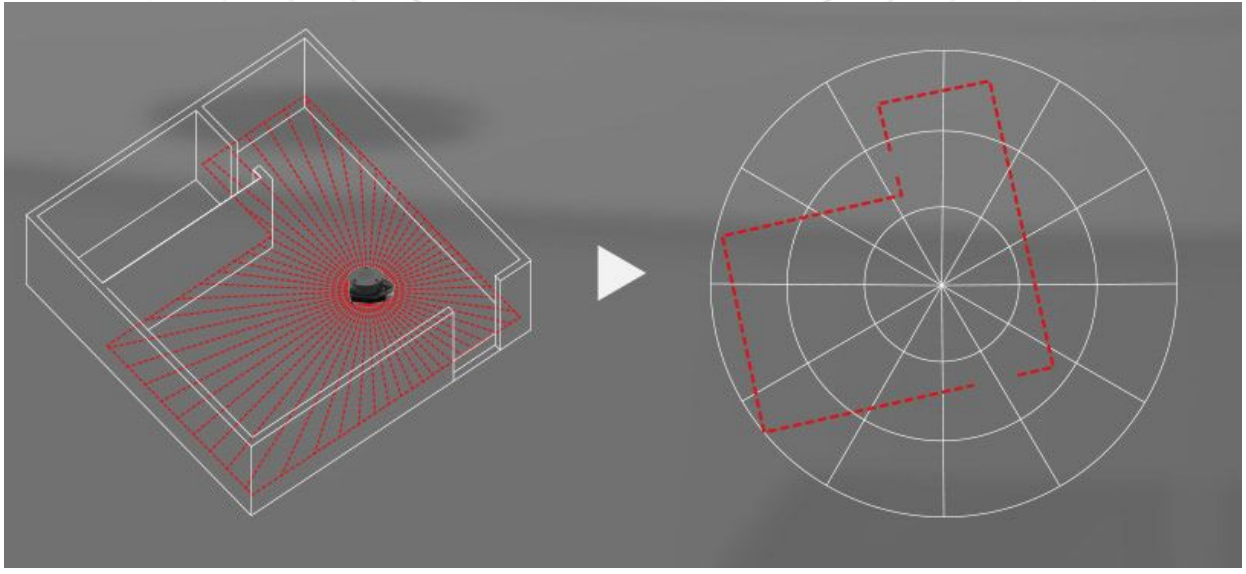


Action

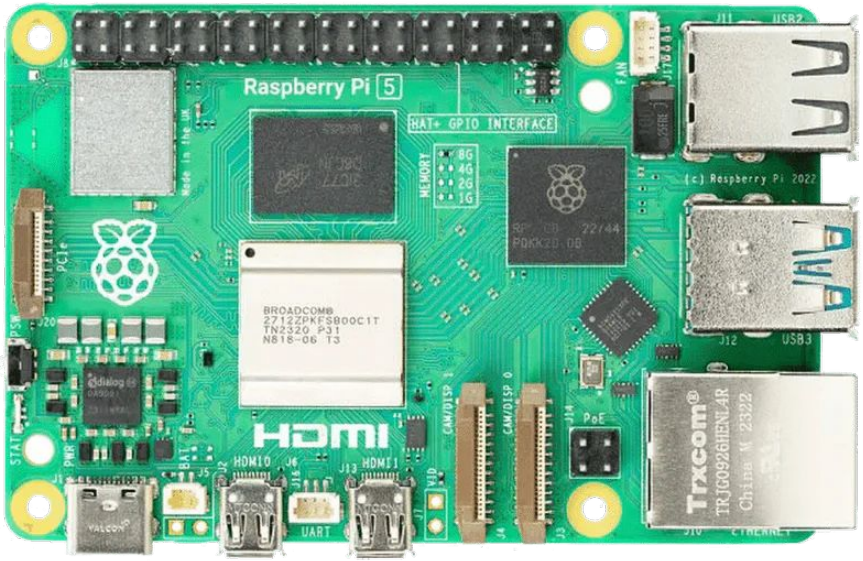
Power

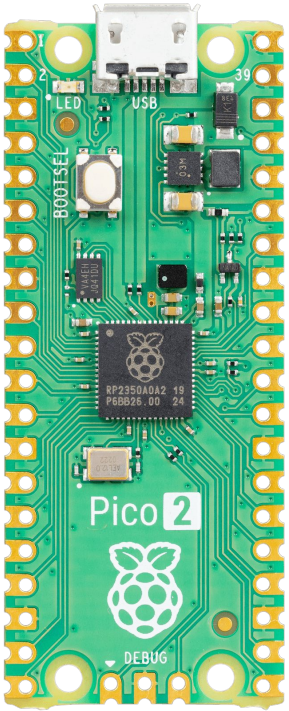


Light Detection And Ranging

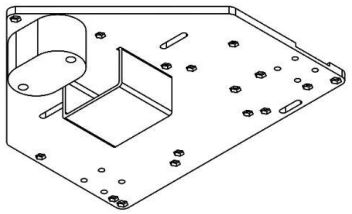


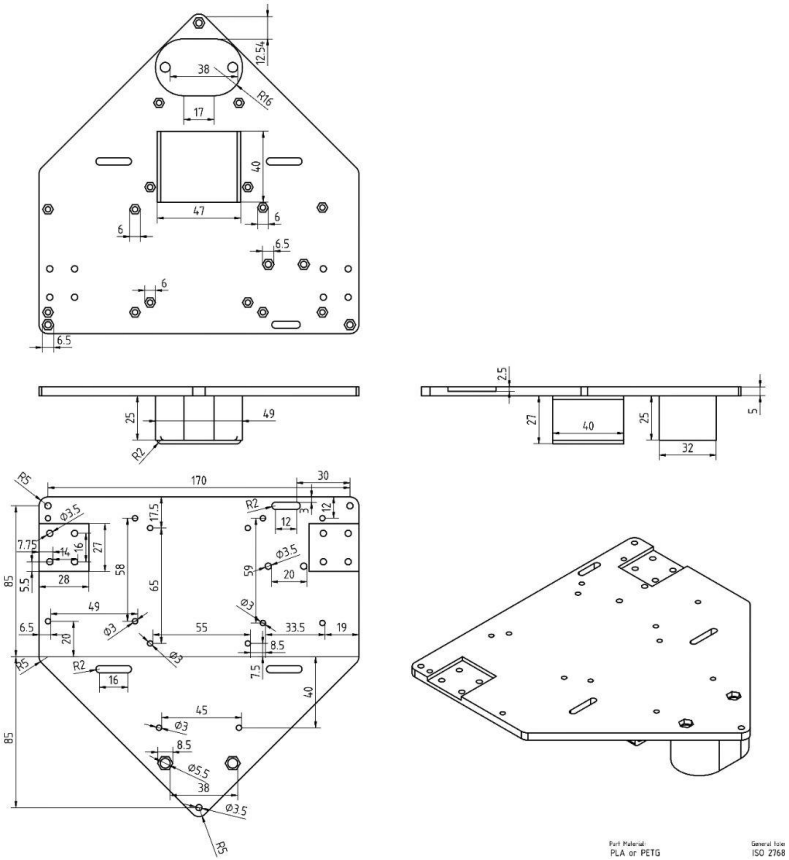
