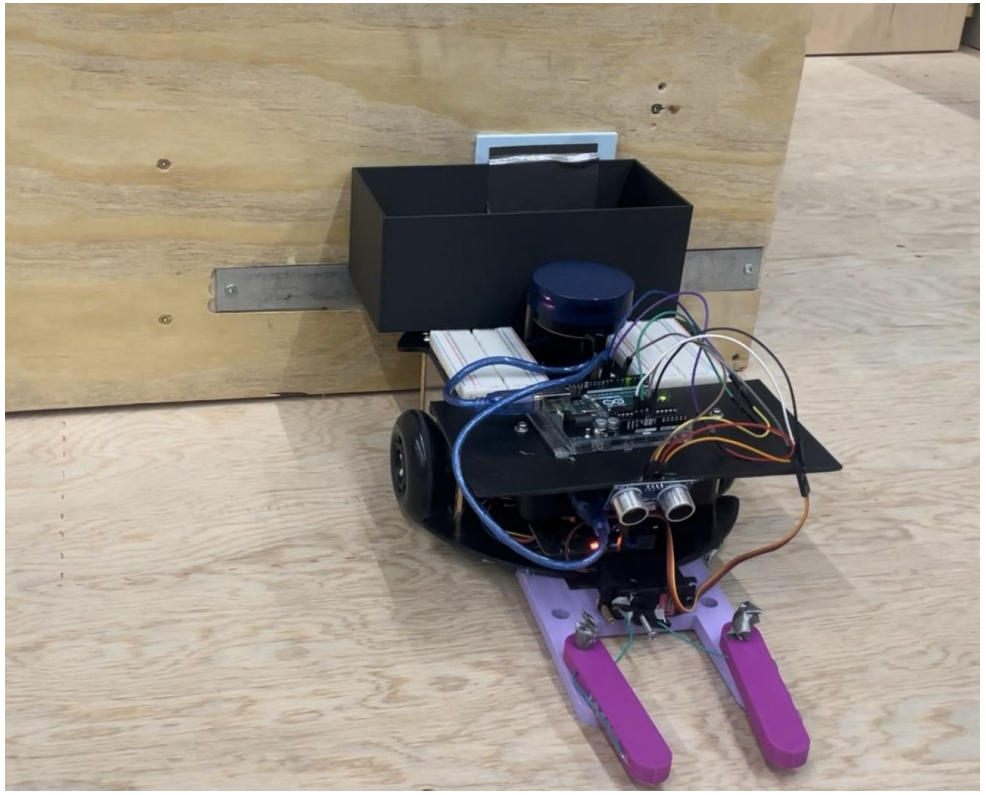
Lobster X

March 24, 2025



Team #3

Abir Alasam – B00929910

Adnan Sekinalya - B00907121

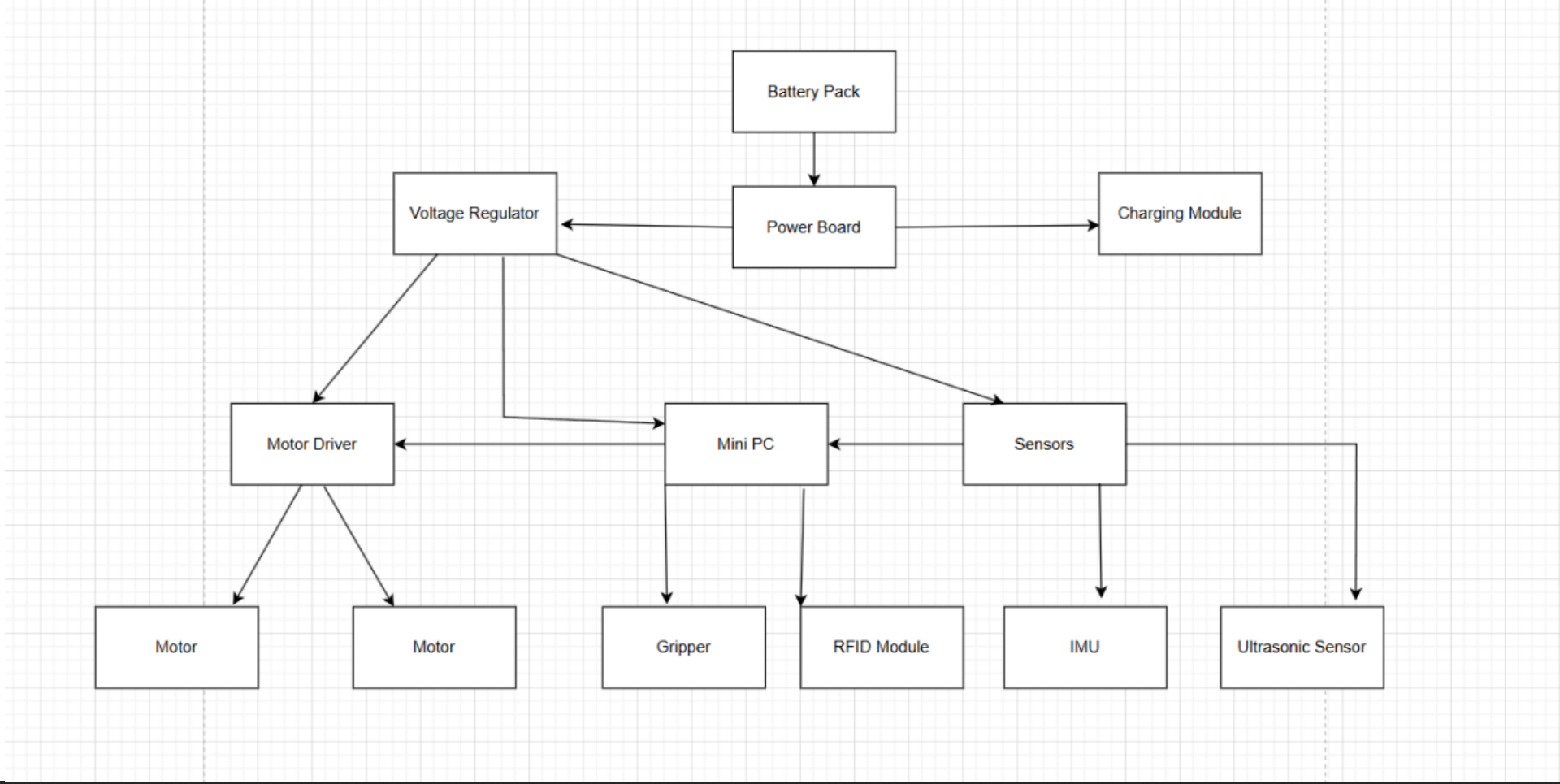
Alois Mashiringwani – B00513674

Lily Berrey - B00905629

Neelie Fliegel – Doucet – B00994346

Timeline

Team Member	Task Assigned	Start Date	End Date
Lily, Neelie, Adnan, Abir	Mechanical design (Arms, Gripper, RFID holder, Loot holder)	Week 1 Jan 6 - 12	Week 9 March 3 - 9
Abir, Adnan	Electrical system (Sensors, Motors)	Week 1 Jan 6 - 12	Week 8 Feb 24 – Mar 2
Lily, Abir, Adnan, Alois	Firmware development (navigation, Gripper's algorithm, arms' algorithm, RFID)	Week 1 Jan 6 - 12	Week 7 Feb 17 - 23
Lily, Adnan, Abir	Testing & validation (integration of everything)	Week 7 Feb 17 - 23	Week 9, 10 March 3 - 16

