

AC CURRENT DETECTOR

A MINOR PROJECT REPORT

Submitted in Partial Fulfilment of the Requirements for the Degree of

Electronics and Communication Engineering

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CERTIFICATE

This is to certify that the seminar report entitled “**AC CURRENT DETECTOR**” that is being submitted by **J.SRI LAKSHMI, SK.RIYAN, SK AHMAD ALISHA** bearing **Regd. No.181FA05093, 181FA05161, 181FA05176** in partial fulfilment for the award of III year I semester B. Tech degree in Electronics and Communication Engineering to Vignan’s Foundation for Science Technology and Research, is a record of work carried out by them under the guidance of (Assistant Professor) of ECE Department.

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ABSTRACT

The main objective of this project is to ensure the safety and precautions when electricity is not properly handled, it results in electrical shocks with a nasty experience. This project makes use of the IC 555 Timer, which gets operated in monostable multivibrator mode and used to detect the AC current flowing through a conductor. By the applications of electromagnetic induction when ever the antenna is brought near the current carrying conducting wire. and as a result of electromagnetic induction, the LED glows and the buzzer buzzes which indicates the presence of the AC current in the conductor.

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1. INTRODUCTION

A non-contact current test provides an easy and safe way of ensuring that electrical conductors do not have power without having to touch them.

The tester works by detecting the electric fields associated with AC voltages. These fields are usually present near the live conductors, hence the reason why there is no requirement for direct contact with the conductors.

The tester can be used by professional as well as consumers who can use the gadget around the house. To check for a live conductor, the tip of the tester is inserted into the socket or placed near any other conductor under test. It is recommended to test all conductors, including the neutral, just in case there is a fault or incorrect wiring. Once the tester is placed near the live conductor, the electrostatic or magnetic fields induce a current that flows through the tester. This makes the device indicate the presence of a voltage by lighting up, making a sound or both.

2. COMPONENTS

- IC 555 TIMER
- 4.7uF CAPACITOR
- 220Ω and 10K RESISTORS
- BUZZER
- LED
- ANTENNA
- BATTERY

3. COMPONENTS DESCRIPTION

1. IC 555 TIMER: - The basic 555 timer gets its name from the fact that there are three internally connected $5k\Omega$ resistors which it uses to generate the two comparators reference voltages. The 555 timer IC is a very cheap, popular and useful precision timing device which can act as either a simple timer to generate single pulses or long time delays, or as a relaxation oscillator producing a string of stabilised waveforms of varying duty cycles from 50 to 100%.

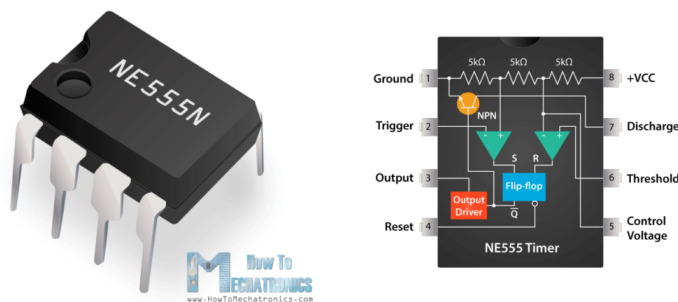


Fig 3.1. Diagram of IC 555 TIMER

2. LED: - A **light-emitting diode (LED)** is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The colour of the light is determined by the energy required for electrons to cross the band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.



Fig.3.2.LED

3. CAPACITORS: - A capacitor (originally known as a condenser) is a passive two-terminal electrical component used to store energy electrostatically in an electric field. Unlike a resistor, a capacitor does not dissipate energy. Instead, a capacitor stores energy in the form of an electrostatic field between its plates.



Fig 3.3. CAPACITORS

4.RESISTOR:- A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses.

