

Mobility Management

This document explains the mobility management system that we built. The system combines a simple but effective driving setup with a custom-made steering mechanism. It uses a combination of a DC motor, a servo motor, and a motor driver to achieve smooth movement and control.

1. Driving System

For the driving system, we used a small 3-6V DC motor with a torque of about 15–20 g·cm. Although compact, this motor provides enough force to move the bot forward and backward. To control the speed and direction of the motor, we used the TB6612FNG motor driver. By sending PWM (pulse width modulation) signals from the microcontroller to the driver, we can easily adjust how fast the bot moves and whether it goes forward or in reverse.

DC Motor Specifications:

- Voltage: 3V to 6V
- Torque: 15–20 g·cm
- Type: Brushed DC motor

How It Works:

When the motor spins in one direction, the bot moves forward. Reversing the motor's polarity makes the bot go backward. The TB6612FNG motor driver handles this switching smoothly, while PWM signals let me control the speed more precisely.

2. Steering Mechanism

Steering is handled by a self-made steering system powered by an MG90S metal gear servo motor. This servo moves the front wheels left or right, allowing the bot to change its direction. The MG90S is a reliable servo with metal gears, which makes it strong enough for this job. It runs on standard PWM signals, so it's easy to control using the microcontroller.

MG90S Servo Specifications:

- Voltage: 4.8V to 6.0V
- Torque: 2.2 kg·cm at 6V
- Speed: 0.08s/60° at 6V
- Signal: PWM (1–2 ms pulse width)

How It Works:

Turning the wheels to the left or right is as simple as sending the correct PWM signal to the servo. When the servo is centered, the wheels point straight ahead. This allows the bot to drive straight, and by adjusting the servo angle, we can make it turn left or right smoothly. [we added a video in the repository for clear understanding]

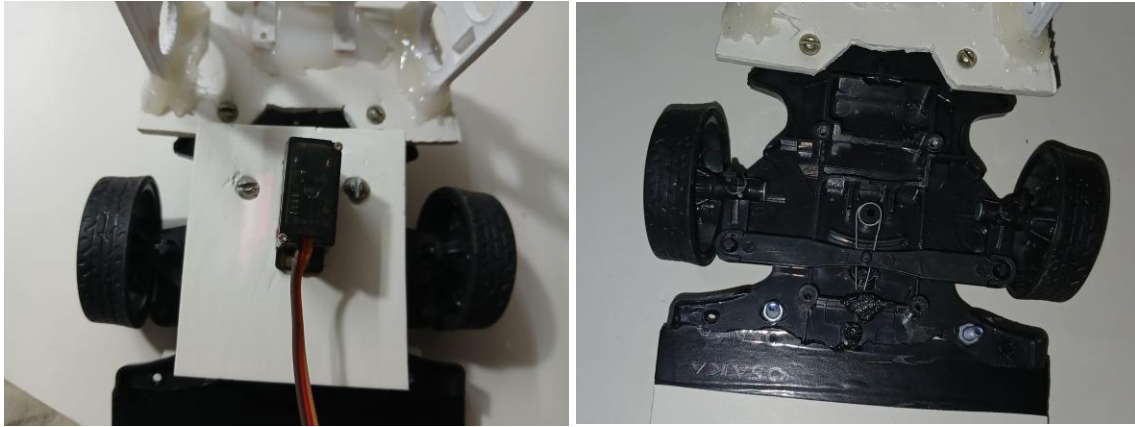


Fig: Steering control

3. Components Used

Here is a quick summary of the main components we used in the system:

Component	Purpose	Power
3-6V DC Motor	Provides the driving force to move the bot	3-6V
Self-made Steering System	Custom design that links the front wheels for steering	Mechanical
MG90S Metal Gear Servo	Controls the steering angle of the front wheels	4.8-6.0V
TB6612FNG Motor Driver	Controls the motor's speed and direction	Logic: 5V, Motor: 3-6V

Overall, this setup provides a good balance of simplicity and functionality. The DC motor ensures consistent forward and backward movement, while the servo-driven steering system allows for accurate turns. Together, these components make the bot reliable and easy to control.