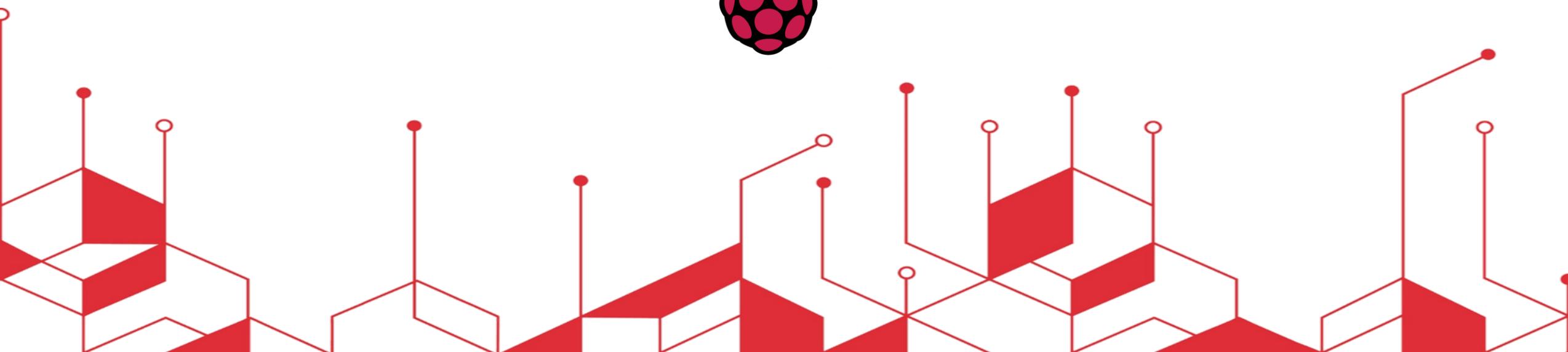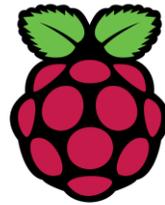Remote Lab For Engineering Project
Erasmus+ Program

Raspberry Pi -Take Home Lab

### Lab Experiment # 8

Raspberry Pi- Servo Motor

Servo Motor

➢ SG90 is a popular micro servo motor commonly used in small-scale robotics and model control applications.

➢ This motor can rotate 180 degrees with a maximum torque of 1.8 kg-cm. It operates at 4.8-6V and has a weight of approximately 9 grams.

➢ A Servo Motor mainly has three wires, one is for positive voltage, another is for ground and last one is for position setting. The Red wire is connected to power, Brown wire is connected to ground and Yellow wire (or WHITE) is connected to signal.

