

Electric Shock Prevention Device Using RF Transceiver

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Abstract

The major problems in these days is Electric shock, it may occur due to improper maintenance of the electric loads and ground fault (GF). The proposed paper will be very much helpful in solving this problem. Whenever a person experiences the electric shock the device which is in contact with person detects the electric shock and sends a RF (Radio frequency) signal to the main power supply through RF transmitter. RF receiver receives the signal and turns off the main power supply. The whole process takes place within micro seconds.

Key Words: Ground fault (GF) and Radio frequency (RF).

INTRODUCTION

Nowadays the people are losing their life due to electric shock. Electric shock is produced when an electric voltage is discharged through a human body or a living thing. The earth fault occurs when there is breaking of resistance in ground from an electrical system, because of this condition current flow is disturbed and it will take the alternative path from the human body. This results in severe injuries for the human body.

Many of the conventional methods are followed to prevent the electric shock for human body. The first concept came into picture is Earth leakage circuit breaker (ELCB), in this method if any imbalance occurs in grounding and voltage, the system turns off the Fuse automatically.

The other method is Voltage earth leakage circuit breaker (VELCB), this method is achieved using the relay circuit. The one end of the relay is connected to Load line and the other end is connected to ground terminal. If any fault occurs, the circuit phase line will be grounded by tripping the Relay circuit.

The above two methods are less efficient sometimes it fails to perform the required operation in a specified time and many lives were lost due to this.

So, the proposed system is an efficient method to save the life of the individual. And it is done using the simple and widely used Radio frequency (RF) Transmitter and Receiver.

The remaining part of the paper consist of Block diagram, Methodology, other part consists of circuit diagram and the circuit working. The final part consists of the Conclusions of the proposal and references.

MATERIAL AND METHODOLOGY

Transmitter

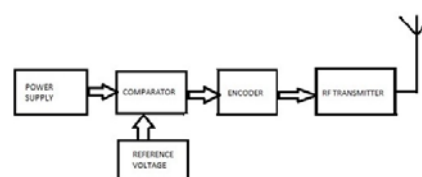


Figure 1. Block diagram representation of Transmitter section.

The block diagram of the Transmitter part is shown in Figure 1.

A. Power supply

A 9v power supply is used for the components in Transmitter section.

B. Comparator

The IC LM-358 comparator is used in the Transmitter section the operational voltage ranges from 3V to 30V for single power supply and $\pm 1.5V$ to $\pm 16V$ for dual power supply. The main function of this IC is to compare Input voltage with reference voltage and produce the output.

C. Encoder

The IC HT12E is an encoder, commonly used in interfacing Radio frequency circuits.

D. RF Transmitter

The RF transmitter shown in figure 2 is mainly used for wireless communication. It produces RF signal to communicate with the receiver. It is used in many remote applications and wireless automation.



Figure 2. RF Transmitter.
Receiver:

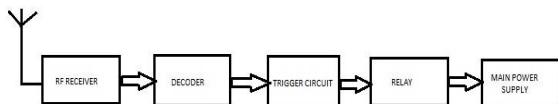


Figure 3. Block diagram representation of Receiver section.

The block diagram of the Receiver part is shown in Figure 3.

A. RF Receiver

The RF Receiver shown in figure 4 is mainly used for wireless communication. It receives RF signal from

the sender. It is used in many remote application and wireless automation.



Figure 4. RF Receiver

B. Decoder

The IC HT12D is decoder which decodes the information from HT12E, commonly used in interfacing Radio frequency circuits.

C. Trigger circuit

IC 555 timer is used in the Trigger circuit. The operating voltage ranges from 5v to 18v. It is used as Monostable Multi-vibrator in the proposed paper. The output of the monostable multi-vibrator is shown in figure 5.

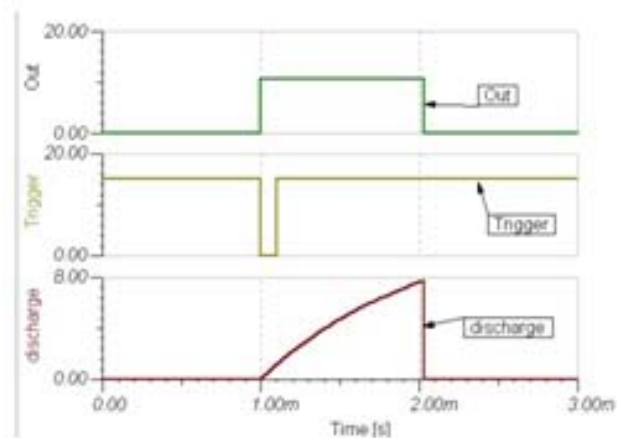


Figure 5. Graphical representation of monostable multi-vibrator

D. Relay

It is a used to suspend the main power supply, based on the pulses generated by 555 timer.

E. Main power supply

It is nothing but main electricity board, which is controlled by Relay.

