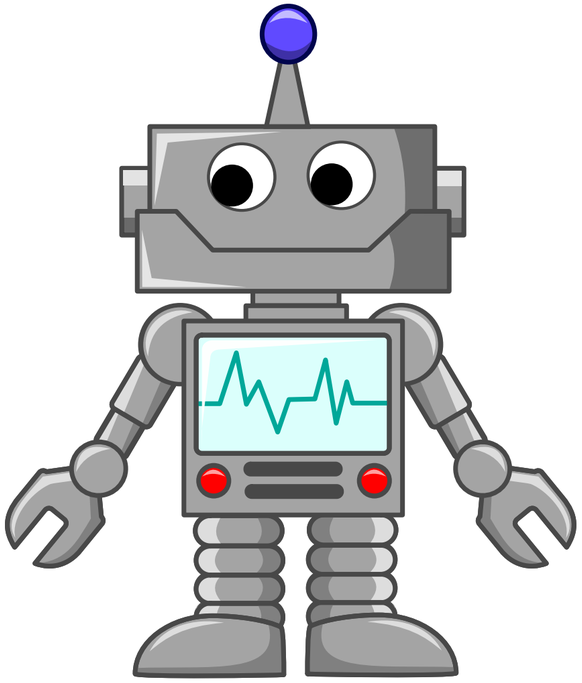
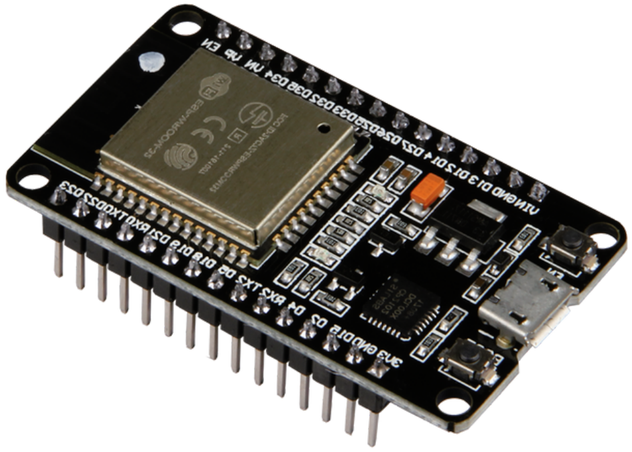
D Y PATIL
INTERNATIONAL
UNIVERSITY
AKURDI PUNE

