KY-026 Flame Sensor - Infrared (IR) Sensor: Detailed Explanation

The **KY-026 Flame Sensor** is an **infrared (IR) sensor** designed to detect **flames and fire**. It works by sensing the **infrared light** emitted by flames and other heat sources. This makes it useful for **fire detection**, **robotics**, and **safety systems**.

How the KY-026 Flame Sensor Works

The KY-026 Flame Sensor detects **infrared (IR) radiation** in the **760nm to 1100nm** wavelength range, which is the spectrum emitted by flames. It consists of:

Components of KY-026

Component	Function
IR Receiver (Photodiode)	Detects infrared light emitted by flames.
Comparator (LM393)	Converts the sensor's analog signal to a digital output.
Adjustable Potentiometer	Adjusts the sensitivity of the digital signal.
Analog Output (A0)	Outputs a voltage proportional to the detected IR intensity.
Digital Output (D0)	Outputs HIGH (1) if a flame is detected, LOW (0) otherwise.
Power Pins (VCC, GND)	Connects to the 5V power source.

How the KY-026 Detects Infrared Light and Flames

Step 1: Emission of IR Light from Flames

Flames and hot objects emit **infrared radiation** due to the heat they generate. This IR light is not visible to the human eye but can be detected by special sensors.

Step 2: Detection of IR by the KY-026

- The **IR photodiode** in the KY-026 absorbs the **infrared radiation** and converts it into an **electrical signal**.
- If the amount of **IR light is above the threshold**, the sensor **activates**.

Step 3: Signal Processing

- The **analog output (A0)** provides a **variable voltage** proportional to the IR intensity.
- The **digital output (D0)**, processed by the **LM393 comparator**, switches **HIGH (1)** if a flame is detected and **LOW (0)** otherwise.
- The **potentiometer** on the module allows users to **adjust the sensitivity** of the digital signal.

Practical Uses of the KY-026 Flame Sensor

- **Fire Detection Systems** – Used in fire alarms and safety systems.
- **Robotics** – Helps robots detect and avoid fire hazards.
- **Smart Home Automation** – Can trigger alarms or sprinklers when fire is detected.
- **Security Applications** – Used in security systems for detecting unauthorized flames or heat sources.

Difference Between KY-026 and Other IR Sensors

Feature	KY-026	KY-024 (Hall Effect)	KY-039 (Heartbeat Sensor)
Detects	Flames (IR radiation)	Magnetic fields	Heartbeat (IR absorption)
Analog Output	Yes	Yes	Yes
Digital Output	Yes	Yes	Yes
Adjustable Sensitivity	Yes	Yes	No

Limitations of the KY-026

1. **False Positives** – The sensor can be triggered by other IR sources, like **sunlight** or **hot objects**.
2. **Limited Range** – Effective at detecting flames up to **1 meter** away.
3. **Requires Calibration** – The **potentiometer** must be adjusted for optimal performance.

Summary

- The **KY-026 Flame Sensor** detects flames by sensing **infrared light (IR)**.
- It provides both **analog** and **digital** outputs.
- The **LM393 comparator** converts the signal into a **HIGH/LOW** digital output.
- The **potentiometer** allows **adjusting the sensitivity** of the sensor.
- It is commonly used in **fire detection**, **robotics**, and **security systems**.