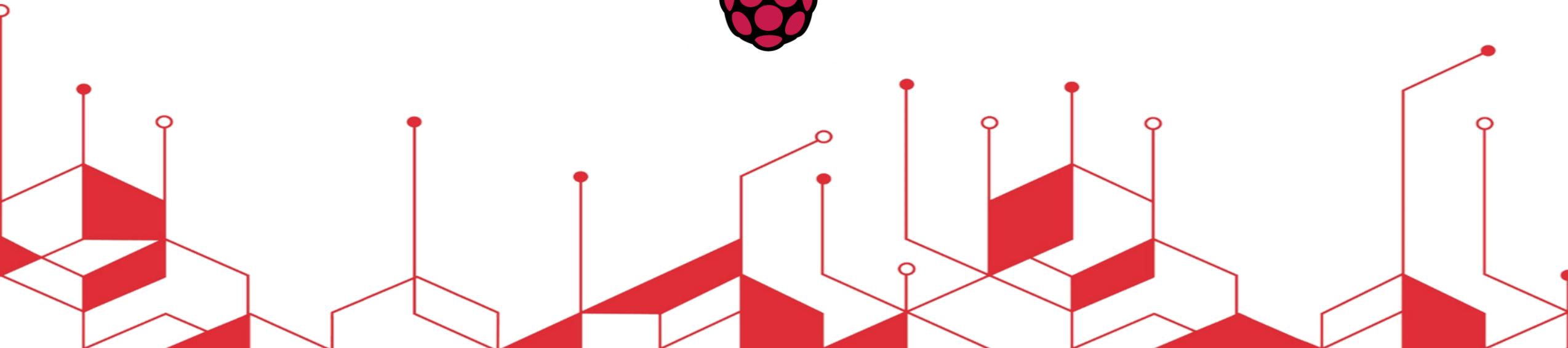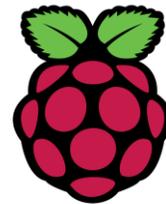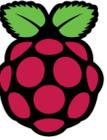Remote Lab For Engineering Project
Erasmus+ Program