EMBEDDED SYSTEM DESIGN PRACTICAL - 2

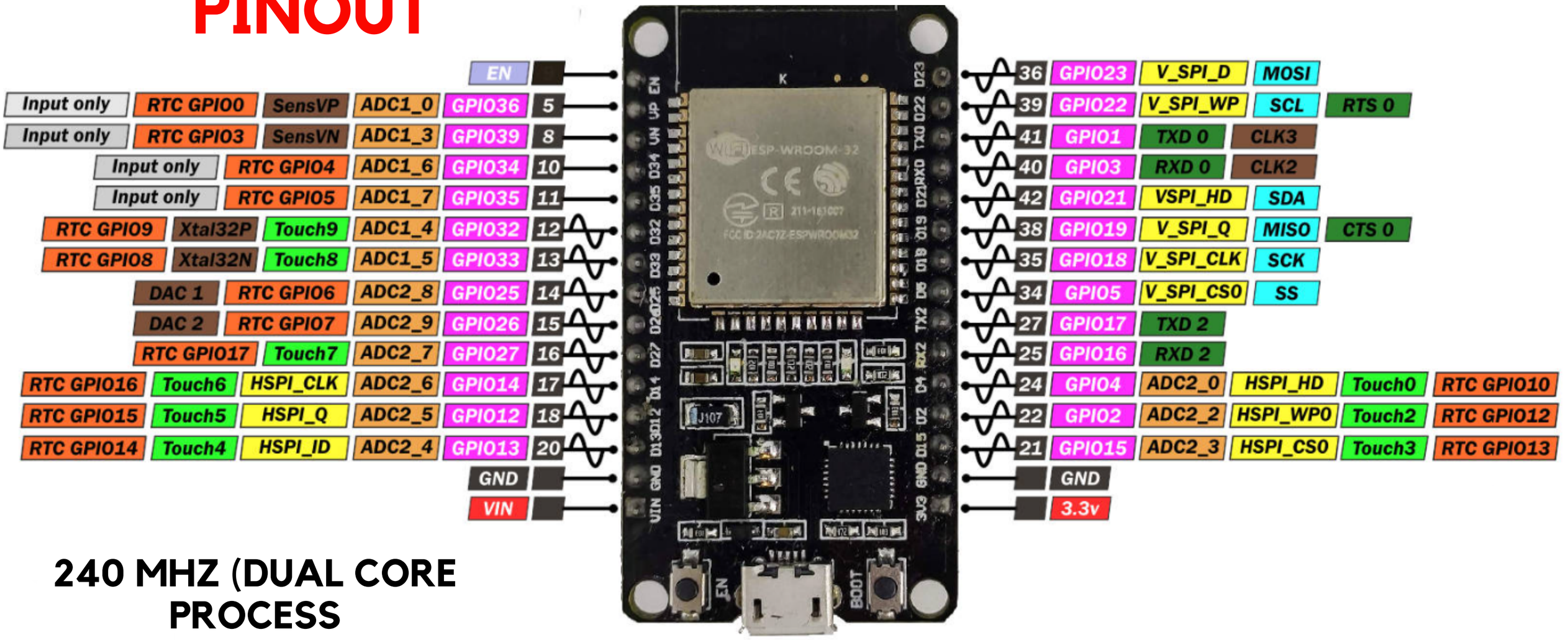
SERVO MOTOR

By Divesh Jadhwani





ESP32 PINOUT

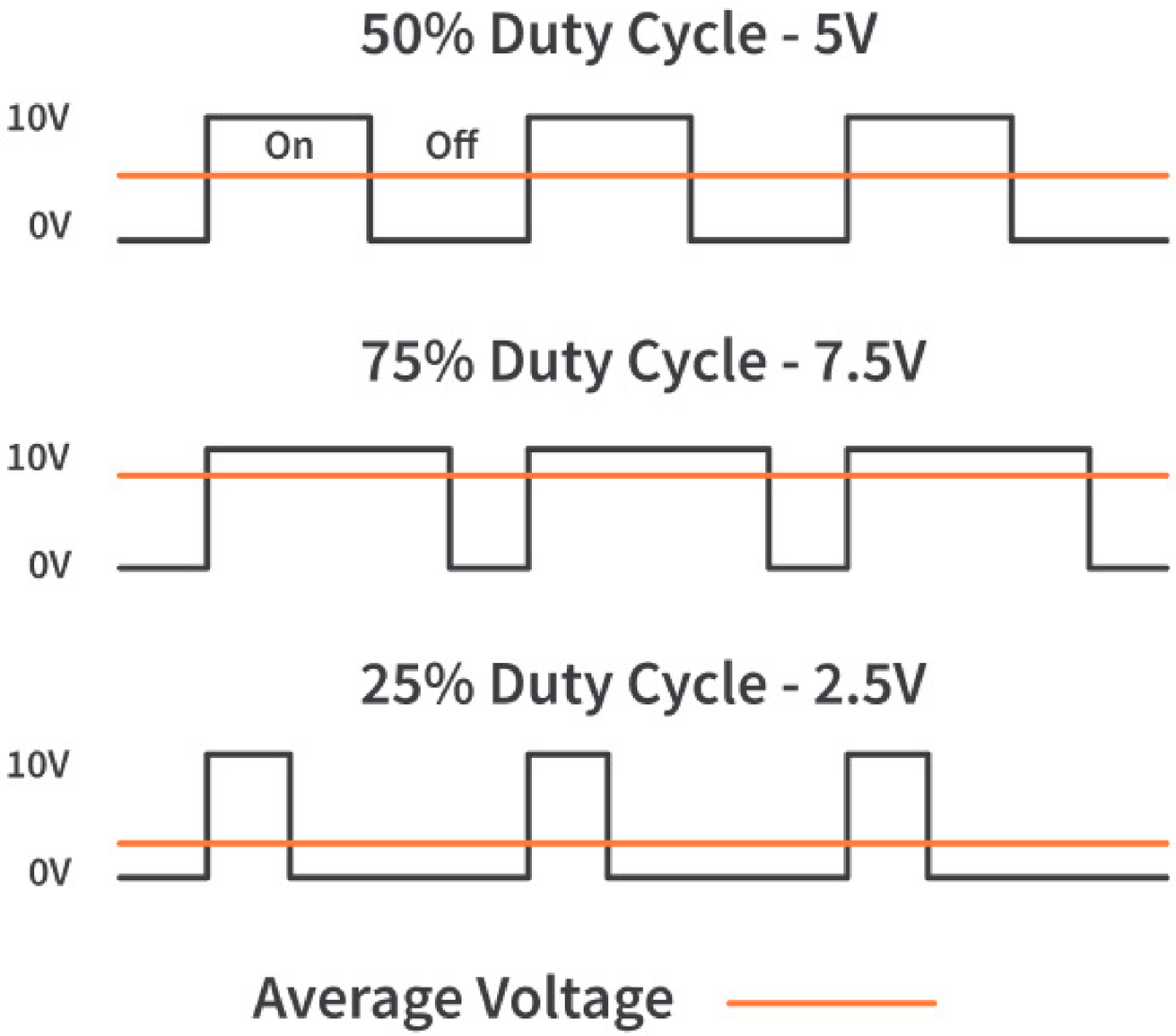


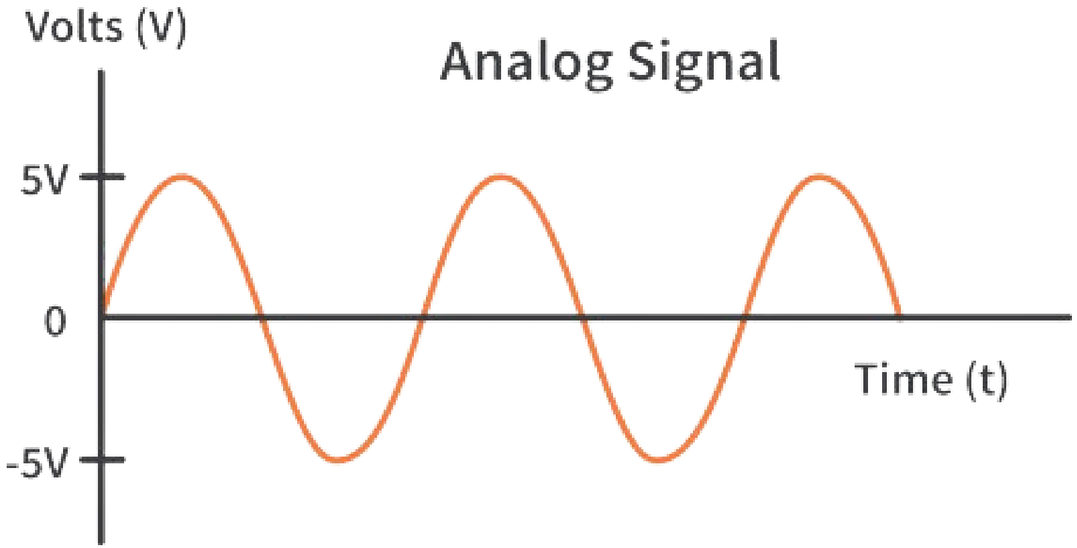
240 MHZ (DUAL CORE PROCESS
4MB FLASH MEMORY
520 KB RAM

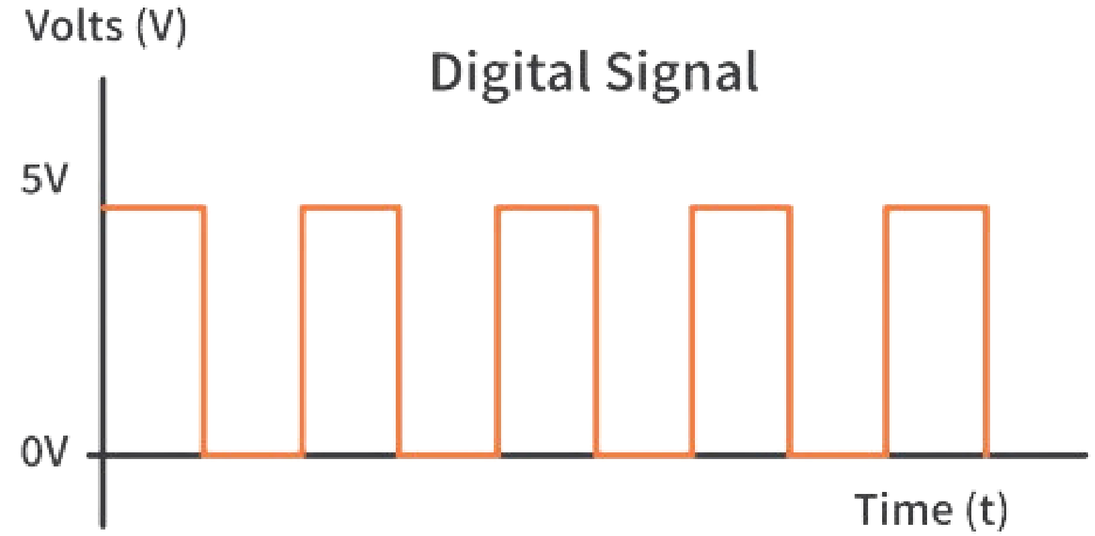
ESP32 PINOUT

- 34 PROGRAMMABLE GPIOS
- 18 12-BIT ADC CHANNELS
- 2 8-BIT DAC CHANNELS
- 16 PWM CHANNELS – INTENSITY
- 3 UART INTERFACES – ADD
- 3 SPI INTERFACES – MEMORY
- 2 I2C INTERFACES – SDA AND SCL
- 10 CAPACITIVE TOUCH SENSING GPIOS
- 16 RTC GPIOS – DATE AND TIME

