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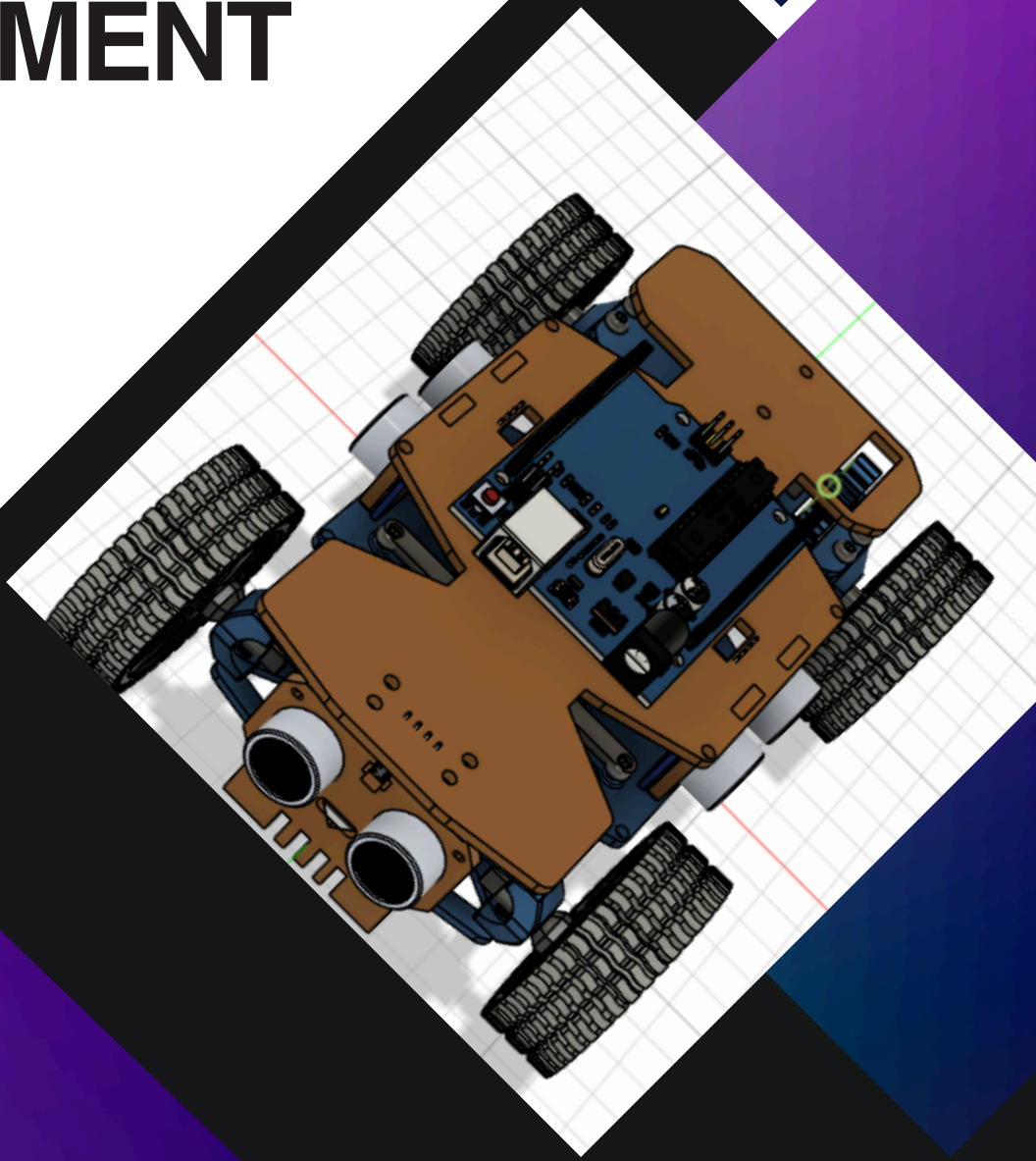
MOBILITY MANAGEMENT



