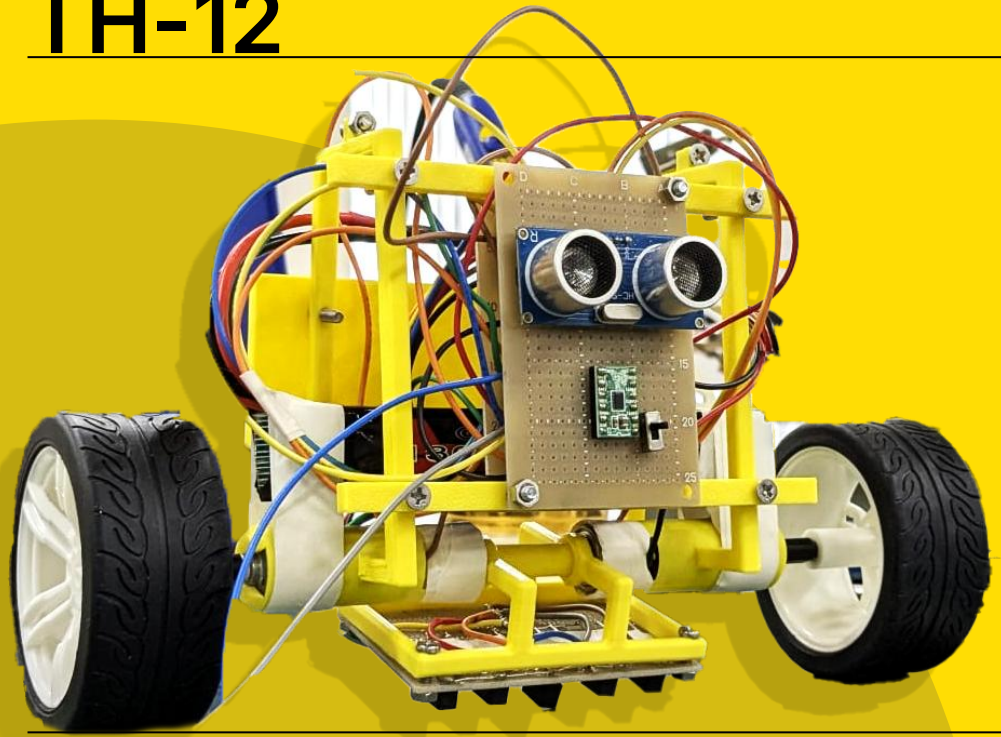
Project Progress

TH-12



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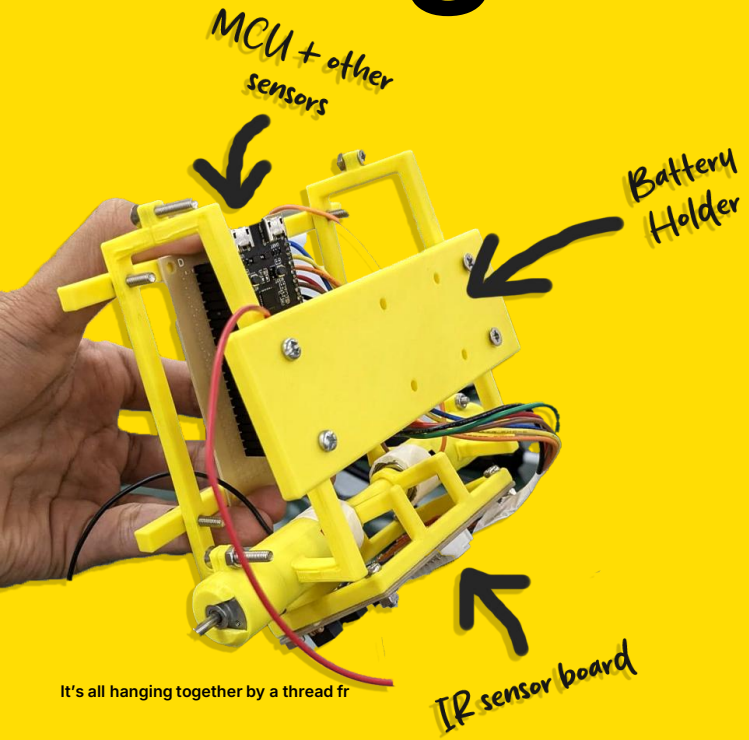
This bot barely works at all. Please lower your expectations, we will certainly disappoint.

