CMR UNIVERSITY

Private University Established in Karnataka State by Act No. 45 of 2013

SCHOOL OF ENGINEERING AND TECHNOLOGY

A Project Report
On

"CALP SWITCH SYSTEM"

Submitted in partial fulfillment of the requirements for the award of degree in

BACHELOR OF TECHNOLOGY
IN

COMPUTER SCIENCE AND ENGINEERING

SUBMITTED BY-

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2023-2024

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Chagalahatti, Bengaluru, Karnataka-562149

Department of Electronics and Communication Engineering

CERTIFICATE

This is to certify that the Project entitled "CALP SWITCH SYSTEM"has been successfully carried out by **SANJAY E (22BBTCS262)**in partial fulfillment of the requirement for the award of the degree **Bachelor of Technology in Making with Electronics of CMR University,** Bengaluru during the academic year **2023-2024.**The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the said degree.

Signature of the Guide

_ _ _ _ _ _ _ _ _ _ _ _

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Signature of HOD

_ _ _ _ _ _ _ _ _ _ _

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Examiners Signature with date:

1.

2.

ACKNOWLEDGEMENT

The satisfaction that accompanies the successful completion of this project would be incomplete without the mention of the people who made it possible, without whose constant guidance and encouragement would have made efforts go in vain.

I would like to express my thanks to **Dr. K Ezhilarasan, Assistant Professor and Head**, Department of Electronics and Communication Engineering, School of Engineering and Technology, CMR University, Bangalore, for his encouragement that motivated me for the successful completion of Project work.

I express my thanks to my Internal Project Guide **Prof. Akshatha Bhat, Assistant Professor**, Department of Electronics and communication Engineering, School of Engineering and Technology, CMR University for her constant support.

Sanjay E

22BBTCS262

DECLARATION

I Sanjay E (Reg. No. 22BBTCS262) student of 3rd semester B.Tech, Computer Science and Engineering, School of Engineering and Technology, Bangalore, hereby declare that the project work entitle **"CLAP SWITCH SYSTEM"** has been carried out by me under the guidance of Prof. Akshatha Bhat, Assistant Professor, Department of Electronics and Communication, School of Engineering and Technology. This report is submitted in partial fulfillment of the requirement for award of Bachelor of Technology in Computer Science and Engineering, by CMR University, Bangalore during the academic year 2023-2024. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the said degree.

Place: Bangalore

Sanjay E

Date:

22BBTCS262

ABSTRACT

The Clap Switch project uses Arduino to create a hands-free control system for electrical appliances, aiming to be both innovative and practical. The system consists of a sound sensor, Arduino board, and relay module. The sound sensor captures audio from outside, identifying specific clap patterns that are then analyzed by Arduino. The relay module determines whether the power supply to connected appliances should be switched off or on based on the user's clapping sequence. This system is energy-efficient and easy-to-use, providing convenience. The Clap Switch project aligns with the growing popularity of smart homes, making it affordable for those wanting their homes automated. There are no complex procedures involved, making it an entry-level demonstration for integrating Arduino technology into daily life. This project promotes innovation and simplicity in residential automation systems at large scales, aligning with the growing trend of smart homes.

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1. INTRODUCTION

The field of electronics and automation is full of surprises. It is amazing how we can actually control our gadgets by just waving at them or talking to them. One such project that has made people wonder is called “Clap Switch” which uses Arduino, a no touch way of switching on and off any electronic gadget.

The concept behind the Clap Switch is very simple but it works perfectly well. It uses sound recognition to turn lights ON/OFF, operate different appliances, etc., based on patterns of claps produced by the user. This is one example where Arduino, an open-source electronics platform, has been used in creating innovative applications thus showing how convenient DIY(Do-It-Yourself) electronics are nowadays.

APPLICATIONS

1.Assistive Technology: People who have difficulty moving (such as those with physical disabilities) can use claps to control devices.6.

2.Interactive Public Installations: Public spaces, museums and community events should be places where interactive exhibits or displays can be found.

3.Community Gatherings: Clap controls for lighting or decorations can bring about interactivity and fun in parties or events.

4.Educational Workshops: Introduce electronics and programming through STEM workshops that are conducted in schools or community centers.

5.Energy Conservation Campaigns: Electricity management and conservation can be simplified by using clap-based controls.

6.Public Spaces Accessibility: Accessible public spaces should have clap-controlled features like lighting among others to assist people living with disabilities.

7.Cultural and Artistic Events: Clap-controlled elements for audience interaction can be added to cultural performances or art displays.

8.Senior Citizen Support: Clap controls in their living spaces may help elderly people do things more easily.

9.Community Innovation Challenges: Residents should be challenged to invent new Clap Switch applications in the neighborhood.

