Workshop

Capstone Project
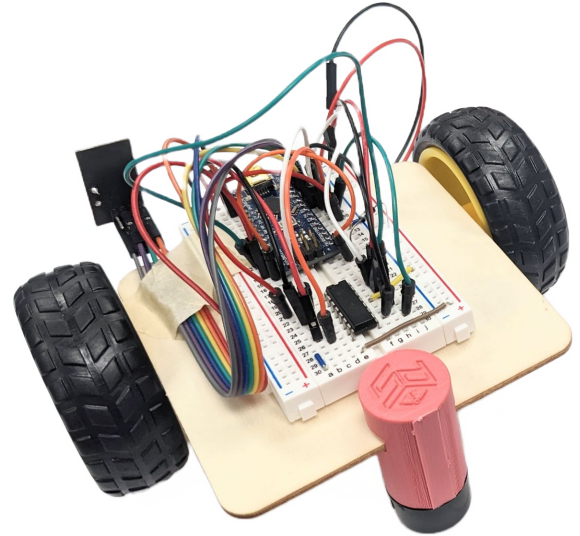
Capstone Overview

Capstone Project Requirements

Build a **remote-controlled rover**

- The rover must be controlled wirelessly via the remote control

- The remote control should use a joystick for user input

- A user should be able to intuitively use the joystick to control the rover

    - This means that pivoting the joystick left should move the rover left, not backward

Capstone Project Requirements (Cont.)

- You must design a PCB for the remote control

  - The PCB must adhere to the provided manufacturer constraints.

  - The PCB must be **less than 100x100mm in size**

- The rover must be able to move forward, backward, left, and right in response to commands sent by the remote

- Lastly, the rover must be stable and reliable

  - There should be no spontaneous movement, no wireless connection issues, and absolutely no sparks.

Capstone Project Schedule

Week	Suggested Activity	Workshop
1	Capstone PCB Design (Due **April 4th, 2025 at 11:59 PM**) Attend Lecture: Capstone Project: Getting Started	
2		Capstone Rover Assembly
3	Attend Lecture: Senior Design Project Showcase	
4		Capstone PCB Assembly
5	Start Working on Capstone Programming Independently (Lecture Tentative)	
6		Capstone Programming
7	Attend Lecture: End of the Year Review/Reflection	
8	Suggested Capstone Project Submission Date: **May 23rd**	
9	Rover Competition	
10	OFFICIAL Capstone Project Submission Deadline: **June 6th, 2025 at 11:59PM**	

Capstone Rover Assembly (Week 2)

- We will be assembling the rover first w/ a Hot Glue Gun
- Parts needed:
  - x2 Gearbox Motor
  - x2 Wheel
  - x1 Ball Caster + Mount
  - x1 9V Battery Holder
  - x1 4" x 4" Wood Plate
  - x1 Breadboard
  - x1 Battery (If your battery is weak, stop by lab hours for a new one)
  - x1 9V Battery Snap Connector with Dupont Terminals
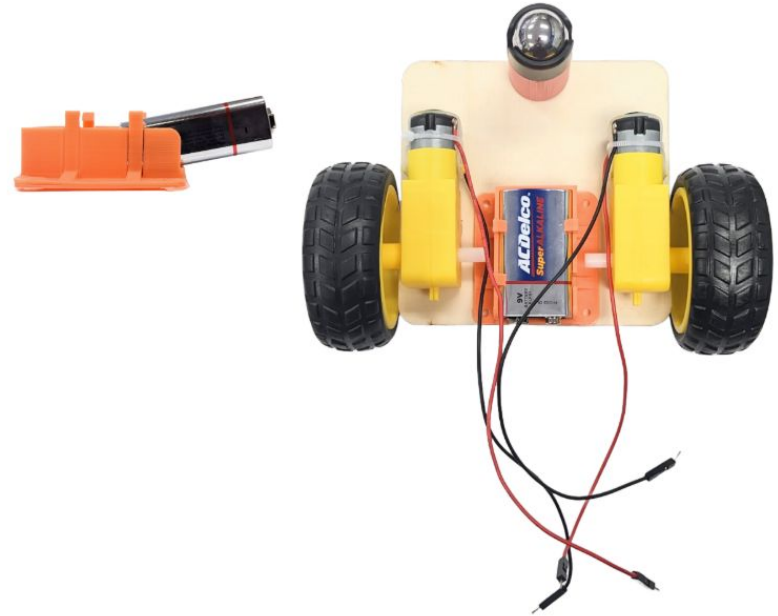
Capstone Project Deadlines

Deadlines

- PCB Design Submission: **April 4th, 2025** at **11:59 PM**

- Suggested Capstone Submission: **May 23rd** at **11:59PM**

- Final Submission: **June 6th, 2025** at **11:59 PM**

One More Thing...