PWM


50% Duty Cycle - 5V
10V
On
Off
0V
75% Duty Cycle - 7.5V
10V
0V
25% Duty Cycle - 2.5V
10V
0V
Average Voltage


Volts (V)
Analog Signal
5V
0
-5V
Time (t)

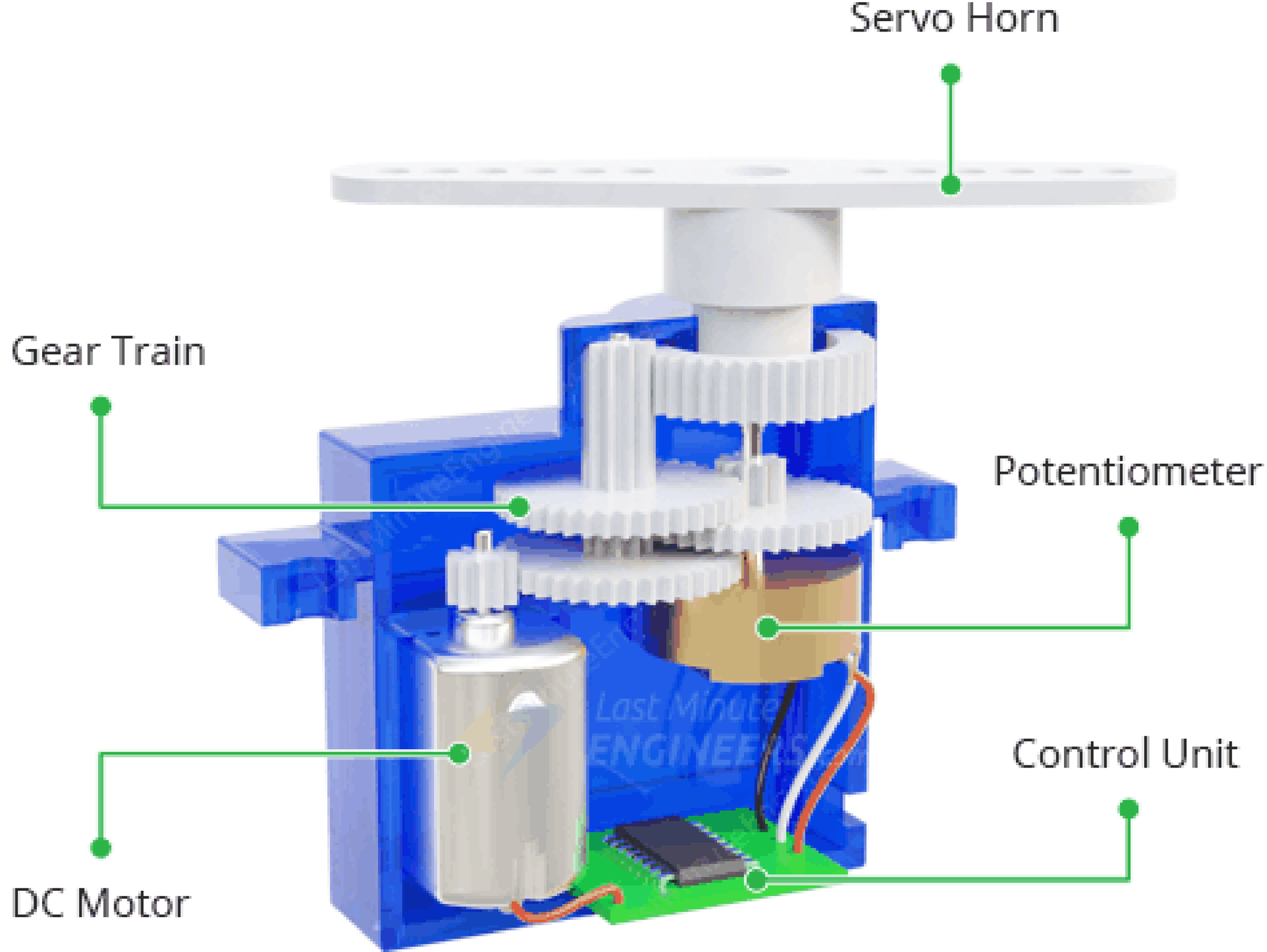

Volts (V)
Digital Signal
5V
0V
Time (t)