10.Communication Aid: Non-verbal individuals might consider using clap patterns as a way to communicate.

2. Hardware and software requirements

2.1 Hardware components

(a) Arduino UNO

Fig. 2.1 Arduino Uno board

Arduino / Genuine Uno is a microcontroller board based on ATmega328P(datasheet).It has 14 digital input/output pins(of which 6 are used as PWM outputs),6 analog inputs, a 16 MHz quartz crystal a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started .You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

(b)LED (Light Emitting Diode)

Fig. 2.2 LED(light emitting diode)

A light emitting diode is a two lead semiconductor light source. It is a p-n junction diode that emits light when activated. In this project we are using two LEDs.

(c)Sound sensor

Fig. 2.3 Sound sensor

A sound sensor, or microphone sensor, converts sound waves into electrical signals. This versatile electronic component is utilized in clap-activated switches, voice recognition systems, security alarms, and smart home devices. Its adaptability extends to industrial applications, enhancing machinery monitoring, while also playing a key role in robotics by enabling responses to environmental sounds

(d)Relay

Fig. 2.4 Relay

A relay is an electrical switch that controls a high-power circuit with a low-power input. It consists of an electromagnet that, when energized, opens or closes the circuit. Relays are widely used in various applications, such as automation, automotive systems, and electronics, to control and protect electrical devices.

(e)Battery

Fig. 2.5 Battery

A battery is a portable energy storage device that converts chemical energy into electrical energy. Comprising one or more electrochemical cells, it provides a stable power source for electronic devices. Batteries are essential in powering everything from small gadgets to electric vehicles, offering convenient and reliable energy on-the-go.

2.2 Software requirements

(a)Arduino IDE software

Arduino IDE software is an open source software to which a hobbyist can connect the AT mega chips. In this software the code can be written and uploaded to any AT mega chip and then the code can be executed on the chip. Many 3D printed electronics and Arduino-compatible use AT mega chip and hence the user can upload the program. Arduino can also be used firmware any electronics. Sketch is the window in which the program is to be written.

