HYBRID FLOOR UV-C STERILIZER ROBOT- A REVIEW

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Abstract - *Hybrid Floor UV-C sterilizer Robot is a fluid less device which can be used to perform the disinfection of various bacteria and viruses, it is based on UV C light. It has an add on hidden vacuum cleaner inside the device. It has various ultrasonic sensors to minimize the jerks and accidents with household furniture or industrial flooring obstacles. It detects all motions happening around it, it has special cliff detection to avoid falling from heights. It is user friendly and cost effective. UV light detects the spatters of viruses and bacteria, which can be seen only in blacklight. UV C light kills almost all the bacteria and viruses and it doesn't use any fluid for sanitization. It is human friendly so it doesn't require attention as it is automatic robot. It has in built UPS system with Battery which can be used as hybrid. We can use it with solar energy or electrical energy to run this device. It is user friendly and cost effective.*

Key Words: Hybrid, UV-C Light, Vacuum Cleaner.

1. INTRODUCTION

A. Effect of surface characteristics on the bactericidal efficacy of UVC LEDs by Do-kyun Kim, Dong-Hyun Kang, 2019

It is study of using UVC LED lamps and low-pressure mercury UV lamps for sterilization and effect of both on various surfaces like glass, PVC, Stainless steel, Teflon and silicon. Due to the Minamata convention, use of mercury lamp is eliminated so it is safer to use LED Lamps. This include experiment on various food contact surface and influence of surface properties on inactivation efficiency of foodborne pathogens like E. coli O157:H7, S. Typhimurium and L. monocytogenes. LED can be use as HEAT, UVC LED, HEAT+UVC LED and combination of HEAT+UVC LED. It all have different effect on various food contact surface and foodborne pathogens. As per research, reduction of foodborne pathogens on various food contact surfaces is different and combination of HEAT+UVC LED is best for use as it can reduce maximum foodborne pathogens. So, for enhancing the efficiency of LED bulb UVC LED irradiation integrates with mild heat treatment for maximum utilization of LED. By this research it is concluded that LEDs are better than mercury lamps.

B. Ultraviolet C irradiation: an alternative antimicrobial approach to localized infections?

This research paper gives the potential of UVC irradiation as an alternative approach to current methods used to treat localized infections. It has been reported that multidrug-resistant microorganisms are equally sensitive to UVC irradiation as their wild-type counterparts. With appropriate doses, UVC may selectively inactivate microorganisms while preserving viability of mammalian cells. UVC is also found in animal studies to be less damaging to tissue than UVB. Even though UVC may produce DNA damage in mammalian cells, it can be rapidly repaired by DNA repair enzymes. If UVC irradiation is repeated excessively, resistance of microorganisms to UVC inactivation may develop. In summary, UVC should be investigated as an alternative approach to current methods used to treat localized infections, especially those caused by multidrug-resistant microorganisms. UVC should be used in a manner such that the side effects would be minimized and resistance of microorganisms to UVC would be avoided.

C. Study on Coronavirus (COVID-19) and how UVC Light helps to Destroy it and its Applications.

In this research paper we study about how the UVC light deactivate the corona viruses and many different viruses, bacteria and germs. The corona virus is single stranded RNA virus. This virus is same as SARS and MERS viruses. SARS virus have found that it is sensitive to UVC light and heat radiation and can be diminished when exposure to UVC irradiation stronger than 90 $\mu W/cm^2$. So, we can say that UV light can help to destroy nCoV-2019. UV light would be able to kill germs, bacteria and viruses by destroying nucleic acids of microorganisms and disrupting their DNA. This light is a short-wavelength light ranges from 200- 280 nm, that breaks DNA, which can't able to be further reproduce the virus. The UV radiation is in between 200 to 300 nm range which can destroy the virus. So as in current pandemic situation this UV light is in demand but it requires more sources/dosages of light that works rapidly or efficiently in this situation. Based on the available scientific evidence it is found that the UVC light can destroy various viruses. The National Academies of Sciences, Engineering and Medicine reported that ultraviolet light can almost kill the corona virus.