DC MOTOR AND SERVO MOTOR

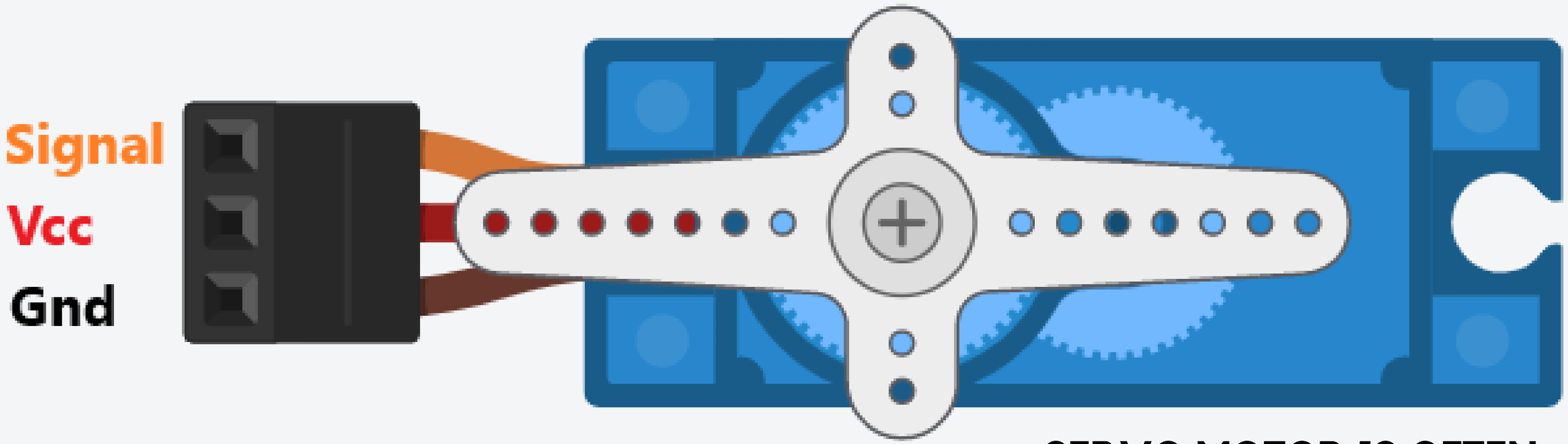
DC(DIRECT CURRENT) MOTOR JUST CONTINOUSLY ROTATES GIVEN A VOLTAGE

SERVO MOTOR ACCEPTS A SIGNAL AND THEN ROTATES IN A CERTAIN DEGREE SPECIFIED BY US


S3006
HS-422
08.02

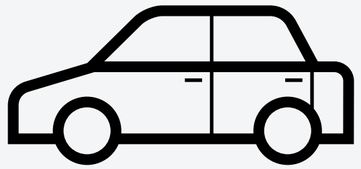

Servo Horn
Gear Train
