

An abstract graphic of flowing, translucent liquid or smoke in shades of blue and white, swirling from the top left towards the bottom left and bottom right of the frame.

# **SPRING BOOTCAMP**

**MICROCONTROLLERS AND SENSORS**

Elektronica



**ELEKTRONICA**  
IIT HYDERABAD

# AGENDA

## Q1

Brief Overview  
of Sensors and  
Microcontrollers

## Q2

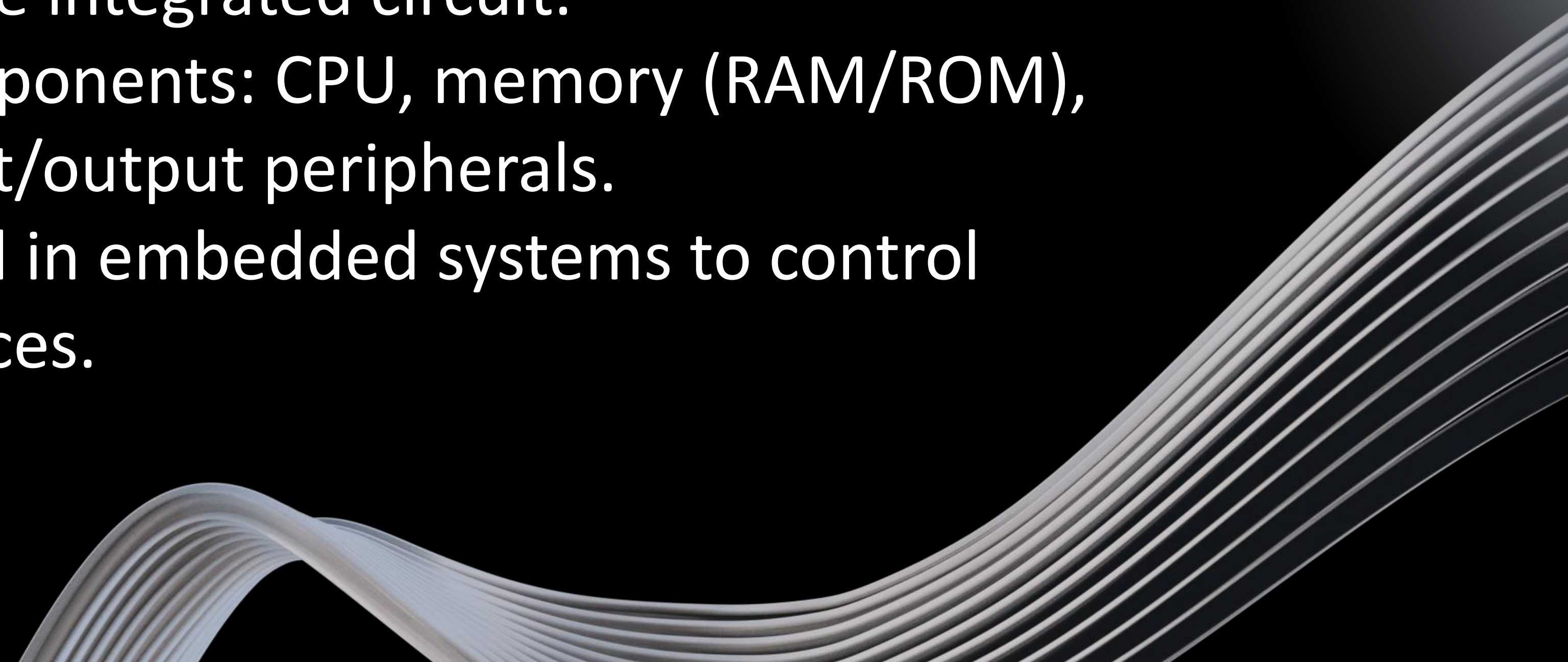
Mini Hands-on  
Project: Mini  
Piano

## Q3

Exploring  
