**Course: Digital Logic Design (CSE260)**

Project Title: Clap Switch

Theory Section: 09

Group Number: 04

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**Introduction:**

A clap switch is an electronic circuit that can be turned on by clapping our hands. It can also be turned on by any sound similar to the pitch of the sound of clapping. The objective is to construct a clap switch circuit which requires a 555 timer IC, BC 547 Transistor, and a few other equipments. One of the main components of this circuit is the condenser microphone, which is being used as a sound sensor. It receives a sound as an input and turns the LED on as an output, so it can be said that the circuit turns sound energy to electrical energy.

Proposed Model:

At first the circuit will be given power using a 9V battery. Then a clapping sound will be made and the microphone, connected to the base of the transistor, will react as the sound sensor. The circuit will take the input as sound energy, then process it to produce the output as electrical energy. As a result, the LED will be turned on. The period of time for which the LED remains on can be altered by using capacitors of different capacitance, since it is connected with a 555 timer IC whose main purpose is to generate the pulse.

Experimental Setup:

The Required Components are as follows:

1. 555 Timer IC

2. Condenser Microphone

3. 9V battery and battery clip

4. BC 547 Transistor

5. 10uF capacitor

6. Resistors of 4 different types of resistances (330,1k,47k,100k)

7. LED

8. Breadboard

9. Wires

**Explanation:**

At first, connect pin 4 to the pin 8 of 555 timer IC, then pin 6 to pin 7, pin 1 to the ground, and pin 8 to the power or positive rail. Then the BC 547 transistor’s collector is to be connected to the IC’s pin 2, and its emitter to ground. Afterwards connect the base of the transistor to the positive lead of the microphone, and the negative lead to the ground. Then again with the base of the transistor connect a 47k ohm resistor whose other end will have to be connected with the positive rail of breadboard. After that, the collector of the transistor is to be connected to the positive rail via a 1k ohm resistor. Using a 100k ohm resistor connect pin 7 to the positive rail and connect the 10uF capacitor’s positive lead to pin 6 and the negative lead to ground. For the LED, connect its anode to pin 3 of IC and its cathode to the ground using a 330 ohm resistor. Lastly, power supply is given using a 9V battery.

Results and Analysis:

After giving the power supply through a 9V battery, the circuit is activated. Then for the circuit to start working, a clapping sound is made and it is received through the microphone. Then the sound energy is converted to electrical energy, and the LED lights up as a result. The LED will light up for longer span of time depending on the capacitance of the capacitor. For instance, when using a capacitor of 10uF the LED will stay lit for only 1 second, but when using a 22uF capacitor it will remain lit for about 2.5 seconds, again when a 47uF capacitor will be used it will stay on for 5 seconds.

**Conclusion:**

There are a few advantages of using this circuit as well as disadvantages. Some of the advantages that should be mentioned- while using this circuit there is no fear of electric shock as no mechanical switches will be touched physically, the production cost is less, circuit is reliable. On the other hand some disadvantages may include- microphone condenser being used has a default short range that cannot be varied, unnecessary disturbance may occur while operating this circuit in open spaces etc. Clap switch is not restricted to turning LED’s on and off but it can be used in electric appliances like tube light, fan, radio and other basic circuits which we want to turn on by sound energy. This system is also very useful for mobility-impaired people and the elderly. In conclusion, this circuit is useful for turning on and off the household appliances by just clapping hands.