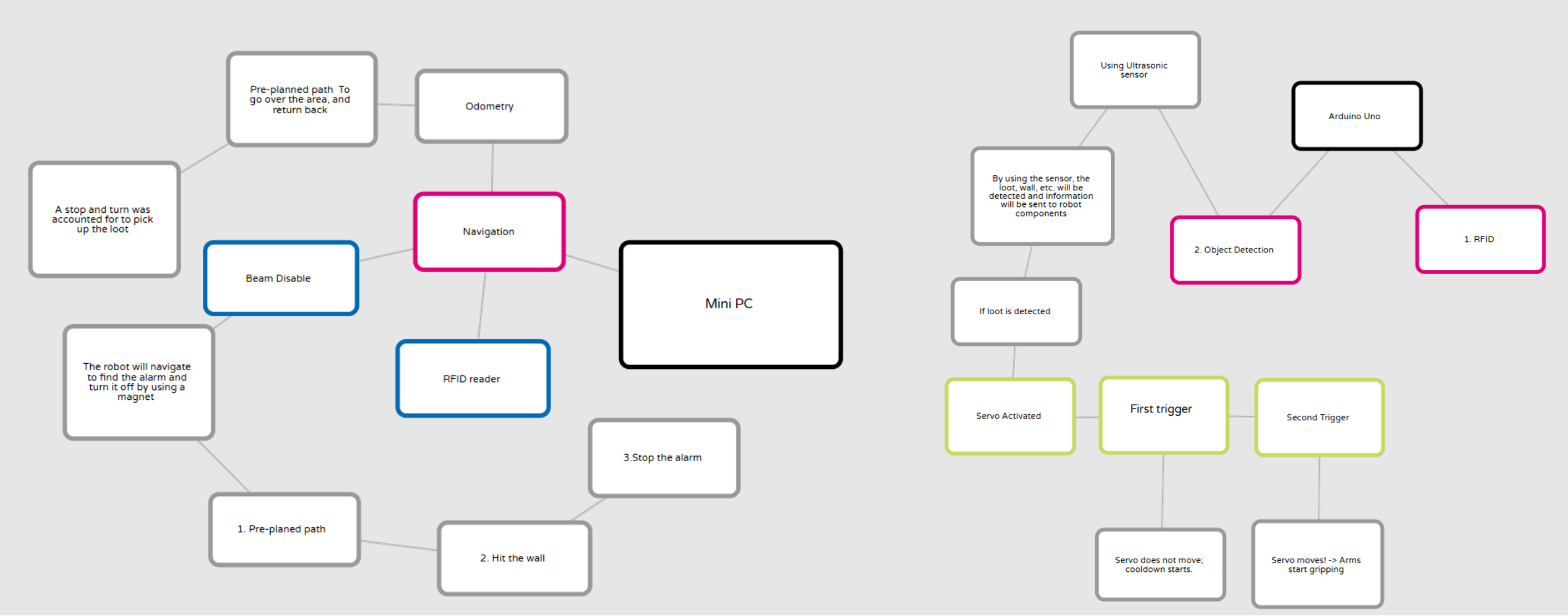


System Architecture Overview

Electrical architecture

System Architecture Overview

Firmware architecture



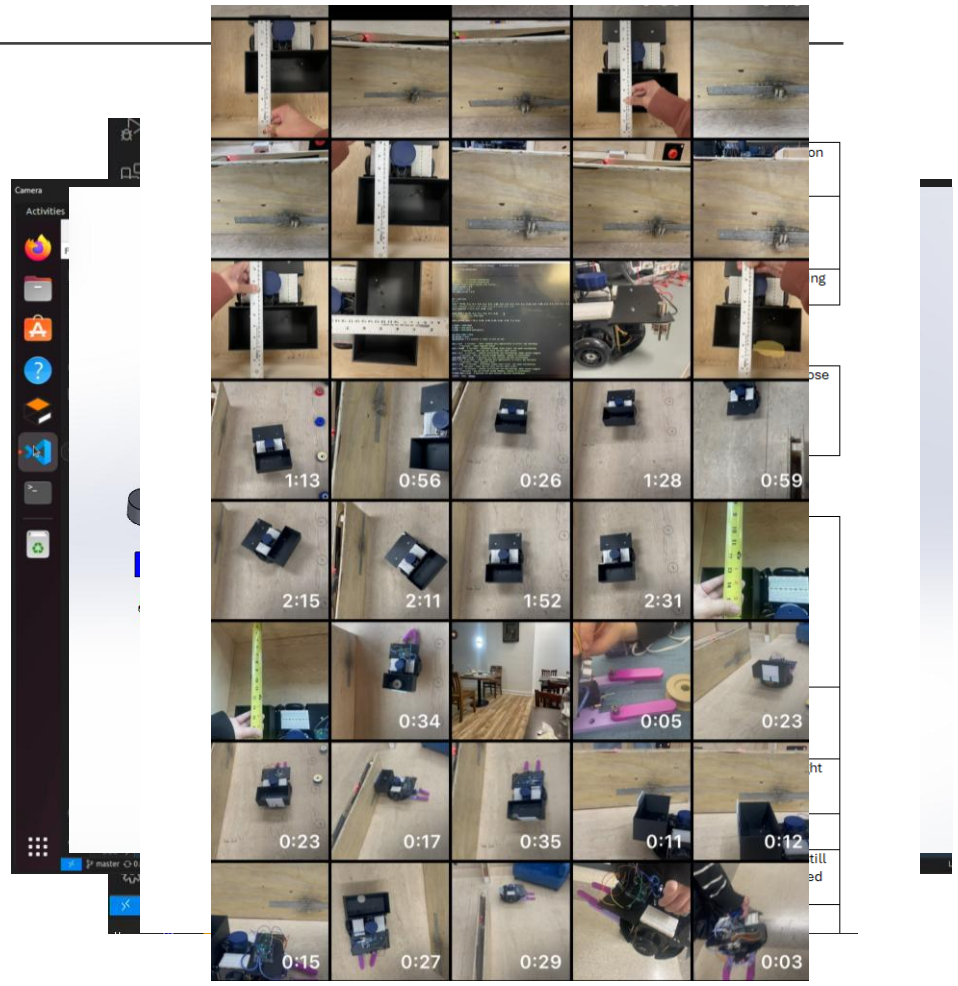
Lily’s contribution

Verification:

1. State Tracking: Printing State, speed, distance to terminal
2. Error control: PID controller for turning accuracy
3. Challenge completion: Implement multiple path plans for different demos
4. Gripper: Verifying gripper dimensions to stay within the limit

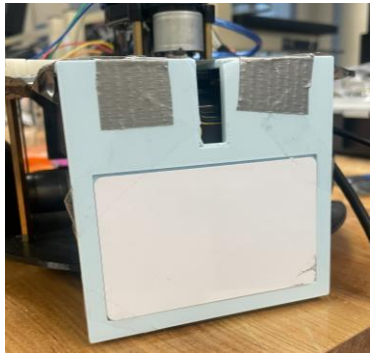
Validation:

1. Complete the Path plan successfully