ESP32 Wi-Fi  
and Bluetooth  
capabilities

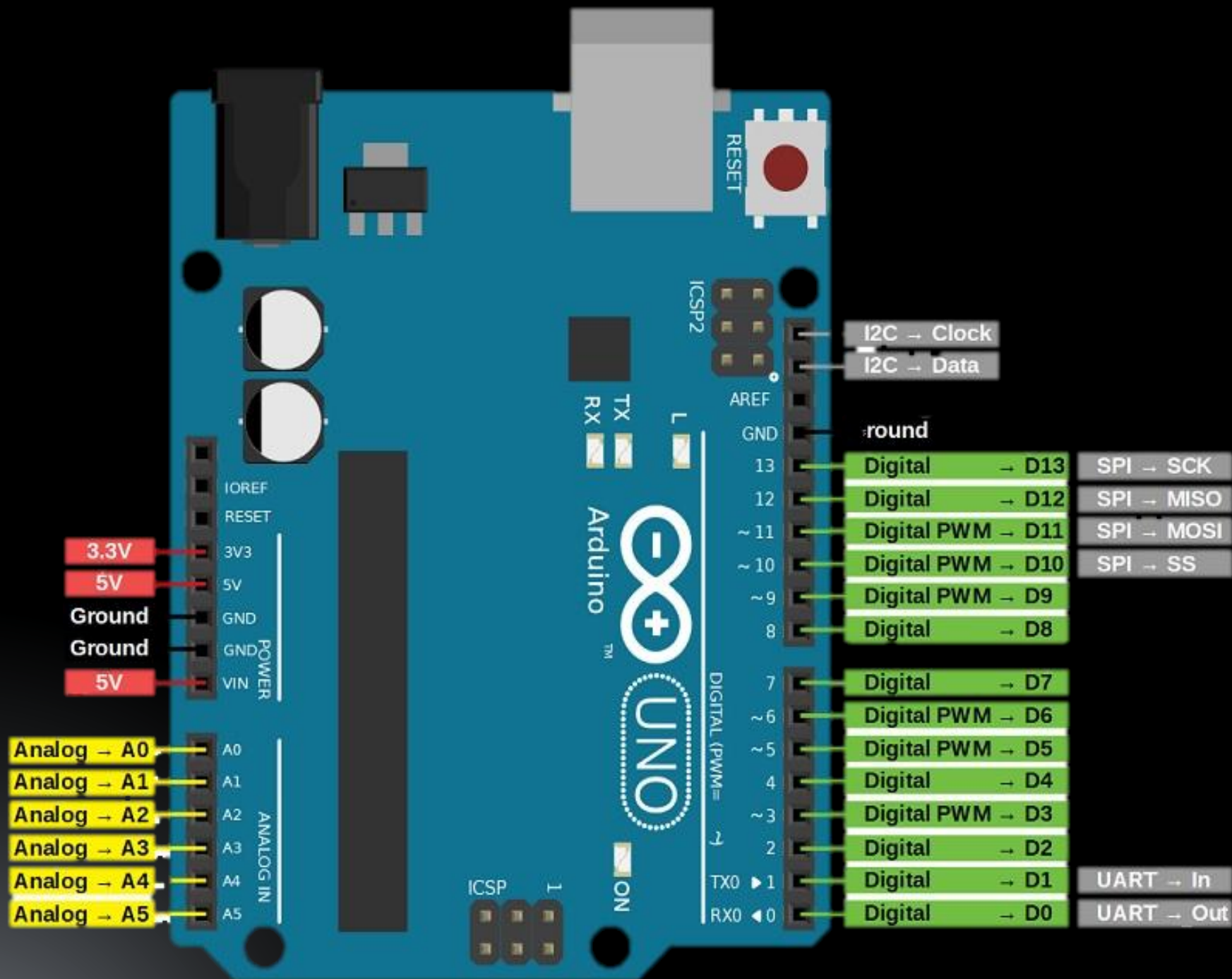


# MICROCONTROLLERS

- A microcontroller is a small computer on a single integrated circuit.
  - Components: CPU, memory (RAM/ROM), input/output peripherals.
  - Used in embedded systems to control devices.
- 
- Abstract wavy lines in shades of gray and white, flowing from the bottom left towards the top right, creating a sense of motion and depth against the dark background.



