How to make clap switch using Arduino UNO

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Introduction:

One of the most cutting-edge devices available today is a clap switch, which enables users to control various appliances, such as lights, by just making a clap sound. In order to perform its duties, it first detects sound waves by use of a microphone or sound sensor, which then transmits signals to a control unit, such as an Arduino.

The sound pattern is processed by this device, which then activates a relay to decide whether the associated appliance should be turned on or off. The fact that this system is both straightforward and efficient, combining fundamental electronics and programming, makes it a fantastic project for anyone who is interested in home automation and smart home technology.

Objective:

The purpose of this project is to produce a clap-activated switch that enables users to control electrical equipment, such as a light bulb, by means of sound detection. The switch will be designed and implemented.

By employing components such as an Arduino Uno, a sound sensor, and a relay module, the purpose of this system is to illustrate the practical use of automation and sound identification.

In the context of smart home settings, the project demonstrates how straightforward and economical technology may improve convenience and make it possible to operate without using one's hands.

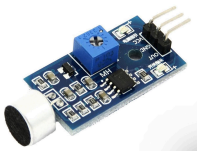
Components:

1. **Arduino Uno:** Acts as the microcontroller for processing sound sensor inputs and controlling the relay.
2. **5V Relay**: Used to switch the electrical appliance (light bulb) on and off.
3. **Sound Sensor:** Detects the clap sound and sends a signal to the Arduino.

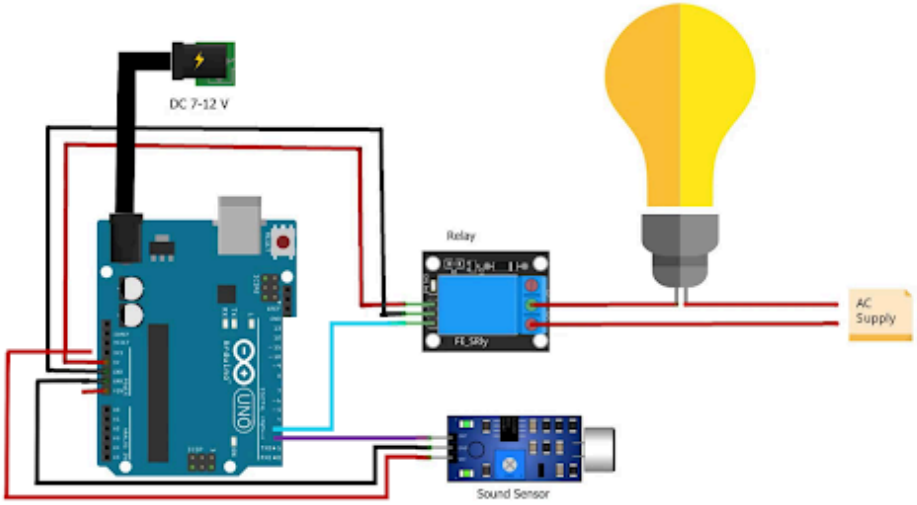
4. **Bulb and Holder:** The electrical appliance to be controlled.

5. **6 Male-Female Jumper Wires:** For connecting the components (sound sensor, relay, and Arduino).





Circuit diagram:



Arduino uno code:

```
#define SENSOR_PIN 2.
#define RELAY_PIN 3
int previousValue = HIGH;
int clapCount = 0;
unsigned long previousTime = millis();
```

```
bool relayOutPut = HIGH;
void setup()
{
pinMode(SENSOR_PIN , INPUT);
  pinMode(RELAY_PIN, OUTPUT);
 //Turn off relay . Relay is LOW level triggered relay
  digitalWrite(RELAY_PIN, HIGH);
}
void loop()
{
int currentValue = digitalRead(SENSOR_PIN);
  if (previousValue == HIGH && currentValue == LOW)
  {
    if (clapCount == 1 &&  millis() - previousTime >= 500)
    {
      clapCount = 0;
    }
    if (clapCount == 0)
    {
      previousTime = millis();
    }
    clapCount++;
    if (clapCount == 2)
    {
      relayOutPut = !relayOutPut;
      digitalWrite(RELAY_PIN, relayOutPut);
      clapCount = 0;
    }
    delay(200);
  }
  previousValue = currentValue;
```

How to install the clap switch:

1. **Prepare Components**: Gather all the necessary materials: an Arduino Uno, sound sensor, 5V relay, bulb with holder, 12V-DC power supply, wires, and a computer with the Arduino IDE installed.

2. **Attach Wires to the Sound Sensor**: Connect wires to the signal, VCC (power), and GND (ground) pins of the sound sensor. This sensor will detect the sound of claps and send a signal to the Arduino.

3. **Prepare the Relay Module**: Connect wires to the input, VCC, and GND pins of the 5V relay module. The relay acts as a switch to control the 220V-AC light bulb.

4. **Set Up Arduino IDE**:

   • Connect your Arduino Uno to your computer using a USB cable.

   • Open the Arduino IDE and write the code to interpret the sound sensor's input and toggle the relay on and off based on claps.

   • Upload the code to the Arduino Uno. Make sure the code correctly identifies the input pin for the sound sensor and the output pin for the relay.

4. **Disconnect Arduino**: Once the code is uploaded, disconnect the Arduino from your computer to prepare it for the hardware setup.

6. **Connect Components to Arduino**:

   • Attach the sound sensor's signal wire to a digital input pin on the Arduino, and connect its VCC and GND to the Arduino's 5V and GND pins, respectively.

   • Connect the relay module's input pin to a digital output pin on the Arduino, and connect its VCC and GND to the Arduino's 5V and GND pins.

7. **Set Up the Light Bulb**:

   • Attach one wire to the bottom contact of the bulb in its holder and screw it on tightly.

   • Connect this wire to the common (COM) terminal of the relay module.

   • Attach another wire to the normally open (NO) terminal of the relay and connect it to a 220V-AC source. The second wire from the light bulb holder should also connect to the AC source to complete the circuit.

8. **Power the Arduino**:

   • Use a 12V-DC power supply to provide power to the Arduino Uno through the power jack.

9. **Test the System**:

   • Power on the Arduino.

   • Clap once to turn the light bulb on and clap again to turn it off. The sound sensor will detect the clap, and the Arduino code will toggle the relay, controlling the light.

Results:

https://drive.google.com/file/d/1xT3n6OLwyAizUaqc8rJkve4iu7jV0cQI/view?usp=drivesdk

Conclusion:

The clap switch project is an excellent example of how straightforward technology may be utilized to provide a hands-free method of controlling electrical appliances thanks to its effective implementation.

The system is able to provide a dependable response to the sound of a clap by combining an Arduino Uno, a sound sensor, and a relay module. This allows the system to easily turn a light bulb on and off. Not only does this project illustrate how sound detection may be applied

in the real world, but it also brings to light the expanding possibilities that automation can bring to various aspects of society.

Incorporating smart functionality into houses may be accomplished in a way that is both accessible and cost-effective. Overall, this project is a stepping stone to more complex smart home technologies, and with future developments, it may be modified to manage numerous devices or filter out undesired noise for improved accuracy. In addition, it might be used to increase the accuracy of the application.

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