Potentiometer
Control Unit
DC Motor

SERVO MOTOR PINOUT



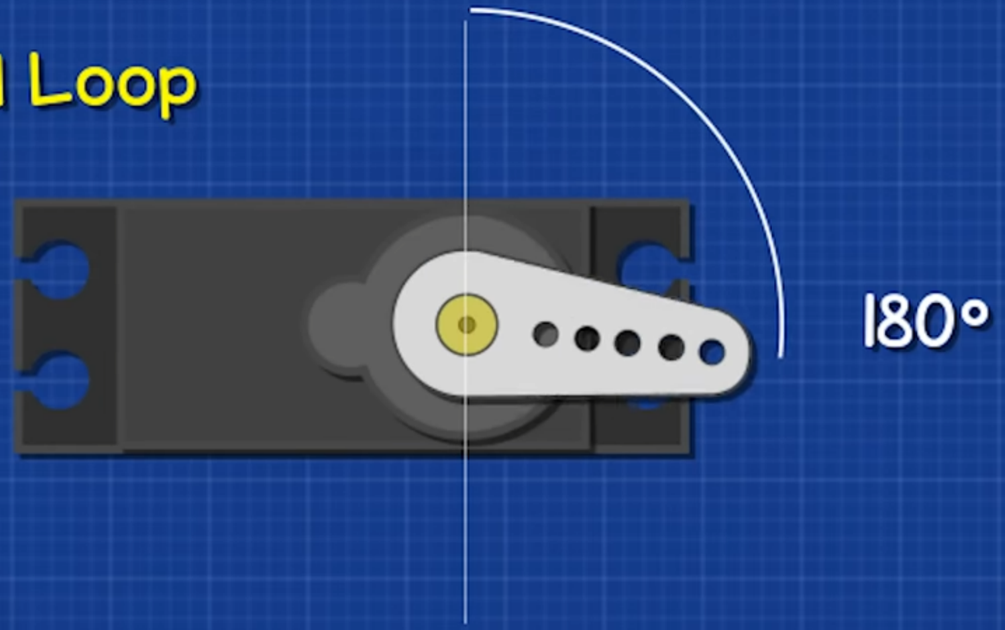
SERVO MOTOR CONVERTS ELECTRICAL ENERGY INTO MECHANICAL ENERGY

SERVO MOTOR IS OFTEN CONTROLLED BY A CONTROLLER
EG : REMOTE CONTROLLED CAR

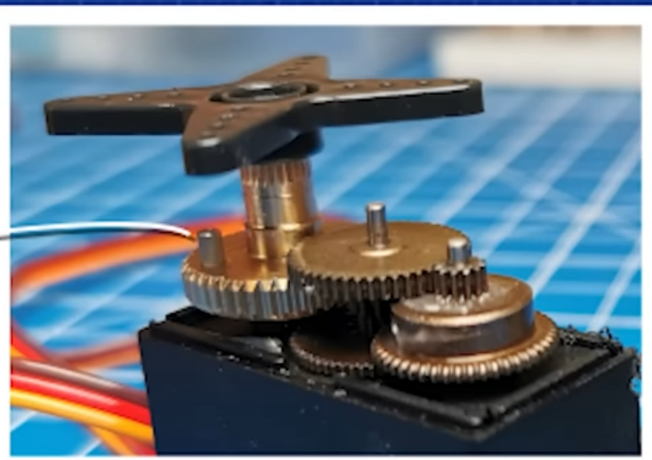


VARIATIONS