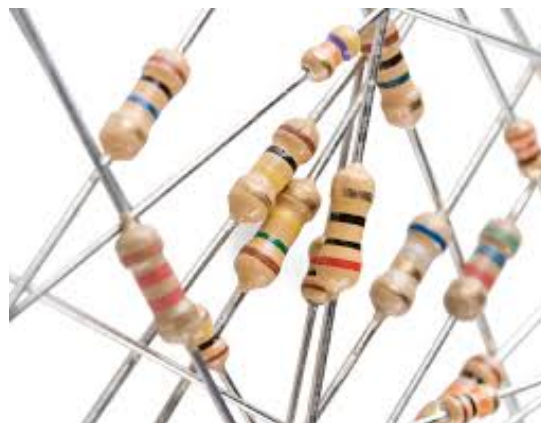


Fig 3.4. Resistor

5.BATTERY :- A battery is a device consisting of one or more electrochemical cells with external connections for powering electrical devices such as flashlights, mobile phones, and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal.



Fig 3.5. Battery

6. BUZZER:-The buzzer is a sounding device that can convert audio signals into sound signals. It is usually powered by DC voltage. It is widely used in alarms, computers, printers and other electronic products as sound devices. It is mainly divided into piezoelectric buzzer and electromagnetic buzzer, represented by the letter "H" or "HA" in the circuit. According to different designs and uses, the buzzer can emit various sounds such as music, siren, buzzer, alarm, and electric bell.

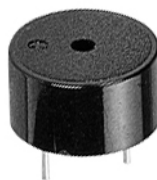


Fig 3.6. Buzzer

7.ANTENNA : Antennas are made of loops of wire. These antennas detect the magnetic field rather than the electric field. Just as a magnetic field through a coil of wire is produced by the current in that coil, so too a current is induced in a coil of wire when a magnetic field goes through that coil.



