"A REVIEW ON 8*8*8 CUBE LED"

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ABSTRACT

In this paper three dimensional display is been presented in this paper which is driven by a microcontroller. A new form of display has been introduced in the LED arena. Any size cube of A*A*A can be effectively implemented which are cheap as well as rugged. A three dimensional mosaic of light emitting diode is formed in a cube which is comprised of light emitting diodes arranged in the dimensional matrix. This LED cube is like a LED screen, but it is special in that it has a third dimension, making it 3D. Think of it as many transparent low resolution displays. In normal displays it is normal to try to stack the pixels as close as possible in order to make it look better, but in a cube one must be able to see through it, and more spacing between the pixels (actually it's pixels since it is in 3d) is needed. The spacing is a trade-off between how easy the layers behind it are seen, and pixel fidelity. Since it is a lot more work making a LED cube than a LED display, they are usually low resolution. A LED display of 8x8 pixels are only 64 LEDs, but a LED cube in 8x8x8 is 512 LEDs. Cheapness and ruggedness is result of the simplicity of this design. The circuit comprises of a cube connected to a micro controller which is in turn connected to a laptop. The display patterns are sent by the laptop.

KEYWORDS

Arduino, Three Dimensional Array, LED Cube, 512 LEDs, 8*8*8 LED.

INTRODUCTION

The goal of this paper is to be able to output and modify the LED array fast enough to see a persistent image. A three dimensional display is been presented in this paper which is driven by a microcontroller. A new form of display has been introduced in the LED arena. Any size cube of A*A*A can be effectively implemented which are cheap as well as rugged. A three dimensional mosaic of light emitting diode is formed in a cube which is comprised of light emitting diodes arranged in the dimensional matrix. Cheapness and ruggedness is result of the simplicity of this design. The circuit comprises of a cube connected to a micro controller which is in turn connected to a laptop. The displays patterns are sent by the laptop. We have chosen the implementation of this project based on our teams experience and the simplest methods by which we see to complete our goals. When constructing the actual LED array we have chosen to construct the array in layers, verifying that all LEDs function after every step. Due to close proximity soldering there is a high chance that some of them may burn out and we would like to catch this early on. Once we have all layers completed we will stack them and solder the layers on by one till they are fully assembled. We shall also place several strong strands of wire to support the structure and increase its integrity. [1] We have chosen to do the main processing in C through our MSP430. Since both team members have significant experience in coding this device and language it will help develop more intelligent and succinct code.

LITERATURE SURVEY

At a glance 3D LED CUBE is an evolution from 2D DISPLAY. Before this, 2D DISPLAY is usually used in many electronic devices to display something. After that, 3D takes a part on the electronic technology world. The first era of 3D LED CUBE is built the 3x3x3 pocket led. It just use 27 led to shown some text display or interactive design. The cube's 3D construction is straightforward and easy to solder using the included jig and instructions. With use 27 led's, the design or text that display is not too clear. It runs using a PIC16F690 and a piece of software written in
VB.NET. After that, 4x4x4 LED CUBE has been introduced. 64 led's has been used to show the 3D view. Many type of controller can be used to develop this project. PCB is one of the controller that been used. For example, Atmel Atmega16 microcontroller and AVR microcontroller. Each LED can be addressed individually in software, enabling it to display amazing 3d animations. On the programming side, many type of coding can be built for this project such as FPGA, mat lab and c language. Now 8x8x8 3D LED CUBE with 512 led's has been choose for this project. It has two ways can be choose as controller for this project or by arduino controller board .Have a same concept, but with a different works. [2] C language with hex files will be use to run the program. The reason why will choose C language because it related with microcontroller interfacing subject that had been taken for all electric and electronic student. It will be use as software to run this program. This unique way of displaying messages is a very eye catching and much more stand out compared to the two dimensional normal panel displays.

OPERATION OF SYSTEM

The LED cube has 512 LEDs. So it is impractical to dedicate a IO port for each LED. Instead of LED cube rely on optical phenomenon called Persistence of vision. If you flash a LED really fast it will remain in your retina for some time even after LED is switched off. By flashing each layer of cube very fast after one another it gives the feeling of 3d. With this setup we will need only 64(anode) + 8(layers) IO ports to control each led. LED cube is the

major component of this display system which runs on a particular set of instructions. It comprises of 512 LED's (it is 8x8x8 display system and the number of LED, s can be changed as per the size of the cube).An RS232 standard is used to directly connect the PC to the microcontroller. Serial communication is used for this purpose.''CUBEAPP.EXE" is an application designed for the PC which sends the input data from user to microcontroller. The circuit comprises of an LED Drive circuit to which a microcontroller is connected. A clear and accurate response is given by LED cube according to the current signal from driver.