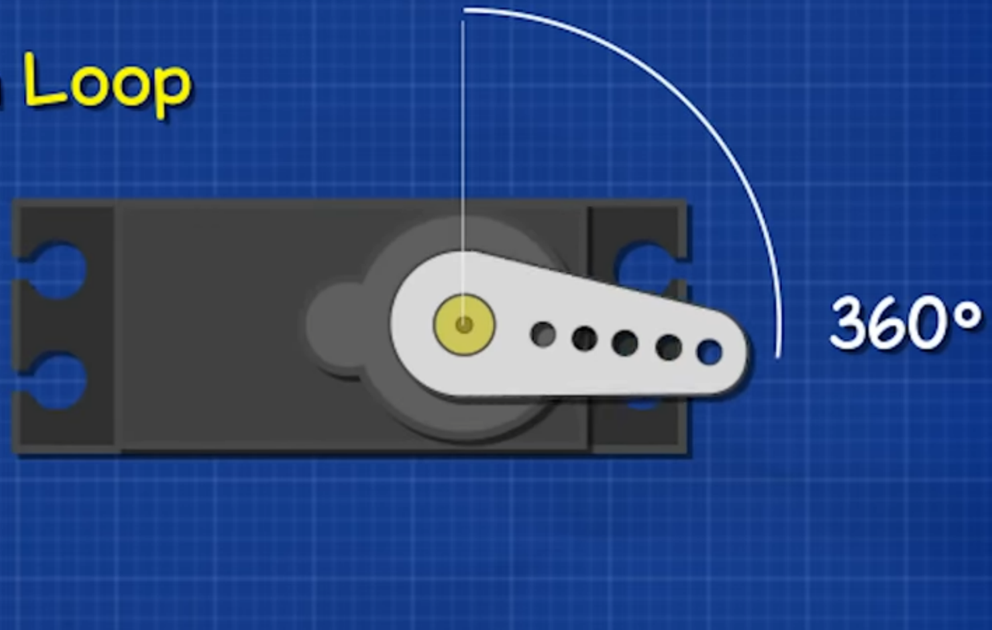
Closed Loop

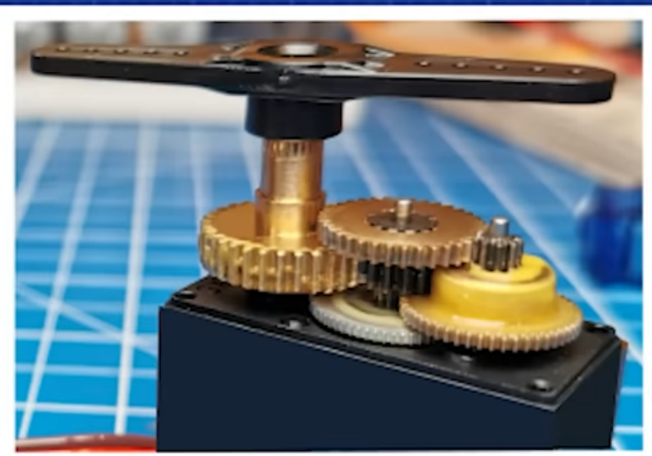


Limiting Pin



Open Loop





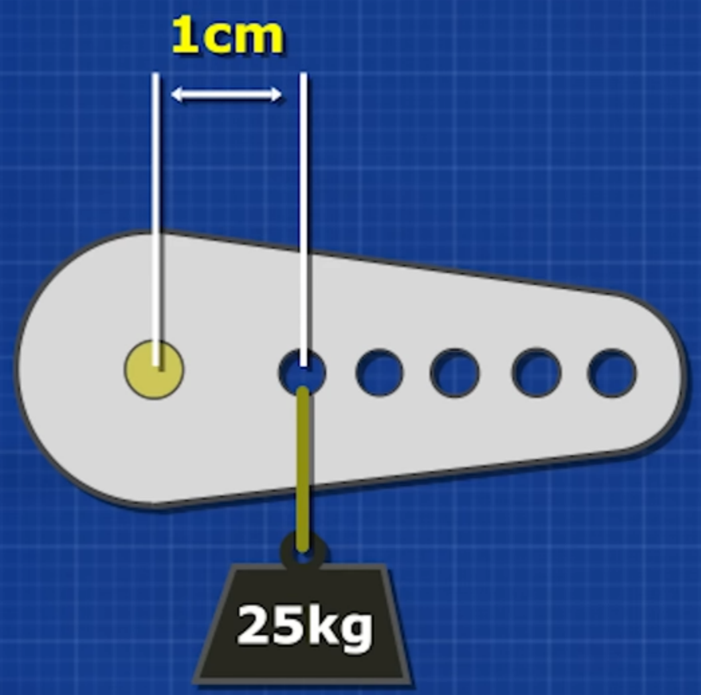
WEIGHTS

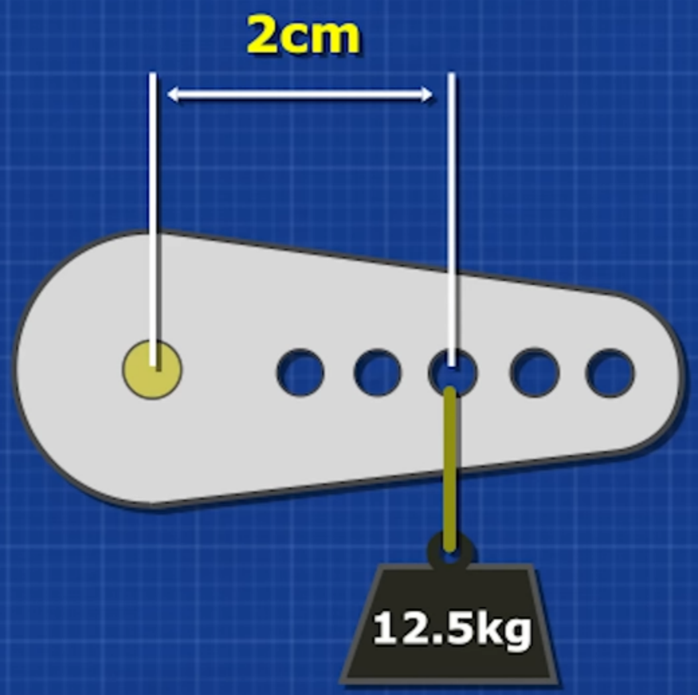
Weights determine how much force can be applied using a servo motor and not the actual weight of the motor