Fig 3.7. ANTENNA

4. CIRCUIT DIAGRAM

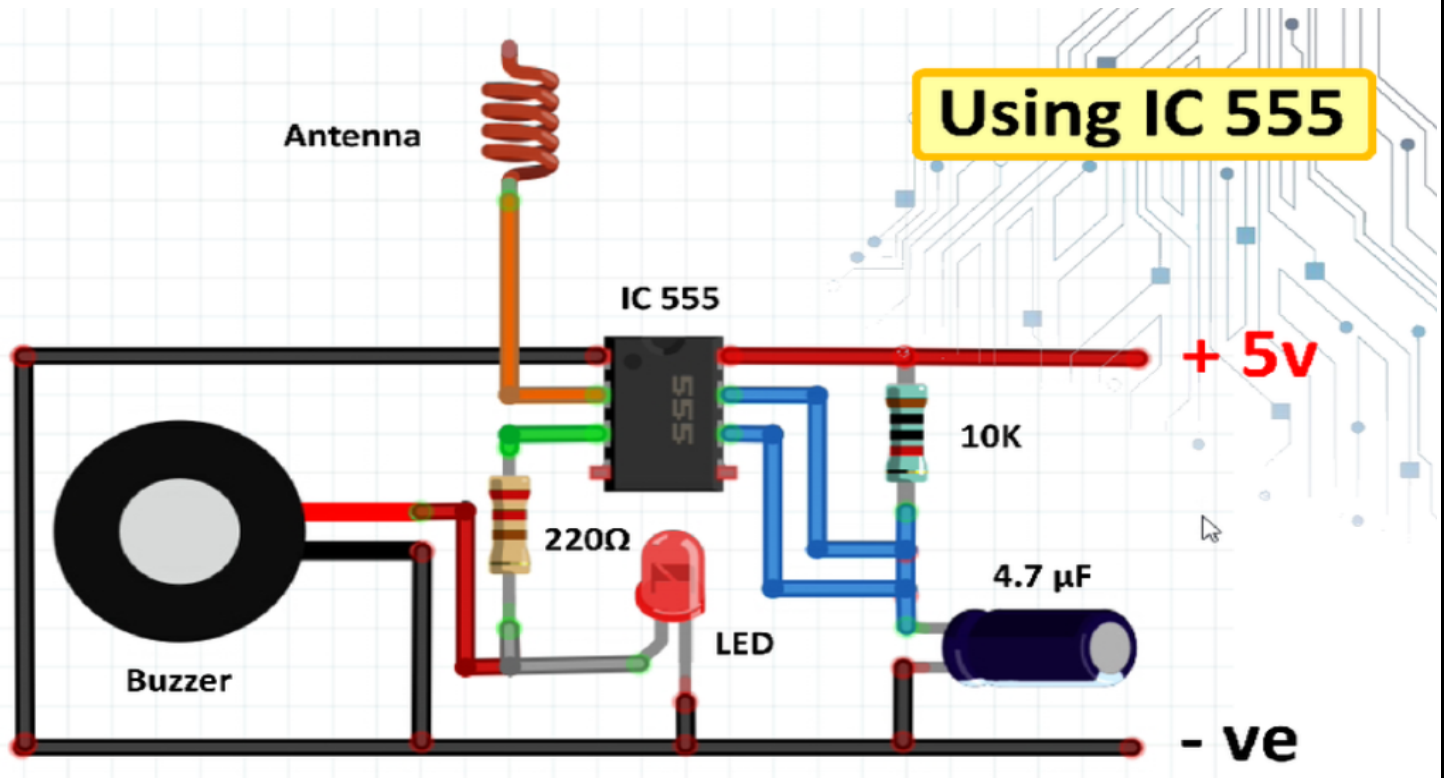


Fig. 4.1 Circuit diagram of AC Current detector.

5. WORKING

Connect Pin-1 to ground. Pin-2 to the antenna. Pin-3 to the LED and the buzzer. Pin-6 to the +ve leg of the capacitor and Pin-7 to one end of the 10K resistor. Then Pin-6 or the Threshold pin and Pin-7 or the Discharge pin need to be connected to each other. Pin-8 and the other end of the 10K resistor connects to the +ve rail of the circuit board, and finally connect all the -ve legs to the negative rail of the circuit board.

This circuit is very simple. When the voltage on Pin-2 falls below $\frac{1}{3}$ of VCC the Output on Pin-3 goes HIGH and the LED lights up. Alright, now let's do a quick test.

This circuit actually works on the principle of **electromagnetic induction**. A magnetic field is produced around a current carrying conductor and if current through the conductor is alternating current (AC), the magnetic field produced varies periodically.

When we place an antenna near an AC energized object, a small current gets induced into the antenna due to electromagnetic induction. By amplifying this current we can light up a LED or a buzzer circuit, indicating that AC voltage is present.

As we bring a live wire close to the antenna the buzzer and the LED starts buzzing and flashing. If I put my hand around the antenna it has no effect on the circuit. Which makes this setup more reliable as I am not getting any false reading.

6. ADVANTAGES

- The circuit is small in size.
- It's easy to construct.
- More over it's cost effective .
- This circuit is used to detect the breakage of connection.
- It also prevents shocks without in contact.