   - Recording changes + results from each change for progress tracking
   - Adjusting distances accordingly
2. Recording the runs to evaluate the performance
   - Measuring and Tracking the robot's starting position

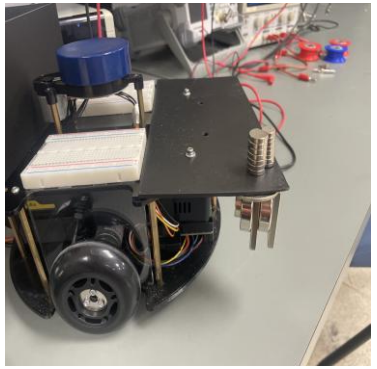


Abir’s contribution

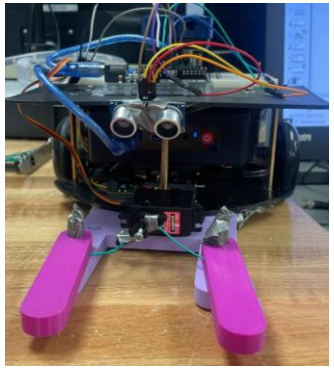
RFID placeholder



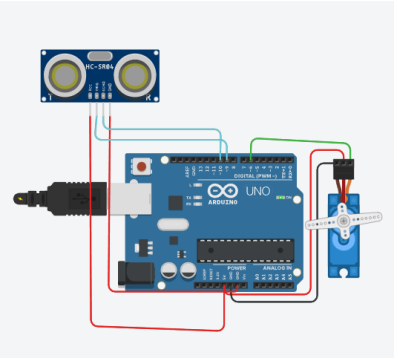
Magnetic challenge



Gripper mechanism



V & V



Verification:

- Ultrasonic sensor and Servo motor (TinkerCad)
- Magnet strength was verified to break the beam
- Arms with sensors were tested before assembly

