Priyadarshini College of Engineering , Nagpur

Department Of Electronics and Telecommunication Engineering

Undergraduate fifth semester mini project

Title:- **" The clap switch "**

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23/10/2024

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CERTIFICATE

This is to certify that the project entitled **"THE CLAP SWITCH"**,has been carried out by the team under my guidance in partial fulfilment of the Degree B. Tech in Electronics and Telecommunication Engineering of Rashtra Sant Tukdoji Maharaj Nagpur University, during the academic year 2024-2025. (semester 5th)

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Theory:-

INTRODUCTION:-

This is a project on "CLAP SWITCH" which can switch on/off any electric circuit by the sound of the clap.

The basic idea of clap switch is that the electric microphone picks up the sound of your claps, cough, and the sound of that book knocked off the table. It produces a small electrical signal which is amplified by the succeeding transistor stage. Two transistors cross connected as a bistable multivibrator change state at each signal. One of these transistors drives a heavier transistor which controls a lamp.

This circuit is constructed using basic electronic components like resistors, transistors, relay, transformer, capacitors. This circuit turns 'ON' light for the first clap. The light turns ON till the next clap. For the next clap the light turns OFF. This circuit works with 12v voltage. Therefore, a step-down transformer 12/300mA is employed.

This working if this circuit is based on amplifying nature of the transistors, switching nature of the transistors, relay as an electronic switch. Basically, this is a sound operand switch.

Aim :- To design the clap switch while using the Arduino board and write its program.

Requirements: -

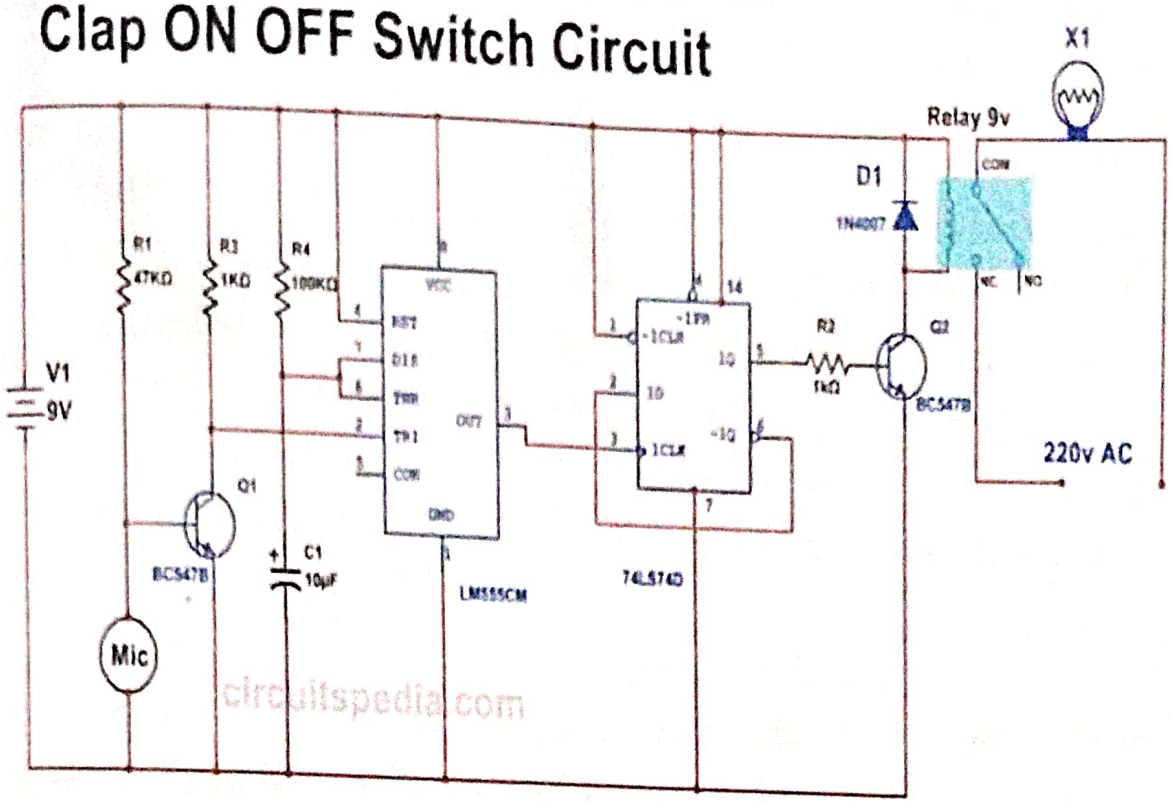
- Jumper wires
- Project box
- Arduino uno board
- 5-volt smps
- Digital sound sensor
- Relay module
- Data cable with otg
- Arduino software

