SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECT213- IoT SYSTEM ARCHITECTURE

II ECE / IV SEMESTER

UNIT 3 – ACTUATORS AND IOT NETWORKING DEVICES

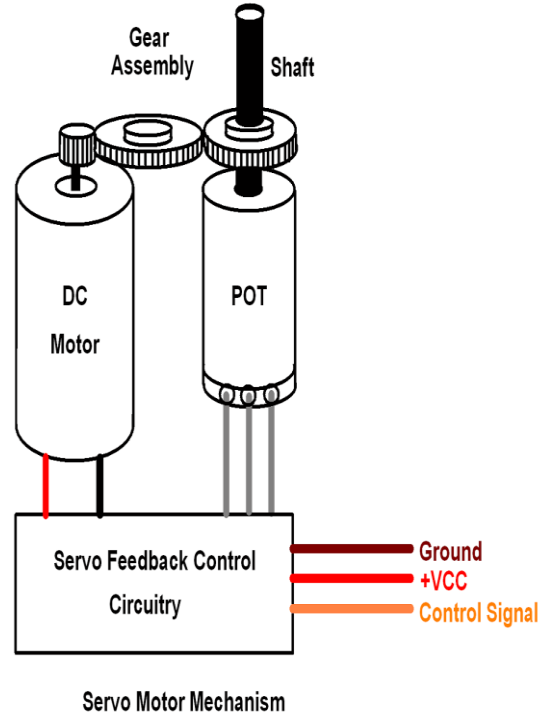# TOPIC 4 –Programming and Interfacing of Actuators: Servo

Servo Motor Interfacing With Arduino Uno

- A servo motor is an electric device used for precise control of angular rotation.
- It is used in applications that demand precise control over motion, like in case of control of a robotic arm.
- The rotation angle of the servo motor is controlled by applying a PWM signal to it.
- By varying the width of the PWM signal, we can change the rotation angle and direction of the motor.
- Servo motor consists of DC motor with error sensing negative feedback mechanism. This allows precise control over angular velocity and position of motor. In some cases, AC motors are used.
- It is a closed loop system where it uses negative feedback to control motion and final position of the shaft.
- It is not used for continuous rotation like conventional AC/DC motors.
- It has rotation angle that varies from 0° to 180°.

Servo Motor Interfacing With Arduino Uno

Gear Assembly   Shaft

DC Motor   POT

Servo Feedback Control Circuitry

Ground
+VCC
Control Signal

Servo Motor Mechanism

ElectronicWings.com

•**+VCC (RED)**
- Connect +VCC supply to this pin.
•**Ground (BROWN)**
- Connect Ground to this pin.
•**Control Signal (ORANGE)**
- Connect PWM of 20ms (50 Hz) period to this pin.