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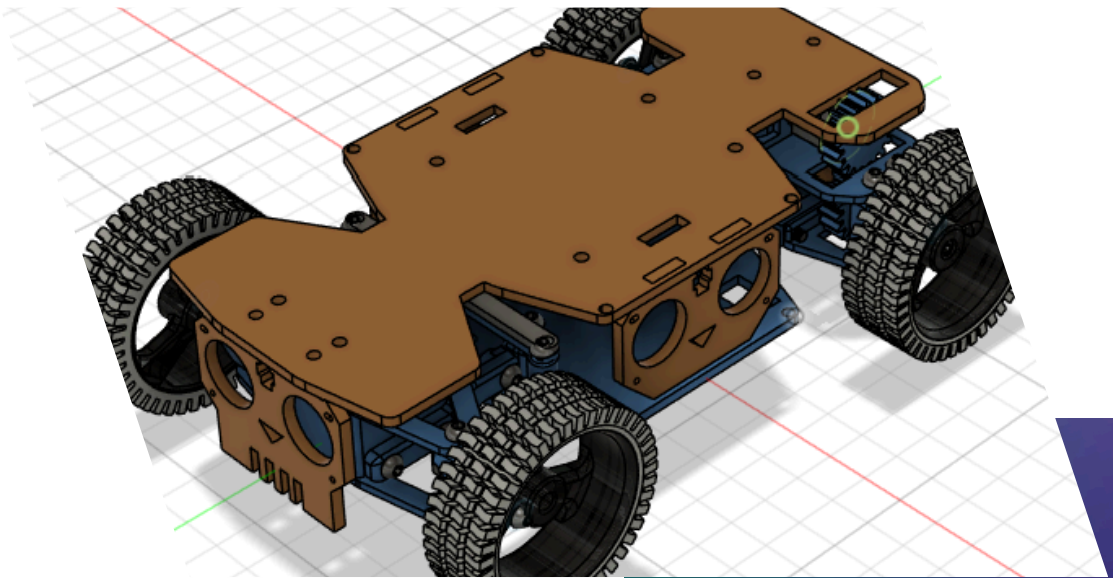


Driving system

1.1 DC N20 Motor and Single Axle Drive

The DC N20 motor powers both rear wheels through a single axle drive connected by two gears with a 1:1 gear ratio. This means that both rear wheels rotate at the same speed, providing forward and backward movement.

DC N20 Motor Specifications:

- **Operating voltage: 6V to 12V**
- **No-load speed: Approximately 200-600 RPM depending on the motor model**
- **Current draw: 40-70mA at no load, higher under load**
- **Torque: Typically around 0.1-0.2 kg.cm at 6V**

The motor is controlled by PWM signals from the Arduino Uno, which adjusts the speed of the rear wheels. The TB6612FNG motor driver manages the power supply and controls motor direction.

How It Works:

