

Ultra Violet Chamber with Digital Timer-Implementation with Microcontroller

B. Kanaka Durga Devi¹, A. Keertana², A.Anusha³, M. Durga Bhavani⁴, P. Tulasi⁵,
P. Mounika Devi⁶

¹ Lecturer, Dept.of Physics (PG), Ch.S.D.St.Theresa's College for Women (A), Eluru.
^{2, 3, 4, 5, 6} PG Students, Dept.of Physics, Ch.S.D.St.Theresa's College for Women (A), Eluru.

*****_

Abstract:

Health care facilities strived to maintain clean environment, but studies show that after disinfecting the surfaces and things on regular basis, 40% of infections are transmitted from contaminated things or surfaces to the other persons. However, new evidence suggested that significant reduction of bacteria and viruses can be achieved by using UV radiation. For people this could be a major stop for controlling the problem. To overcome this problem, virus bacteria fighter with UV radiation is the ideal solution for sterilizing anything you don't want to use the chemicals on vegetables, currency notes, fruits, baby bottles, groceries, masks, keys, wallets, mobile phones, and many more. It is made with commercial grade materials and intensity bulb (UV-C source) Phillips bulb 8 watt. It can keep any of your things sanitized without the use of any harsh chemicals. This contains automated timer controller up to 30 minutes with auto shut-off facility. The user can set the required time by rotating the potentiometer provided in the circuit. When the timer is running, if the cover of the UV chamber is opened accidentally, the UV lamp will automatically shut down. This facilitates to protect us from the UV radiation.

Keywords — UV Chamber, Health care, Sterilizing.

*****_

I. INTRODUCTION

Disinfection or sterilizing or sanitizing is considered to be the primary mechanism for the inactivation or destruction of pathogenic organisms, viruses, bacteria to prevent the spread of the disease to downstream users and the environment.

An Ultra Violet (UV) disinfection system or chamber transfers the electromagnetic energy from a lamp to a virus's genetic material. When UV radiation penetrates through it and destroys the virus's ability to reproduce. Between the outbreaks of novel corona virus cases in the country, the government and other public authorities have been

promoting various directions to keep oneself safe from the highly contagious virus. One of the primary ways to protect yourself from the disease is to wash your hands at regular intervals as well as carry hand sanitizer when stepping out. However, the fear among citizens in terms of the items for groceries they buy and how can they make them — virus-free. There is a solution to that we are developed a device, which disinfects daily objects and kill covid-19 virus in ten minute using UV light. The device which goes by the name —ULTRAVIOLET CHAMBER WITH DIGITAL TIMER is a portable UV disinfection chamber can help protect from Virus, bacteria and other germs or pathogens. And the device can

disinfect fruits vegetables, kitchen utensils, clothes, slippers, etc as well as personal protective equipment (PPE).

The aim of this paper is to present a way to disinfect or sterilize or sanitize the things using the “ULTRA VIOLET CHAMBER WITH DIGITAL TIMER”.

II. IMPLEMENTATION

Now a days, there is a problem with disinfection and sanitizing and establishing protection against the virus, bacteria. Sometimes there are no protection parameters, while using the existing procedure of disinfecting with hydrogen peroxide. Here we have taken an UV chamber as an example and established a complete control system to stop the spreading of virus and bacteria. The UV chamber disinfects or sterilize, if any object or thing is presented inside the box and set the required time it automatically starts sanitizing the things which were present inside the chamber, by emitting the UV radiation through the lamp. After completion of time it will automatically turns off the lamp along with the buzzer. One more facility is awarded is that the UV light automatically turns off, when the cover is accidentally opened. This is a complete automation device, man made mistakes of preventive maintenance can be eliminated with this. It is completely designed with Microcontroller (ATMEGA 328 P), LED display for the timer etc.

MICRO CONTROLLER ATMEGA 328 P:-

ATMEGA328P is high performance, low power controller from Microchip. ATMEGA328P is an 8-bit microcontroller based on AVR RISC architecture. It is the most popular of all AVR controllers as it is used in ARDUINO boards. The ATmega328 is a single- chip microcontroller created by Atmel in the mega AVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8-bit RISC processor core.

SPECIFICATIONS OF ATMEGA 328 P:-

- The Atmel 8-bit AVR RISC-based microcontroller combines 32 KB ISP flash memory with read-while-write capabilities.
- 32 general purpose working registers, three flexible timer/counters with compare modes.
- The device operates between 1.8-5.5 volts.
- Programmable watchdog timer with internal oscillator, and five software selectable power saving modes.
- Up to 20 MIPS Throughput at 20MHz, On-chip 2-cycle Multiplier.

