

A Design of Multicolor LED Name Board with Sequential LED Blinking



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ABSTRACT: The led name board system is aimed at the colleges and universities for displaying their name for attractive look, and at night time can be visible from distance. Led name board system can also be used at other public places like schools, hospitals, railway stations, gardens etc. without affecting the surrounding environment. The led name board system mainly consists of a dc switch mode power supply, LED's, resistors and LED chaser circuit for switching LEDs one after another as to look like LEDs are chasing each other, using LED chaser circuit we can control speed of blinking time of LEDs. Here we are implementing a 1.5x7.5 feet rectangular LED board with name as Padm. Dr. VBKCOE using red color LED and border is with red, green and yellow LEDs they are connected to LED chaser circuit so they will be blinking one after another, as we would feel like they are chasing each other. LED chaser circuit is made of two main IC one is timer IC and another CD4017 Chaser IC, timer IC for generating clock pulse for chaser IC so we can control chasing speed of LED by changing pulse rate. All LED in board is powered by DC power supply. Here we are using 12 Volt 10 Amp switch mode power supply which has AC 230 Volt input and DC 12 regulated voltage. LEDs are connected with resistor for limiting current to flow through it as 20mA.

KEYWORDS: SMPS, LED Chaser, Decade Counter CD4017, Timer 555 IC, LED (Light Emitting Diode)

I. INTRODUCTION

Now-a-days LED name boards are becoming very popular. These LED Boards are used in shopping malls, theatres, public transportation, traffic signs, highways signs, etc. This led name board system is aimed at the college for displaying college name for attractive look, and at night time can be visible from distance. Here in this name board we are using 5mm red color LED for font color and at border line we use yellow, red and green color LED which continuously blink as looks like chasing one another. Power for all LEDs are supplied by 12 Volt 10 Amp SMPS (switch mode power supply) which converts AC 230 Volt into 12 V 10Amp DC Power. Here we are implementing LED name board for college name as "PADM. DR. VBKCOE" in size 7.5x1.5 feet. All LEDs are mounting on 3mm width of foam sheet with accuracy. LED name board can be damaged if water logged, to avoid this we are making a metal box, the LED board will be fixed inside metal box and that will also get strength to board. LED chaser circuit is made of two main IC one is timer IC and another CD4017 Chaser IC, timer IC for generating clock pulse for chaser IC so we can control chasing speed of LED by changing pulse rate. All the LED are connected in series and parallel combination with current limiting resistor, here 4 LEDs are connected in series with 220 ohm resistor and powered by 12 Volt DC power. LEDs have voltage drop 2 Volt and needs 20mA current flow through it, we have chosen 220 ohm 0.25 watt resistor. All 4 series LED connected to 12 V DC power source.

II. OBJECTIVES

- To design & implement low cost attractive LED name board
- To launch new LED board technology into the market.
- To make names boards more decorative using multicolour LEDs with blinking.

III. BLOCK DIAGRAM

The block diagram of name board is as shown in following figure. The block diagram contains three main blocks which are 12 volt/10 Amp switch mode power supply, current limiting resistor set and LED chaser circuit. The switch mode power supply converts AC 230 volt input into DC 12 V output. Then DC output is given to LED chaser circuit and current limiting resistor set and after that all LEDs are connected to resistor set. Current limiting resistors do not allow excessive current flow through LED.

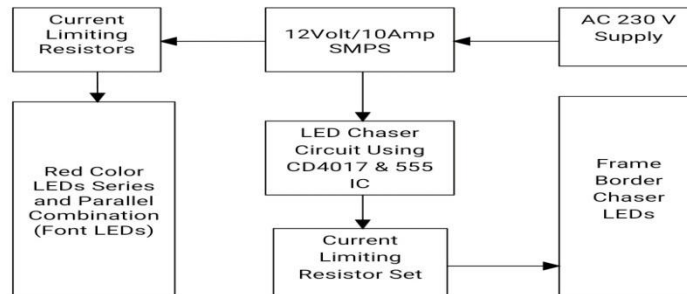


Fig1.Blockdiagram of LED name board

IV.COMPONENTS USED

i. SMPS DC 12V/10Amp :

The term SMPS is defined as when the power supply is involved with the switching regulator to change the electrical power from one form to another form with required characteristics is called SMPS. This power supply is used to achieve regulated DC output voltage from the DC input voltage (or) unregulated AC. SMPS is a complex circuit such as other power supplies, it provides the supply from a source to the loads. SMPS is very important for different appliances which consume power and also for making electronic projects. A switching regulator does the regulation in the switch mode power supply. A series switching element switches the current supply to a smoothing capacitor turn ON and OFF. The voltage on the smoothing capacitor controls the time when the series element is switched. The constant switching of the capacitor keeps the voltage at the necessary level. AC power first flows through the fuses & a line filter, then it is resolved by a full wave bridge rectifier. The voltage which is resolved is next used to the PFC (power factor correction) pre-regulator followed by the downstream DC to DC converter. Most of the computers and small machines utilize IEC (International Electro technical Commission) style i/p connector. As for o/p connectors and pin outs, excluding for some industries like PC & compact PCI. In general, they are not consistent and are left up to the manufacturer. Like every electronic device, the switch mode power supply also comprises some active & passive components.



