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A Review on UVC Sanitization Cabinet

Saloni Bambole[1], Charushila Natkar[2], Anup Thool[3], Badal Morankar[4], Hrushikesh Nagrale[5], Rahul Khadtakar[6], Y. A. Sadawarte[7]

[1, 2, 3, 4, 5, 6]*B.E Student,* [7]*Assistant Professor Department of Electronics Engineering, Rashtrasant Tukdoji Maharaj University, Nagpur, Maharashtra, India*

Abstract: ***The entire world is facing a dangerous Corona Virus (covid-19) which is a highly transmitted disease. It is transmitted by just coming in contact with an infected person or the things used by an infected person. The virus may survive on objects for a few hours up to several days. To avoid such contact sanitization is done but still, some strains are present which can be infectious. By the study, it is found that UV radiation is capable of disinfecting air, surface, and water. A wide wavelength range of UV radiation can inactivate infectious agents. In this paper we have described the system 'UV-c automated sanitization cabinet' that uses UV radiation to inactivate dangerous bacteria and viruses. This system is basically a sanitization machine that uses ultraviolet light as the main agent for disinfecting material placed inside the machine. It sanitizes the 360-degree coverage. Experimental UV wavelength ranges from UV-C (200–280 nm) the germicidal range effectively inactivates bacteria and viruses. It is easy to use with the efficiency of disinfecting 99.99% of microorganisms.***

Keywords: Ultraviolet radiation, ATmega, UV-c band, technology for disinfection

I. INTRODUCTION

The world is going through a pandemic that is Coronavirus disease (Covid-19) which is an airborne infectious disease caused by a newly discovered coronavirus. This is rapidly increasing day by day. It has infected and killed lakhs of people all across the world. Through the research, we come to know that this virus is transmitted through direct contact with respiratory droplets of an infected person or touching things, surface contaminated with the virus. According to a recent study published in the New England journal of medicine, SARS-Cov-2, the virus that causes COVID-19, can live in the air and on surfaces between several hours and several days. According to the study it is found that the virus residue effective for up to 72 hours on plastics, 48 hours on stainless steel, 24 hours on cardboard, and 4 hours on copper. It is also evident in the air for 3 hours. The World Health Organization (WHO) has suggested that to lower the risk of infection, cleaning and disinfecting of objects in your home regularly are the important precautions to be taken. Not only for avoiding covid-19 but also for maintaining peoples good health and hygiene it is necessary that each and everything used by the people should be kept clean and sanitized, infection-free. So to solve this problem 'UV-c automated Sanitization Cabinet' is developed. It is an efficient and fast technique for deactivating bacteria, viruses, and microorganisms. This system comprises an automatic cabinet in which anything such as mobile, wallet, vegetables, packed materials, etc can be placed and are sanitized using UV light mounted inside the cabinet. Due to this UV radiation formed by UV light the 360- degree coverage of material is sanitized. This process takes 15-20 seconds. As soon as the process stops the sensor detects and switches off the power supply. Keeping the safety of the user in mind the protective external walls of the cabinet are double- coated. A safety switch is placed that stops the process if the user accidentally opens the cabinet door. This device is highly efficient and effective.

II. LITERATURE SURVEY

A. This paper explains a simple model to check efficacy of germicidal UV tube, to standardize the position, distance and time for UV light and also to find out its efficiency against medically important bacteria, the bacterial spores and fungi. The microbial cultures tested included gram positive and gram negative bacteria, bacterial spores and fungal spores. The microbes streaked on solid media were exposed to UV light. The inactivation of the order of four logs was observed for bacteria. UV light can have efficient inactivation of bacteria up to a distance of eight feet on either side and exposure time of 30 minutes is adequate.

B. This paper gives the information about a systematic review of the different technological UV alternatives that have been developed to reduce the spread of Covid-19 and other pathogens harmful to health, since it has been proven that the UV-C range which is considered to have a very powerful radiation.

C. This paper deals Water must be made safe to drink, and an important step in ensuring water safety is disinfection. Disinfectants are added to water to kill disease-causing microorganisms. Ground water sources can be disinfected by "The Water Treatment Rule," which requires public water systems for disinfection. Chlorination, ozone, ultraviolet light, and chloramines are primary methods for disinfection.