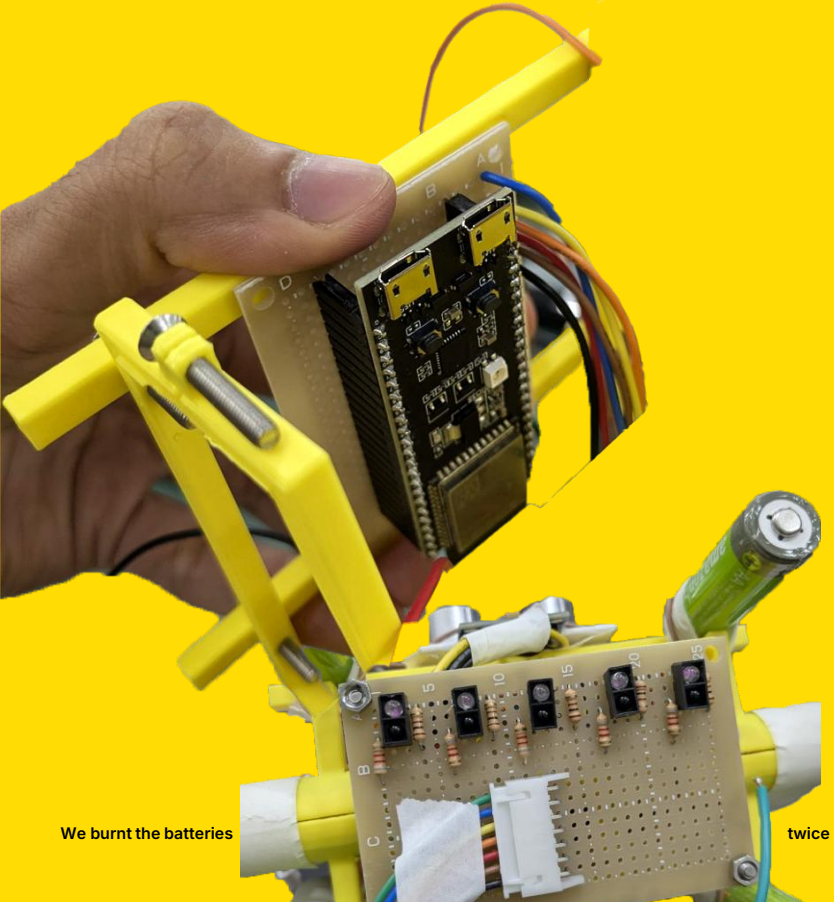
Mechanical Design



It's all hanging together by a thread fr

- ➔ Successfully integrated DC motors
- ➔ Attached MCU
- ➔ Attached general sensors board
- ➔ Attached rotationally isolated IR sensor board
- ➔ Attached battery packs
- ➔ Used 3d printed parts + screws

