VISION ENABLED FACIAL SEARCH VEHICLE

Group 2

Leo Chen - 400188406

Priyam Gandhi - 400490099

Juliusz Gasior - 400490100

Mostafa Tehrani - 400490450

SEP 780 PROJECT

ENGINEERING
W Booth School of Engineering
Practice and Technology

McMaster
University

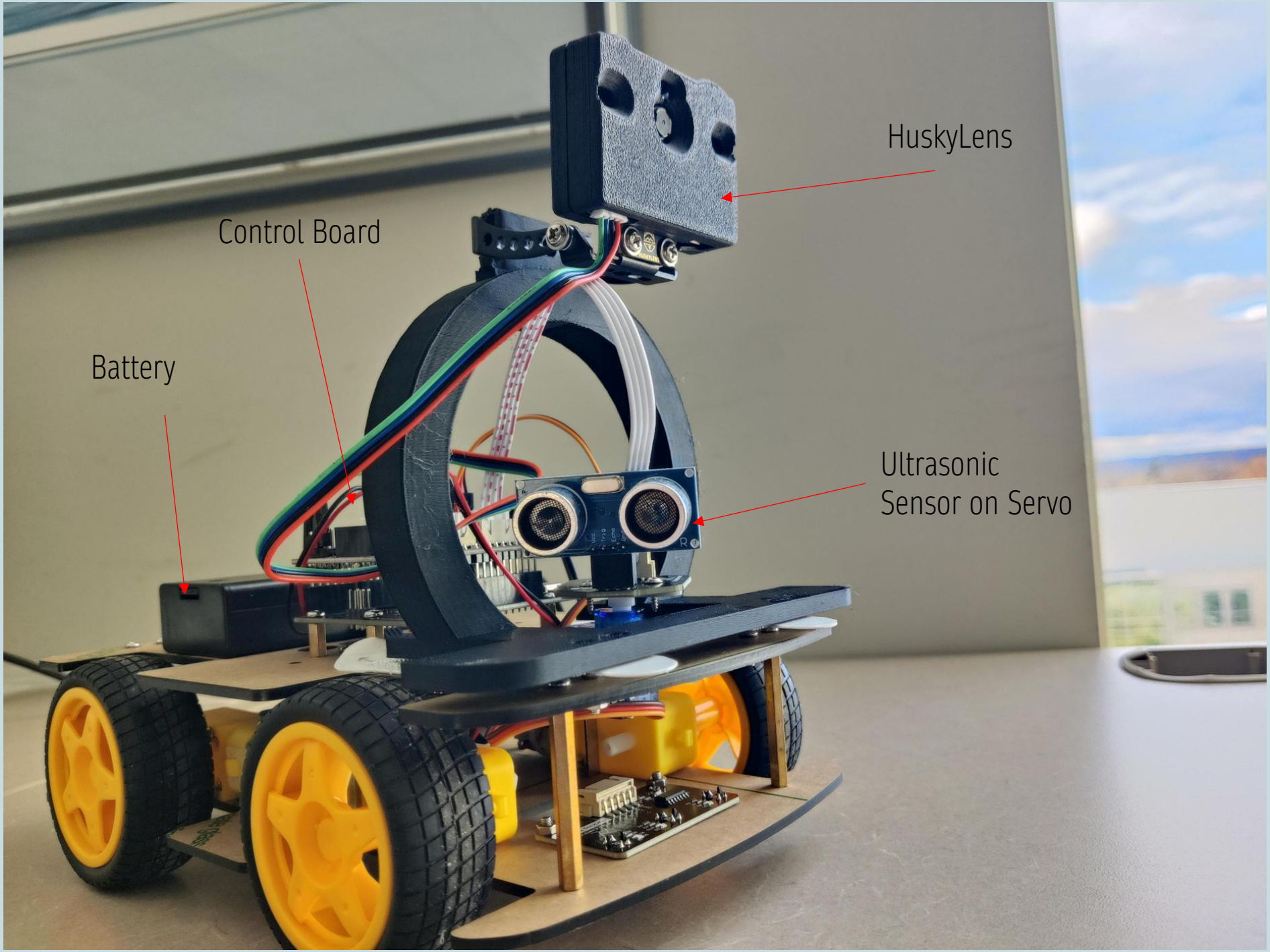
INTRODUCTION

Objective

Robot is to roam a space looking for a specific person. During its roaming, the robot should be able to detect obstacles, move around them while always on the lookout for its target. When the person is found the robot will stop and audibly notify everyone in the vicinity that it has met its objective.