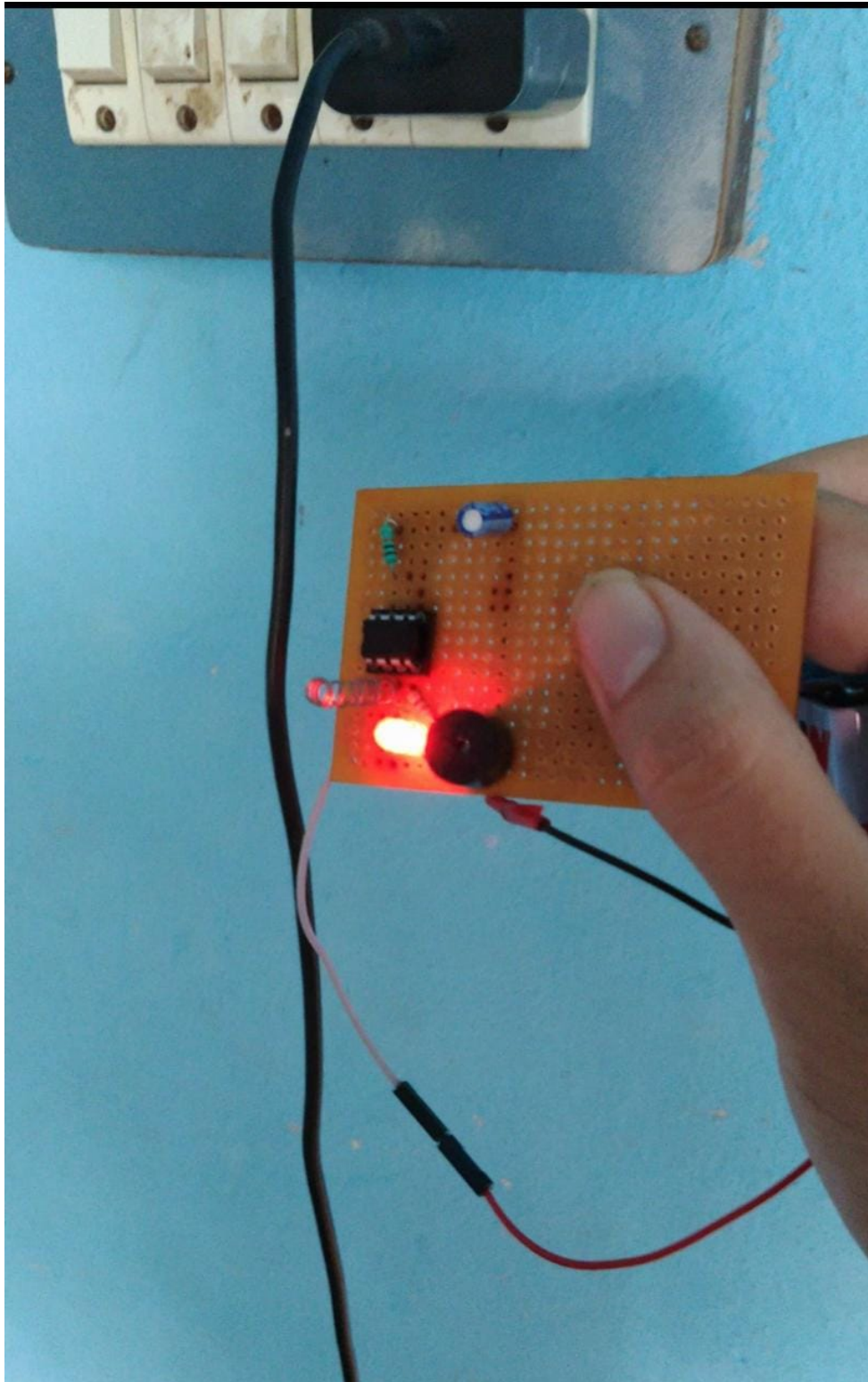
7. DISADVANTAGES

- This circuit cannot be used to detect dc current in a conductor.
- It cannot measure the amount of current and will only indicate the presence of current.
- Circuit can not be used to test the current inside the sockets.

8. APPLICATIONS

- Most Common Used In Electrical Wiring.
- widely Used By Professional Technicians.
- Lamp Cords.
- Used By Electricians.

9. OUTPUT RESULT



10. CONCLUSION

The non-contact tester makes sure that the current is cut off, and there's no need to touch any wires. It is the safest way to do so. This is important in ensuring that power to the equipment is off before opening it for maintenance or a repair.. In this circuit we use some basic terminology and concept of electronics engineering and some simple equipment. As experiments are never dies and ideas are never stops so there also a possibility of improvement in this system.

11. REFERENCES

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