Theory: -

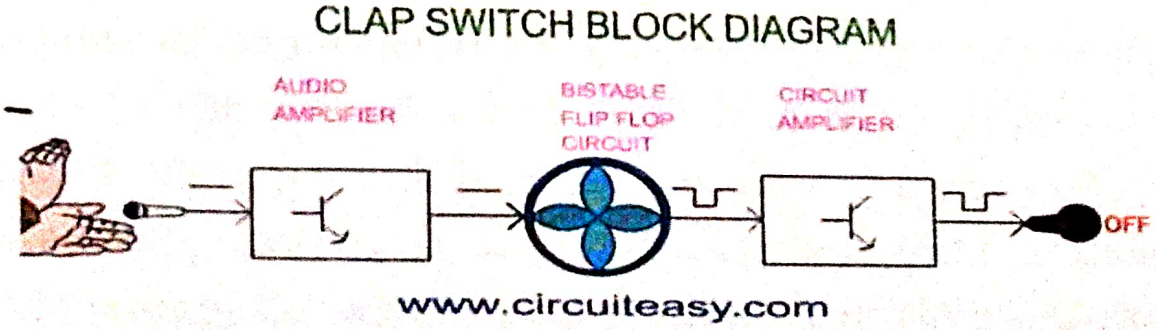
INTRODUCTION: -

Circuit Diagram

Clap ON OFF Switch Circuit



Block diagram



Working Principle

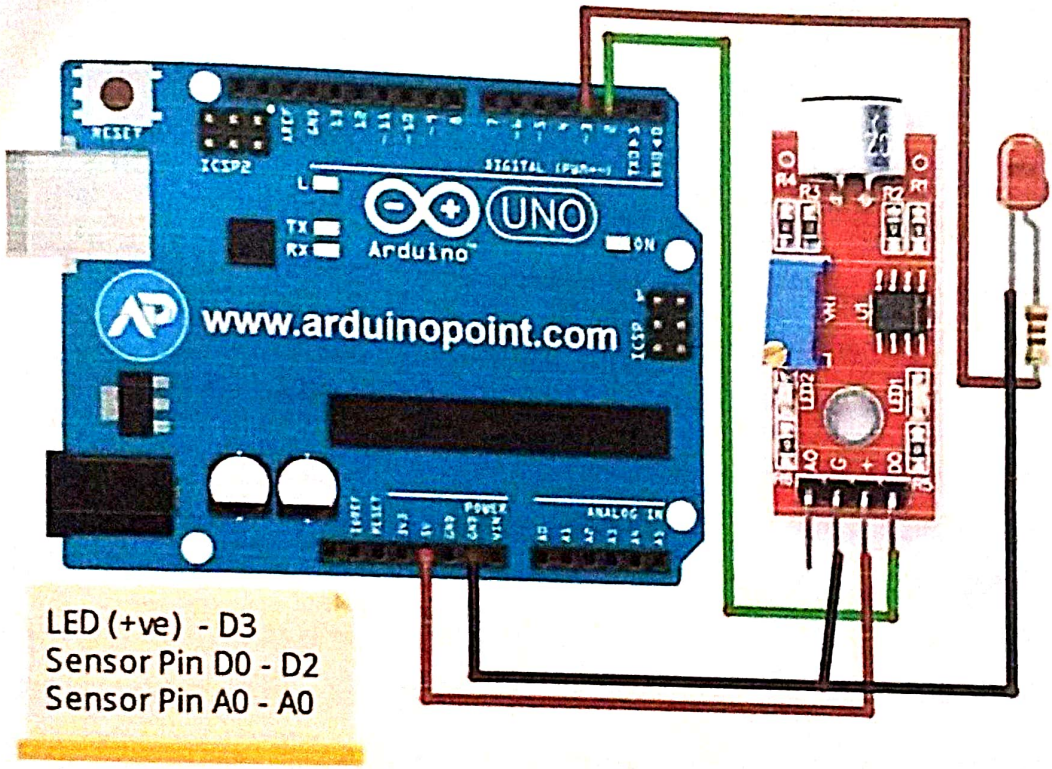
The sound of the clap is received by a small microphone that is shown biased by resistor R1 in the circuit. The microphone changes sound wave into electrical wave which is further amplified by Q1. Transistor Q1 is used as common emitter circuit to amplify weak signals received by the microphone. Amplified output from the collector of transistor Q1 is then feed to the bistable Multivibrator circuit also known as flip-flop.

