EXPERIMENT 32: Wireless Obstacle Monitoring Robo

Objective: The objective of this code is to create a simple obstacle avoidance system using an ultrasonic sensor and a motor controller. The system is designed to move a robot forward at high speed when there are no obstacles detected within a certain range. When an obstacle is detected within that range, the robot stops moving to avoid collision.

Setup:

- The code sets up the pins for the ultrasonic sensor (trigPin and echoPin) and the motor controller (motor1A, motor1B, motor2A, and motor2B).
- Serial communication is initialized at a baud rate of 9600.

Hardware Setup:

- Ultrasonic Sensor: Connected to the Arduino's trigPin(Pin 2) and echoPin(Pin 3).
- Motor Controller: Connected to the Arduino's digital pins (motor1A(Pin 8), motor1B(Pin 9), motor2A(Pin 10), motor2B(Pin 11)).
- Ensure the Bluetooth module (HC-05) is properly connected to the Arduino (VCC and GND). Connect its RX to TX and TX to RX.For detailed guidance on connecting the HC-05 Bluetooth module to your Arduino, please refer to the following link: HC-05 and Arduino Connection
  Code Example: Wireless Obstacle Monitoring Robo

Mobile App Setup (Assumed, not implemented in the provided code):

Usage Instructions:

- Connect the hardware components according to the specified pin connections.
- Upload the provided code to an Arduino board.
- Open the Arduino IDE serial monitor or use a mobile app (if implemented) to observe the system behavior.
- When no obstacles are detected within 50 cm, the robot moves forward at high speed.
- If an obstacle is detected within 50 cm, the robot stops moving to avoid collision.

Expected Results:

- The system continuously monitors the distance measured by the ultrasonic sensor.
- If the distance is greater than or equal to 50 cm, the robot moves forward with high speed, and the message "NO OBSTACLES NEARBY" is printed on the Bluetooth app.
- If the distance is less than 50 cm, indicating an obstacle nearby, the robot stops moving, and the message "Obstacle detected nearby and Robo Stops" is printed on the Bluetooth app.

Frequently Asked Questions (FAQs):

- **Q:** How can I modify the code to make the robot turn when an obstacle is detected? **A:** You can adjust the motor control logic to turn the robot left or right when an obstacle is detected instead of stopping it completely.

- **Q:** What is the purpose of the **`delayMicroseconds()`** function calls? **A:** These calls create the necessary delay for triggering the ultrasonic sensor accurately. They ensure that the sensor operates correctly and provides accurate distance measurements.

- **Q:** How can I change the distance threshold for obstacle detection? **A:** You can adjust the value in the **`if (distance >= 50)`** condition to set a different distance threshold for obstacle detection.