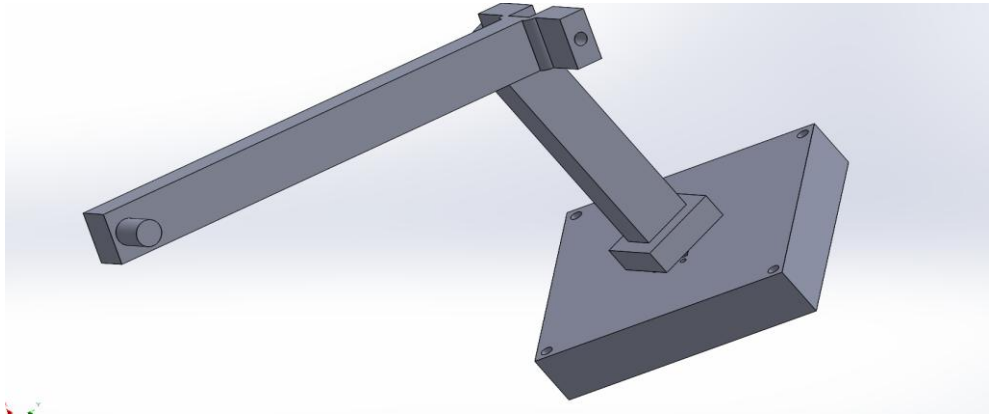
Validation:

- Arms were correctly triggered by a sensor
- The magnet placement was validated after completing the navigation mechanism
- The placement of the RFID on the robot was approved to trigger the RFID reader

Adnan's contribution

Verification:
(SolidWorks & Physical):

- Fit design strategy (Pick up and store multiple loots)
  - Pre-assembly test: Arm height fits within constraints.
  - Forearm clears box distance.



Validation:

- Prototyping:
  - 2 DF9GMS micro servos and 1 regular servo.: Second arm failed to lift target object,
  - Pivot decision: Team shifted focus to first arm (lobster claw), confirming it met performance needs with existing hardware.

Alois's contribution

RFID Cloning

Verification:

Tag Detection: HF tag failed → switched to T55xx LF card

Cloning Process: Extracted & cloned data onto a blank card

Validation:

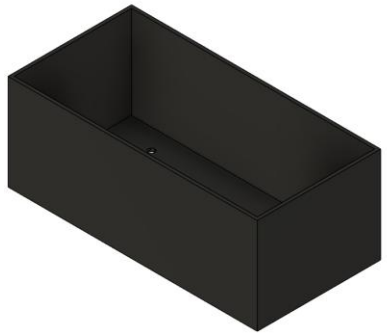
Ensured LF tag compatibility

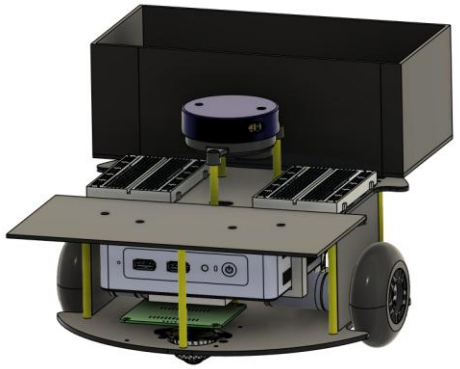
Testing & Adjustments: Adjusted process based on scan results.

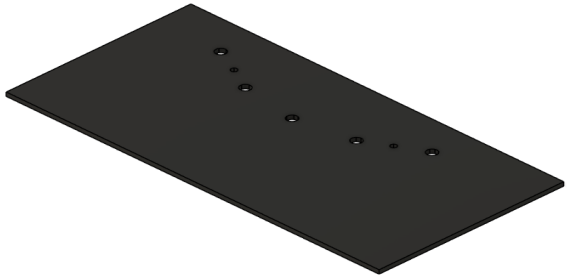
Neelie’s contribution

Verification:
Designed the box to hold the loot.
Design a plate to hold the claw on

Validation:
The box wasn’t used
The plate was used







Outcome

Lessons learned:

- Balancing a budget with creating a competent and reliable design (sensor not working)
- Following the timeline to have a chance to troubleshoot
- Communicating between team members to ensure design requirements are being followed (the box not fitting)

Transferrable skills acquired:

- Team organization and communication
- Budget planning
- Version control
- Adhering to design requirements and client requirements (v&v)
- 3D modeling, slicing, and printing

Robot Operation:

- ✓ Navigation: Basic walling, advanced walling & all waypoints
- ✓ Bomb disarm: Find the magnetic switch & disable the beam break detector
- ✓ Carded: Robot swipes the RFID badge that disarms the alarm
- ✓ Gripping system: The robot collects the loot and returns it to the starting area

Challenges:

- Sensor or Arduino stopped working
- One set of grippers did not work
- Limited access to the testing area

Thanks!

ANY QUESTION?