PROBLEM FORMULATION

LED has two legs one positive and one negative .The positive end is connected to the pillars of LED cube which acts as anode. The negative one is connected to the layer. Hence, to switch on a particular LED we have to give current to the corresponding pillar and ground the layer. LEDs offer a huge variety of benefits but at the same time they cannot be viewed as the optimum solution for every lighting-related application. Here, in no particular order, we list some of the main advantages of LEDs, together with some of the challenges faced by these devices.

a) LIGHT QUALITY

Most cool-white LEDs have spectra that differ significantly from a black body radiator like the sun or an incandescent light. [3] The spike at 460 nm and dip at 500 nm can cause the color of objects to be perceived differently under cool-white LED illumination than sunlight or incandescent sources, due to metamerism, red surfaces being rendered particularly badly by typical phosphor-based cool-white LEDs. However, the color rendering properties of common fluorescent lamps are often inferior to what is now available in state-of-art white LEDs.

b) TEMPERATURE DEPENDENCE

LED performance largely depends on the ambient temperature of the operating environment. Over-driving the LED in high ambient temperatures may result in overheating of the LED package, eventually leading to device failure. Adequate heat-sinking is required to maintain long life. This is especially important when considering automotive, medical, and military applications where the device must operate over a large range of temperatures, and is required to have a low failure rate.

c) BLUE POLLUTION

Because cool-white LEDs (i.e., LEDs with high color temperature) emit proportionally more blue light than conventional outdoor light sources such as high-pressure sodium lamps, the strong wavelength dependence of Rayleigh scattering means that cool-white LEDs can cause more light pollution than other light sources. [4] The International Dark-Sky Association discourages the use of white light sources with correlated color temperature above 3,000 K.

METHODOLOGY

Block diagram of 8*8*8 CUBE LED is as shown in fig 1.

a) ARDUINO UNO ATMEGA328P

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins(of which 6 can be used as PWM outputs),6 analog inputs , 16 MHz quartz crystal, a USB connection , a power jack ,an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC to DC adapter or a battery to get started.

b) N- CHANNEL MOSFET (IRF540)

IRFZ44 is an N-channel (MOSFET) enhancement mode standard " " level field-effect power transistor in a plastic envelope using trench technology. The device features very low on-state resistance and has integral zener diodes giving ESD protection up to 2kV. [5] It is intended for use in switched mode power supplies and general purpose switching applications.

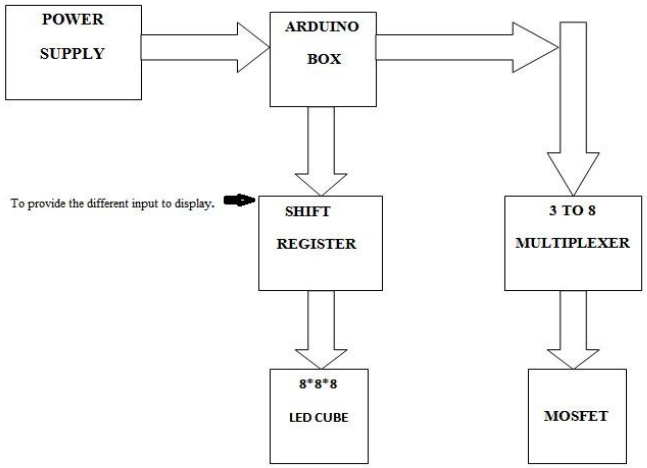

Fig 1: Block diagram

c) 3D LED CUBE STRUCTURE

This 3D led cube is made up of stainless steel rods with 512 LEDs. There are 64 anodes 8 cathodes. The LED cube is made up of columns and layers. [6] The cathode legs of every LED in a layer are soldered together. All the anode legs in one column are soldered together. Each of the 64 columns is connected to the controller board with a separate wire. [7] Each column can be controlled individually. Each of the 8 layers also has a separate wire going to the controller board. Each of the layers is connected to a transistor that enables the cube to turn on and off the flow of current through each layer.