Fig. 2.6 Arduino software tool

3. METHODOLOGY

3.1 Hardware Description:

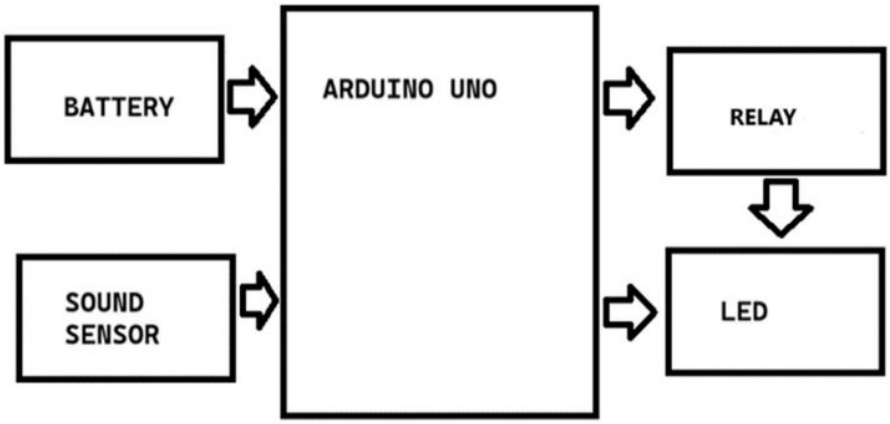


Fig. 3.1 Block diagram of clap switch system

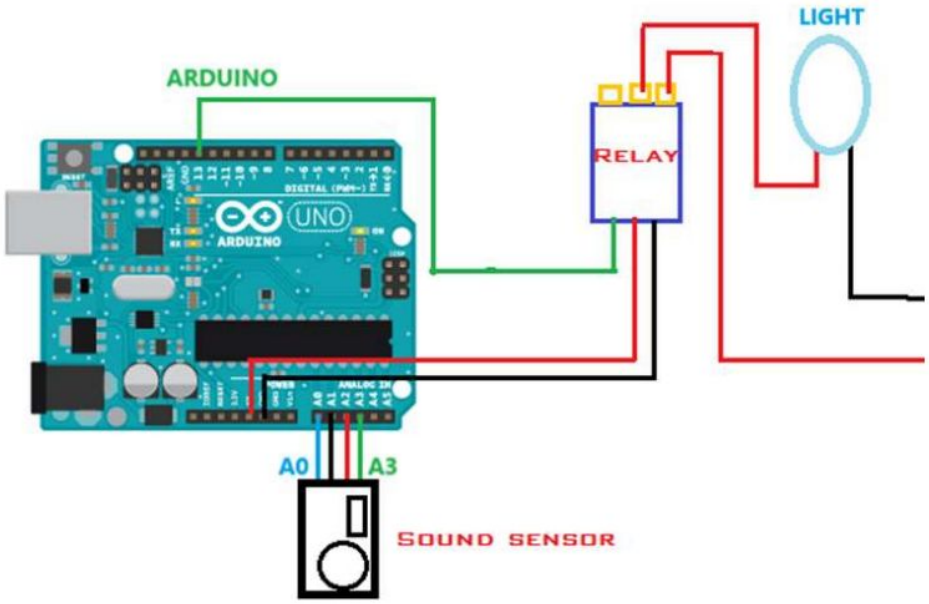


Fig. 3.2 circuit diagram of clap switch system

The components are connected as shown above the circuit diagram.

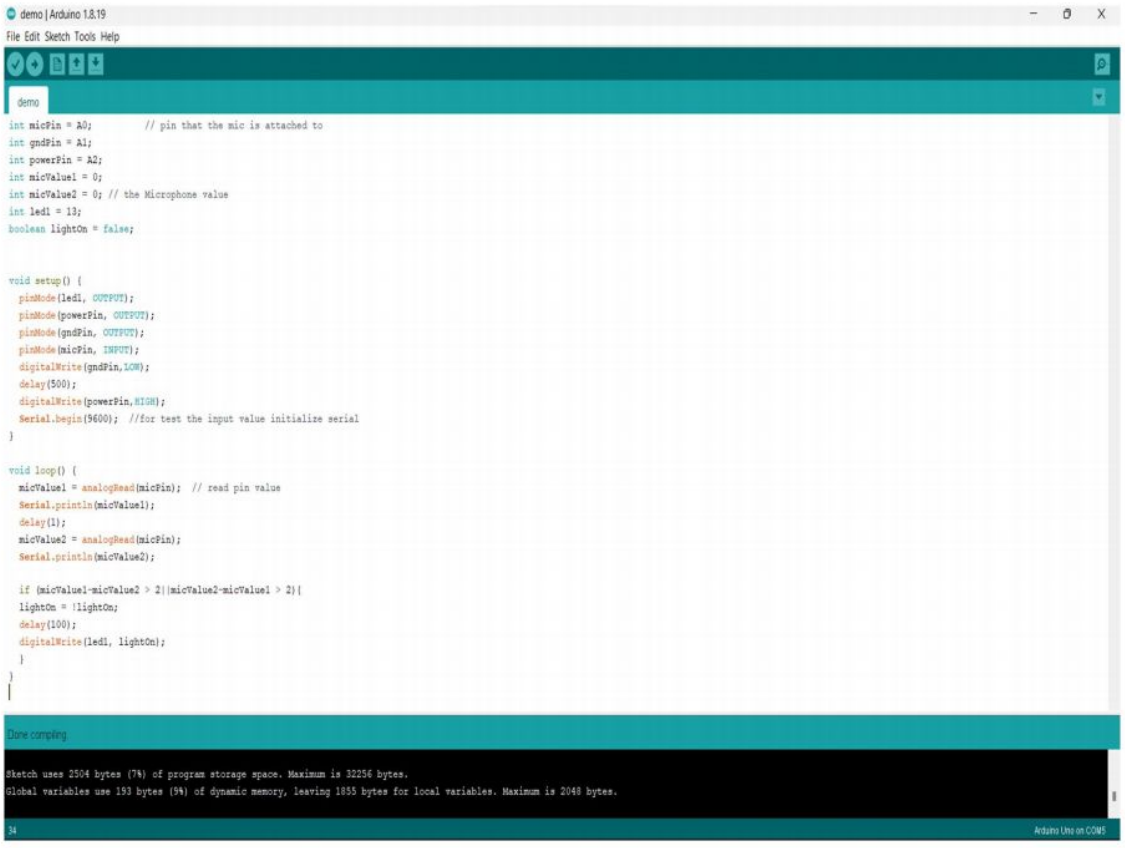
Sound Sensor: Connect the microphone or sound sensor to the input of the circuit. The sound sensor should have four pins.A0,A1,A2 and A3.

Relay: Connect the relay to the collector of the transistor. The relay contacts can be used to control the connected device (e.g., a light or a fan).And where Relay's VCC is connected to 5v of Arduino, GND to GND, IN to pin 13.

Power Supply: Connect the power supply to the circuit. Make sure to provide the required voltage for the components used.

4. SOFTWARE DESCRIPTION

The Arduino IDE (Integrated Development Environment) is a user-friendly platform for programming Arduino microcontrollers. It provides a simple and intuitive interface, enabling users to write, compile, and upload code to their Arduino boards effortlessly. With a vast library of pre-written functions, it facilitates rapid prototyping and easy development of projects for both beginners and experienced makers in the world of electronics and embedded systems.