Servo Motor Interfacing With Arduino Uno
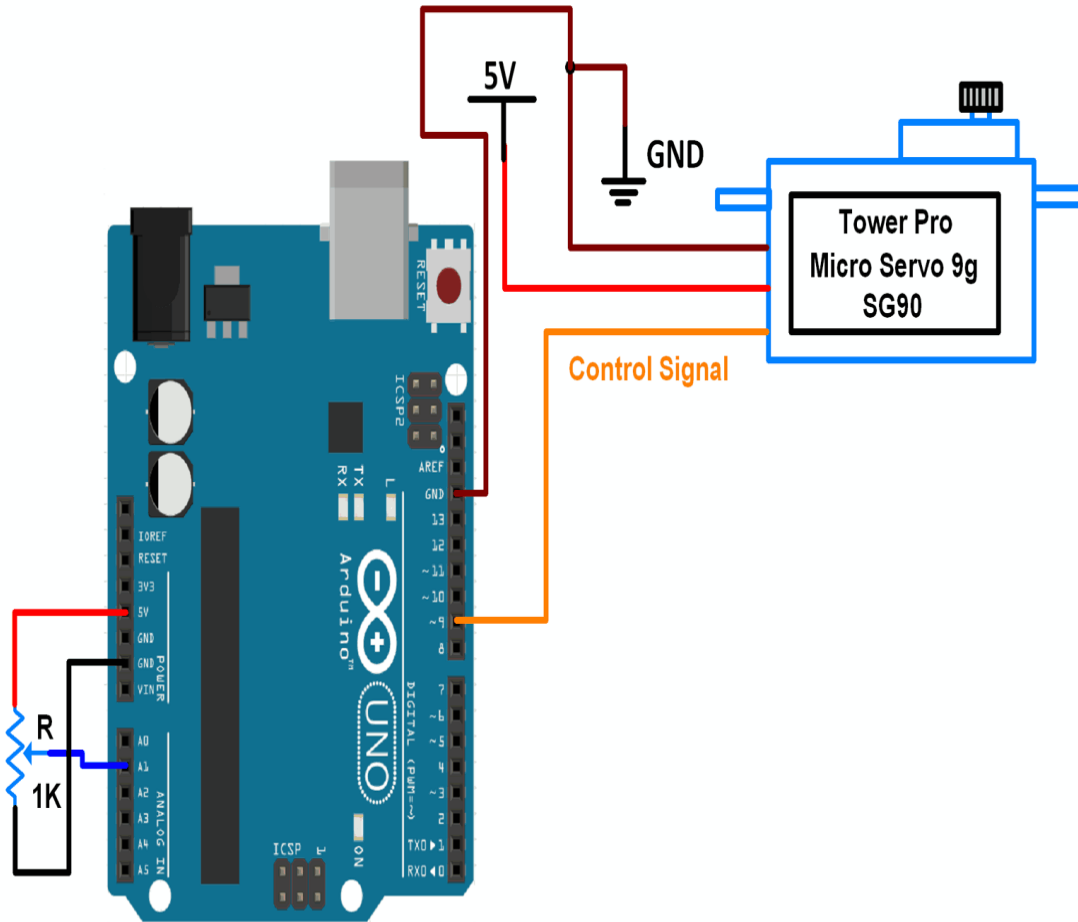
The circuit connections are very simple as the servo motor has only 3 pins.

- The red wire of the servo goes to 5V pin of Arduino Uno
- The Black wire of the servo goes to Arduino Uno's ground pin (GND)
- The yellow wire (called the control pin of servo) goes to Arduino pin 8
- This completes the circuit connections of the servo motor with Arduino Uno.

Servo Motor Interfacing With Arduino Uno

Servo Position Control Using Potentiometer and Arduino

```
#include <Servo.h>
 Servo myservo; /* create servo object to control a servo */
int potpin = 1; /* analog pin used to connect the potentiometer */
int val; /* variable to read the value from the analog pin */
void setup()
{ Serial.begin(9600);
myservo.attach(9); /* attaches the servo on pin 9 to the servo object */
 }
void loop()
{ val = analogRead(potpin); /* reads the value of the potentiometer (value between 0 and 1023) */
Serial.print("Analog Value : ");
Serial.print(val);
 Serial.print("\n");
 val = map(val, 0, 1023, 0, 180); /* scale it to use it with the servo (value between 0 and 180) */
Serial.print("Mapped Value : ");
 Serial.print(val);
Serial.print("\n\n");
myservo.write(val); /* sets the servo position according to the scaled value */
 delay(1000); /* waits for the servo to get there */ }
```

Servo Motor Interfacing With Arduino Uno

- First, include a library called "Servo.h" to be able to control various servo motors.
- If you don't already have this library in your Arduino IDE, then you can go to "tools" à "Manage Libraries…" and type "Servo" in the Library Manager and install the one from "Michael Margolis, Arduino".
- Next, declare a variable called "servo".
- In void setup function, use the servo.attach function to tell the Arduino board that the control pin of the servo motor is attached to pin 8 of Arduino (the function attaches the servo variable to the pin).
- The servo.write function is used to tell the servo the degree to which it should turn.
- At the beginning the default state of servo is considered as zero degree keep this as origin position that is zero degrees.,
- So write servo.write(0).
- Then a delay function is used to create a delay of 2ms.
- In void loop, use the servo.write function again to tell the servo to turn to 180 degrees and the delay function will hold this position for 1ms.
- Then the servo is instructed again to go back to 0 degrees, as initialized before.
- The delay function will hold this position for 1ms.
- This is repeated until the power is disconnected or servo is disconnected.