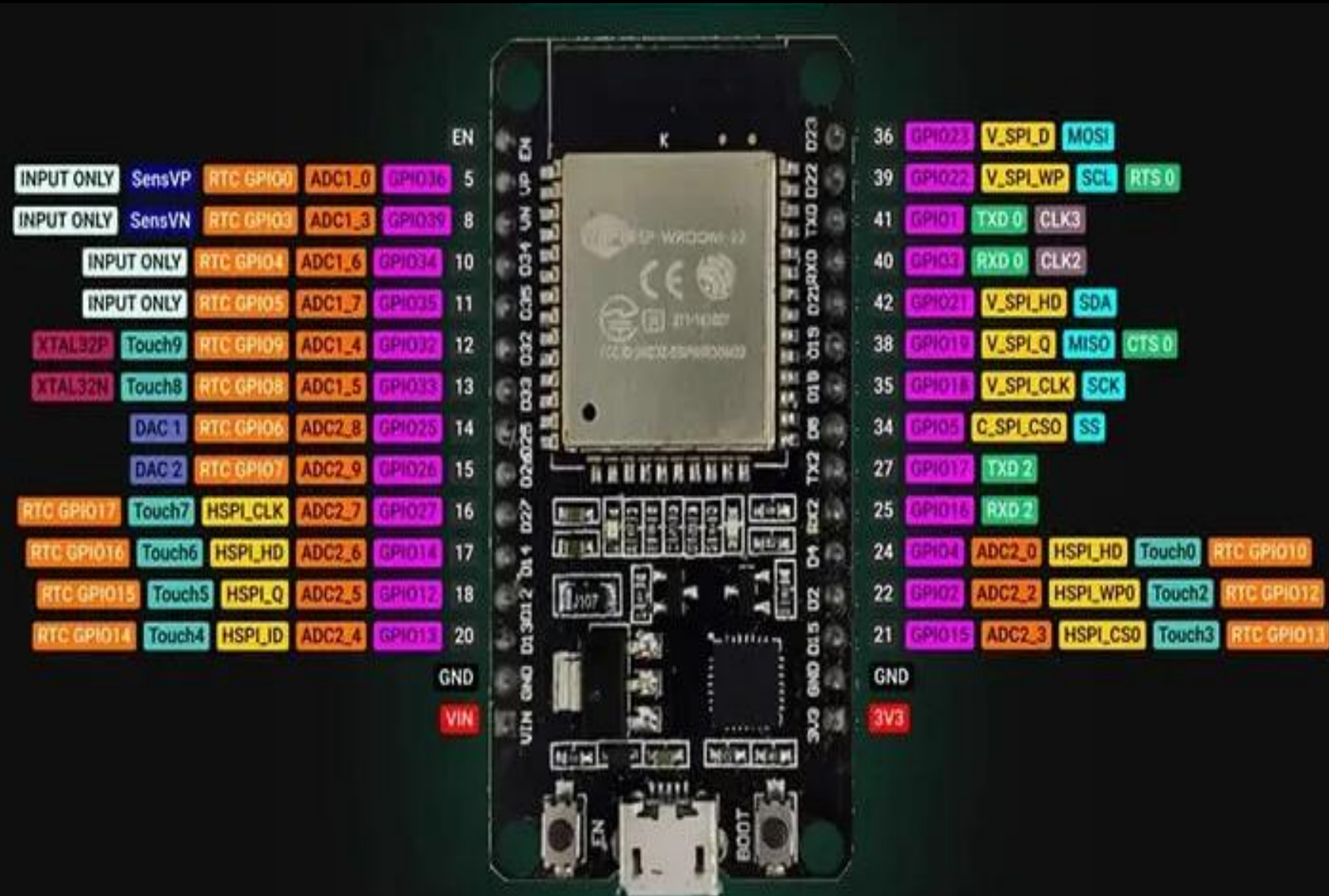
# ARDUINO UNO



- Open-source electronics platform with easy-to-use hardware and software.
- Popular models: Arduino Uno, Nano, Mega.
- Uses ATmega microcontrollers.
- Ideal for beginners and prototyping.



# ESP32



- Low-cost, low-power microcontroller with integrated Wi-Fi and Bluetooth.
- Dual-core processor, more powerful than Arduino.
- Suitable for IoT projects and wireless communication.
- Supports MicroPython and Arduino IDE.



# TEMPERATURE SENSOR – DHT11/DHT22



- Measures temperature and humidity.
- Digital signal output
- Widely used in weather stations and HVAC systems.

# LIGHT SENSOR – LDR (PHOTORESISTOR)



- Changes resistance based on light intensity.
- Analog output.
- Common in automatic lighting and solar trackers.

