

PROJECT 2

CLAP-ACTIVATED LED USING ARDUINO AND SOUND SENSOR

A simple Arduino Project that turns an LED **on and off using a clap** detected from a **sound sensor** (like the KY-038 or KY-037). Each clap toggles the LED state.

From the implementation of the Clap-Activated LED project described below, I learned how to design a simple, interactive embedded system using an Arduino microcontroller and a sound sensor. Specifically, I gained practical knowledge on how to process input signals (like a clap) in real-time to control output devices (such as an LED).

What I Learned:

- How sound sensors (KY-038/KY-037) function and how to interface them with Arduino.
- How to use digital input and output in Arduino programming.
- The importance of debouncing in signal detection to avoid false triggers.
- The fundamentals of building sound-activated control systems applicable to smart home automation.

Project Code and Explanation:

```
const int soundSensor = 2; // Pin connected to the sound sensor's digital output

const int ledPin = 13; // Built-in LED pin on Arduino

bool ledState = false; // Stores the current state of the LED

unsigned long lastClapTime = 0;

int debounceDelay = 500; // Minimum time between valid claps (in milliseconds)

void setup() {
    pinMode(soundSensor, INPUT); // Configure sound sensor pin as input
    pinMode(ledPin, OUTPUT); // Configure LED pin as output
```

```
Serial.begin(9600); // Start serial communication for debugging
}

void loop() {
  int sensorValue = digitalRead(soundSensor); // Read sensor value

  if (sensorValue == HIGH) { // Clap detected
    unsigned long currentTime = millis();

    if (currentTime - lastClapTime > debounceDelay) { // Debounce check
      ledState = !ledState; // Toggle LED state
      digitalWrite(ledPin, ledState); // Update LED
      Serial.println(ledState ? "LED ON" : "LED OFF"); // Output status
      lastClapTime = currentTime; // Update last clap time
    }
  }
}
```

This project provided hands-on experience with hardware-software interaction and laid a foundation for more complex applications involving sensors and actuators.