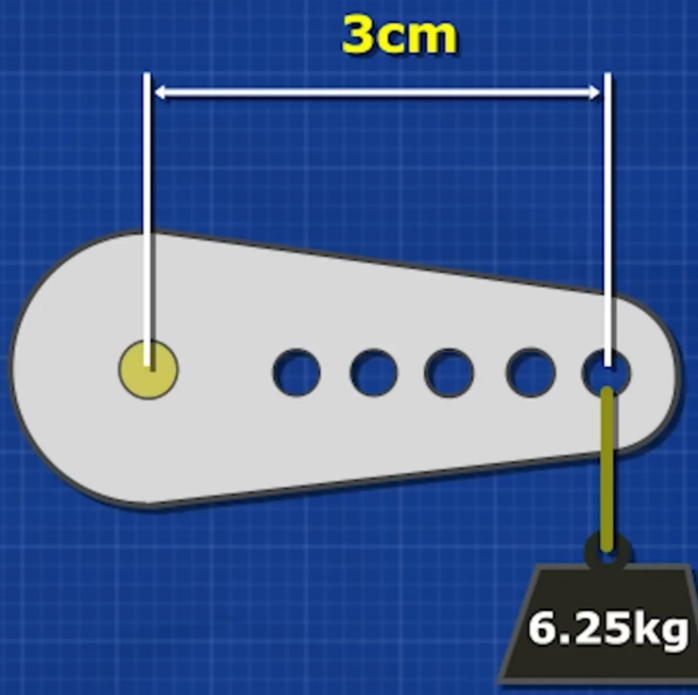
25 kg

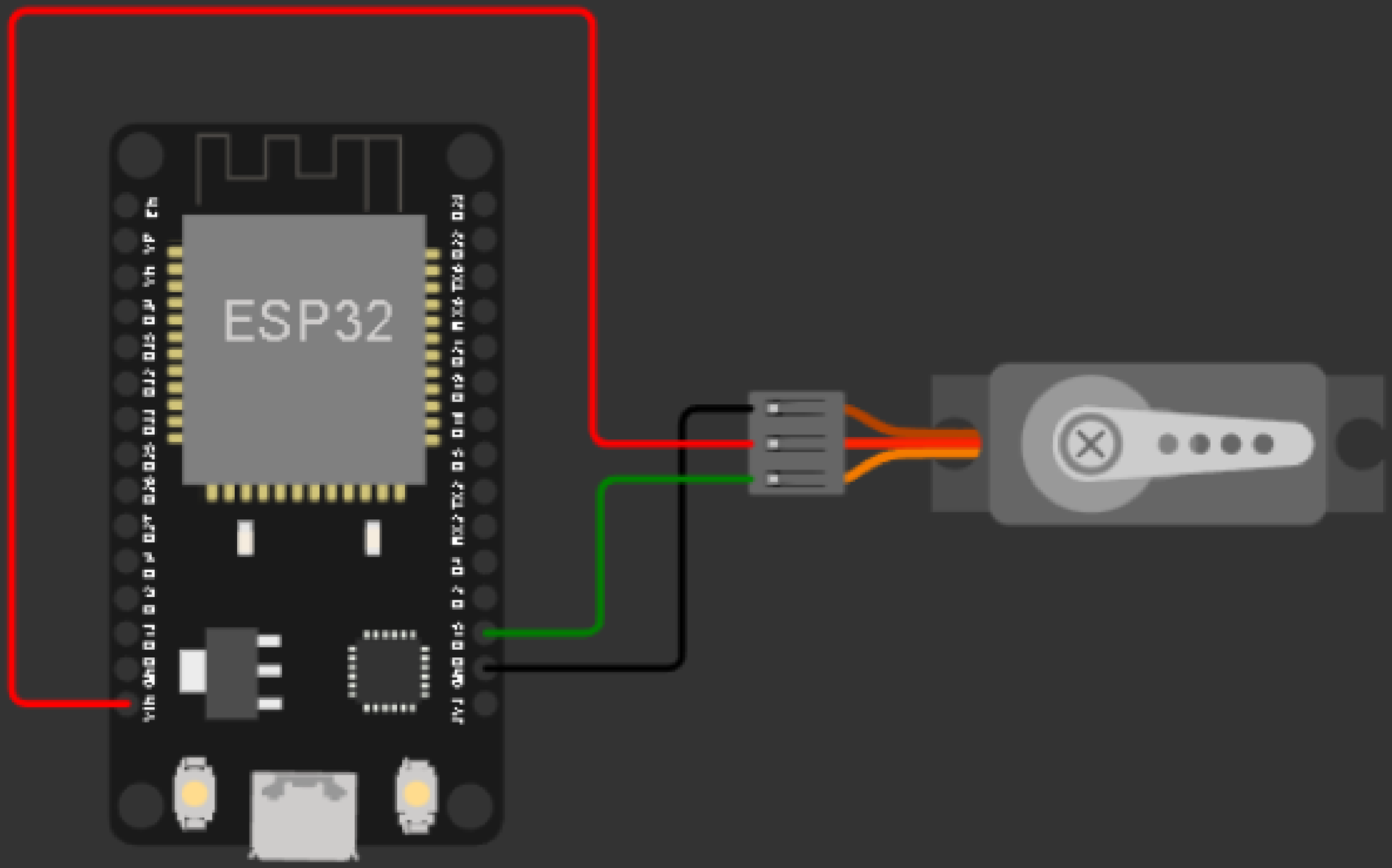
9g (0.009 kg)

WEIGHTS - DIVISION








ESP32

```
1   import machine
2   from machine import Pin , PWW
3   import time
4
5   servo = PWM(Pin(5) , 50)
6
7   while True:
8       servo.duty(26)
9       time.sleep(1)
10      servo.duty(123)
11      time.sleep(1)
```

THANK YOU

dypiu.ac.in