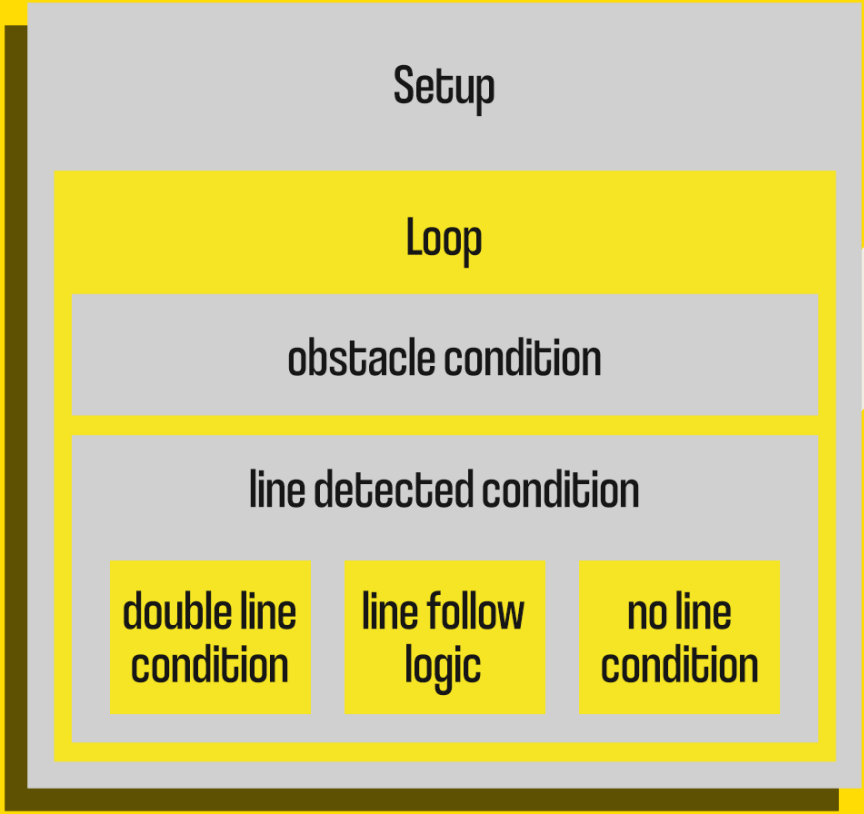
Electronics



We burnt the batteries twice

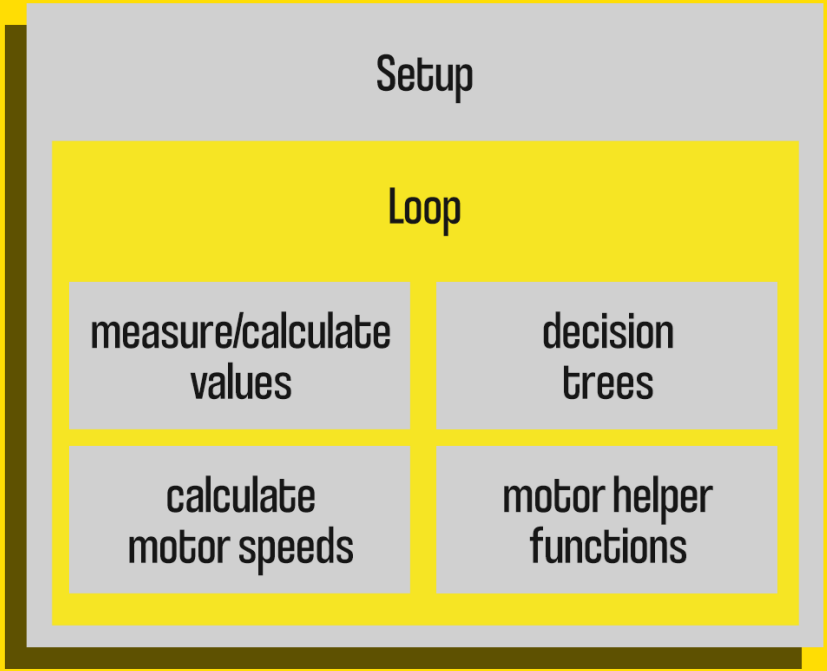
- ➔ Connected an ESP32 MCU
- ➔ Sensors used:
  - ◆ Ultrasonic
  - ◆ IR
  - ◆ IMU
- ➔ Soldered all connections
- ➔ LiPo battery for motors
- ➔ AA batteries for MCU + sensors

