Detailed Arduino Component

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1. Arduino UNO

Description:
The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller.
It features 14 digital input/output pins (6 PWM capable), 6 analog inputs, a 16 MHz quartz crystal, USB connection, power jack, ICSP header, and a reset button.
Widely used for educational purposes, prototyping, robotics, and home automation.

Connections:

- Connect to PC via USB for programming.
- Use VIN pin for external power (7-12V).
- 5V and GND pins provide power to other modules.

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2. DHT11 Temperature and Humidity Sensor

Description:
The DHT11 sensor provides calibrated digital output for temperature and humidity.
It uses a capacitive humidity sensor and thermistor to measure ambient air conditions.
Suitable for simple weather stations or HVAC monitoring.

Connections:

- VCC to 5V
- GND to GND
- Data pin to Digital Pin 2 (use 10k pull-up resistor if needed)

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3. Flame Sensor

Description:
The flame sensor detects light in the 760nm to 1100nm wavelength range (IR spectrum), suitable for flame or fire detection.
It provides a digital HIGH/LOW output based on light intensity. Ideal for fire alarms and safety systems.

Connections:

- VCC to 5V
- GND to GND
- DO (Digital Output) to Digital Pin 3

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4. MQ Gas Sensor (e.g., MQ-2)

Description:
MQ-series sensors can detect gases like LPG, smoke, alcohol, propane, methane, hydrogen, and CO.
The sensor outputs an analog signal based on gas concentration. Used in air quality and safety systems.

Connections:

- VCC to 5V
- GND to GND
- AO to Analog Pin A0

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5. Potentiometer

Description:
A potentiometer is a variable resistor that divides voltage and provides an analog output.
Often used to control brightness, volume, or analog input levels.

Connections:

- One terminal to 5V
- Other terminal to GND

- Wiper (middle terminal) to Analog Pin A1

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6. Buzzer (Piezo)

Description:
A piezo buzzer produces sound when voltage is applied.
It can be used for tones, alarms, or simple audio alerts in embedded projects.

Connections:

- Positive to Digital Pin 4
- Negative to GND

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7. LED

Description:
A Light Emitting Diode emits light when current flows through it.
Commonly used as status indicators, alerts, or outputs.

Connections:

- Anode to relay NO (Normally Open)
- Cathode to GND via 220Ω resistor

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8. Relay Module

Description:
A relay is an electrically operated switch that allows a low voltage circuit (Arduino) to control a high voltage circuit (e.g., lights).
Relay modules often include optocouplers and transistors for safe interfacing.

Connections:

- VCC to 5V

- GND to GND
- IN to Digital Pin 5
- NO (Normally Open) to LED
- COM to external power if needed

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9. Power Supply

Description:
Arduino can be powered via USB (5V) or through an external adapter (7-12V) via the barrel jack or VIN pin.
Provides power to all connected sensors and actuators.

Connections:

- USB or DC adapter to Arduino
- Use 5V/GND pins to power sensors and modules

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10. Jumper Wires

Description:
Jumper wires are used to make temporary connections between components on a breadboard or between breadboards and Arduino.
Available in male-to-male, male-to-female, and female-to-female forms.

Connections:

- Used to connect every module's signal, VCC, and GND lines to Arduino