New Raspberry Pi Products





Base Layout

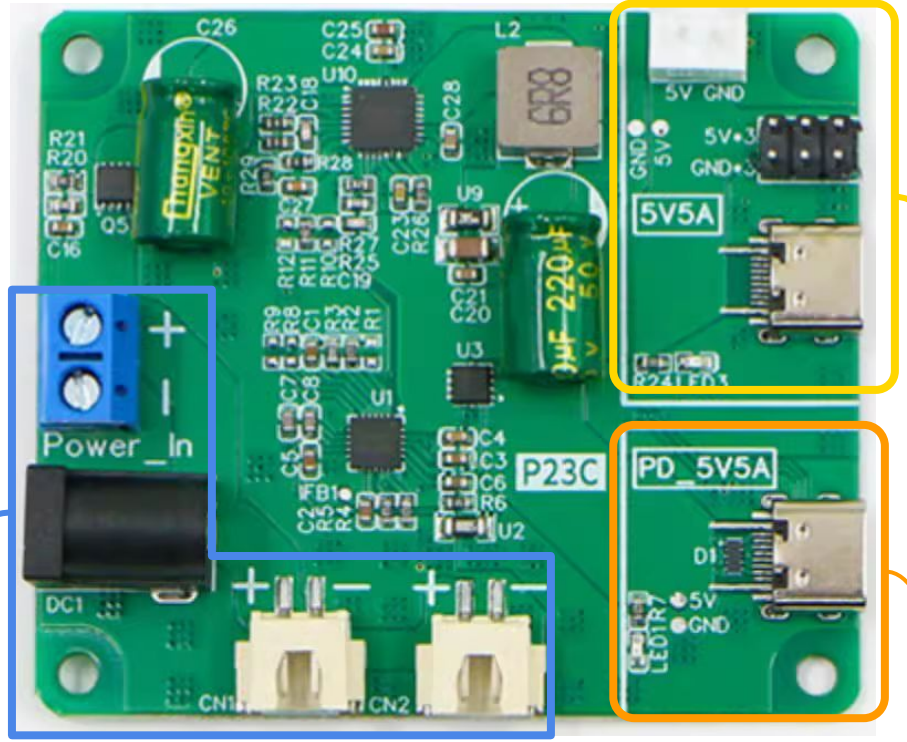




Part Material
PLA or PETG

General tole
ISO 2768

Power Management

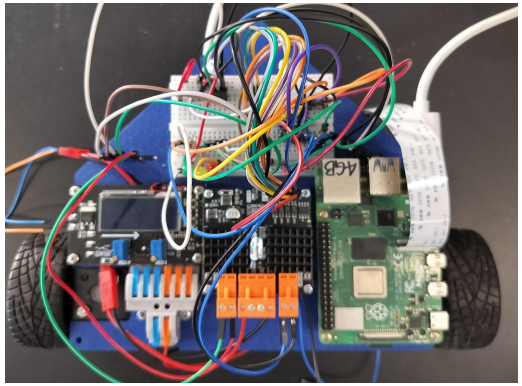


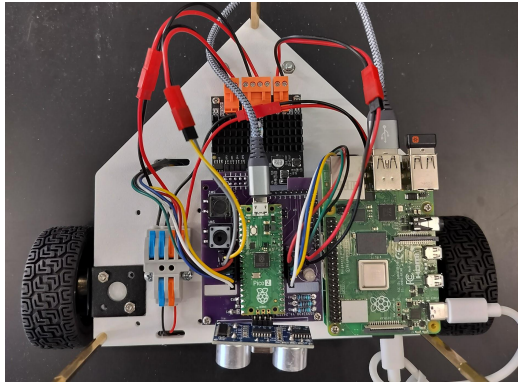