Fig2.SMPS 12V/10Amp

ii. Timer 555 IC :



Fig3.Timer 555 IC

The 555 timer IC was introduced in the year 1970 by Signetic Corporation and gave the name SE/NE 555 timer. It is basically a monolithic timing circuit that produces accurate and highly stable time delays or oscillation. When compared to the applications of an op-amp in the same areas, the 555IC is also equally reliable and is cheap in cost. Apart from its applications as a monostable multivibrator and astable multivibrator, a 555 timer can also be used in dc converters, digital logic probes, waveform generators, analog frequency meters and tachometers, temperature measurement and control devices, voltage regulators etc. The timer IC is set up to work in either of the two modes – one-shot or monostable or as a free-running or astable multivibrator. The SE 555 can be used for temperature ranges between -55°C to 125° . The NE 555 can be used for a temperature range between 0° to 70°C .

iii. Decade Counter CD4017 IC :



Fig4. Decade Counter CD4017 IC

The CD4017 is a CMOS Decade counter IC. CD4017 is used for low range counting applications. It can count from 0 to 10 (the decade count). The circuit designed by using this ic will save board space and also time required to design the circuit. CD4017 is as 'Johnson 10 stage decade counter'.

Features

- The supply voltage of this IC is 3V to 15V.
- It is compatible with TTL (Transistor -Transistor Logic).
- The clock speed or operational speed of CD4017 IC is 5 MHz.

This IC is also used in electronic industries, automotive industries, manufacturing medical electronic devices, alarms and in electronic instrumentation devices.

iv. LED Chaser :

The LED chaser circuit by using CD4017 and IC 555 is shown below. This circuit is also called as “LED sequencer circuit”.

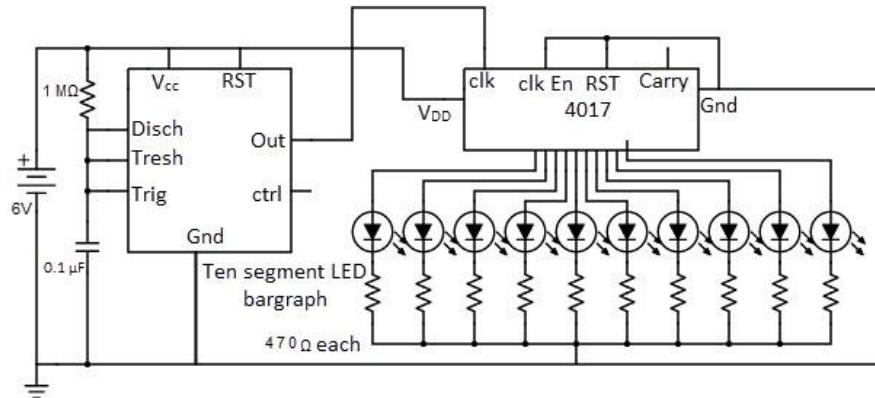


Fig5. Circuit Diagram of LED Chaser

v. LED (Light Emitting Diode):

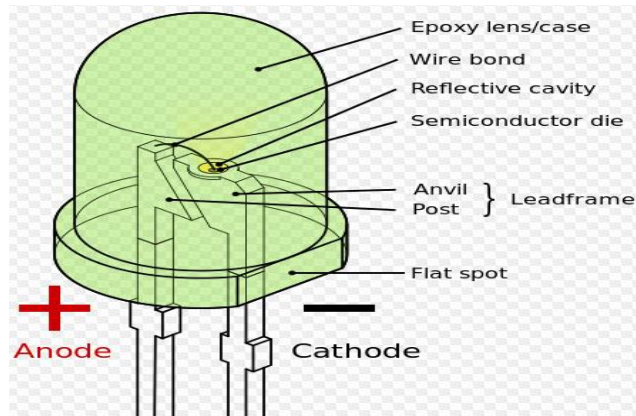


Fig6. Construction of LED

A light releasing diode is an electric component that emits light when the electric current flows through it. It is a light source based on semiconductors. When current passes through the LED, the electrons recombine with holes emitting light in the process. It is a specific type of diode having similar characteristics as the p-n junction diode. Which means that an LED allows the flow of current in its forward direction while it blocks the flow in the reverse direction. Light-emitting diodes are built using a weak layer of heavily doped semiconductor material. Based on the semiconductor material used and the amount of doping, an LED will emit a coloured light at a particular spectral wavelength when forward biased.

V. RESULTS

The final implementation of LED name for college name as “Padm. Dr. VBKCOE” is shown in following image. The name board is successfully implemented, working and looks attractive.



Fig7. LED Name Board

VI.CONCLUSION

Here we have successfully implemented a 1.5x7.5 feet rectangular LED board with name as “Padm. Dr. VBKCOE” using red colour LED and border is with red, green and yellow LEDs they are connected to LED chaser circuit so they will blinking one after another, as we would feel like they are chasing each other. The led name board system is aimed at the colleges and universities for displaying their name for attractive look, and at night time can be visible from distance. Led name board system can also be used at other public places like schools, hospitals, railway stations, gardens etc. without affecting the surrounding environment. This model can be used very efficiently in establishments like in colleges, hospitals, railways, bus station, and airport and also at roadside for traffic control and in emergency situations, it is cost efficient system and very easy to handle. The project has been successfully implemented. Thus the project has been successfully designed and tested.

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