Raspberry Pi -Take Home Lab

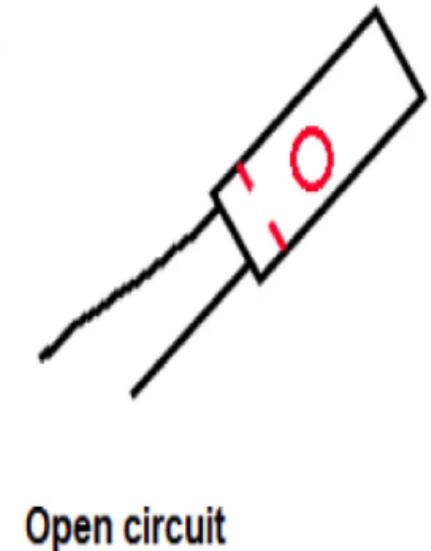## Lab Experiment # 7

Raspberry Pi- Sensors
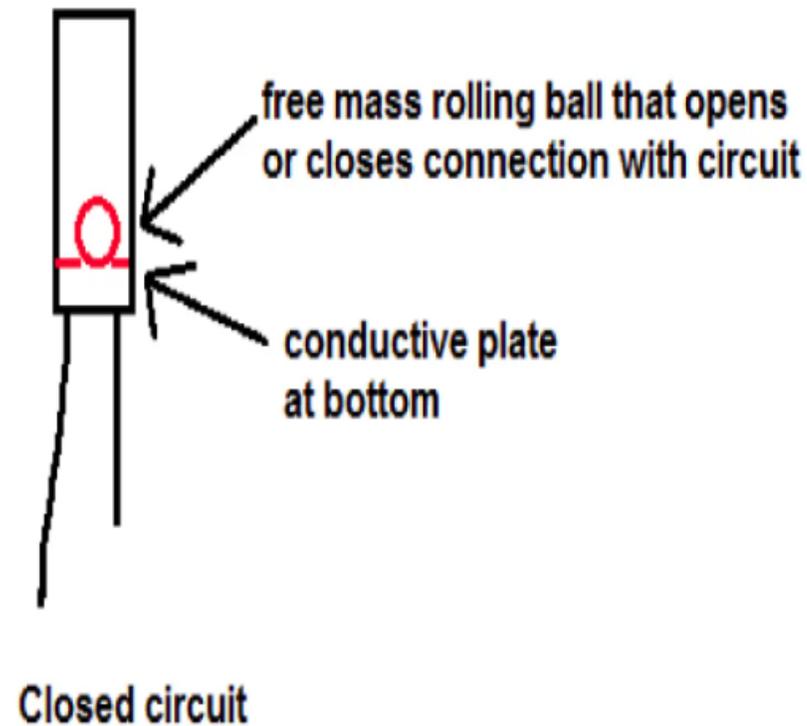
Tilt Sensor

➢ The tilt sensor is an instrument that is used for measuring the tilt in multiple axes of a reference plane.

➢ Tilt sensors measure the tilting position with reference to gravity and are used in numerous applications.

➢ They enable the easy detection of orientation or inclination. Similar to mercury switches, they may also be known as tilt switches or rolling ball sensors.
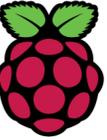
Tilt Sensor- Working Principle
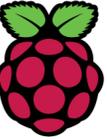
➢ The tilt sensor has a metallic ball that is designed to move the two pins of the instrument from the 'on' to the 'off' position, and vice versa, if the sensor reaches a pre-determined angle.

➢ Tilt sensors are the environment-friendly version of a mercury-switch.

free mass rolling ball that opens or closes connection with circuit

conductive plate at bottom

Closed circuit

Open circuit

Tilt Sensor- Code

```python
import RPi.GPIO as GPIO
import time
GPIO.setmode(GPIO.BCM)
GPIO.setup(18,GPIO.IN)
try:
    while True:
        i = GPIO.input(18)
        if i==1:
            print("Horizontal")
            time.sleep(0.1)
        elif i==0:
            print("Vertical")
            time.sleep(0.1)
except KeyboardInterrupt:
        GPIO.cleanup()
```
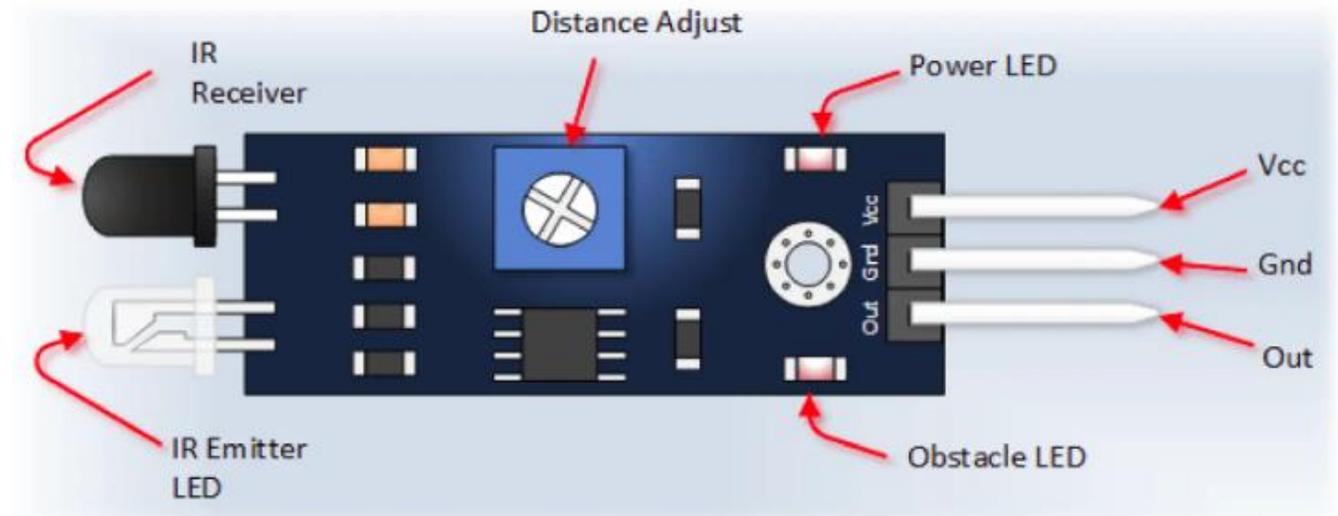
Tilt Sensor- Applications
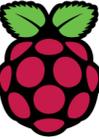
➢ To monitor the angle at which a mobile phone or tablet is held for the auto-rotate function
➢ To detect the position of hand-held game systems and in game controllers
➢ To measure the angle at which a satellite antenna 'looks' toward a satellite
➢ To monitor laser levels and seismic activity.