Methodology:

Transmitter Section:

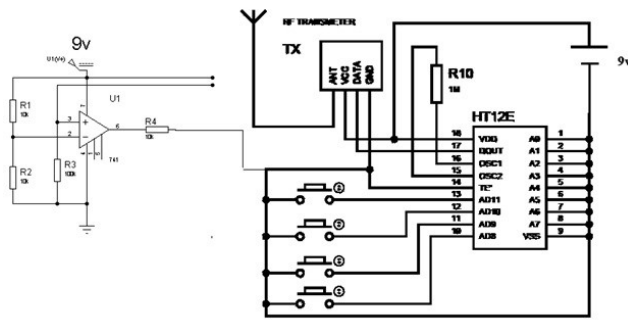


Figure 6: Circuit diagram representation of Transmitter section

The transmitter part is made as a device which detects the electricity. The device is attached to the hand glove or helmet which must be in contact with the body of lineman. In the proposed paper we have used a 9V battery to enable IC LM358, the reference voltage is given to the inverting terminal of the IC LM358 and the non-inverting terminal is in contact with the body of the lineman. Whenever the lineman experiences an electric shock the voltage at non-inverting increases which is compared with the reference voltage and the output of the IC LM358 enables the HT12E encoder through which the RF transmitter transmits a Radio Frequency signal with the help of an antenna as shown in figure 6.

Receiver Section:

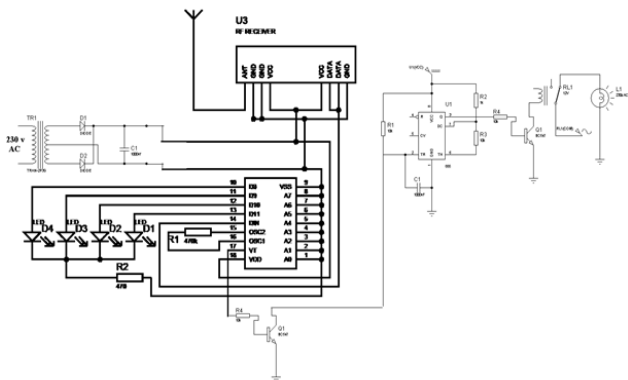


Figure 7. Circuit diagram representation of Receiver section

The RF Receiver is placed at the electricity board. The circuit diagram of the receiver section is shown in figure 7. The RF receiver module receives the RF signal through antenna which is decoded with the

decoder HT12D, the output of the decoder is passed to IC 555 which acts as monostable multi-vibrator and generates the pulse which triggers the relay. Then the relay switches from normally closed state to normally open state which disconnects the main power supply at electricity board so that the lineman is prevented from electric shock. The whole process of disconnecting the main power supply takes place within few micro seconds.

RESULTS AND TABLES

In this paper we have developed a useful tool to save the lives of lineman from electric shock. The circuit consist of Radio Frequency transmitter and receiver which has an operating range of 10-15feet. The Receiver can sense signal from 15 feet away from Transmitter. The image of the Transmitter device is shown in figure 8(a) and that of receiver is shown in figure 8(b).

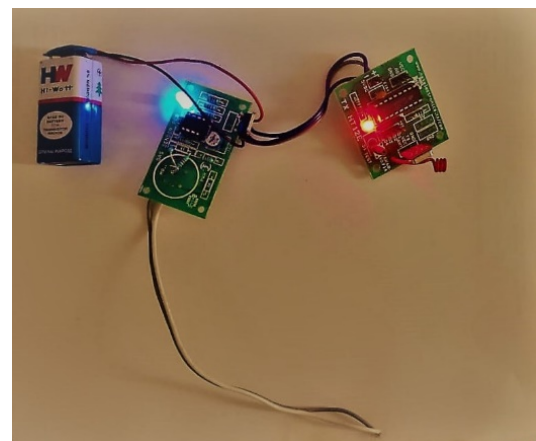


Figure 8(a). Proposed System Hardware of Transmitter

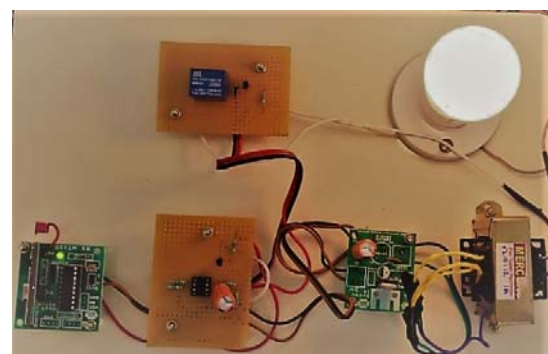


Figure 8(b). Proposed System Hardware of Receiver

Conclusion

The Proposed Paper can be implemented in Electricity Boards and other similar industries. The system can be used in the situations, where there is more threaten to human lives due to heavy loads of electricity. It is very easy to maintain, design is simpler and cost effective as well.

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