Flip flop circuit is made by using 2 transistors, in our circuit Q2&Q3. In a flip flop circuit, at a time only one transistor conducts and the other cut off and when it gets a trigger pulse from outside source then first transistor is cutoff and second transistor conducts. Thus, output of transistor is either logic-0 or logic-1 and it remains in one state 0 or 1 until it gets trigger pulse from outer source.

The pulse of clap which is a trigger for flip flop which makes changes to the output which is complementary (reverse). Output of flip flop which is in the low current from is unable to drive relay directly so we have used a current amplifier circuit by using Q4 which is common emitter circuit. Output of Q4 is connected to a relay (electromagnetic switch), works like a mechanical switch. With the help of a relay, it is easy for connecting other electrical appliances.

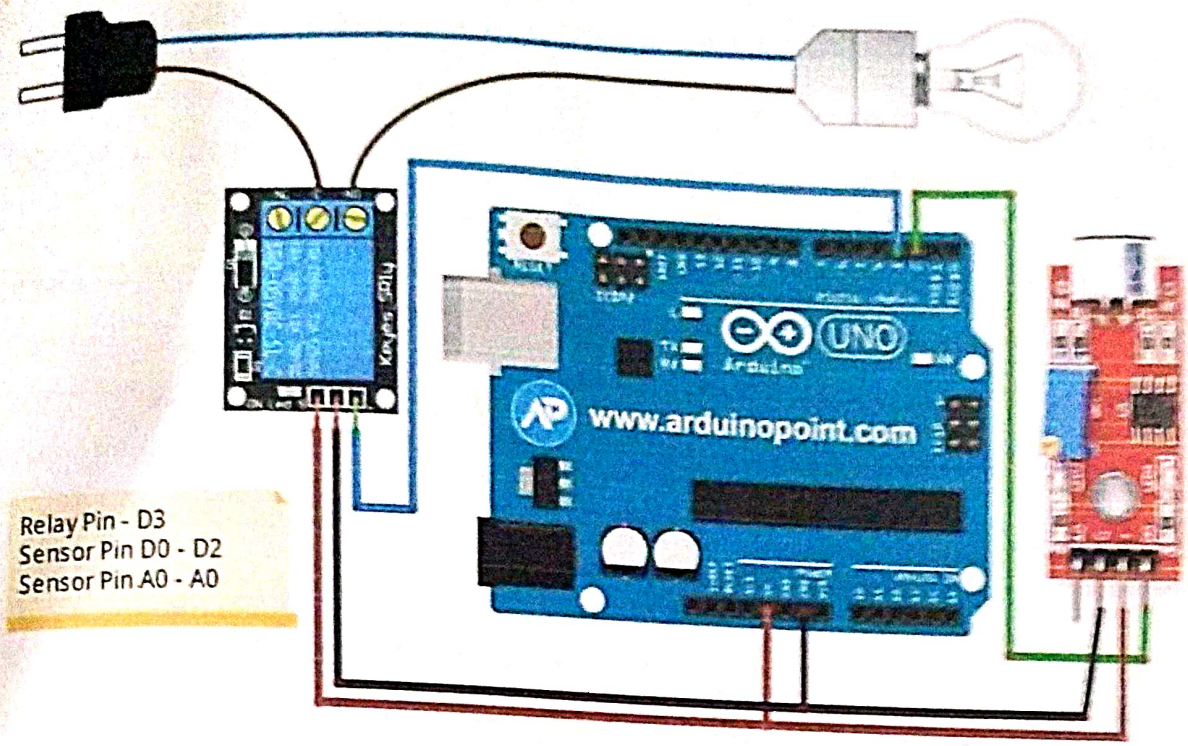
Arduino Clap Switch with LED Circuit Schematics:-

