# SERVO MOTOR

INTRODUCTION

A Servo Motor is a small device that has an output shaft. This shaft can be positioned to specific angular positions by sending the servo a coded signal. As long as the coded signal exists on the input line, the servo will maintain the angular position of the shaft. If the coded signal changes, the angular position of the shaft changes. In practice, servos are used in radio-controlled airplanes to position control surfaces like the elevators and rudders. They are also used in radio-controlled cars, puppets, and of course, robots.

Servos are extremely useful in robotics. The motors are small, have built-in control circuitry, and are extremely powerful for their size.

WORKING PRINCIPLE

• Servos are controlled by sending an electrical pulse of variable width, or pulse width modulation (PWM), through the control wire. There is a minimum pulse, a maximum pulse, and a repetition rate. • A servo motor can usually only turn 90° in either direction for a total of 180° movement. The motor's neutral position is defined as the position where the servo has the same amount of potential rotation in the both the clockwise or counter-clockwise direction.

• The PWM sent to the motor determines position of the shaft, and based on the duration of the pulse sent via the control wire; the rotor will turn to the desired position.

• The servo motor expects to see a pulse every 20 milliseconds (ms) and the length of the pulse will determine how far the motor turns.

• For example, a 1.5ms pulse will make the motor turn to the 90° position. Shorter than 1.5ms moves it in the counter clockwise direction toward the 0° position, and any longer than 1.5ms will turn the servo in a clockwise direction toward the 180° position.
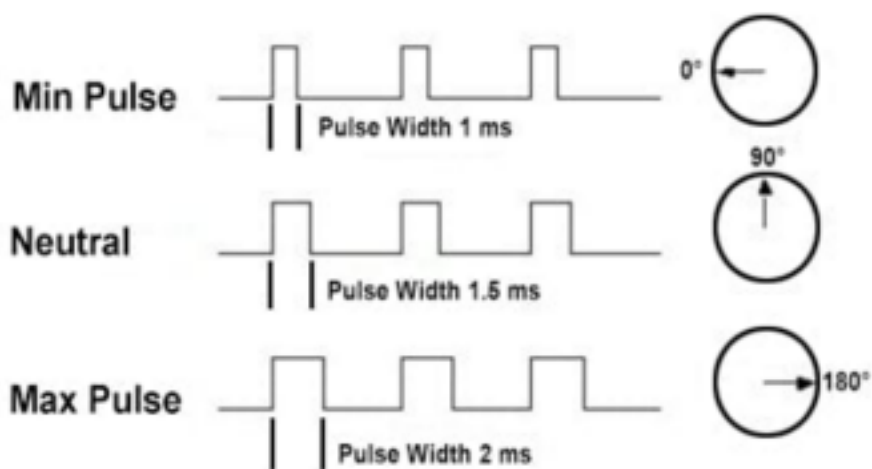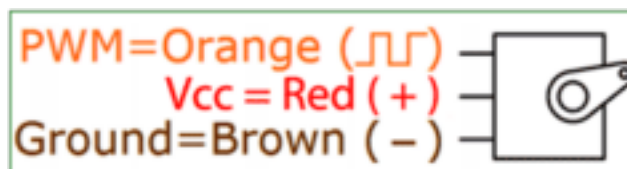

It consists of three parts:

1. Controlled device
2. Output sensor
3. Feedback system

It is a closed-loop system where it uses a positive feedback system to control motion and the final position of the shaft. Here the device is controlled by a feedback signal generated by comparing output signal and reference input signal.

PWM=Orange (⎍)
Vcc = Red (+)
Ground=Brown (−)

MINI PROJECT

AIM:

To actuate a servo motor, 0 - 180 degrees and 180 - 0 degrees.

COMPONENTS REQUIRED:

EVOED Board, Servo motor

PROGRAM:

#include <Servo.h>

Servo myservo; // create servo object to control a servo // twelve servo objects can be created on most boards

```
int pos = 0; // variable to store the servo position

void setup() {
  myservo.attach(9); // attaches the servo on pin 9 to the servo object }

void loop()
{
  for (pos = 0; pos <= 180; pos += 1) { // goes from 0 degrees to 180
    degrees // in steps of 1 degree
    myservo.write(pos); // tell servo to go to position in variable 'pos' delay(15); //
  waits 15ms for the servo to reach the position }

  for (pos = 180; pos >= 0; pos -= 1) { // goes from 180 degrees to 0 degrees
  myservo.write(pos); // tell servo to go to position in variable 'pos' delay(15); // waits
  15ms for the servo to reach the position }
}
```