



Course Name: Internet of Things Lab

Course code: 21CSP-344

Experiment 2.3

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Semester: 5th

Date of Performance:

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Aim: Assemble and controlling of multiple actuators using Arduino Uno for any IoT Application.

Objectives:

- Learn about actuators.

Software used: Arduino UNO

Hardware used:

- Breadboard
- Arduino Uno R3 board
- LEDs
- 200-ohm Resistor
- 1 Motor
- 1 Buzzer
- Jumper Wires

Theory:

Servo Motors: Servo motors are equipped with three cables, namely power, ground, and signal wires. The power cable is commonly colored red and should be linked to the 5V pin on the Arduino board. The ground cable, often black or brown, should be connected to a ground pin on the board. The signal pin is typically yellow or orange and is meant to be connected to a PWM pin on the board.

Knob Circuit: In the case of the Knob example, you should set up the potentiometer in a manner where its two outer pins are connected to power (+5V) and ground. Meanwhile, the middle pin of the potentiometer should be linked to the Ao (analog output) on the board. Subsequently, establish the connection for the servo motor.

LEDs (Light-Emitting Diodes): LEDs are compact, energy-efficient lights commonly employed in electronic devices. LED lights are polarized components, requiring specific circuit connections for proper functionality. Each LED consists of a positive and a negative leg, distinguishable by their length, with the negative leg being shorter.

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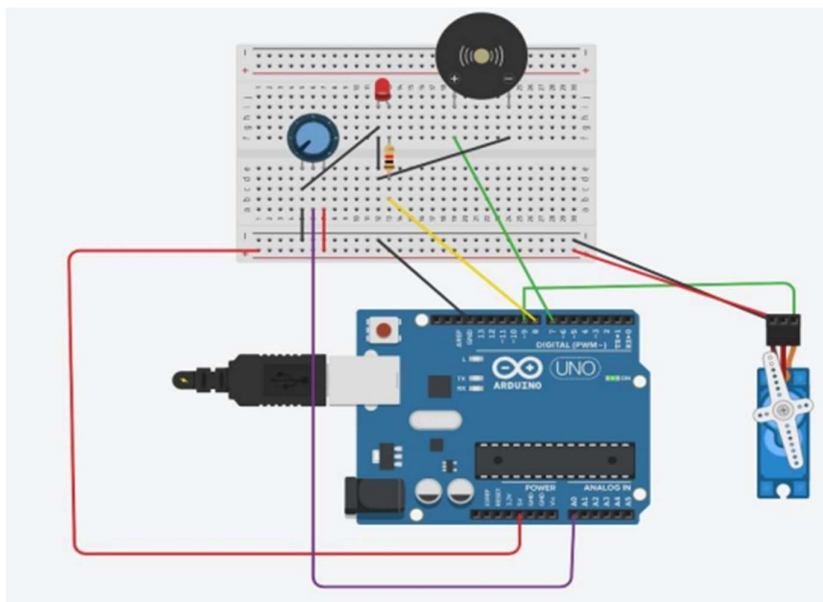
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Buzzer: A buzzer is an acoustic device capable of transforming audio signals into sound signals, usually driven by DC voltage. It finds extensive use in devices like alarms, computers, printers, and other electronics for sound output. Buzzer types can be categorized as piezoelectric or electromagnetic, often represented by the labels "H" or "HA" in circuits. Depending on their design and intended use, buzzers can produce various sounds such as music, sirens, buzzes, alarms, and electric bell sounds.

Procedure:

- Connect the LED's positive leg to digital pin 8.
- Connect the motor's positive leg to digital pin 9.
- Connect the buzzer's positive leg to digital pin 7.
- Connect all negative legs of the components to the ground pin.

Circuit Diagram:



Code:

```
#include <Servo>

const int ledPin1 = 8;
const int motorPin = 9;
const int buzzerPin = 7;

Servo servo;
void setup() {
```

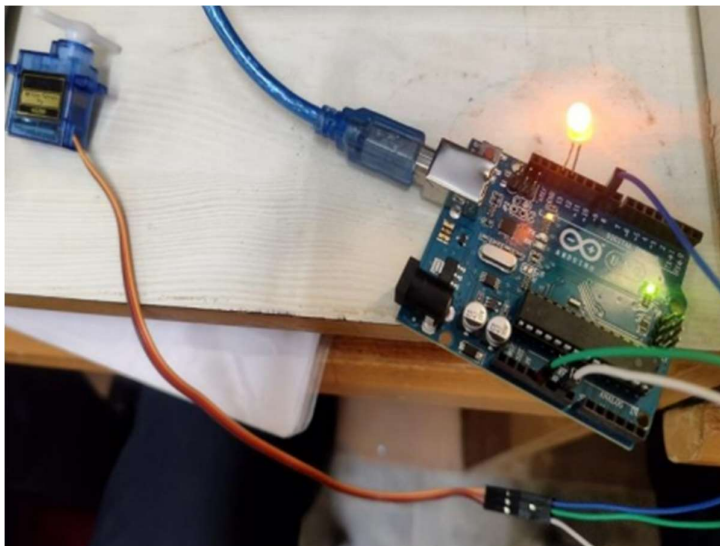
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```
pinMode(ledPin1, OUTPUT);  
pinMode(motorPin, OUTPUT);  
pinMode(buzzerPin, OUTPUT);  
servo.attach(motorPin);  
}  
  
void loop() {  
  digitalWrite(ledPin1, HIGH);  
  servo.write(90);  
  digitalWrite(buzzerPin, HIGH);  
  delay(1000);  
  
  digitalWrite(ledPin1, LOW);  
  servo.write(0);  
  digitalWrite(buzzerPin, LOW);  
  delay(1000);  
}
```

Result/Conclusion:

The experiment successfully controlled LED, servo motor, and buzzer using an Arduino, demonstrating effective actuator interfacing and programming.



Learning Outcomes:

- Learned about Arduino-based actuator control.
- Learned about sensor and actuator interfacing
- Learned about coding for IoT applications.