Interfacing servo motor with microcontroller

EEE F411, IoT course, Dr. Vinay Chamola, BITS-Pilani

Arduino microcontroller
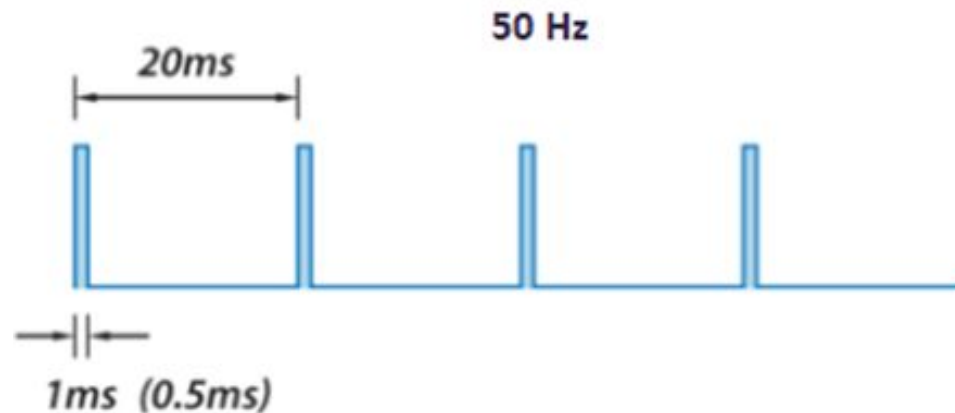
servo motor

Control Signal

Controlling of Servo Motors

- We will use PWM control signals to control the servo motor.

- The frequency of the control signal should be 50Hz i.e. a pulse should occur every 20ms.

- The width of pulse determines angular position of the servo. Servos generally can rotate upto 180 degrees.

Servo Motor Control

50 Hz

20ms

1ms (0.5ms)

0 Degrees

1.5ms

90 Degrees

2ms (2.5ms)

180 Degrees

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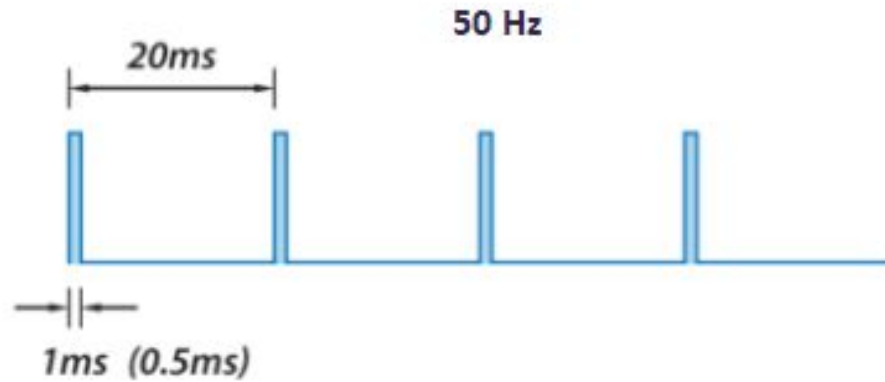
Servo Commands

```
Import Servo Library:        #include <Servo.h>
Create Servo Object:          Servo myServo;
Attach Servo Pin:         myServo.attach(9);
Set the angle:            myServo.write(angle);
```