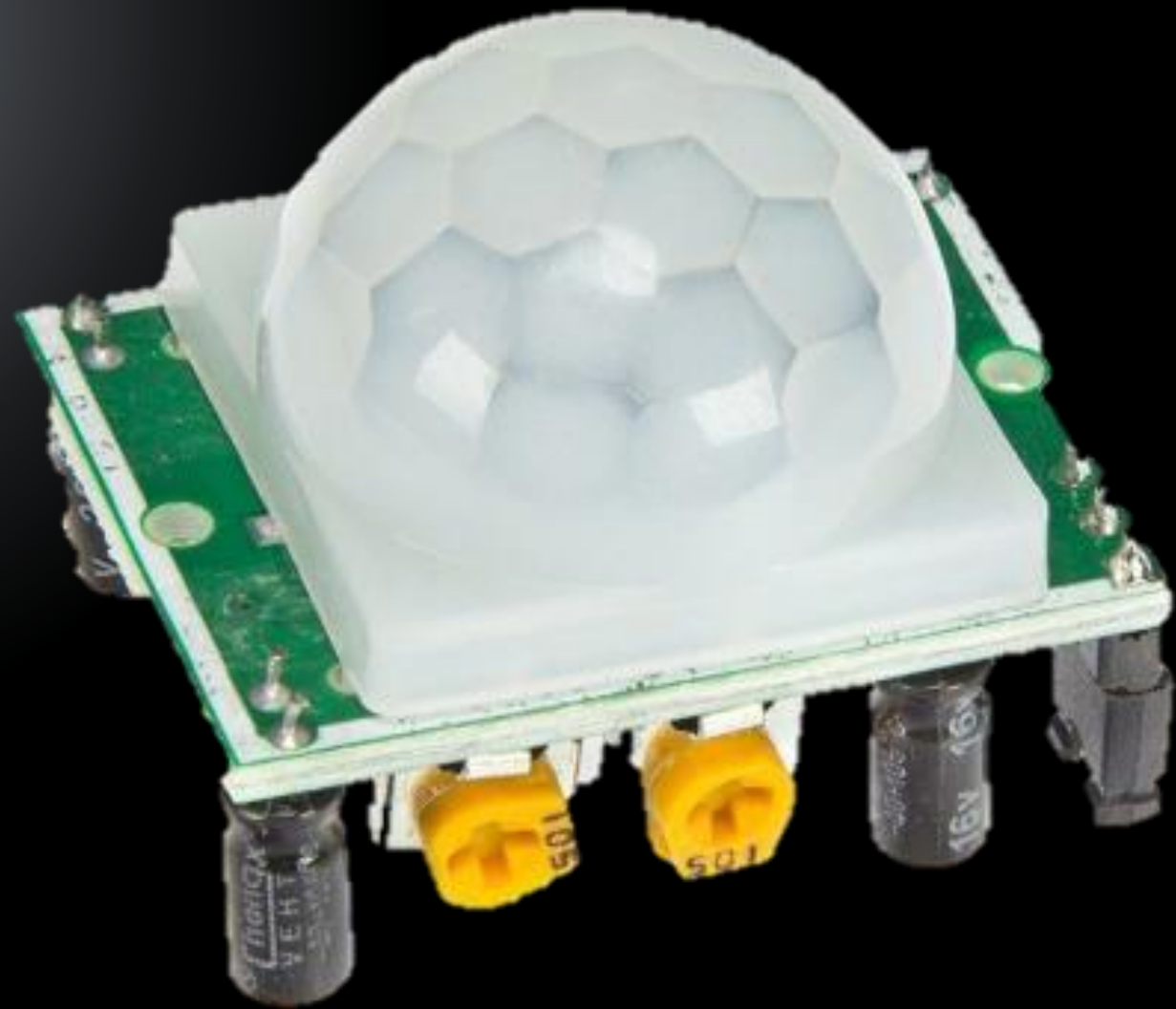
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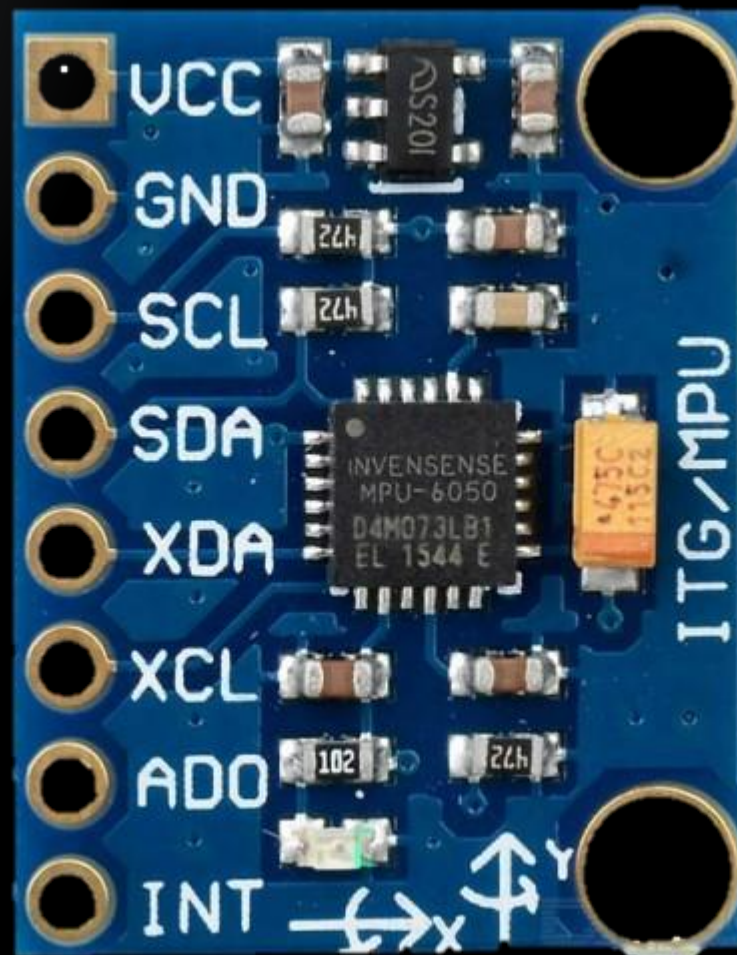


