

Multi-Function 2WD Robotic System for Wall Tracking and Object Detection

ME 331 Final Project - Team MC
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ME 331 - 002 Mechatronics
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Prof. Carl Schaefer

1. Parts List

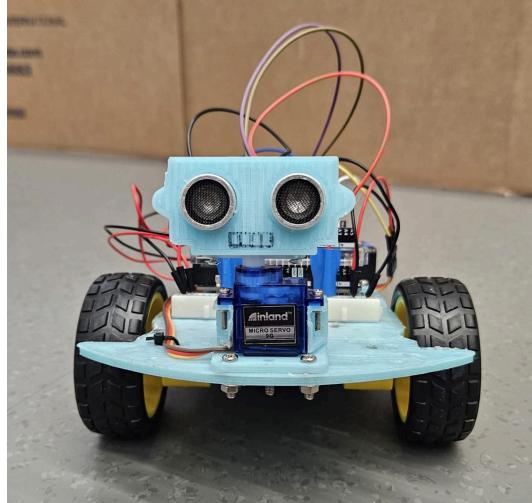
Following is the spreadsheet for the parts used for the project. Every part used was purchased/made by ourselves as we had decided to make our own robot. Every part has been hyperlinked with its source for reference.

Parts List - Group 3: Abbas Hussain & Nadia Carr						
	Item	Quantity	\$ Price	Link	# Per Robot	\$ Per Robot
	3D Filament (Chassis, Mounts & Cases)	1	\$29.99	Frosty PLA	1	\$29.99
	Motor Shield Rev 3	1	\$29.00	Motor Shield	1	\$29.00
	TT Motors w/Leads	4	\$9.69	TT Motors	2	\$4.85
	18650 Battery w/Charger	4	\$19.89	18650 Battery	2	\$9.95
	18650 Battery Holder	4	\$7.99	Battery Holder	1	\$2.00
	Ultrasonic Sensor	3	\$7.99	Sensor	1	\$2.66
	9G Servo	3	\$10.99	Servo	1	\$3.66
	400 Tie-Point Bread Board	3	\$7.99	Half Bread Board	1	\$2.66
	Castor Wheels	4	\$6.83	Wheel	1	\$1.71
From the ELEGOO Starter Kit	IR Receiver + Remote	1	\$44.99	Super Starter Kit	1	\$44.99
	Arduino Uno R3	1			1	
	Wires	-			13	
	Passive Buzzer	1			1	
			\$175.35			\$131.47
Extras	170 Tie-Point Bread Board	4	\$4.99	Mini Bread Board	1	\$1.25

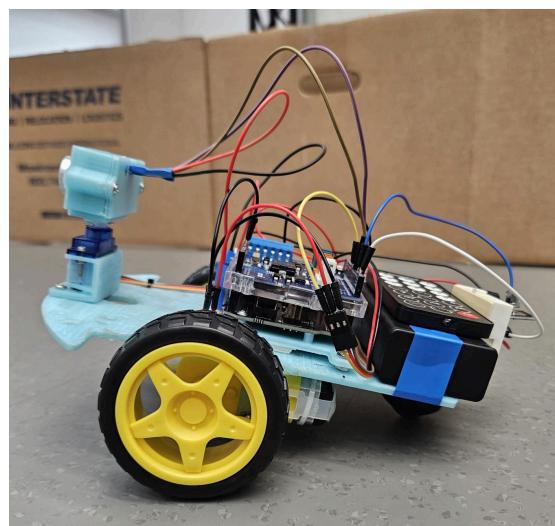
2. Pictures

Below are the pictures of our final robot for the project with different views.

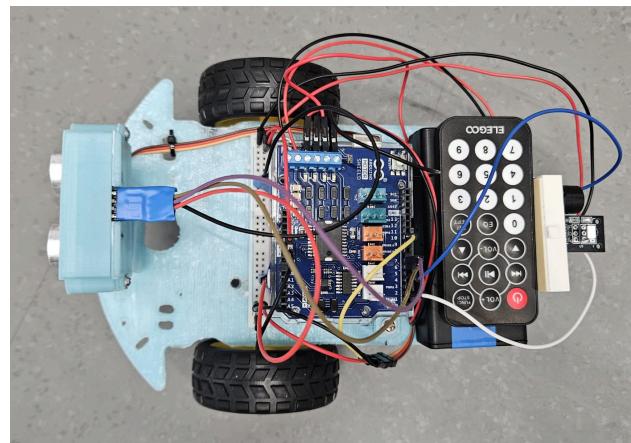
Front View:



Side View:



Top View:



3. Descriptions & Links

STL Files:

- [Arduino 2WD Robot Chassis | 3D CAD Model Library | GrabCAD](#)
- [Micro Servo SG90 Mount by yang02 - Thingiverse](#)
- [Elegoo Uno R3 base plate \(Arduino Clone\) by fabcam - Thingiverse](#)
- [Ultrasonic Sensor Box by meestermcfeelme - Thingiverse](#)

Servo and Ultrasonic Sensor Code and Setup:

Referenced back to code from the midterm assignments.

Motor Shield Rev3 Code and Setup:

- [Controlling a DC Motor with Motor Shield Rev3 | Arduino Documentation](#)
- [Arduino Motor Shield Tutorial : 6 Steps \(with Pictures\) - Instructables](#)
- [How to Use the Arduino Motor Shield Rev 3 To Control Two Motors](#)

PID Debugging for Challenge 2:

<https://forum.arduino.cc/t/pid-control-on-2-wheels-robot/534233>

Code for Passive Buzzer Tunes for Challenge 3:

- [Playing popular songs with Arduino and a buzzer](#)
- [GitHub - hibit-dev/buzzer](#)

IR Receiver/Remote Code for Challenge 3:

From the given pdf document for motor shields.

4. Team Member Contributions

Nadia: Was responsible for physically building the robot, including assembling and printing the chassis, integrating the motors and sensors, and ensuring reliable wiring and power distribution. Collaborated in developing and refining the Arduino code, contributing to critical problem-solving during the debugging process. Worked with teammate to test the robot's performance across all three challenges and supported adjustments to improve accuracy and reliability. Did essential mechanical work and testing to ensure the robot could effectively accomplish all the challenges, by conducting numerous trials of each challenge to ensure reliability. Helped compile parts list spreadsheet, organize code, and compile references for final documentation.

Abbas: Was primarily responsible for developing the Arduino code for each of the project challenges. Iteratively refined the code through testing and debugging to ensure each function for the given challenges and operated reliably under the project constraints. Assisted in testing the robot's performance and collaborated closely with teammate to evaluate and adjust sensor readings, motor behavior, and obstacle-handling logic. Managed the written documentation of the project, structuring the report, and ensuring clear explanation of our work.