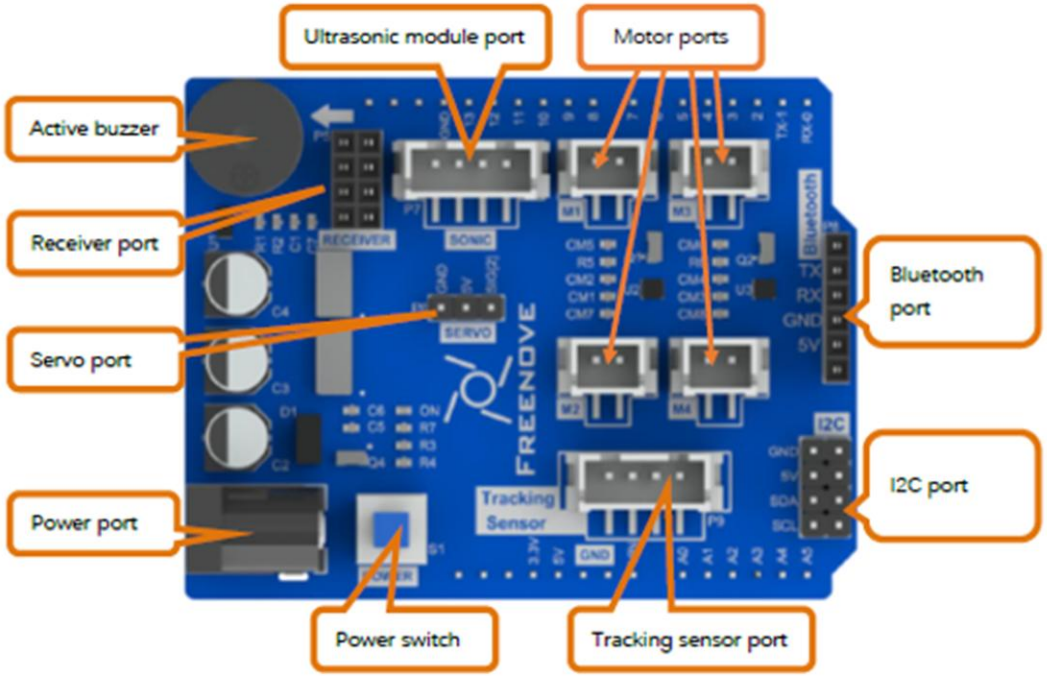
Background

Using the Freenove 4WD Smart Car Kit, meant for academic and professional use, and enhanced with a HuskyLens AI Camera, an autonomous robot was developed that met its objective.