# MOTION SENSOR – PIR



- Detects infrared radiation from moving objects.
- Digital output.
- Used in security and automation systems.

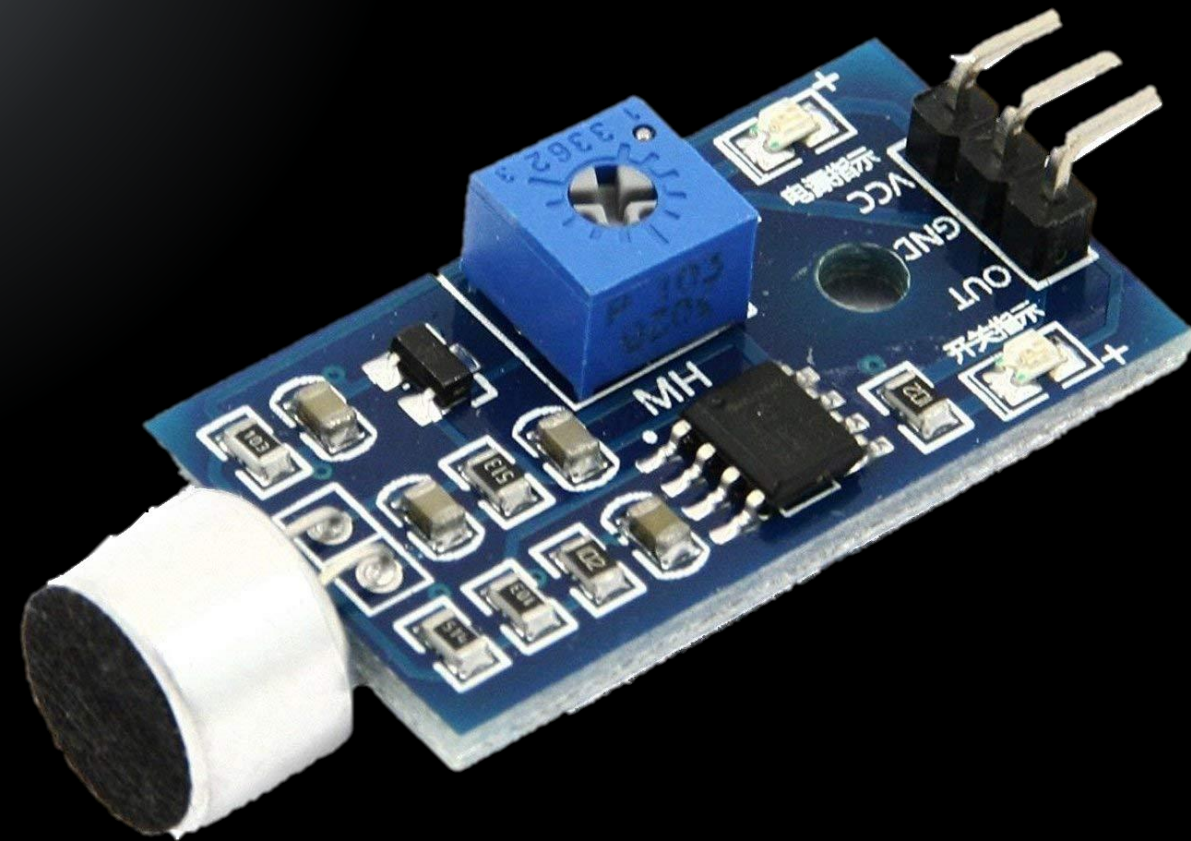
# ACCELEROMETER – MPU6050



- Measures acceleration and orientation.
- Combines accelerometer and gyroscope.
- Communicates via I2C.

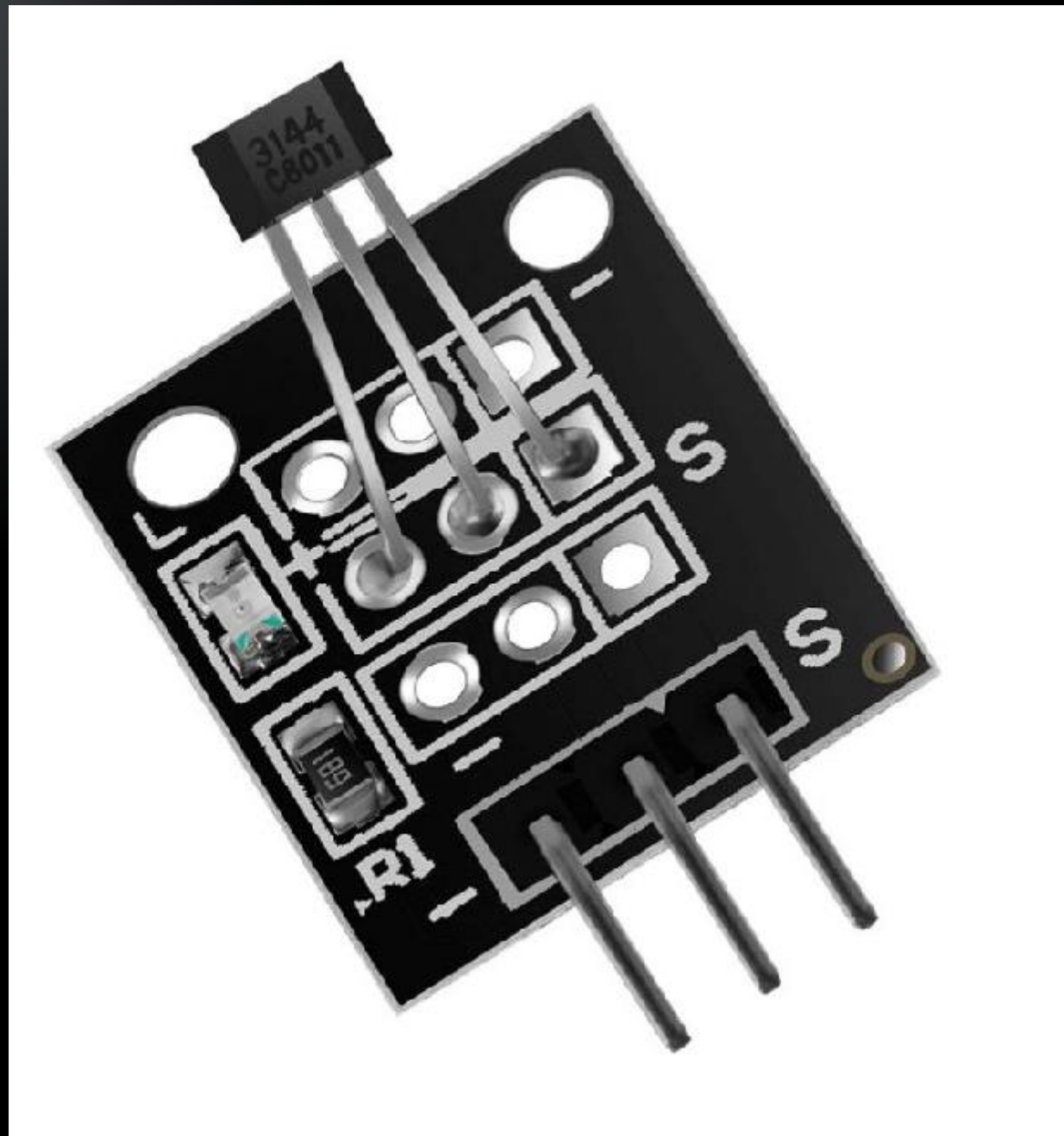


# MICROPHONE MODULE



- Detects sound intensity.
- Outputs analog or digital signals.
- Used in sound-activated devices.

