Mobility Control

For controlling the movement of our robot, we selected a differential drive system with two powered wheels and a passive caster wheel at the rear. This configuration ensures both effective linear movement and precise turning capability.

Drive selection:

We use two DC gear motors connected through an L298N motor driver. This setup provides reliable operation and sufficient torque to move the robot across the field and handle minor obstacles.

Gear ratio:

The motors are equipped with small pinion gears that mesh with larger gears on the wheel axles. The chosen gear ratio ensures a balance between speed and torque:

- Low but stable speed for accurate maneuvering around obstacles.
- Increased torque for stability during sharp turns.

Steering control:

A servo motor is used for steering control of the front (or rear) axle, depending on the robot's configuration. The servo's neutral position is set at 94°, allowing symmetric deflection to the left and right for smooth turning.

Sensors for motion correction:

- A gyroscope (MPU6050) stabilizes the robot's heading and compensates for deviations from the intended path.
- Infrared (IR) distance sensors help detect obstacles and maintain optimal distances from walls and other objects.

Justification for component choice:

We based our design on engineering solutions used in mobile robots and transportation systems, considering the specific requirements of the WRO competition:

- Maximum maneuverability within limited space.
- Stable motion that adapts to changing field conditions.

Additionally, we provide a wiring diagram and 3D model of the chassis showing component placement and dimensions (CAD files are included in the documentation).