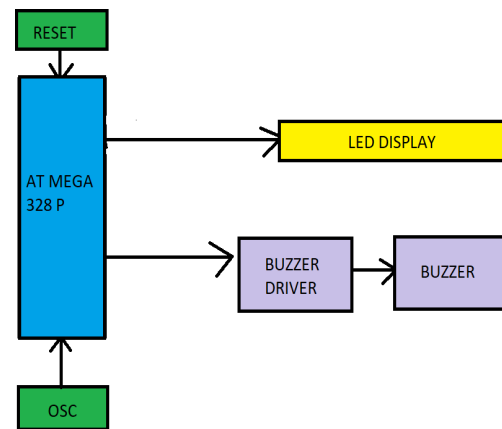


Fig 1: Block diagram for the implementation

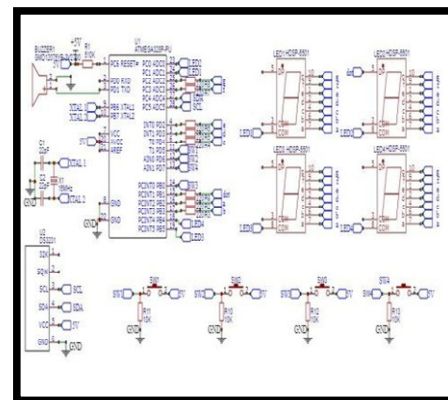


Fig2: Schematic of implementation

Construction:-

- ❖ **Microcontroller:** The microcontroller used in the UV chamber with digital timer is ATMEGA328p from the family of 8051. It contains 28 pins.
- ❖ **Oscillator circuit:** The oscillator circuit is connected to the ports of microcontroller. This circuit is build with a combination of oscillator and two 33pf capacitors at 11.0592 MHz operation frequency
- ❖ **Reset pin circuit:** The microcontroller ATMEGA 328P has 6th pin as the circuit of the reset which is build up with a capacitor and a resistor .When the switch is pressed, the reset pin is connected to microcontroller and it will reset.
- ❖ **LED Display:** The LED display is a 7 segment display. It has seven pins and they are connected to the output ports of microcontroller.
- ❖ **Buzzer:** The buzzer is used for indication after completion of the presented timer.
- ❖ **Power supply:** The required DC power supply for the base unit is derived from the AC main line.

WORKING:

Whenever the things were placed inside the UV chamber and then the user sets required time which was displayed on the LED, by pressing the switch the process will starts the relay and the relay will turns on the UV lamp. The UV lamp will radiates the UV radiation penetrates through the things. After the completion of time the relay will automatically stops the UV lamp by making a sound from the buzzer. During the process of sanitizing if any one accidentally opens the chambers door the relay will automatically turns off the UV lamp by providing any kind of further damage to the users. We can also stop the process by simply holding the switch for three to four seconds then it will stops the process. After completion of the time, the UV lamp turns off and then we will get whatever things placed inside the

chamber are disinfected or sanitized with UV radiation.

III. DISCUSSION & CONCLUSION

ULTRA VIOLET-C is a type of electromagnetic radiation that consists of wavelengths between 100-280 nm at a wavelength of 254 nm it is highly effective in breaking down the DNA and RNA of viruses, effectively inactivating them and rendering them harmless. While the antimicrobial potential of UV-C isn't new, the widespread need for the technology until recently was confined to markets. That was, until the covid-19 pandemic.

UV-C light is currently proving itself in the fight against the virus causing covid-19. However, we should not overlook the disinfection power of UV-C to prevent other serious air born infections such as seasonal flu and Tuberculosis, which can cause deaths and sickness.

As the disinfection of surfaces requires direct exposure to the light source, the disinfection cycle must only take place when people or animals are not present. Not surprisingly, these disinfection luminaries are built with safety in mind and are meant to be deployed with features such as digital timer. But, as we move towards a post-pandemic world, there's a strong case for UV-C to become normalized in the mitigation of viruses.

Result:-

The proposed system is achieving the aim as to disinfect or sanitize the vegetables, fruits, keys, wallets, masks, and many more things using an — ULTRA VIOLET CHANBER WITH DIGITAL TIMER. The traditional method of sanitizing or disinfecting the things is usually done by cleaning with water. Hence the method is time taking and also not effective for the things like money and wallets etc.

On the other side, there are several disinfecting techniques are also available such as disinfecting sprays and sanitizers. So the proposed process for sanitizing and disinfecting by the UV light is the new method, and it is based on the UV light radiation and a digital timer.

Our test result shows that a specific dose of UV-C radiation, viruses were completely inactivated in matter of seconds. We could no longer detect any virus of the prescribed thing.

We are very excited about these findings and hope that this will accelerate the development of products that can help limit the spread of corona virus and other effecting viruses that will cause deaths.

Conclusion:-

Sanitizing and Disinfecting is an integral part for every person in the society. There is a greater demand for reliable and faultless sanitizing.

Hence in this paper we have demonstrated the UV CHAMBER with DIGITAL TIMER. In the earlier days we have used regular methods of sanitizing but it is not reliable. Various faults in the earlier days of sanitizing have been analysed thoroughly.

Basically this paper is based on the process of disinfecting. It is applicable to all the things that we were using throughout the day. This type of design is very well studied in the field of hospitals mainly, and can also used in the house holds also.

Since it is a live demonstration unit, the UV light is used in this project is a range of 320 – 380 nm and It is made with commercial grade materials and

intensity bulb (UV-C source) Phillips bulb 8 watt. It can keep any of your things sanitized without the use of any harsh chemicals. This contains automated timer controller up to 30 minutes with auto shut-off facility. The user can set the required time by rotating the potentiometer provided in the circuit.

ACKNOWLEDGMENT

The authors are expressing gratitude to Dr. Sr.Marietta D' Mello, Principal, Dr. Sr. K. Showrilu, Vice Principal & Director-PG Courses and Dr. A. Nirmala Jyothsna, Head, Dept. of Physics & Electronics, Ch. S. D. St. Theresa's College for Women (A), Eluru, A.P, India.

REFERENCES

- [1] <https://www.tutorialspoint.com/>
- [2] <https://www.allaboutcircuits.com/>
- [3] <https://www.autodesk.in/>
- [4] <https://en.wikipedia.org/wiki/Wikipedia>
- [5] <https://www.arduino.cc/>