4.1 Source Code

```
int micPin = A0;  // pin that the mic is attached to
int gndPin = A1;
int powerPin = A2;
int micValue1 = 0;
int micValue2 = 0; // the Microphone value
int led1 = 13;
boolean lightOn = false;


void setup() {
 pinMode(led1, OUTPUT);
 pinMode(powerPin, OUTPUT);
 pinMode(gndPin, OUTPUT);
 pinMode(micPin, INPUT);
 digitalWrite(gndPin,LOW);
 delay(500);
 digitalWrite(powerPin,HIGH);
 Serial.begin(9600);  //for test the input value initialize serial
}

void loop() {
 micValue1 = analogRead(micPin);  // read pin value
 Serial.println(micValue1);
 delay(1);
 micValue2 = analogRead(micPin);
 Serial.println(micValue2);

 if (micValue1-micValue2 > 2||micValue2-micValue1 > 2){
 lightOn = !lightOn;
 delay(100);
 digitalWrite(led1, lightOn);
 }
}
```

5. RESULT & DISCUSSION

5. 1 Snapshot of the Project

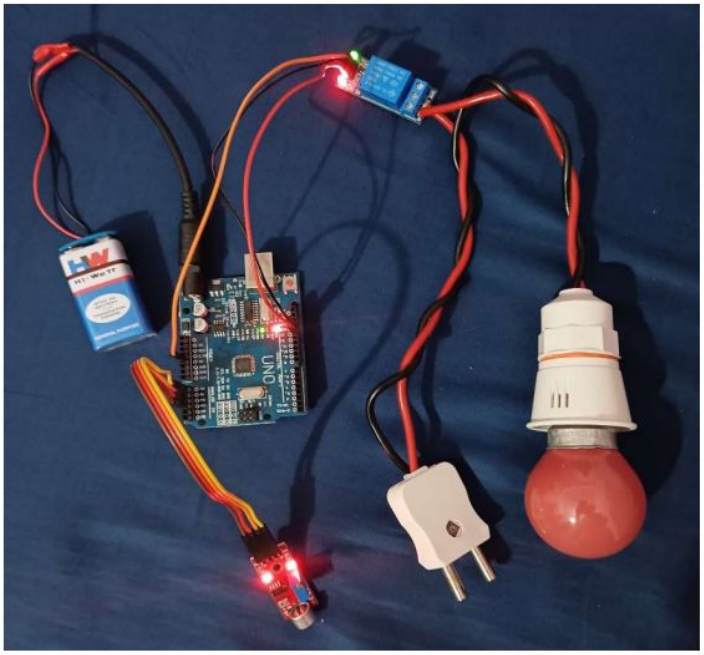


Fig. 5.1 The system setup of clap switch system.

After making the connections and uploading the code to Arduino, turn on the power supply to the project. The principle behind the working of the project lies in the functioning of Sound sensor. We is going to use a Sound sensor in this project. In Sound sensor, the Sound sensed by the sensor will turn on the light if the light is in turn off state, if the light is in turn on state after receiving the sound it will turn off the light. But during the time of connection the power supply to the bulb should be turned off.

Upon connecting a microphone to an Arduino and uploading the clap switch code, the system functions by capturing sound through the microphone. The Arduino processes the analog signal, employing an amplification stage and a comparator to compare the signal against a predefined threshold. When the sound intensity surpasses this threshold, the Arduino triggers a digital output. This output, in turn, controls a relay or directly influences a connected device, enabling actions like turning lights on or off in response to clapping sounds. The code allows for adjustments, letting users fine-tune sensitivity and debounce settings for optimal performance, resulting in a reliable and hands-free clap-activated switch for electronic devices.

5.2 Result

A clap switch is a basic electronic circuit designed to toggle the state of a device in response to clapping sounds. The circuit typically comprises a microphone to detect claps, an amplifier to strengthen the signal, a comparator to compare the signal with a reference voltage, and relay to control the switch. When a clap is detected, the amplified signal triggers the switch, turning the connected device on or off. The simplicity of the circuit makes it an accessible project for electronics enthusiasts, providing an engaging introduction to basic components and signal processing. Adjusting sensitivity and debounce settings can customize the switch's response to suit various environments and preferences.

6. CONCLUSION

The Arduino Uno clap switch project is a hands-free electronics and microcontroller programming application that integrates a microphone and uses carefully crafted code. It allows hands-free control of electronic devices through clapping sounds, making it an excellent introductory project for sensor integration, signal processing, and digital output control. The project's versatility is enhanced by fine-tuning sensitivity settings, making it suitable for various environments. Overall, it serves as an educational and interactive endeavor in DIY electronics.

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