D. This article reviews that history of UVGI for air disinfection, starting with its biological basis, moving to its application in the real world, and ending with its current status. There is a long history of investigations concluding that, if used properly, UVGI can be safe and highly effective in disinfecting the air, thereby preventing transmission of a variety of airborne infections. Despite this long history, many infection control professionals are not familiar with the history of UVGI and how it has, and has not, been used safely and effectively.

E. This paper explains Healthcare-associated infections caused by multidrug-resistant (MDR) pathogens are significantly associated with increased mortality and morbidity. Environmental cleaning can reduce transmission of these pathogens but is often inadequate. Adjunctive methods are warranted to enhance the effectiveness of disinfection particularly in hospital settings where healthcare-associated infections are of major concern.

III. BLOCK DIAGRAM

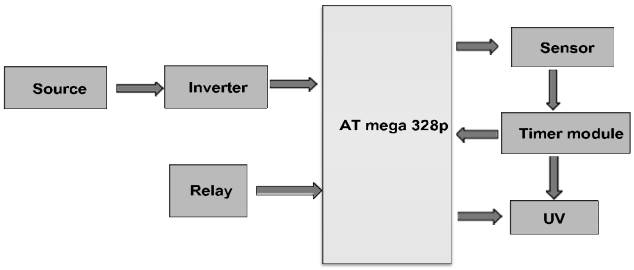

Fig. 1 Block Diagram of UV-c Sanitization Cabinet

IV. METHEDOLOGY

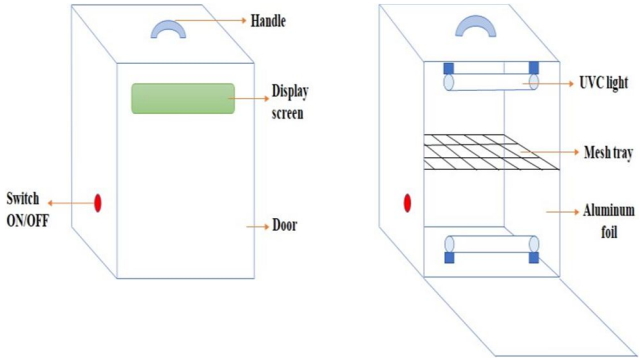

Fig. 2 Overview of The UV-C Sanitization Cabinet

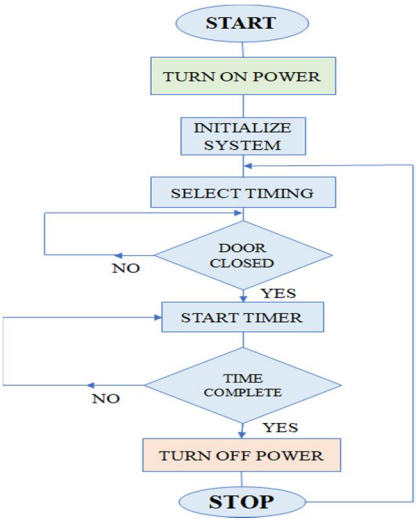

Fig. 3 Flowchart of the process

V. METHEDOLOGY

Initially turn ON the power supply, the message WELCOME is displayed on the screen, this states that the system is ready to use further. Then put the object that is to be sanitized such as mobile, mask, vegetables, packed objects or any other material inside the cabinet over the tray. Now close the door of the cabinet and select the mode and set the timer (10-150 sec) and press the start button. Hence the system starts the UV light that provides UV radiation and the sanitization process gets started. During the process 'SANITIZATION IS ON' message is displayed. At the corners of the cabinet, there is a sensor that detects that the door is properly closed or not. If the door is not closed properly the sanitization process will not initiate.

When the door is closed properly the atoms in the radiation of UV-c light are get activated and blue-colored light appears. This blue-colored light has a wavelength of 100 to 280 nm which is very short and due to this, it has a capacity to kill the DNA of the virus, bacteria, micro-organisms, etc. After completion of the timer (60, 80, 120... so on) the UV light will automatically get OFF and the sanitization process is completed 'SANITIZATION IS DONE' messages are displayed on the screen. Then open the door and take the sanitized objects out of the cabinet. Now the objects are 99.99% germs-free.