Sketch to control servo

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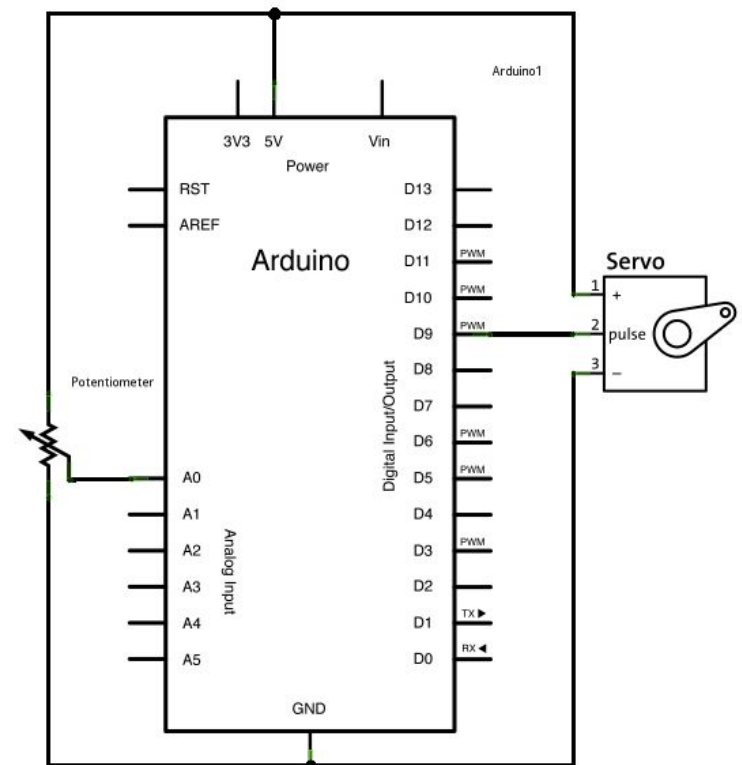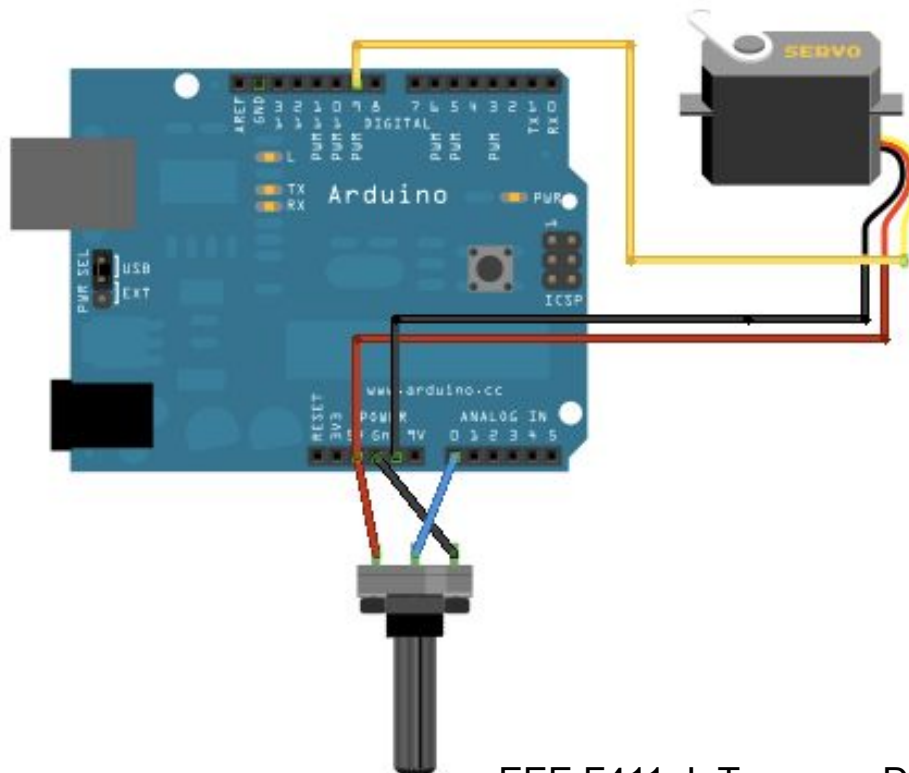
```
#include <Servo.h>
Servo myservo;

void setup()
{
        myservo.attach(9);
}
void loop()
{
        myservo.write(95);
        delay(2000);
        myservo.write(150);
        delay(2000);
}
```

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Challenge!

Challenge: Servo

Use the potentiometer to control the angle of the servo motor

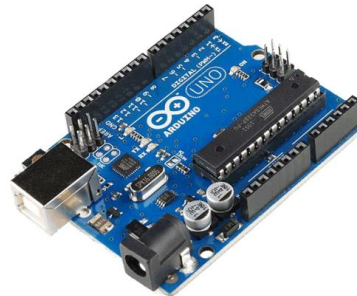EEE F411, IoT course, Dr. Vinay Chamola, BITS-Pilani

Hint to Challenge

```
potVal = analogRead(potPin);
angle = map(potVal, 0, 1023, 0, 179);
myServo.write(angle);
delay(15);
```

Steps for connecting Servo motor and potentiometer with Arduino

1. The servo has a three pin female connector. The brown (or darkest pin) is usually ground. Connect this to ground of Arduino.

