EXPERIMENT 19: WALL FOLLOW ROBOT

Objective: The objective of this experiment is to create a wall-following robot using ultrasonic sensors and a PID controller. The robot should navigate by following a wall, adjusting its direction based on sensor inputs.

Setup:

- Assemble the robot hardware as per the provided instructions in Section 2.1.
- Connect the robot to the Arduino IDE following the guidelines in Section 2.3.
- Establish the following hardware connections:

Left Motor:

- Motor Input 1 (LMP): Connect to digital pin 8.
- Motor Input 2 (LMN): Connect to digital pin 9.

Right Motor:

- Motor Input 1 (RMP): Connect to digital pin 10.
- Motor Input 2 (RMN): Connect to digital pin 11.

Ultrasonic Frontside Sensor:

- Trigger Pin: Connect to digital pin 2.
- Echo Pin: Connect to digital pin 3.

Ultrasonic Left side Sensor:

- Trigger Pin: Connect to digital pin 4.
- Echo Pin: Connect to digital pin 5.

Libraries:

- PID controller library:

To download the PID controller library, click on the following link:PID Controller library
After downloading the zip file, open the Arduino IDE. Navigate to the 'Sketch' menu, select 'Include Library,' and choose 'Add .ZIP Library. Locate the downloaded zip file, click 'Open,' and the Arduino IDE will install the library

Code Example: Wall Follow Robot

Usage Instructions:

- Ensure the robot is powered on and connected to the Arduino.
- The robot will use ultrasonic sensors to measure distances from the front and left sides.
- The PID controller adjusts motor speeds based on sensor inputs to maintain a set distance from the wall.
- Monitor real-time distance values and motor actions on the serial monitor.
- Adjust PID tuning parameters and distance setpoints for optimal performance.

Expected Results: The robot should follow a wall based on the input from ultrasonic sensors. It will adjust its direction to maintain a set distance from both the front and left walls.

Additional Information:

- The PID controller helps achieve smooth and precise control over the robot's movements.
- Experiment with PID tuning for different wall-following behaviors.