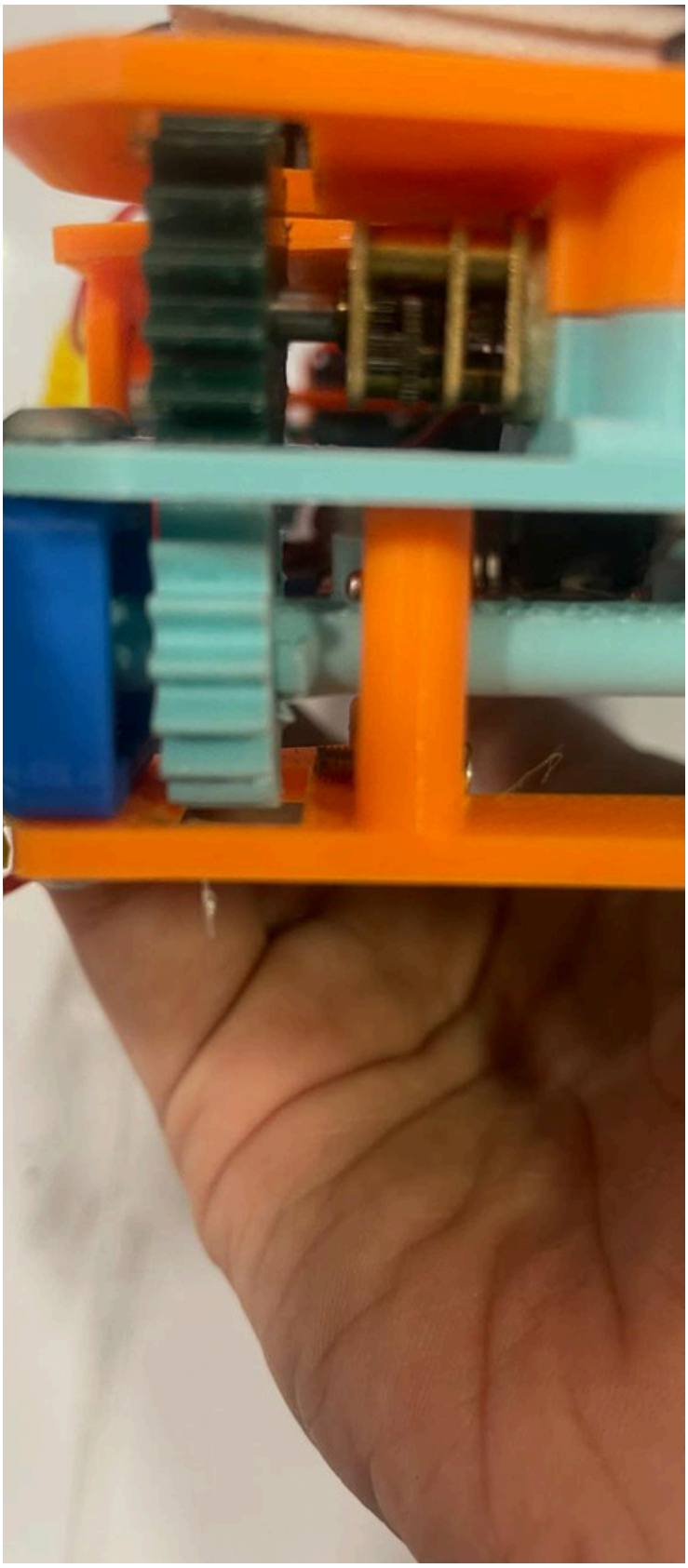
- **Forward movement: The N20 motor drives the rear wheels through the single axle. Both wheels rotate at the same speed, propelling the bot forward.**
- **Backward movement: The motor reverses, causing both rear wheels to rotate in the opposite direction, moving the bot backward.**