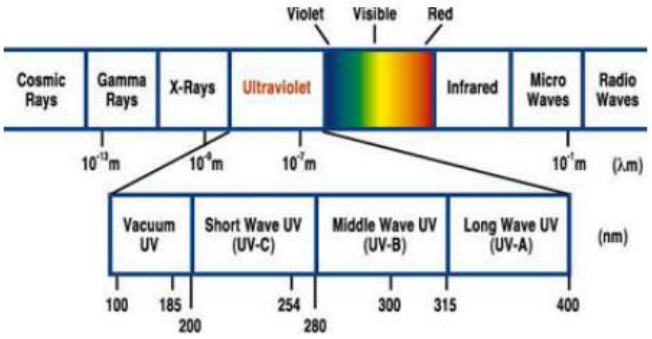

Fig.1: UV Region with wave length

D. Development of a vacuum cleaner robot.

Vacuum cleaner is used for cleaning the floors and any dirty surfaces from many years, but this study is based on automatic vacuum cleaning robot. Which can easily clean the surface without human interaction, no time consuming and efficiently working. Many sensors like ultrasonic sensors, cliff sensors and robot navigation system are used for detection of surrounding conditions. So, the device works automatically without impact to any obstacles or objects. The main component is Arduino chip by which all automations are functioned. They also function on balancing and vibration. So, when the device is in working mode no wobbling or vibration occurs, due to 360 rotation movement it can easily vacuum the dirt. Here in this research paper vacuum pump has low capacity and dustbin have 0.14L of storage box. So, it is disadvantage of this device. So, we can overcome this by developing a high capacity vacuum pump and storage by little change in the dimensions of whole device.

E. Design and Development of Automatic Cleaning and Moping Robot.

This article is based on using of both cleaning and moping of surfaces in one machine. It is very easy to use by just switching on the device and its cost is very less compared to other foreign mopping and cleaning devices. So, its main aim to develop device which is easy to use and cost effective. Because, by the survey it is clear that more than 60% of the families don't know about the existence of such kind of robots and 40% of them felt that the price of the robot is too high. This paper gives us information about Design Methodology for the Project and Working Methodology of the robot.

F. Design and Development of Automatic Cleaning and Moping Robot.

This paper is based on automatic floor cleaning and manual floor cleaning. Manual floor cleaning is done by RF module. Sometime automatic floor cleaning is less efficient. Because, due to autonomous modules some parts of room maybe unclear like corners, area around obstacles. To overcome this manual operating by remote control can be efficient compare to automatic. Nonetheless, automatic floor cleaner has higher efficiency but to overcome some disadvantages manual operation is good to clean every left area part. So, this paper is useful for both auto-manual mode.

G. Solar Powered UPS Systems.

It is solar based UPS system. Solar inverters are way better than normal electric inverters. It is multifunctional solar inverter which is the best among all and works efficiently. Inverter battery store the electrical energy that is coming from solar panel, then it converts the DC power to AC very carefully which is perfect for commercial use. This system is very useful for our project. Because, the project is working on hybrid energy (solar+electrical). So, this solar powered UPS system gives us very flexible functioning of our device.

2. CONCLUSION

After reviewing all the papers, I found that we can developed a device which is used for cleaning as well as a sterilizer or disinfectant in a portable size. So, it can be use anywhere like home, hospitals, school and many more places. It should be fully automatic, manual, remote operated and no need of human interaction. There is capacity of dust box is less. So, we can increase the capacity from 0.14L to 1L and with easily removable dust box. Also Cleaning capacity is less and vacuum cover less area. So, it can be improved by attaching brushes to corner of device and it can clean corners of wall easily that is biggest disadvantage of many device.

UVC light can be fitted below the device. So, this device can be use very safely and as per the guideline of using UVC light.

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