180° Rotation

Ground

VCC (5V)   **Signal**
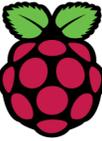
Servo Motor- Code & Wiring Diagram
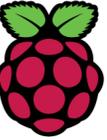
```python
import RPi.GPIO as GPIO
import time

# Pin configuration
SERVO_PIN = 40  # Physical pin 40 (BOARD numbering)

# GPIO setup
GPIO.setmode(GPIO.BOARD)  # Use physical pin numbering
GPIO.setup(SERVO_PIN, GPIO.OUT)  # Set the pin as an output

# Set up PWM for the servo motor
pwm = GPIO.PWM(SERVO_PIN, 50)  # 50 Hz frequency for servo control
pwm.start(0)  # Start with 0 duty cycle

# Function to set servo angle
def set_angle(angle):
    duty_cycle = 2 + (angle / 18)  # Convert angle to duty cycle
    GPIO.output(SERVO_PIN, True)
    pwm.ChangeDutyCycle(duty_cycle)
    time.sleep(0.5)  # Allow the servo to reach position
    GPIO.output(SERVO_PIN, False)
    pwm.ChangeDutyCycle(0)

try:
    # Move the servo to the desired positions
    for angle in [0, 45, 90, 135, 180]:
        print(f"Setting angle: {angle}°")
        set_angle(angle)
        time.sleep(1)  # Delay of 1 second between moves
except KeyboardInterrupt:
    print("Exiting program.")
finally:
    pwm.stop()  # Stop PWM
    GPIO.cleanup()  # Reset GPIO settings
```
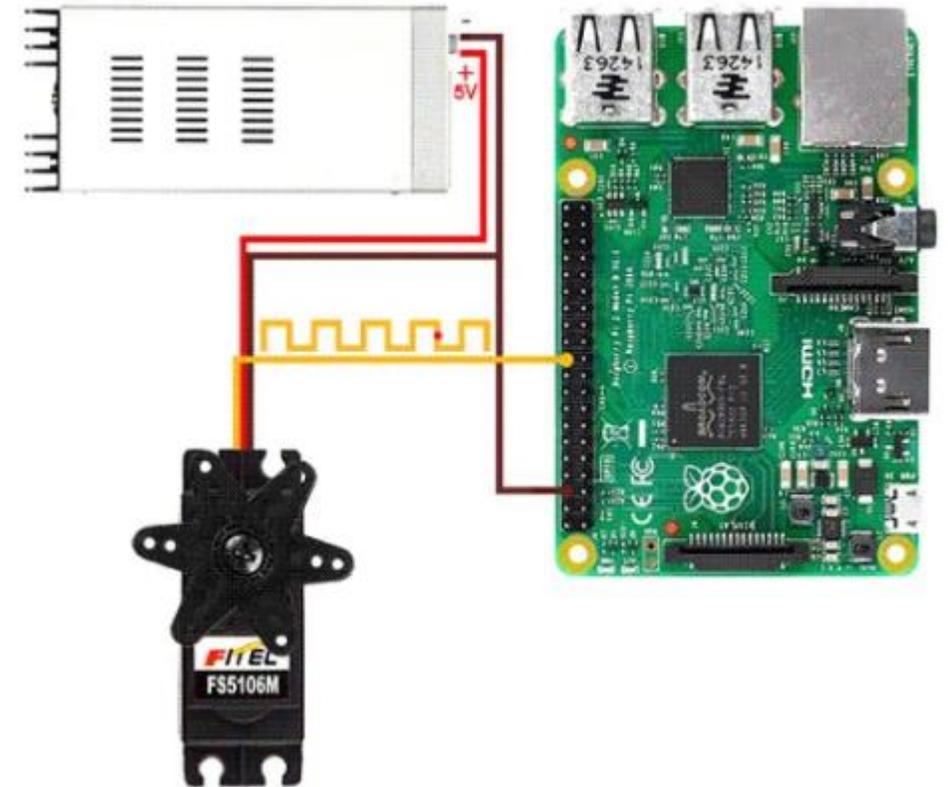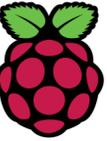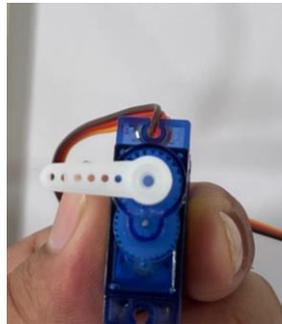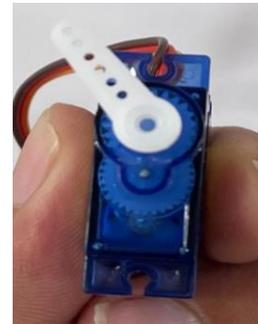
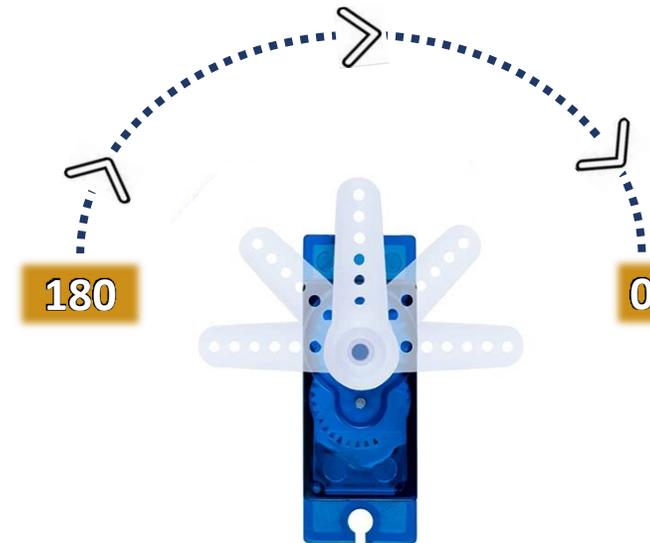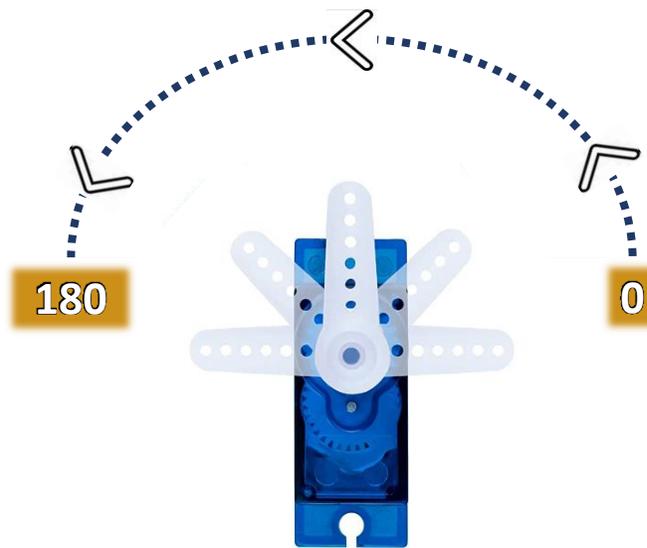# Servo Motor

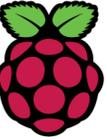| 0 deg | 45 deg | 90 deg | 135 deg | 180 deg |

Practice 1 – Sweeping servo shaft from 0 to 180 deg
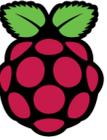
Use the circuit you built in the previous example to move the servo motor shaft from 0 to 180 deg then 180 to 0 deg. Each step is 10 degrees. This is what we call SWEEPING

Take-home Practice

Build a circuit that reads the distance of an object in front of camera to change the camera zoom automatically using the servo motor that fixed on the camera lens.

The object is away with a range **5-10 cm**: Servo motor at 0 deg.

The object is away with a range **11-20 cm**: Servo motor at 60 deg.

The object is away with a range **21-30 cm**: Servo motor at 120 deg.

The object is away with a range **31-40 cm**: Servo motor at 180 deg.