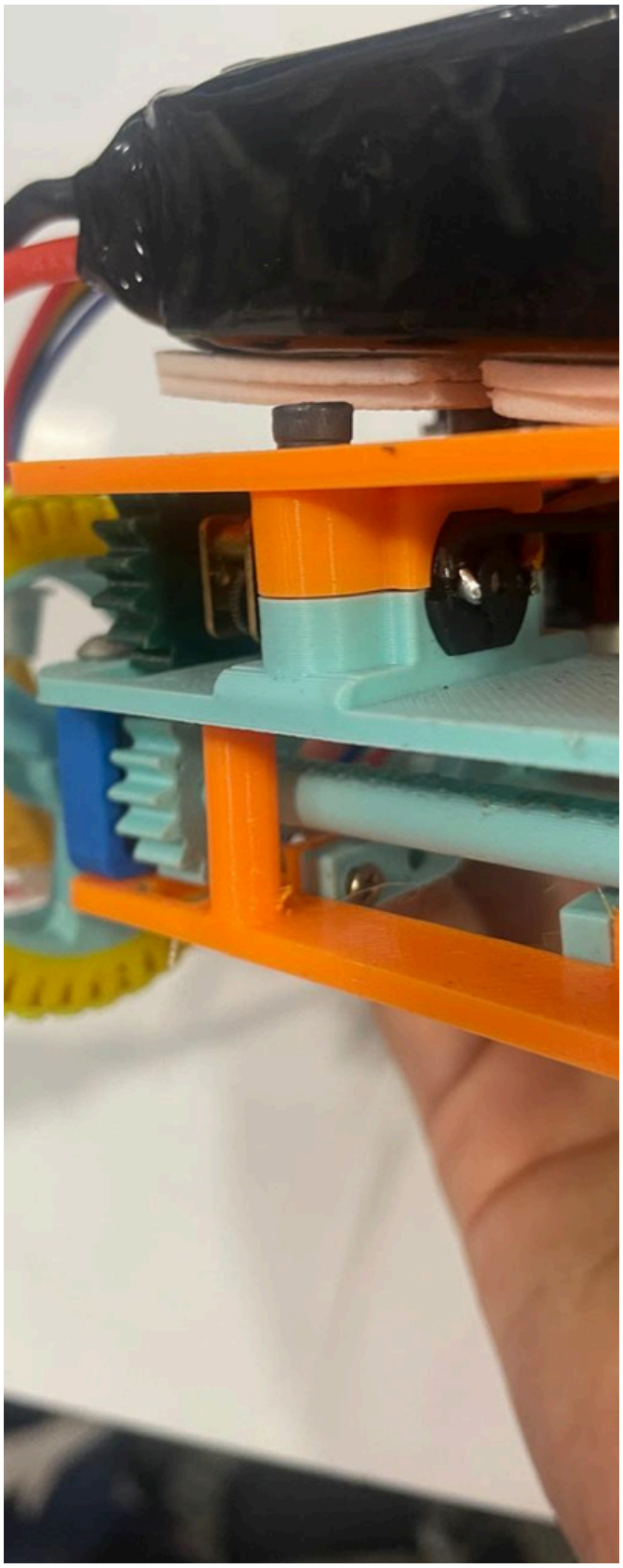
Since there is no differential, both rear wheels are always locked to rotate at the same speed. This setup provides simple and effective movement, but turning requires more reliance on the front-wheel steering system.

1.2 Single Axle and 1:1 Gear Ratio

- **Purpose: The 1:1 gear ratio ensures both rear wheels rotate at the same speed, which simplifies the drivetrain but makes the bot more reliant on the front-wheel steering for turns.**

Visual depiction





Steering system

2.1 MG90S Microservo Motor

The steering system is handled by an MG90S microservo motor, which is responsible for controlling the angle of the front two wheels. This servo motor allows the bot to make accurate turns by adjusting the orientation of the front wheels.

MG90S Microservo Specifications:

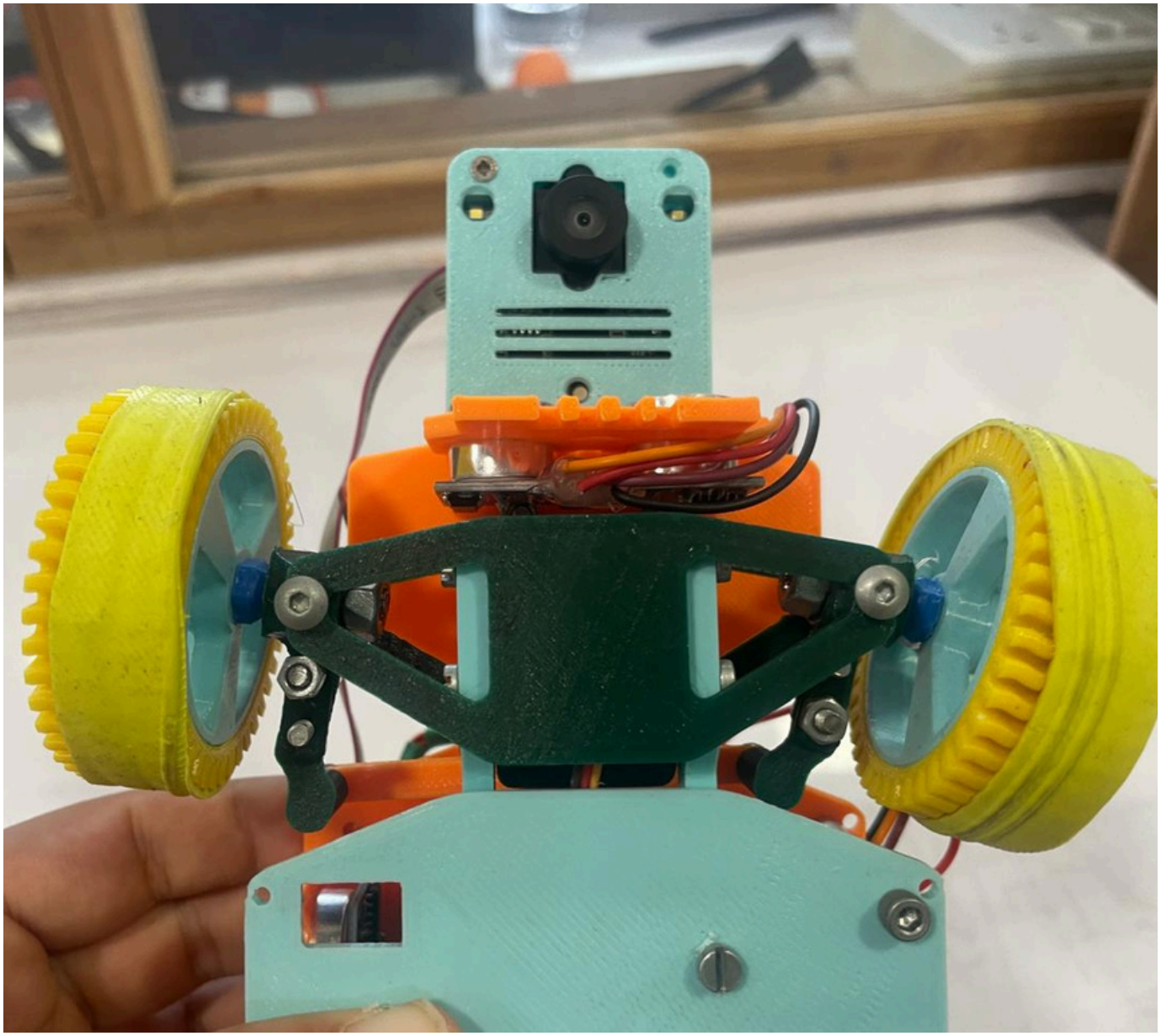
- **Operating voltage: 4.8V to 6.0V**
- **Torque: 2.0 kg.cm at 4.8V, 2.2 kg.cm at 6V**
- **Speed: 0.1s/60˚ at 4.8V, 0.08s/60˚ at 6V**
- **Control: PWM signal from Arduino Uno (generally between 1ms to 2ms pulse width for control angles)**