HuskyLens
Control Board
Battery
Ultrasonic
Sensor on Servo

Extension Board

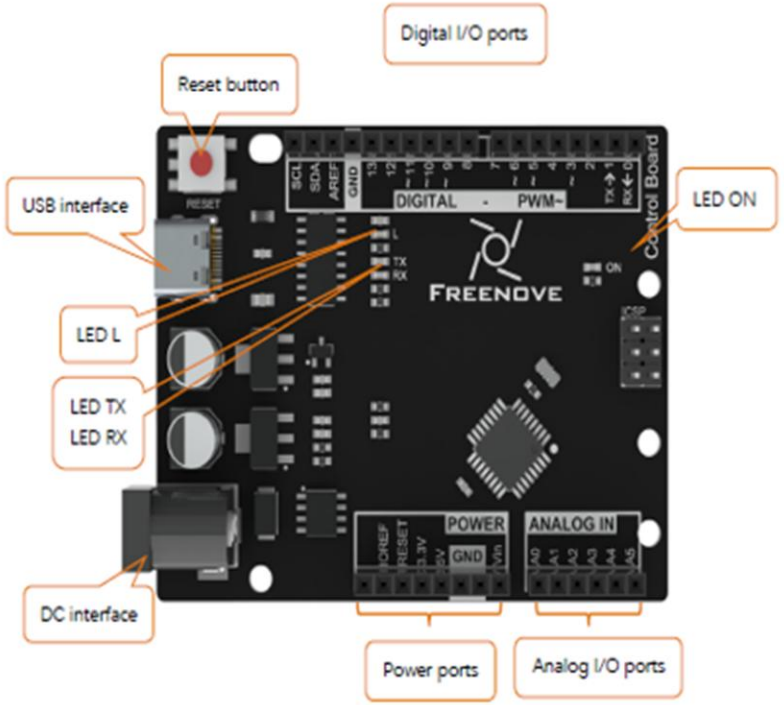
Freenove 4WD Extension board is below:



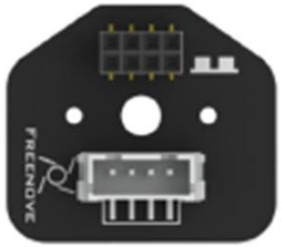
Receiver port can connect to RF module or IR module.

Control Board

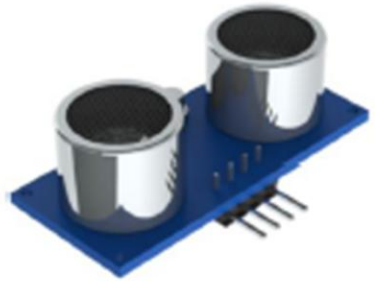
Diagram of Freenove Control board is shown below:



Ultrasonic module connector



Ultrasonic module



IRreceiver

IR remote

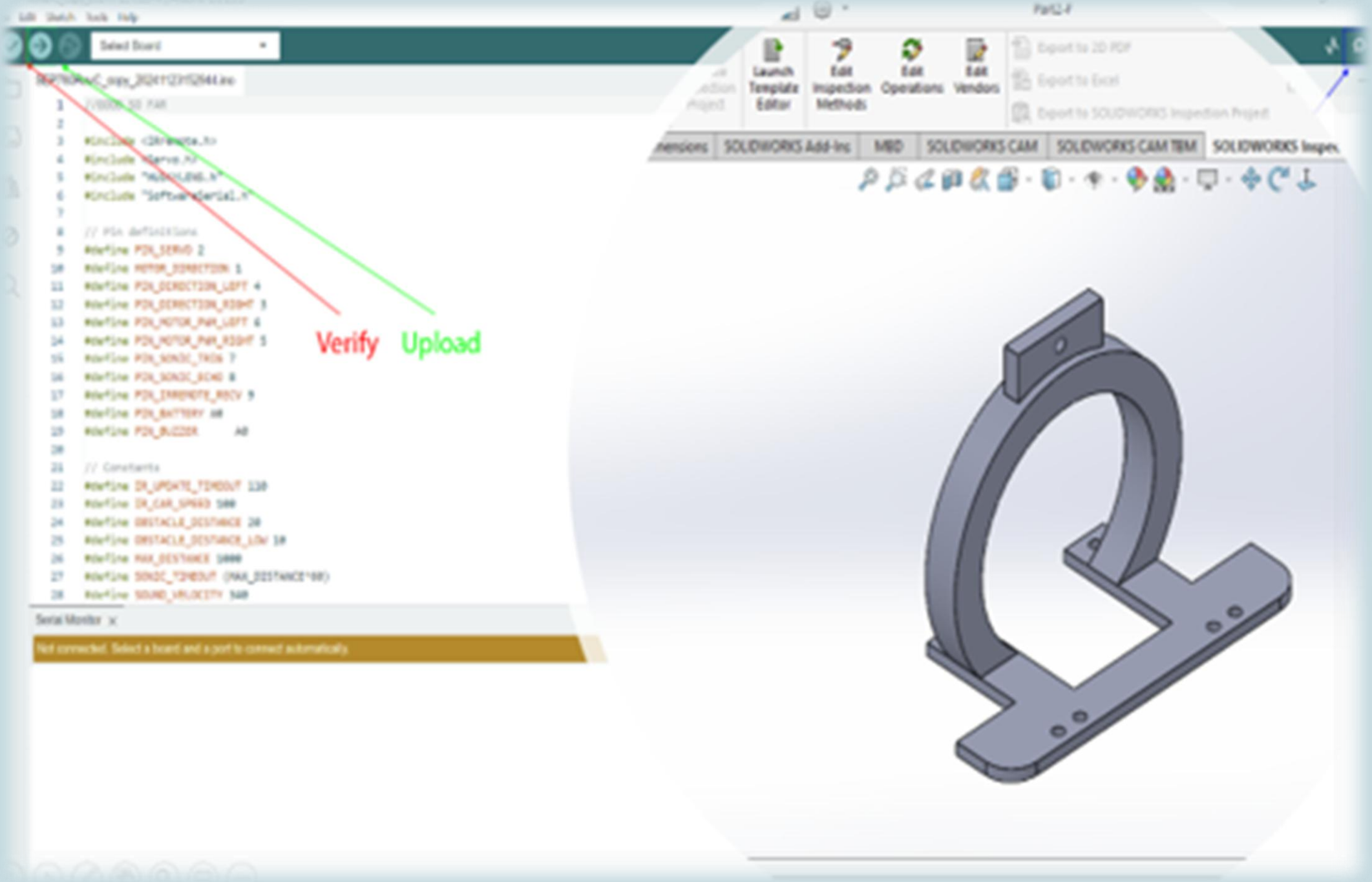
SOFTWARE

Arduino IDE:

A programming platform used to write and upload code to the Freenove Control Board (Arduino UNO). It supports debugging via the serial monitor and integrates multiple libraries for seamless sensor and module operation.

SolidWorks:

