EXPERIMENT 13: OBSTACLE-BASED SPEED CONTROL

Objective: The objective of this experiment is to implement an obstacle-based speed control system using a Chelonia Bot. The Chelonia Bot is equipped with an ultrasonic sensor that detects obstacles. Based on the detected obstacle's distance, the robot adjusts its speed and communicates the status to a mobile app via Bluetooth.

Hardware Setup:

- Connect the motors to the Chelonia Bot following the instructions provided in Section 2.1.
- Connect the Chelonia Bot to the Arduino IDE as explained in Section 2.3.
- Ensure the Bluetooth module (HC-05) is properly connected to the Arduino (VCC and GND). Connect its RX to TX and TX to RX.
- Connect the ultrasonic sensor: Refer the link provided to check the connection:Ultrasonic sensor with arduino
  - Connect the trig Pin to pin 12.
  - Connect the echo Pin to pin 13.
- Connect the motors to the Chelonia Bot:
  - Connect motor1A (IN1) to pin 8.
  - Connect motor1B (IN2) to pin 9.
  - Connect motor2A (IN3) to pin 10.
  - Connect motor2B (IN4) to pin 11.
- Connect the Bluetooth module:
  - Connect the RX pin to pin 1.
  - Connect the TX pin to pin 0.

Bluetooth App Setup:

Download and install “Bluetooth serial monitor” app from play store.

Code Example: Obstacle based speed control

Usage Instructions:

- Power on the Chelonia Bot.
- Open the Bluetooth terminal app on your mobile device.
- Observe the distance readings from the ultrasonic sensor displayed in the app.
- The Chelonia Bot adjusts its speed based on the obstacle distance:
  - If the distance is greater than or equal to 80 cm, the robot moves forward with full speed.
  - If the distance is between 50 cm and 80 cm, the robot moves forward with a speed of 175.
  - If the distance is between 10 cm and 50 cm, the robot moves forward with a speed of 100 cm.
  - If the distance is less than 10 cm, the robot stops.

Expected Results:

- The Chelonia Bot should adjust its speed based on the detected obstacle distance.
- Distance readings and corresponding status messages should be displayed in the Bluetooth terminal app.

Additional Information:

- Customize the speed thresholds in the code based on your specific requirements.
- Ensure the Bluetooth module is paired correctly for communication.