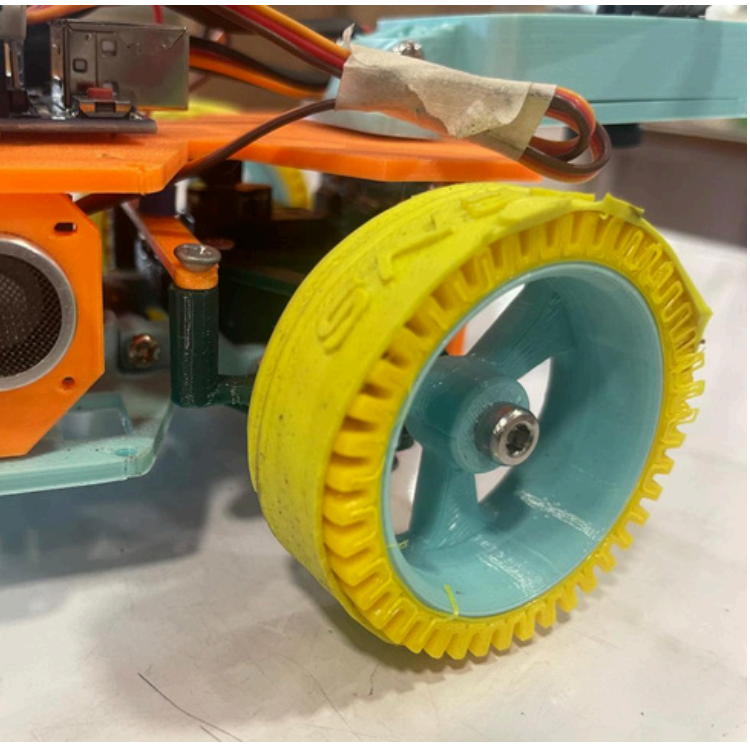
The MG90S microservo is robust, metal-geared, and ideal for handling the steering of the bot's front wheels. It operates within a range of 0˚ to 180˚, but it typically controls the front wheels within a smaller range to steer the bot left or right.

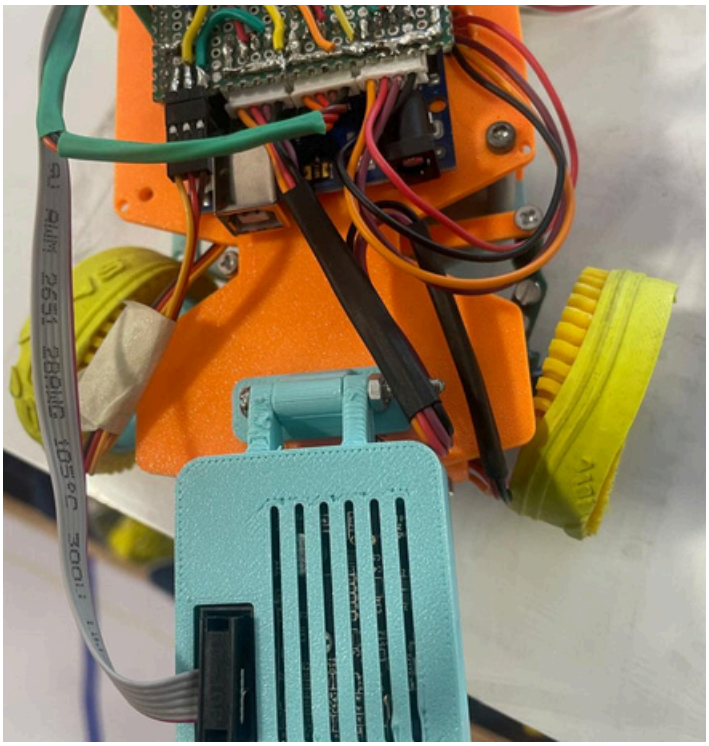
How It Works:

- **Left turn: The servo rotates the front wheels to the left, typically by adjusting the angle to a negative value.**
- **Right turn: The servo rotates the front wheels to the right, using a positive angle.**
- **Straight movement: When the servo is in the neutral (0˚) position, the front wheels point straight ahead, allowing the bot to move forward in a straight line.**

The Pixy Cam 2 informs the turning direction based on obstacle color detection (green for left, red for right), and the Arduino Uno sends commands to the MG90S servo accordingly.







Components

Component	Function	Power Requirements
DC N20 Motor	Drives the two rear wheels for movement (forward/backward).	6-12V
Single axle drive	Allows rear wheels to rotate at different speeds during turns.	N/A (mechanical)
MG90S Microservo	Controls the angle of the front wheels for steering.	4.8-6.0V
TB6612FNG Motor Driver	Controls the DC motor's speed and direction.	Motor side: 11.1V; Logic: 5V