- **Raffle Prizes for Completing Projects!**
  - Each completed project = 1 Raffle Ticket
  - Completed Capstone Project = 3 Raffle Tickets
- Tickets will be drawn for:
  - Gaming Keyboard + Mouse (1 Winner)
  - Soldering Kits (2-5 Winners)
 - ESP-C6s (10 winners)

Capstone Rover Assembly

Capstone Project Rover Assembly

- Build the rover any way you like!
  - As long as it meets the requirements, you're good to go!
- **Recommended**: Hot Glue Gun
  - Available at the IEEE Room

Capstone Project Rover Assembly

- There is no schematic for the rover, so **you will have to design the circuit** yourself

- The L293D motor driver datasheet is linked in the project specifications

- **Recommended**: Read the datasheet to help you design the circuit

  - NOTE: VCC1 pin can be supplied 9V (from the 9V Battery)

  - DO NOT CONNECT 9V BATTERY TO 5V, connect it to VB of the ESP32
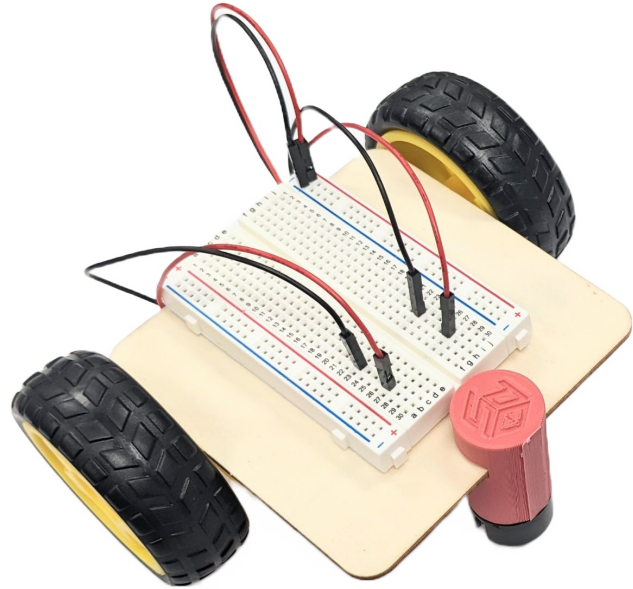
# Capstone Project Rover Assembly

- Remember how to solder? No?

    - Review the Fall soldering workshop slides

- Solder only the header components to the PCB

- **Do not solder** the transceiver, the ESP32, or the joystick to the board

- If the remote does not work later, check the solder joints and your PCB design for errors

Capstone PCB Assembly

Required Components

- What you'll need:
    - **x1** 1x5 Pin Female Header (Bent)
    - **x2** 1x12 Pin Female Header
    - **x1** Analog Joystick
    - **x1** ESP32
    - **x1** PCB
    - **x2** 220Ω Resistor
    - **x2** LED
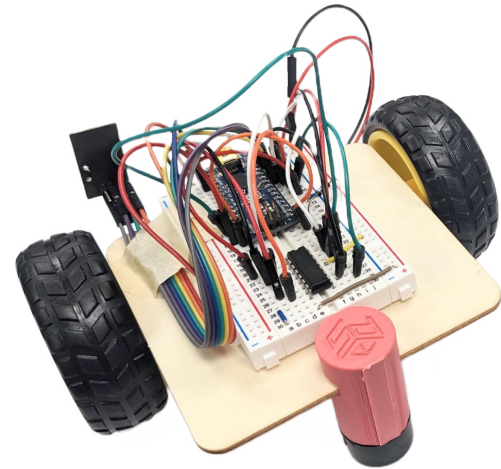
Assembly Steps

1. Place the headers onto your PCB. Remember, **don't solder the ESP32 or Analog Joystick** onto the board, just the headers.

    a. If you need a soldering review, check out the Fall soldering workshop slides!

2. Solder the headers to the PCB.

3. Solder the LEDs and resistors onto the PCB.

    a. Long lead goes into the circle, shorter lead goes into the square!

4. Place the ESP32 and Analog Joystick on the headers. You're done!
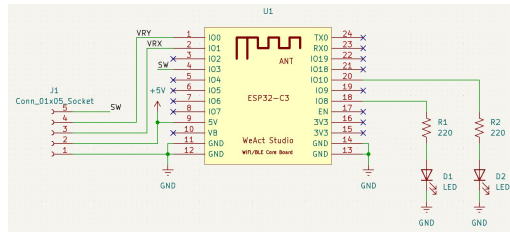
FAIR USE DISCLAIMER

Copyright Disclaimer under section 107 of the Copyright Act 1976, allowance is made for "fair use" for purposes such as criticism, comment, news reporting, teaching, scholarship, education and research.

Fair use is a use permitted by copyright statute that might otherwise be infringing.

Non-profit, educational or personal use tips the balance in favor of fair use.