Title: Noise Detector

- By Mohd Assad Shamim

- Admission No. : 23JE0598

PROJECT CONCEPT:

This project mainly focuses on creating a low-cost, sound-activated switching circuit using a microphone, transistors, and a 555 timer IC. The primary goal is to detect clapping or any sudden noise and convert that acoustic signal into an electrical signal which, after amplification and conditioning, triggers a desired output. This output could be used to light up an LED, activate a buzzer, or even control home appliances like fans and lamps with a relay. The entire project is implemented on a breadboard and powered by a 9V battery, making it simple, portable, and ideal for beginners and educational demonstrations.

Working Principle:

- **Microphone Detection**

  A condenser microphone detects the clap sound and converts it into an electrical signal. This signal is very weak, so it needs to be amplified.

- **BC547 Transistor Amplification**

  The weak signal from the microphone is fed into the base of a BC-547 transistor. The transistor amplifies this signal and produces a larger voltage pulse at its collector. Cascading amplifier is used to do even more amplification. This amplified signal acts as a trigger for the 555 timer IC.

- **555 Timer for generating delay**

  The 555 timer is configured in monostable mode to respond to the amplified pulse. In monostable mode, the output stays ON for a fixed time and then turns OFF automatically depending upon the value of resistor and capacitor.

Components required:

- 555 timer IC (1).
- N-P-N transistors BC-547 (2).
- Resistors: 3.3KΩ, 100KΩ, 270Ω, 470Ω, 1KΩ, 1.5KΩ.
- Capacitor: 22uF, 100nF (code- 104).
- LED (1).
- Microphone (1).
- Breadboard (1).
- Battery 9V (1).
- Connecting wires.

Circuit Wiring:

- **Microphone Section**:
    - Connect one terminal of the microphone to the base of the first BC547 transistor through a resistor.
    - The other microphone terminal is grounded.
    - The collector of the transistor goes to Vcc through a resistor, and the emitter is grounded.
- **Amplification Section**:
    - The output from the collector of the first transistor is sent to the base of a second BC547 transistor for further amplification.
    - This cascaded setup improves the signal quality to trigger the timer accurately.
- **Timer and Output Section**:
    - The amplified signal is sent to the trigger pin (pin 2) of the 555 timer IC configured in **monostable mode**.
    - The output pin (pin 3) is connected to an LED (via a resistor) or to a relay for switching higher power devices.
    - Proper capacitor and resistor values at pin 6 & 7 define the ON-time duration.
- **Power Supply**:
    - All active components are powered through a standard 9V battery.
    - Power rails on the breadboard are used to distribute Vcc and GND efficiently.

Outcomes and Applications:

- **Energy-Efficient Switch:**

  Since the 555 timer remains OFF until a sound is detected, the circuit **saves power**.

- **Automation Possibilities:**

  By **replacing the LED with a relay**, this circuit can control **appliances** like **lights, fans, or other electronic devices**.

Practical Applications:

- Sound-activated light or fan control systems
- Home automation (clap-to-switch appliances)
- Noise detection for security alarms
- Interactive toys or sound-based triggers in art installations
- Assistive devices for differently-abled individuals

Circuit diagram: