EXPERIMENT 23: LINE FOLLOWING ROBOT

Objective: The Line Following Robot with Ultrasonic and IR Sensors is designed to autonomously navigate along a predefined path marked by a black line while avoiding obstacles using an ultrasonic sensor. This user manual provides step-by-step instructions for setting up, operating, and troubleshooting the robot.

Setup:

- Assemble the robot hardware according to the instructions in Section 2.1.
- Connect the robot to the Arduino IDE as explained in Section 2.3.
- **Assemble the Robot Hardware:**
  - Connect the motors, infrared sensors, and ultrasonic sensor based on the provided hardware assembly instructions.
- **Connect to Arduino IDE:**
  - Connect the robot to the Arduino IDE as explained in Section 2.3.
- **Hardware Connections:**
  - **Ultrasonic Sensor**:Ultrasonic sensor with arduino
    - Connect the trig Pin to digital pin 4.
    - Connect the echo Pin to digital pin 5.
  - **Left Motor:**
    - Connect LMP to digital pin 8.
    - Connect LMN to digital pin 9.
  - **Right Motor:**
    - Connect RMP to digital pin 10.
    - Connect RMN to digital pin 11.
  - **Left Infrared Sensor:**
    - Connect LSP to digital pin 2.
  - **Right Infrared Sensor:**
    - Connect RSP to digital pin 6.
- **Initialization:**
  - Initialize the motor pins, infrared sensor pins, and ultrasonic sensor pins in the setup.

Code Example: Line Following Robo

Usage Instructions:

- **Power On:**
  - Power the robot and ensure it is connected to the Arduino.
- **Ultrasonic Sensor Distance Measurement:**
  - The ultrasonic sensor will measure the distance using the trig Pin and echo Pin. The distance will be displayed on the serial monitor.

- **Infrared Sensor Line Following:**
  - The infrared sensors (LSP and RSP) will detect the presence of a black line.
  - If the distance measured by the ultrasonic sensor is greater than 15:
    - If both infrared sensors are not on the black line, the robot will move forward.
    - If the left sensor is on the black line and the right sensor is not, the robot will turn left.
    - If the right sensor is on the black line and the left sensor is not, the robot will turn right.
  - If the distance is less than 15, the robot will stop.

Expected Results:

- The robot should follow a black line on a white surface based on the input from infrared sensors.
- The ultrasonic sensor should measure and display the distance on the serial monitor.

FAQs:

Q: How do I interpret the ultrasonic sensor distance? **A:** The distance is displayed on the serial monitor. Ensure it is greater than 15 for proper line-following.

Q: How can I modify the speed of the motors? **A:** Adjust the PWM values (e.g., **analogWrite(LMP, 50) ;)** for both motors in the code based on your speed requirements.

Please refer: Line following video