APPLICATIONS

Different application was used in different ways. This is shown in fig 2, 3, 4 and 5 respectively.

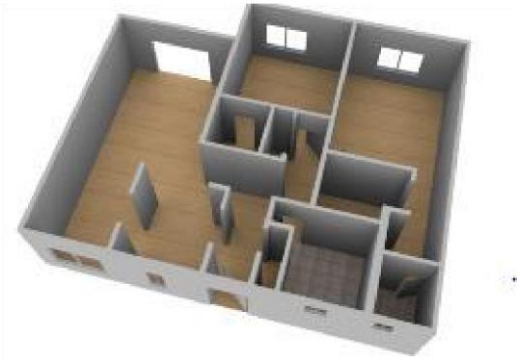

Fig .2: 3D building plotting

Fig 3: Commercial advertisement

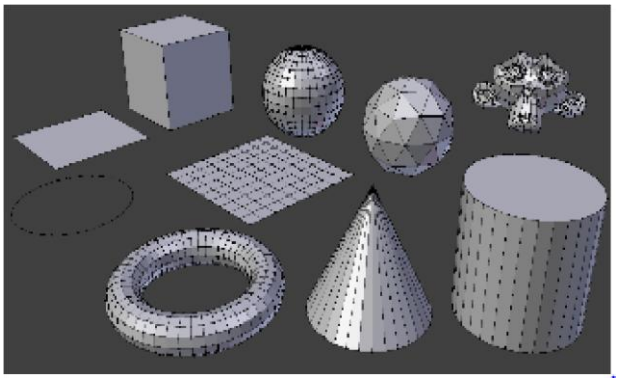

Fig .4: 3D object representation

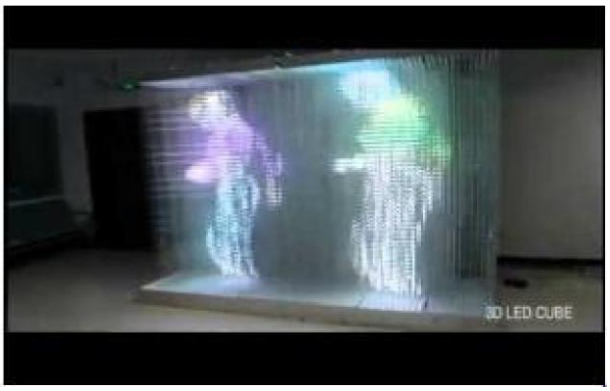

Fig 5: 3D Television

ADVANTAGES

- It is compact and hence uses less area coverage.
- It can be displayed clearly in dark room as well as well lighted rooms/outside conditions.
- It has efficient power management.

DISADVANTAGES

- Project is heavily hardware oriented.
- Time constrains.

CONCLUSION

In the paper, a cheap and affordable 3D LED cubic display system has been developed which supports image exhibition and display patterns. It includes 3D LED CUBE, a driver circuit, a power supply system, display control circuit board. The glow of different LEDs at a specified time results in brilliant image quality and can be viewed from any angle. The RS232 IC is used for serial communication. The advantage of the 3D version of cube over 2D version is data it gives a saturated image quality. The 3D LED display gives a very eye-pleasing and sophisticated image. Its advantages are that it is very low in cost and saves a lot of energy and power. The size, the number of LEDs and the effectiveness are be adjusted and varied. Also the 3D display system is very interactive.

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[4] Chao – Huang Wei and Phuong –Nhung Bui "Implementing a web based remote controlled system for Led dot matrix display".

[5] **Anurag Singh et al., (2015)** "Three Dimensional Cubic Display and Lattice Analysis Using 89C51 Microcontroller". Published in International Journal of Engineering Research & Management Technology , ISSN: 2348-4039.

Web Sites

[6] A demonstration of LED cube http://www.youtube.com/watch?v=6mXM-oGggrM Guide on making LED cube http://www.instructables.com/id/Led-Cube-8x8x8/?ALLS TEPS.

[7] http://www.hownottoengineer.com/projects/lc.html Block diagram Fig (a): Block diagram Explanation Power Supply Power supply is used to provide a +5 volt, 2A from 230V 50Hz ac supply with the use of bridge rectifier and regulator. POWER SUPPLY ARDUINO BOX SHIFT REGISTER 8x8x8 LED CUBES.