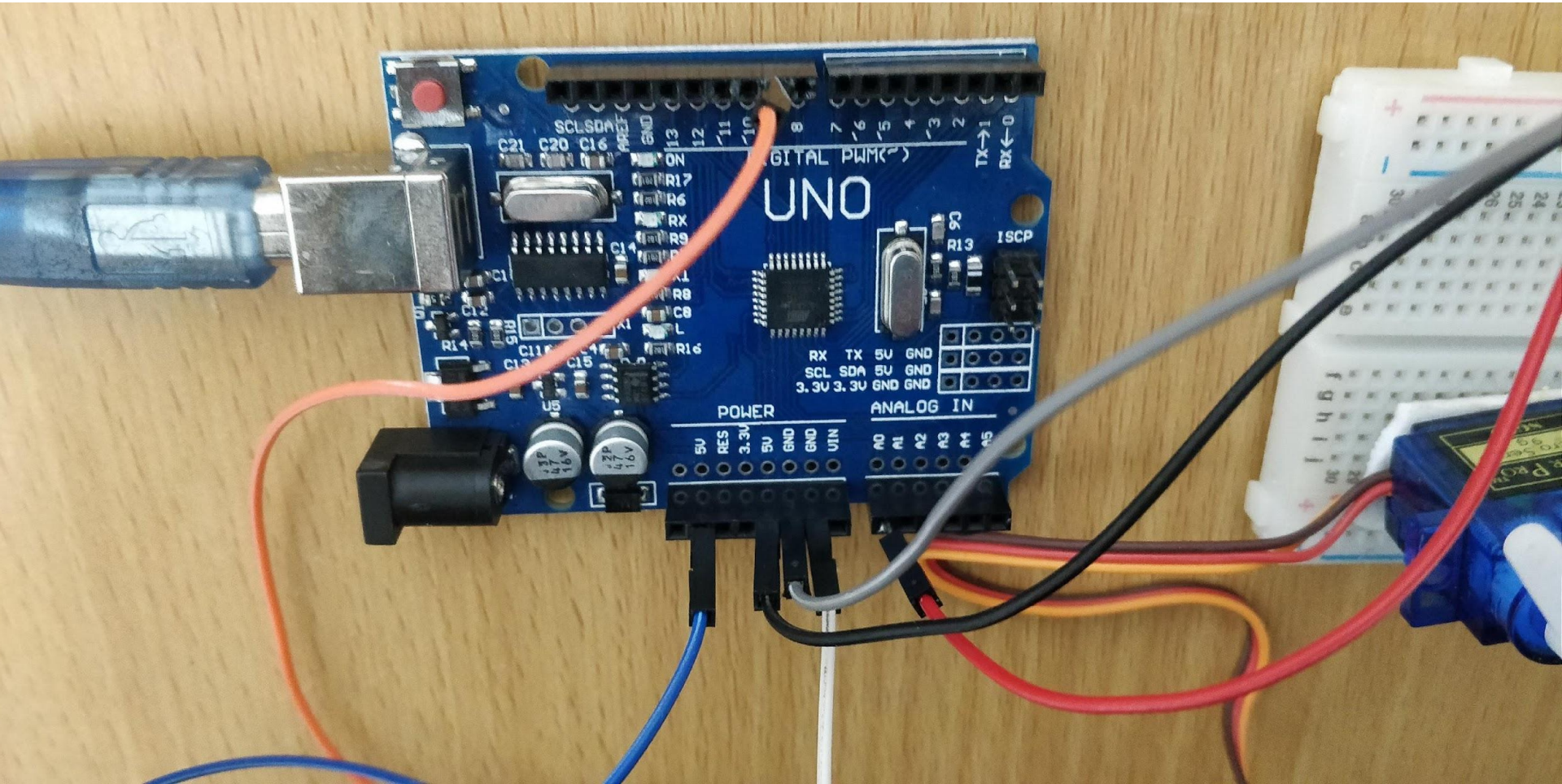Potentiometer

+ 5

VOUT

GND

2. Connect the Red (Power) pin to 5V on the Arduino.

3. Connect the Yellow pin on the servo to Arduino's digital pin 11.

4. Connect the servo Vout (Potentiometer) to the Arduino's Analog Pin 0.

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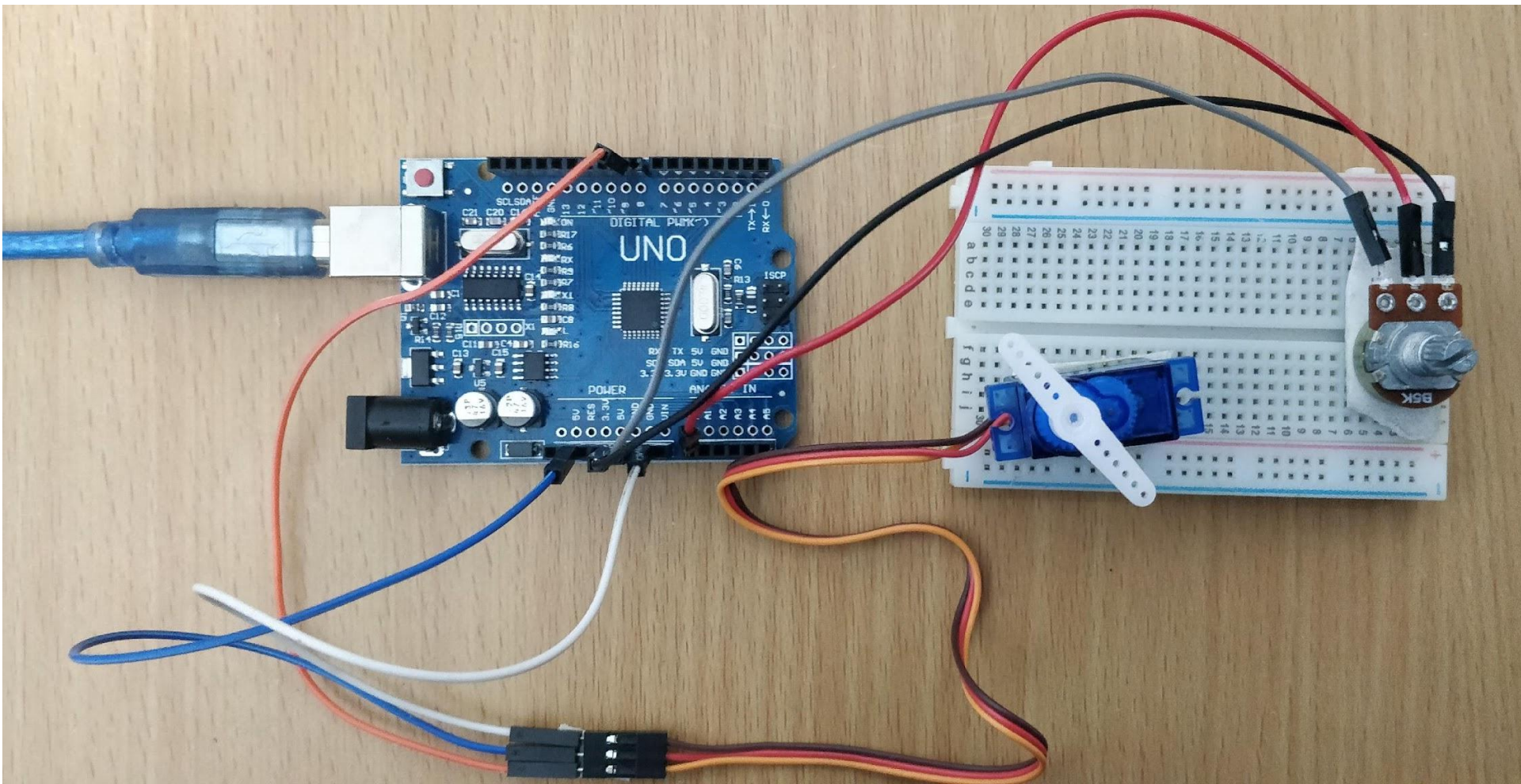
Servo Motor

Servo Motor

Potentiometer in Servo Motor Interfacing

- The potentiometer is connected to the Arduino's analog input pin.

- The PWM signal's duty cycle is determined by the position of the potentiometer. The PWM value, will be in the range of 0 to 1023. (10-bit ADC on Arduino Uno).

- This value is mapped to an angular position between 0 and 180 degrees.

- Thus, the position of the potentiometer precisely controls the servo motor's rotation.

Servo Motor Coding

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```
#include <Servo.h>
   Servo myservo; // create servo object to control a servo
   int potpin = 0; // analog pin used to connect the potentiometer
   int val; // variable to read the value from the analog pin

void setup() {
   myservo.attach11); // attaches the servo on pin11 to the servo object
}

void loop() {
   val = analogRead(potpin);
   // reads the value of the potentiometer (value between 0 and 1023)
   val = map(val, 0, 1023, 0, 180);
   // scale it to use it with the servo (value between 0 and 180)
   myservo.write(val); // sets the servo position according to the scaled value
   delay(15);
}
```