UV Sterilization Box

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ABSTRACT: It is an box type sterilizer. A C-band UV light is used in the hollow rectangular wooden box for sterilizing. One side of the boa is a door. UV tube is placed at one side of the box. The object to be sterilized is placed inside the box. The lamp is powered only when the door is closed. Any DNA or RNA based organism present on the surface of the object will be kills by the UVC radiation.

KEYWORDS- UVC, DNA-based organisms, Arduino, Sterilising, radiation, box

I.INTRODUCTION

UV Sterilization Box is a multi-functional disinfection box that can be used to sterilize rings, watches, keys, mobile phones, earphones etc. It uses UV-C sterilizer which is a band of UV light with bactericidal effect. The ultraviolet C radiations emitted by the special UVC lamps act as a surface disinfectant and can inactivate virus, bacteria and other microbes by attacking their DNA, RNA effectively ends its ability to reproduce. UVC radiation has maximum germicidal effect. The present invention relates to sterilization using Ultra- Violet (UV) radiation and more particularly, to a box- type UV sterilizer. Designed considering 3 main factors, energy applied which is affected by UV-C exposure time and distance from light source, maximum surface exposure, safety & convenience in operation.

Fig.1. Outer view of UV sterilization box

II.BACKGROUND

A.   UV disinfection

UV-C radiation is considered as the best germicidal wavelength range (200-250 rim) which inactivate Micro organisms. DNA or RNA viruses cannot withstand at the radiation of UV-C which kills them. This disinfection is works when the object or surface exposed to UV light.

B.   Box designing

The box we have used is an wooden box which is convenient for this purpose. Inside of the box is completely covered with aluminium foil as shown in figure (0). It provides maximum reflection of the UV light

inside the box.

III.METHODOLOGY

A wooden box is used to create an insulated chamber for UV radiation. The inside walls of the box is covered with aluminium foil to create maximum amount of reflection. One side of the box is a door to place the objects to be disinfected. We have used an Arduino UNO to control the entire function of the device. The UV tube provides the UV light for the sterilizing function. The instructions for setting the time and starting the device is done manually using switches provided outside the box. An LCD display is provided to show the remaining time of sterilizing. To control the ON and OFF of the UV tube, a l2v DC single channel relay board is used. A NO/NC switch is placed on the door to ensure the door is closed before the UV light is produced. A l2V DC adapter powers the Arduino and relay board. The entire device works on 240V 50Hz AC supply
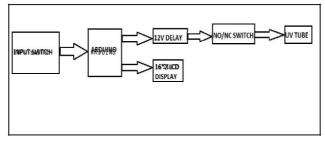
Fig2. Block Diagram

The components are connected as shown in Fig.3. Arduino is programmed to perform the whole function. Open the box and place an object inside the box and close the door. Press the start button. The UV tube starts to emit UV light for a predetermined time limit. When the timer in the display shows zero, we can take back the object. If the door is opened during the sterilizing process, the UV tube turns OFF to ensure the safety of the used.

Fig.3 Inner view of UV sterilization box

IV.RESULTS

Our UV Sterilizer box is shown in Fig.1. It allows the disinfection of the objects placed inside the box. The default exposure time programmed in the device is 10 seconds. The user can change to an require exposure time. It can kill any DNA or RNA based organism by the exposure of UV light to the objects.

V.CONCLUSION

From the above paper, we know that any DNA or RNA based organisms present on the object will be killed by UV-C radiation. The paper talks about the importance of sterilizing the daily use devices and objects like Mobile phone, Purse, Money and keys. This device is also helpful to sterilize masks and face shields faster.

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