



# OVERVOLTAGE AND UNDERVOLTAGE PROTECTION SYSTEM

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**Abstract:** The purpose of this project is trip the relay according to the variations in supply voltage for protecting electrical household as well as industrial equipment in case of overvoltage and under voltage. The electronic devices are very sensitive towards voltage variation, as voltage variation comes in supply the electronic equipment get easily damaged. In that condition it requires an additional protecting mechanism to protect the equipment as a load. According voltage comparator integrated circuits the decision of tripping of relay mechanism get performed, as voltage varies above or below the set value. The main advantage of this relay based mechanism is that it also protects three-phase appliances from single phasing and fluctuation of voltage in ac voltage waveform. In future their might be addition of earth fault detection and protection, automatic starting protection circuitry

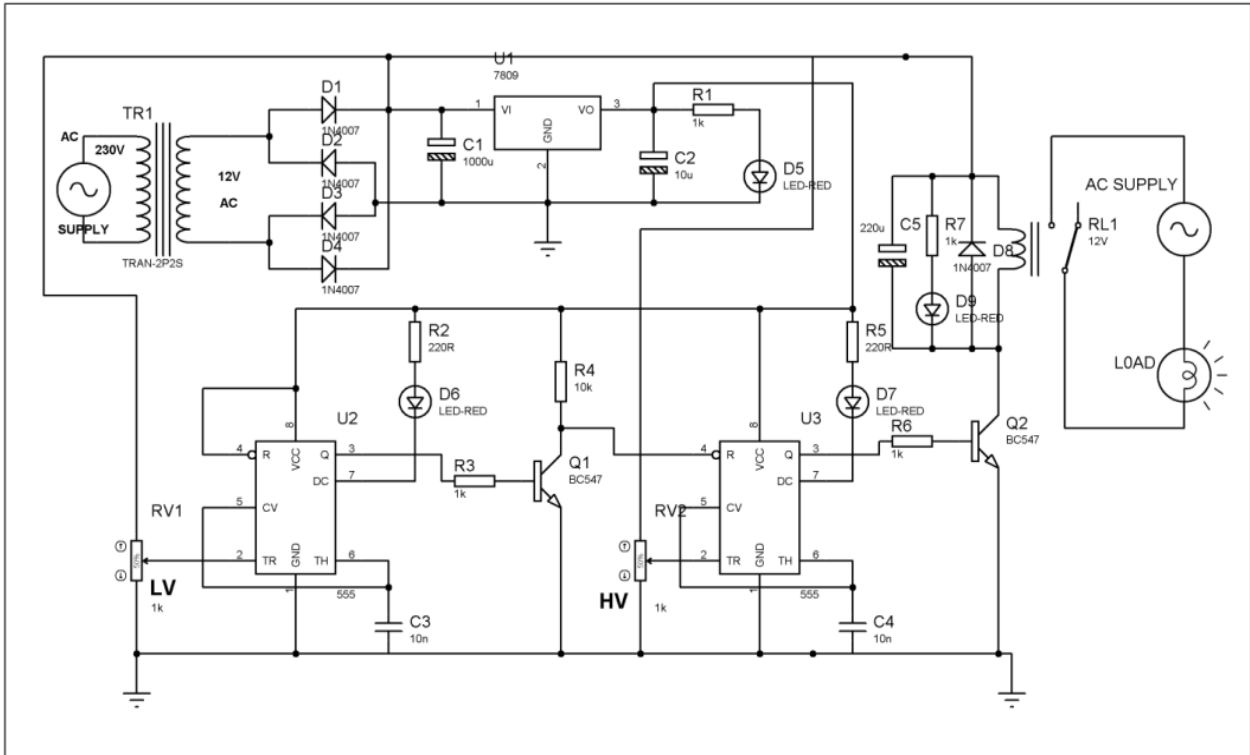
Key Words: overvoltage and under voltage protection, voltage comparator circuitry, tripping mechanism of relay..

## 1. INTRODUCTION

The aim of this project is to develop a low voltage and high voltage tripping mechanism to protect the load from damage. The fluctuation in AC mains supply is frequent in homes and industries. The sensitive electronic devices in these conditions can get easily damaged. It is preferable to have a tripping mechanism to protect the load. This proposed system will trip the load in the event of the input voltage falling below/above a set value. Two 555 timers are used as window comparator. This delivers an error output if the input voltage to them crosses the range beyond the voltage window. A relay is then operated to cutoff the load for safety reasons. A lamp is used as load in this project. The concept in future can be extended by integrating an alarm, which sounds when voltage fluctuations occur. It can also be interfaced with a GSM modem to convey alert message to the user via SMS to take appropriate action.

### 1.1 SCHEMATIC DIAGRAM

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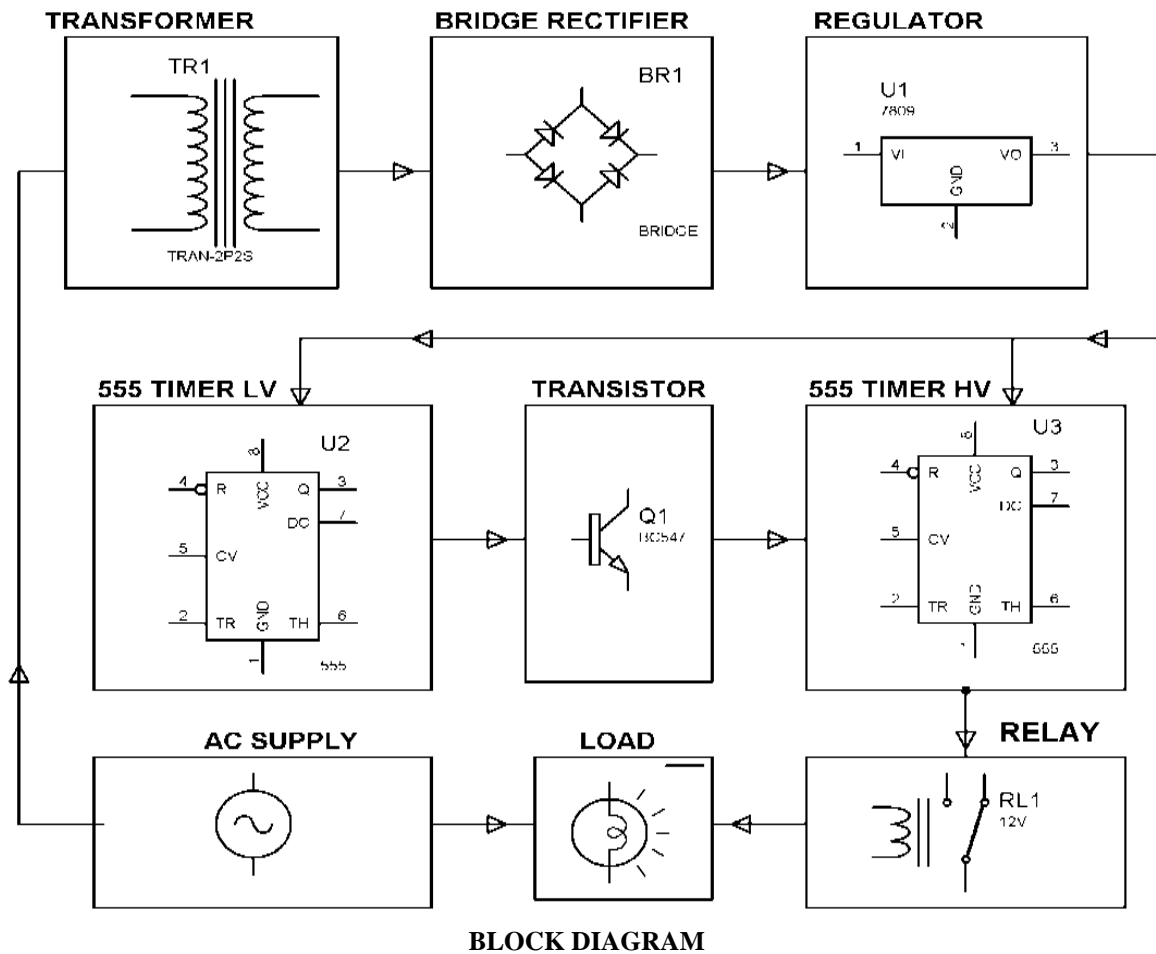
**SCHEMATIC DIAGRAM**

## 1.2 BLOCK DIAGRAM

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**1.3 HARDWARE REQUIREMENTS:**

- 555 Timers
- LED
- Voltage Regulator
- Resistors
- Potentiometer
- Capacitors
- Diodes
- Relay
- Lamp
- Transformer

**2. 2.0 DESCRIPTION**

**2.1 CONNECTIONS:**

In this project of OVER VOLTAGE OR UNDER VOLTAGE ALERT SYSTEM we are using one step down transformer from 230v 50hz to 12v. One bridge rectifier and voltage regulator of 7809 so that +9v can be obtained for the operation of the circuit. Here we are using two 555 timer known as U2 & U3. 8<sup>th</sup> pin of which is connected to 3<sup>rd</sup> pin of voltage regulator where 4<sup>th</sup> pin is shorted to 8<sup>th</sup> pin. 2<sup>nd</sup> pin of U2 is connected to RV1 which is used for low voltage LV and pin 2 of U3 is used for high voltage HV. Where 5<sup>th</sup> pin and 6<sup>th</sup> pin of both U2 & U3 are shorted and connected to ground through capacitor C3 of 10n where 7<sup>th</sup> pin is connected to filter circuit through LED D6 and resistor R2 of 220R. 3<sup>rd</sup> pin is connected to base of transistor Q1 & Q2 (BC547) through R3 of 1k. Emitter is connected to VCC where Q2 is connected to relay where RL1 consist of LOAD lamp and ac supply.

**2.2 WORKING:**

In this project of over voltage or under voltage alert system, the following three conditions are explained:

**2.2.1 FOR NORMAL OPERATION:**





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- Refrigerator
- Agriculture motors
- Water pumps
- Microwave oven

**4. CONCLUSION:**

This project was made with a aim to build a system that monitors voltage and provides a breakpoint based low and high voltage tripping mechanism that avoids any damage to the load. Various industrial and domestic systems consist of fluctuation in the AC mains supply, there's a chance of damaging electronic devices that are quite sensitive to these fluctuations. So there needs to be a tripping system that avoids any damage to these loads. Our system consists of a tripping mechanism that monitors the input voltage and trips according to limits provides. Here we use a quad comparator IC with two more comparators to be used as window comparators to it. This project may be very useful in protecting electrical appliances from over and under voltage problems in an effective way, in both industrial and domestic use.

**REFERENCE:**

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