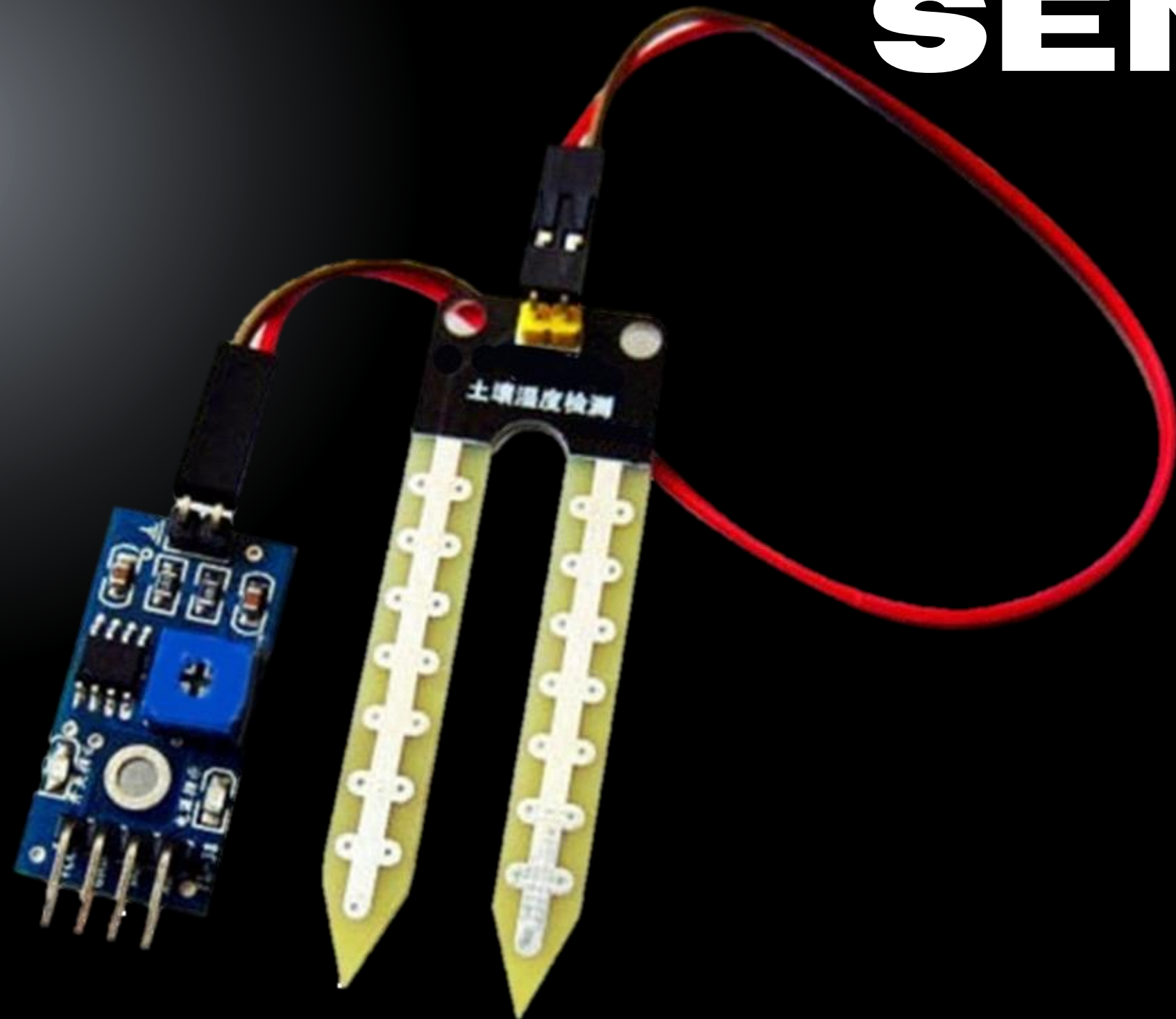
# HALL EFFECT MAGNETIC SENSOR



- Detects magnetic field presence.
- Can provide analog or digital output.
- Used in speed detection and proximity sensing.