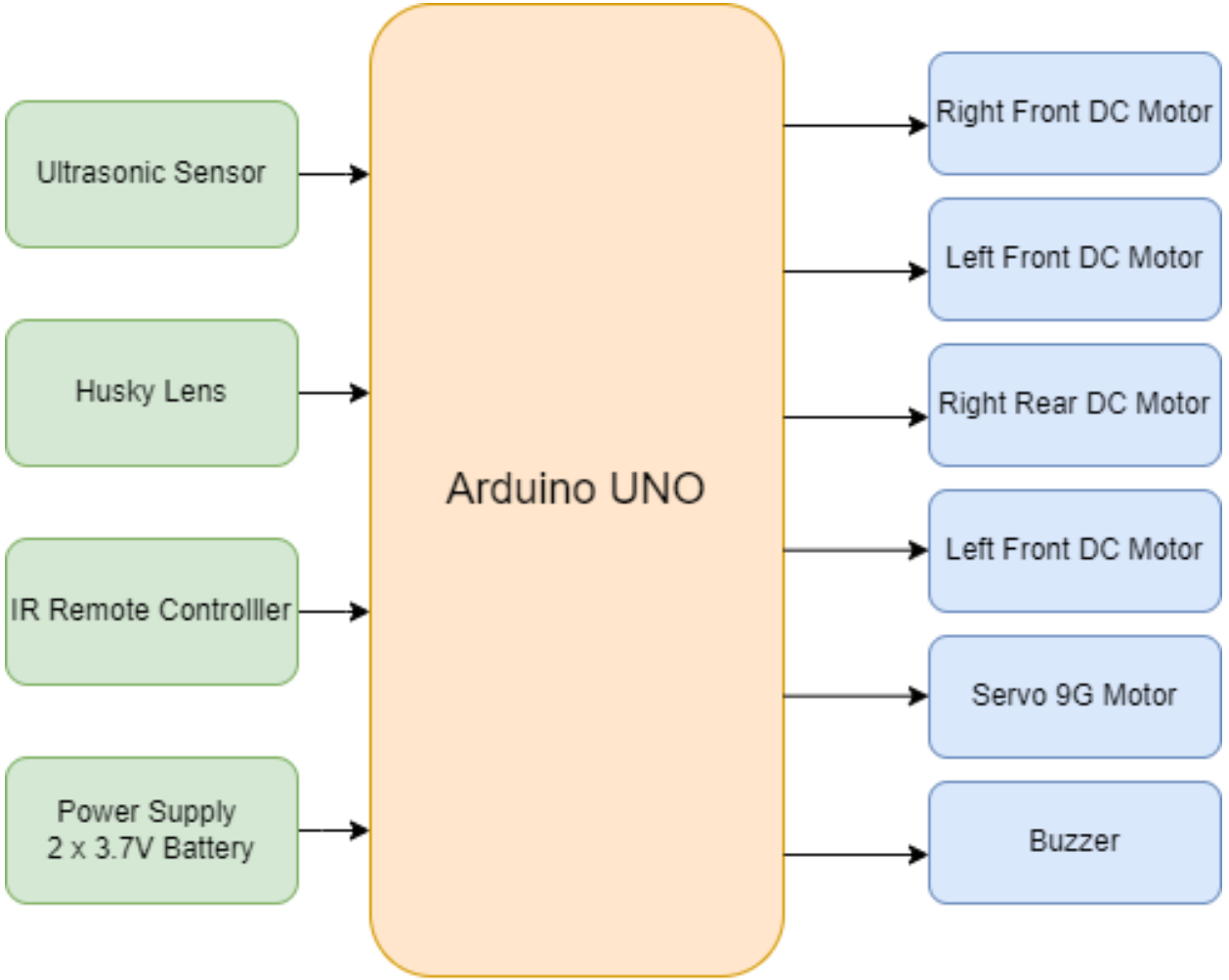
A CAD software used to design and edit 3D models for the HuskyLens camera fixture and case, enabling precise customization and exporting models for 3D printing.


Select Board
Verify
Upload
Launch Template Editor
Edit Inspection Methods
Edit Operations
Edit Vendors
Export to 2D PDF
Export to Excel
Export to SOLIDWORKS Inspection Project
SOLIDWORKS Add-Ins
MBD
SOLIDWORKS CAM
SOLIDWORKS CAM TBM
Serial Monitor
Not connected. Select a board and a port to connect automatically.

METHODOLOGY

1. **Manual Mode:** Controlled by IR remote
2. **Autonomous Mode**: Uses sensors for navigation; movement algorithm to automatically move
3. **Vision Data Processing:** Face detection is done by onboard HuskyLens chip
4. **Feedback Mechanisms:** Buzzer for audible feedback

SYSTEM ARCHITECTURE



CHALLENGES

1. Battery power management
2. Bluetooth remote controller hardware issues
3. HuskyLens data connection and useful data
4. HuskyLens face detection speed
5. Decreasing original scope (originally wanted robot to follow person once found)
6. Code integration of multiple sensors and functions

CONCLUSION

The project highlights the potential of simple hardware with advanced functionalities:

1. Facial Recognition: Usage of AI-enabled camera to simplify implementation
2. Versatile Operation: Supports manual control via infrared remote and autonomous obstacle avoidance.
3. Practical Applications: Suitable for security, surveillance, and human-robot interactions.

FUTURE SCOPE

1. Mapping environments
2. Facial recognition optimization
3. Battery upgrade
4. Improved manual controls
5. GPS integration and microcontroller upgrade
6. Obstacle avoidance improvement

DEMONSTRATION

THANK YOU