VI. CONCLUSION

In this paper, our main aim was to provide the best virus and bacteria protection device hence we developed a UV-c automated sanitization cabinet that kills 99.99% of the viruses and bacteria present over the objects. The UV-c Sanitization technique is the best and world widely used sanitization technique. If the most efficient and effective sanitization technique during this pandemic coronavirus to disinfect the stains of viruses present on any object used by the people.

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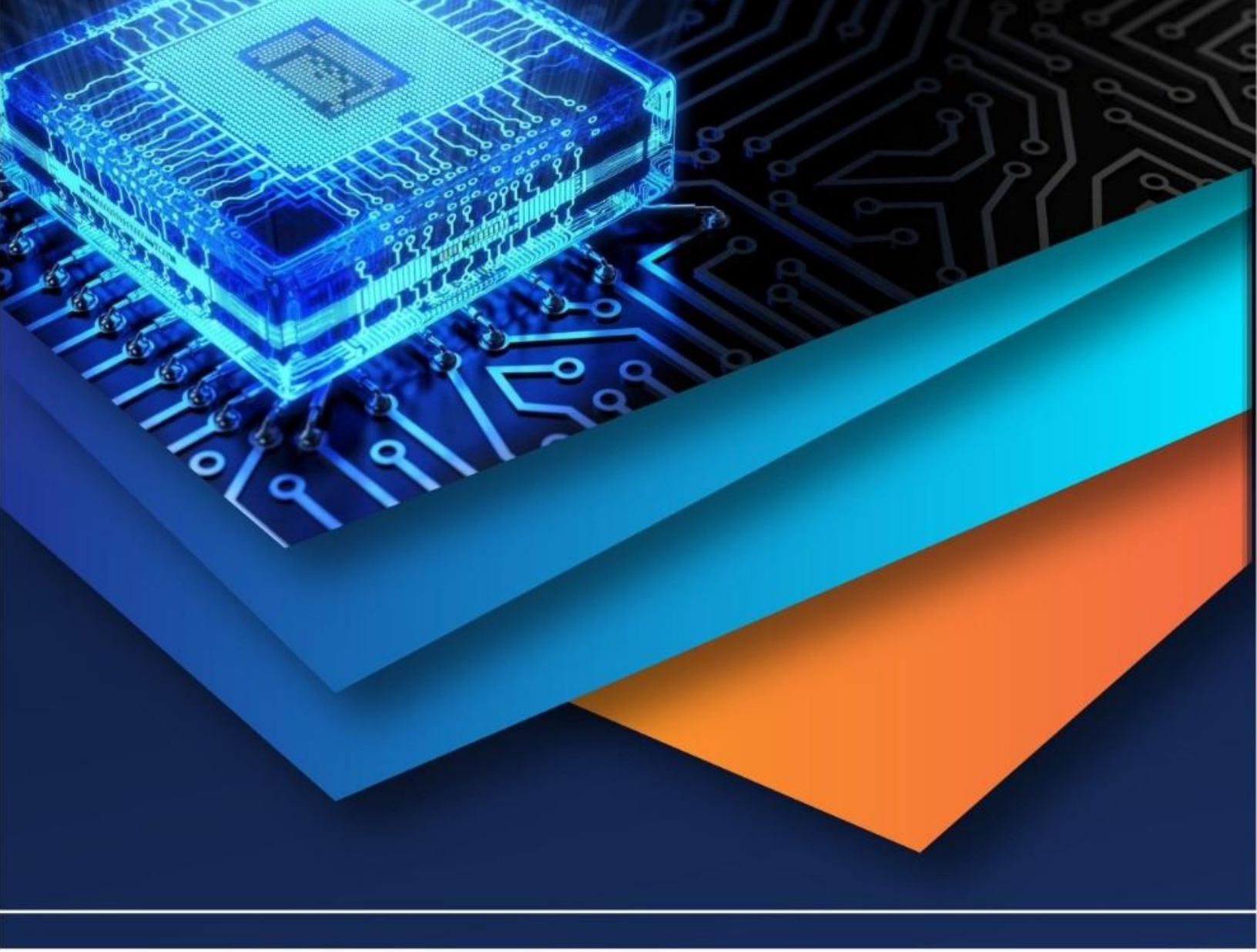

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