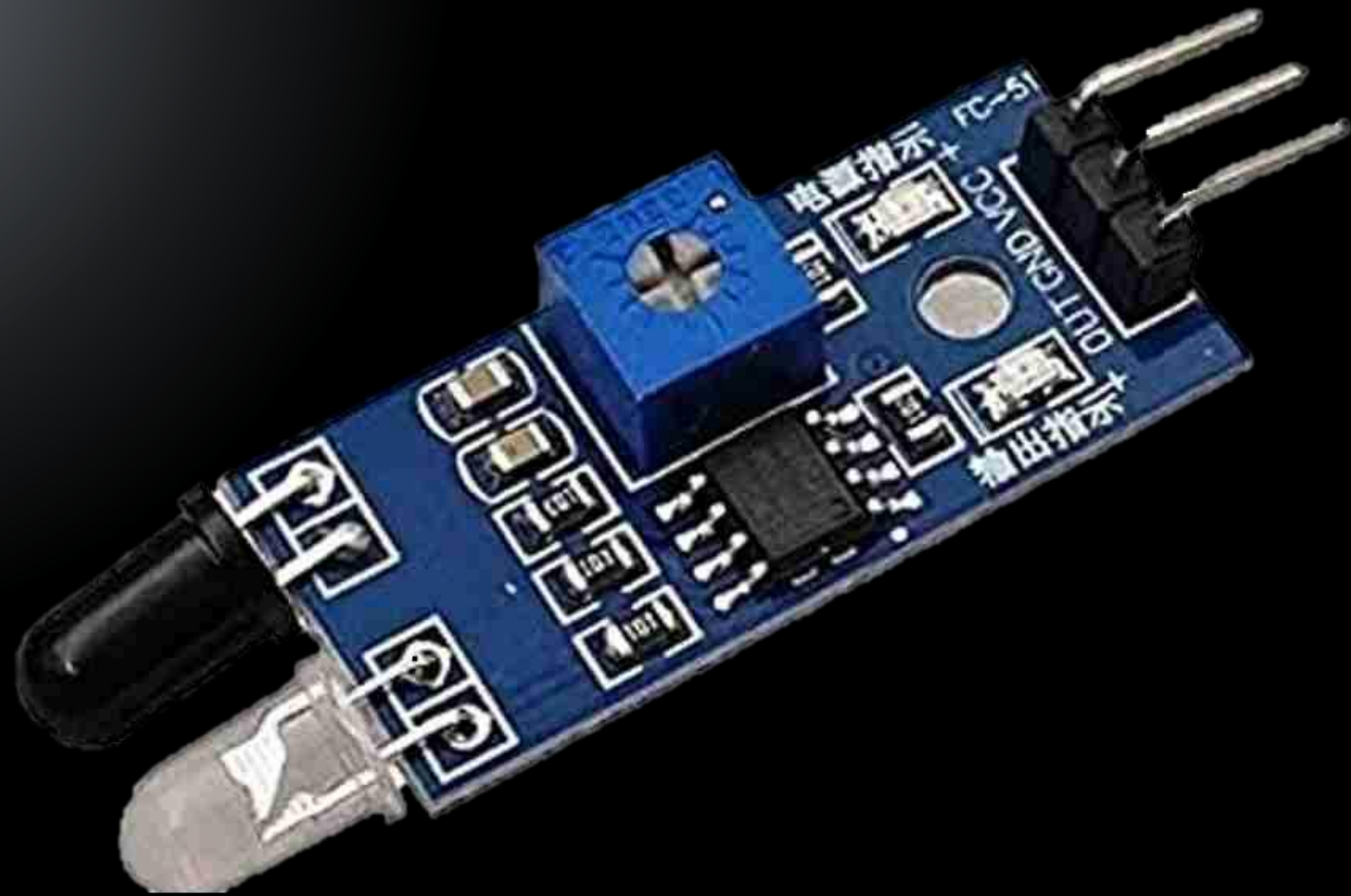


# SOIL MOISTURE SENSOR



- Measures water content in soil.
- Analog output.
- Used in smart irrigation systems.

# INFRARED SENSOR – IR MODULE



- Detects objects using infrared light.
- Digital output.
- Common in obstacle detection and remote controls.



# ULTRASONIC SENSOR



- Measures distance using ultrasonic waves.
- Digital output with trigger and echo pins.
- Used in robotics for obstacle avoidance.

A flowing white fabric, possibly a sheet or a piece of cloth, is draped and billowing from the left side of the frame. The fabric has a smooth texture and is illuminated from the left, creating soft highlights and shadows that define its folds and movement. The background is a solid, deep black, which makes the white fabric stand out prominently.

**THANK  
YOU**