EXPERIMENT 15: SPEED CONTROL USING JOYSTICK

Objective: The objective of this experiment is to control the speed and direction of a Chelonia Bot using a joystick. The X and Y-axis values from the joystick are mapped to control the speed and direction of two motors, providing a dynamic and user-friendly method for robot control.

Setup:

- Assemble the Chelonia Bot hardware following the instructions in Section 2.1.
- Connect the Chelonia Bot to the Arduino IDE as explained in Section 2.3.
- Establish the following hardware connections:
- **Motor A (Left Motor):**
  Pin 9(ENA): Connect to the enable pin of the left motor (PWM).
  Pin 8 (IN1): Connect to input 1 of the left motor.
  Pin 7 (IN2): Connect to input 2 of the left motor.
- **Motor B (Right Motor):**

Pin 3 (ENB): Connect to the enable pin of the right motor (PWM).
Pin 5 (IN3): Connect to input 1 of the right motor.
Pin 4 (IN4): Connect to input 2 of the right motor.

Connection Instructions for Joystick: For doubt see experiment 12 for joystick connection with Arduino. This code only uses X-axis pin and Y axis pin.

For this experiment, connect the joystick to the Arduino by carefully following these steps:

- **X-axis pin (A0):**
  - Locate the X-axis pin on the joystick.
  - Connect one end of a jumper wire to the X-axis pin on the joystick.
  - Connect the other end of the jumper wire to the A0 (Analog 0) pin on the Arduino.
- **Y-axis pin (A1):**
  - Locate the Y-axis pin on the joystick.
  - Connect one end of a jumper wire to the Y-axis pin on the joystick.
  - Connect the other end of the jumper wire to the A1 (Analog 1) pin on the Arduino.

Ensure that the connections are secure, and the wires are properly inserted into the corresponding pins. This setup allows the Arduino to read the analog values from the X and Y axes of the joystick, enabling precise control over the Chelonia Bot's speed and direction.

Code Example:Speed control using joystick

Usage Instructions:

- Ensure that the Chelonia Bot is powered on and connected to the Arduino.
- Use the joystick to control the robot movement:
  - Move the joystick along the Y-axis to control the speed of both motors.
  - Move the joystick along the X-axis to control the direction (left or right) of the Chelonia Bot.

- The serial monitor will display real-time updates on motor speeds, aiding in debugging and understanding the joystick values.
- Adjust the delay in the code based on your requirements.

Expected Results:

The Chelonia Bot should respond to the movements of the joystick, with the speed and direction changing according to the X and Y-axis values. The serial monitor will display the corresponding motor speeds for monitoring.

Additional Information:

- This experiment provides a versatile and interactive method of controlling the Chelonia Bot, making it suitable for various applications.
- The code uses PWM signals to control motor speed, ensuring smooth and proportional movements.

FAQs:

Q. How do I interpret the values on the serial monitor?
A: The serial monitor displays the motor speeds for both motors. Positive values indicate forward movement, and negative values indicate backward movement. The actual speed is proportional to the magnitude of the displayed value.

Q. Can I customize the code for different joystick models?
A: Yes, you can adjust the code by modifying the mapping of joystick values to motor speeds based on the specifications of your joystick.

Q. What should I do if the Chelonia Bot does not respond to joystick movements?
A: Check the connections of the joystick and motors. Ensure that the pins specified in the code match your hardware configuration.

Q. How can I enhance the responsiveness of the Chelonia Bot to joystick movements?
A: Experiment with the delay in the code. Smaller delays may result in more responsive control, while larger delays can provide smoother movements.