Inputs:
6 - 40V

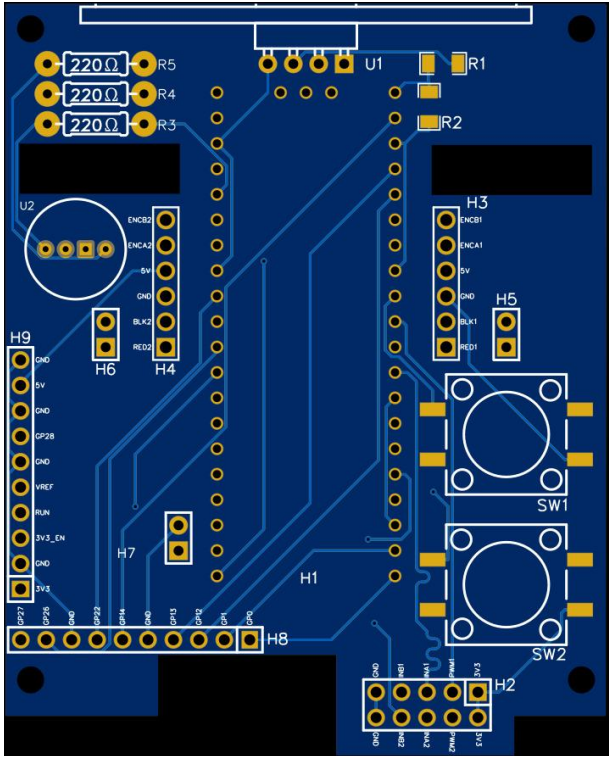
Outputs: 5V

Dedicated to RPi 5

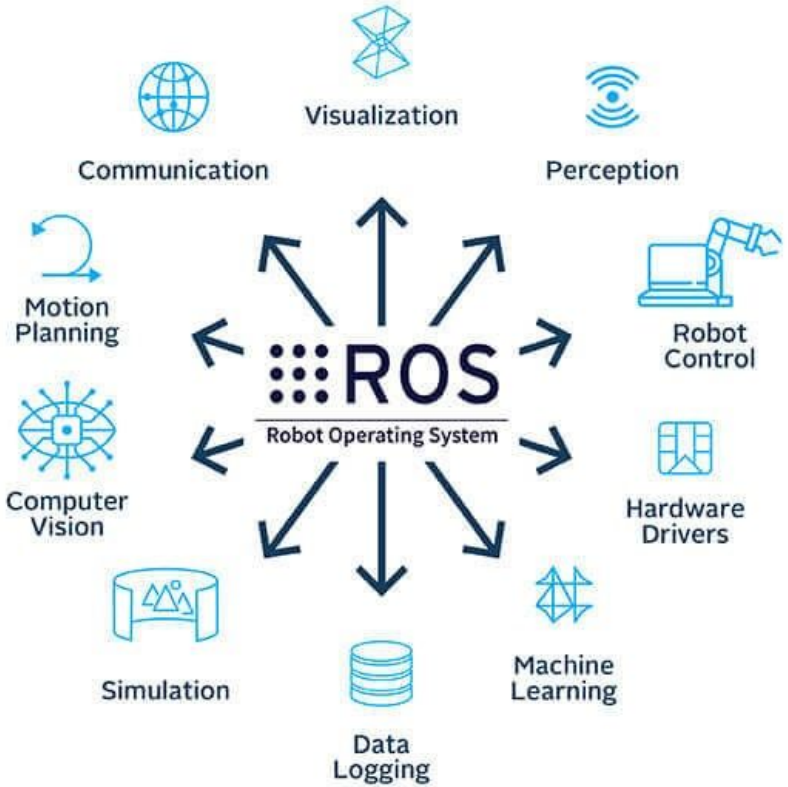
Printed Circuit Board



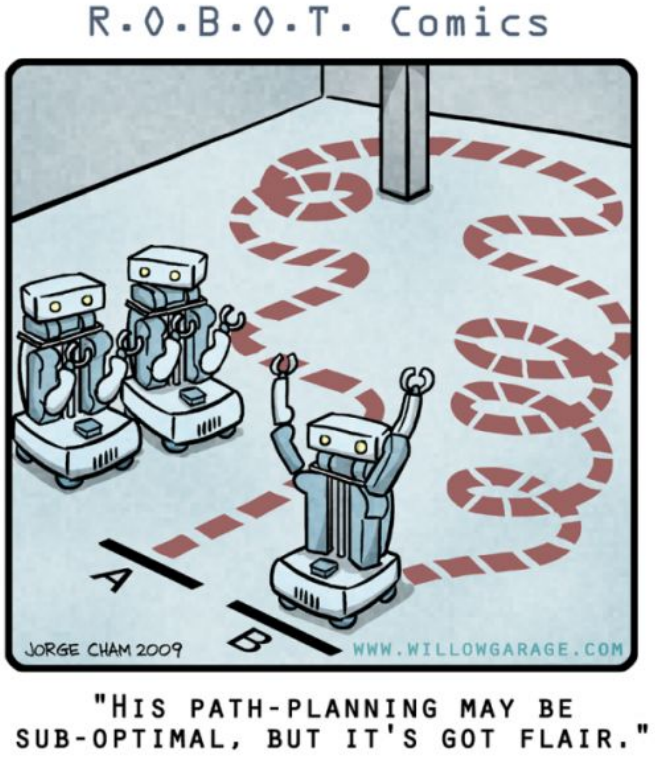




Robot Operating System (ROS)



Goal of Semester: Autonomous Navigation



Expectations

- Robotics/Engineering principles:
  - PID control
  - Frame transformations
  - Simultaneous Localization And Mapping
- Skills:
  - Mechatronics
  - Linux
  - ROS
  - Python