Experiment No: 3
Name of the Experiment: Hands-On Projects with Arduino Microcontroller
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Objective:

- To learn how to interface basic hardware with the Arduino microcontroller.

- To develop simple code for hardware control using Arduino IDE.

Project No.: 01
Project Name:

Overview:

Required Apparatus:

Circuit Diagram:

Experimental Setup:

Code:

```
// Motor A connections
int enA = 9;
int in1 = 8;
int in2 = 7;
// Motor B connections
int enB = 3;
int in3 = 5;
int in4 = 4;
bool a = true;
void setup() {
    // Set all the motor control pins to outputs
    pinMode(enA, OUTPUT);
    pinMode(enB, OUTPUT);
    pinMode(in1, OUTPUT);
    pinMode(in2, OUTPUT);
    pinMode(in3, OUTPUT);
    pinMode(in4, OUTPUT);
    pinMode(12, INPUT);
    // Turn off motors - Initial state
    digitalWrite(in1, LOW);
    digitalWrite(in2, LOW);
    digitalWrite(in3, LOW);
    digitalWrite(in4, LOW);
}

void loop() {
    if (a == true) {
        analogWrite(enA, 255);
        digitalWrite(in1, HIGH);
        digitalWrite(in2, LOW);
        delay(5000);

        a = false;
        digitalWrite(in1, LOW);
        digitalWrite(in2, LOW);
    }

    if (digitalRead(12) == HIGH) {
        analogWrite(enB, 255);
        // Motor 2 run 5 sec
        digitalWrite(in3, HIGH);
        digitalWrite(in4, LOW);
        delay(5000);
        digitalWrite(in3, LOW);
        digitalWrite(in4, LOW);
        delay(1000);
        // Now run both motors for 10 seconds
        analogWrite(enA, 255);
        analogWrite(enB, 255);

        digitalWrite(in1, HIGH);
        digitalWrite(in2, LOW);
        digitalWrite(in3, HIGH);
        digitalWrite(in4, LOW);
```

Listing 1: Blink LED Code

```
            delay(10000);
            digitalWrite(in1, LOW);
            digitalWrite(in2, LOW);
            digitalWrite(in3, LOW);
            digitalWrite(in4, LOW);
            delay(1000);
            a = true;
        }
    }
    // This function lets you control spinning direction of motors
    void directionControl() {
        // Set motors to maximum speed
        // For PWM maximum possible values are 0 to 255
        analogWrite(enA, 255);
        analogWrite(enB, 255);

        // Turn on motor A & B
        digitalWrite(in1, HIGH);
        digitalWrite(in2, LOW);
        digitalWrite(in3, HIGH);
        digitalWrite(in4, LOW);
        delay(2000);

        // Now change motor directions
        digitalWrite(in1, LOW);
        digitalWrite(in2, HIGH);
        digitalWrite(in3, LOW);
        digitalWrite(in4, HIGH);
        delay(2000);

        // Turn off motors
        digitalWrite(in1, LOW);
        digitalWrite(in2, LOW);
        digitalWrite(in3, LOW);
        digitalWrite(in4, LOW);
    }
    // This function lets you control speed of the motors
    void speedControl() {
        // Turn on motors
        digitalWrite(in1, LOW);
        digitalWrite(in2, HIGH);
        digitalWrite(in3, LOW);
        digitalWrite(in4, HIGH);

        // Accelerate from zero to maximum speed
        for (int i = 0; i < 256; i++) {
            analogWrite(enA, i);
            analogWrite(enB, i);
            delay(20);
        }

        // Decelerate from maximum speed to zero
        for (int i = 255; i >= 0; --i) {
            analogWrite(enA, i);
            analogWrite(enB, i);
            delay(20);
        }
```

Listing 2: Blink LED Code

```
        // Now turn off motors
        digitalWrite(in1, LOW);
        digitalWrite(in2, LOW);
        digitalWrite(in3, LOW);
        digitalWrite(in4, LOW);
    }

    void maruf() {
        analogWrite(enA, 255);
        analogWrite(enB, 255);
        for (int i = 1; i < 10; i++) {
            digitalWrite(in1, HIGH);
            digitalWrite(in2, LOW);
            digitalWrite(in3, HIGH);
            digitalWrite(in4, LOW);
            delay(200);

            digitalWrite(in1, LOW);
            digitalWrite(in2, HIGH);
            digitalWrite(in3, LOW);
            digitalWrite(in4, HIGH);
            delay(200);
        }
    }
```

Listing 3: Blink LED Code

Discussions: