

# Switching at Zero Voltage Level

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**Abstract:** The project is designed to develop a device to increase the life of equipment. For example, consider a resistive load as Incandescent lamps. They are having a property of very low resistance in cold condition. Due to which lamp circuit draws very high current at the time of switching, resulting into a fast failure of lamps. Random switching of lamps may occur at any instant of the sinusoidal voltage/current waveform. Assume switching is done at the peak value supply voltage. When such switching of the load (Incandescent Lamp) occurs and as the lamp is having low resistance in cold condition, then the current further shoots up. This will lead to premature failure of the lamp. The proposed project idea provides a solution for the current shoots in the circuit. This is done by connecting a TRIAC in circuit such that the controlling the firing angle of the TRIAC by detecting the zero cross point of the waveform of supply voltage and after switching of the load is done. The project contains comparator here is ZVS (Zero Voltage Switching) which is given as reference interrupt to the microcontroller. Arduino microcontroller is used in this project idea.

**Keywords:** Arduino UNO, AC Voltage Regulator, Light Emitting Diode, LCD, capacitor.

## I. INTRODUCTION

Random voltage switching operates like it states, it energizes the output switch whenever the timing circuit signals it to do so, meaning that the external load can turn on at any point in the AC voltage waveform.

An AC circuit changes polarity frequently. In India it changes 50 times per second, and generally written as 50Hz or even 50 cps (cycles per seconds). This means that the voltage polarity changes from +/- to -/+ and back to +/- 50 times per second.

If switched is on at random instant suppose here at peak of voltage waveform the transients are created in the waveform which leads to formation of harmonics and leads to the damage of the equipment. To avoid this zero voltage circuit is developed. In the circuit the ZVS is used which is used to detect the zero crossing of the waveform and sends signal to the microcontroller. Microcontroller receives the signal and gives output signal to the opto-isolator.

## II. IMPLEMENTATION SETUP COMPONENTS

### A. Arduino Board

Arduino is a simple microcontroller board. It is based on an open-source physical computing platform. The Arduino Uno is a microcontroller board based on the ATmega328 (Arduino Nano 3.x) or ATmega168 (Arduino Nano 2.x). It has 14 digital input/output pins. Out of these 14 pins, 6 pins can be used as a PWM output. 8 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller. USB cable is used for the connection of the Arduino Nano board to the computer or laptop. It is having 40 mA of DC current per I/O (Input Output) pin. It is having 16KB Flash memory in ATmega168 and 32KB Flash Memory in ATmega 328. The 2KB of the total Flash Memory is used by the Bootloader.



Fig. Arduino Board