Infrared Sensor

➤ This sensor comprises two main parts: IR-LED and Photo Diode.

➤ The IR-LED emits light of Infrared range 700 nanometers (nm) to 1 mm

➤ The Photo diode receives the light reflection off the detected object and changes its resistance

➤ The IR-sensor module outputs 'Signal' that carries the voltage according to variations in diode resistance.
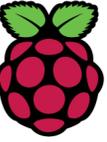
IR color detection sensor
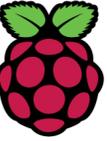
➢ The amount of reflected light depends on the color of the surface from which it is being reflected. Black is a perfect absorber and white is a perfect reflector.

➢ This sensor can be used in many applications, such as line follower, micro mouse, grid solver…
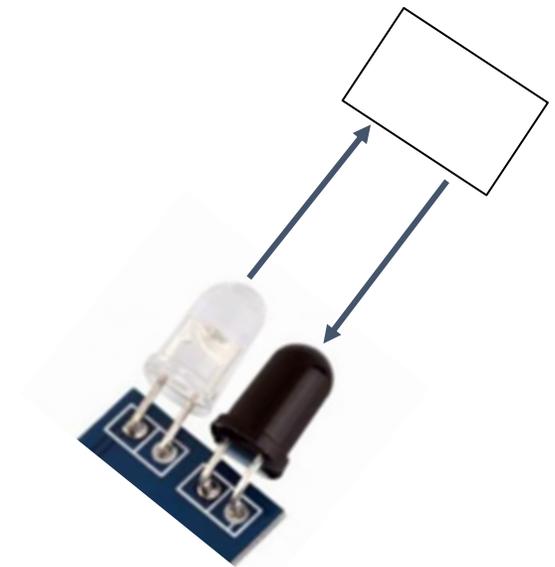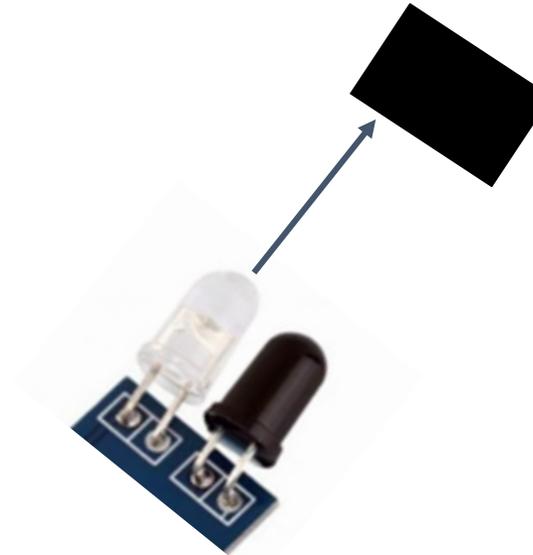
Infrared Sensor- Code & Connection

```python
import RPi.GPIO as GPIO
import time
GPIO.setmode(GPIO.BCM)
GPIO.setup(18,GPIO.IN)
try:
    while True:
        i = GPIO.input(18)
        if i==0:
            print("No Interrupt")
            time.sleep(0.1)
        elif i==1:
            print("Interrupted")
            time.sleep(0.1)
except KeyboardInterrupt:
    GPIO.cleanup()
```

Infrared Sensor

Infrared Sensor