Refer to the image below for the circuit connection. Follow the steps to ensure a correct and functional setup.



Resistor's one terminal goes to LED and another terminal goes to digital pin 3.

Arduino Clap Switch with Relay Circuit Schematics



A bulb connects with a 5V relay module's NO pin and NC pin.

Warning:-

This board interfaces with a high-voltage AC supply. Improper or incorrect use may result in serious injury or death. As a result, it is intended for people who are familiar with and knowledgeable about HIGH AC voltage.

Arduino Clap Switch Code: -

Now, let's understand the code. The Arduino code provided controls the relay based on the sound intensity detected by the LM393 Sound Sensor. Adjust the threshold value by rotating the potentiometer to set the desired sound level for triggering the switch.

By clicking the button in the top right corner of the code field, you can copy the code. Copy and paste it into Arduino IDE.

Program:-

```
/***** www.arduinopoint.com *****/
/***** Arduino Clap Switch *****/
int Sound Sensor=2; // LM393 Sound Sensor Digital Pin
D0 connected to pin 2
int LED=3; // LED connected to pin 3
Boolean LED Status=false;
void setup () {
 pinMode(SoundSensor,INPUT);
 pinMode(LED,OUTPUT);
 Serial.begin(9600); //initialize serial
 }
 void loop() {
  int SensorData=digitalRead(SoundSensor);
   Serial.println(SensorData);//print the value
    if(SensorData==1){
    if(LEDStatus==false){
        LEDStatus=true;
        digitalWrite(LED,HIGH);
     }
     else if(LEDStatus==true){
        LEDStatus=false;
        digitalWrite(LED,LOW);
     }}}
```

Caution Section:-

A crucial step in this project is **adjusting the threshold value.** Rotate the potentiometer to increase or decrease the threshold. A higher threshold means the clap switch responds to louder sounds. Find the right balance for your environment.

Result Section:-

After successful implementation, enjoy the convenience of controlling devices with a simple clap. Achieving the desired sound threshold ensures accurate and responsive operation.

Benefits of a Clap Switch:-

Clap switches offer convenience and energy-saving benefits. Imagine entering a dark room and illuminating it with just a clap. Additionally, they are great for individuals with mobility issues.

Customization Options:-

Feel free to experiment with different components and customize the project to suit your preferences. Personalizing your clap switch adds a unique touch to your home automation setup.

Troubleshooting Guide: -

Encounter issues? Consult our troubleshooting guide for common problems and solutions.

User Feedback: -

We love hearing success stories from our readers. Share your experiences and feedback with the Arduino clap switch project in the comments section.

Conclusion: -

Congratulations on creating your **Arduino clap switch!** This DIY project brings a touch of magic to your home and serves as a great introduction to Arduino and sound sensors. Enjoy the convenience of home automation with this simple yet effective solution.