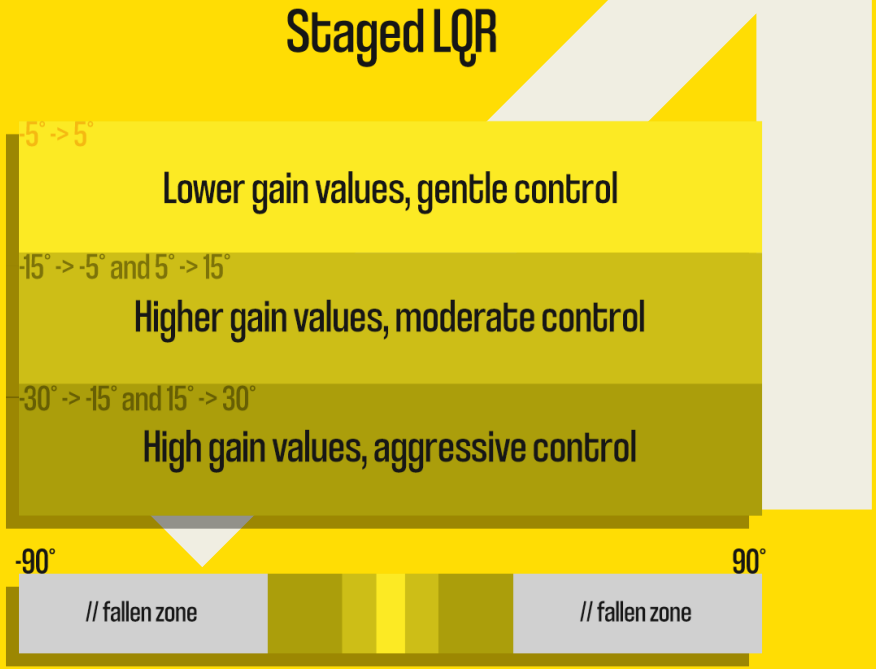
Line Following Logic



I'm not kidding this took HOURS.

Balancing Logic





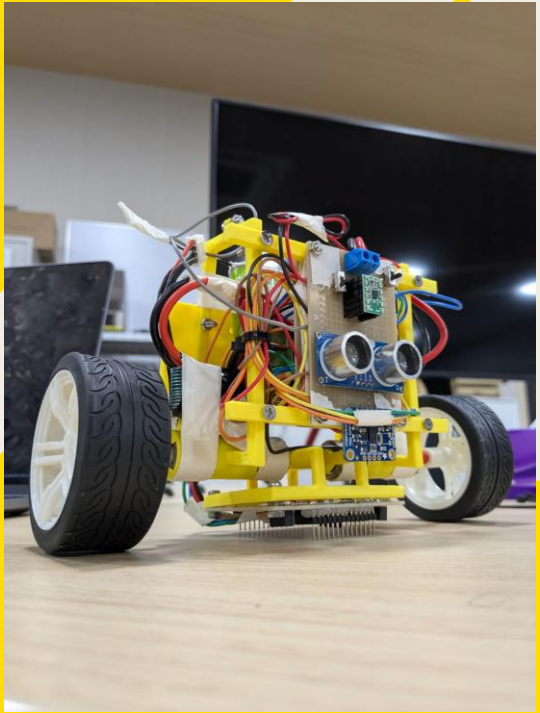
This took an all-nighter to come up with too.

Fixed Major Issues

- ➔ *ESP32 serial monitor stopped working after attaching IMU sensor*
  - ◆ **Removed IMU connection from a specific pin on the MCU**
- ➔ *IR sensors not always same distance from ground due to rotation of robot*
  - ◆ **Using digitalRead for binary values + semi-rotationally isolated sensor housing**
- ➔ *IR sensors almost coincident with wheel axis, difficult to scan for line*
  - ◆ **Incorporated gains and reversing into line following logic**
- ➔ *PID not working well*
  - ◆ **Due to unique body type, resorted to discrete routines instead of continuous error handling**

Remaining Issues

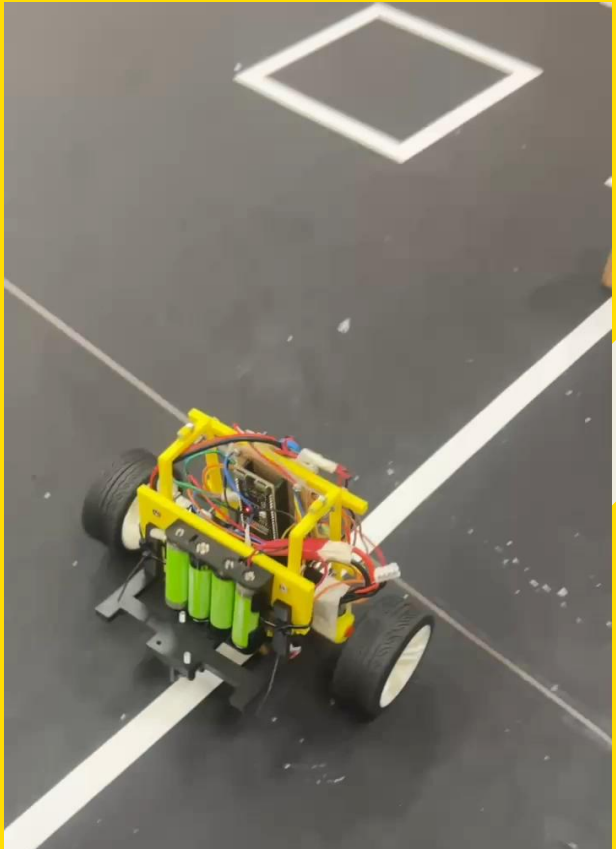
- ➔ Motors only start moving at certain speed = cannot use 0-255 range of PWM for balancing
- ➔ Line following corrections very abrupt due to IR sensors near-coincident on wheelbase axis
- ➔ Hard to do normal movements while balancing
- ➔ Could not yet merge balancing and line following programs



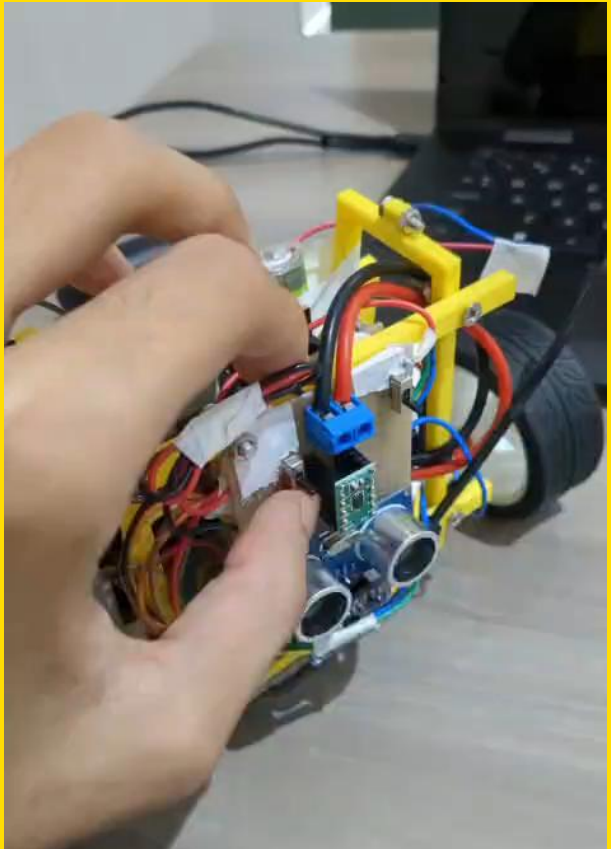
Line Following

- ➔ Completes course
- ➔ Barely ever leaves white line
- ➔ Decent speed
- ➔ Avoids traps

Object Avoidance



Balancing



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