

UV DISINFECTOR FOR MOBILE PHONES & ESSENTIALS

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Abstract

With the research stating that viruses like covid 19 and other viruses can remain infectious up to 3 hours as it floats on aerosol droplets less than 5 microns ,standard disinfectants and sanitization is very important .Articles like mobile phones ,documents, cash and other essentials should be properly sanitized or disinfected. But we cannot use methods like liquid sanitizers or manual methods for this .So we can use UVGI system (Ultraviolet Germicidal Irradiation System) which uses uv rays which can kill microorganisms. By using this technique, the spreading microorganisms such as viruses, bacteria etc. is greatly reduced. We are planning to construct a box equipped with a UV tubelight (254 nm). There will be provisions to safely insert files/ papers into the chamber. The lamp energy, exposure time, and lamp-file distance could be controlled remotely. The whole setup will be designed in such a way that harmful UVC radiation won't escape out of the box.

1. INTRODUCTION

Covid-19 took humankind by surprise in 2019. Due to its fast and efficiently spreading nature, we were forced to use face masks and gloves to protect from everything we touch. Now SARS-COV-2 is just one of the viruses in Coronavirus family, there are many more viruses in this family that haven't jumped to humans yet. This pandemic has just given us an indication to be prepared for these types of pandemics. Well, we can use masks to protect us outside but what about the

things we bring home from market or things we exchange with other people. For example: We cannot apply sanitizers on cell phones, cash or paperwork paper work that doctors exchange with patients or employees exchange with each other. Also, sanitizer usage involves use of chemicals that are harmful to us and the environment as well as it involves recurring cost of buying sanitizers. Well, we solve this huge problem with a smart electronics system powered by a microcontroller. We design a compact

360-degree disinfection box using ultraviolet sterilization to solve the issue. The system makes use of UV-C tubes to achieve this task. Now UV C has been proven to kill all viruses within a matter of seconds.

2. RELATED WORK

Overexposure to UVC radiation can cause permanent damage to skin and eyes. Take proper care while working with it. This project involves working with AC mains electricity as well which can be lethal. Proceed only if you know what you are doing!

The plan is very simple. Build a box of some kind and put the UVC lamp in it. We designed the enclosure in Fusion 360. It is divided into 3 parts. The uppermost part houses all the electronics and a UVC lamp. One part is the region where the radiation will occur and the last part is the drawer which will hold the objects to be sterilized. As already stated, it is not a good idea for us to get exposed to UVC radiation frequently. Since the lamp will be in an enclosure made up of plastic which may absorb most of the radiation and prevent it from reaching us, there is a slight chance of radiation leaking through it. I'm not an expert on this so it is better to be safe. I will be using aluminum tape to cover the inside of the enclosure where the light will

hit. This will also help in reflecting the light evenly. A magnetic reed switch will be used as an extra step to safety such that the lamp will turn/remain ON only when/till the door is closed.

Everything will be controlled using an Arduino Nano. There will be two modes of operation. First will be Manual Mode wherein you have to manually turn OFF the lamp. The second one will be a Timer Mode wherein the lamp will be turned ON for a set amount of time. A menu will be created and displayed on an OLED display. The menu can be controlled using a rotary controller. Thanks to Henry Mane all the hard work of creating a menu was already done. I figured out how the code works and modified it to suit my need.

3. IMPLEMENTATION

Due to the COVID-19, lot of confusions erupted regarding sanitization of the daily use items viz., cell phones, vehicle & house keys, pens and above all Currency notes along with other domestic items, particularly after unlock declared by GOI. To cater to the needs of the Same a Non-contact Disinfectant is designed and developed based on principle of UV-C rays, which will kill or inactive the microorganisms by emitting radiation predominantly at a wavelength of 25.7nm. We are well aware to the fact that every

office, hospital, Individual house, apartments, restaurants, etc. require this kind of equipment to assure their belongings, backpacks, are safely carried and reused.

The central objective of this project is to disinfect files, papers, envelopes etc. which will be circulated in the campus. For a fruitful disinfection, box type disinfection chambers will be fabricated by incorporating a tube light emitting wavelength in UV-C range. Exposure time will be optimized based on the lamp energy and material specifications.

Hardware Requirements:

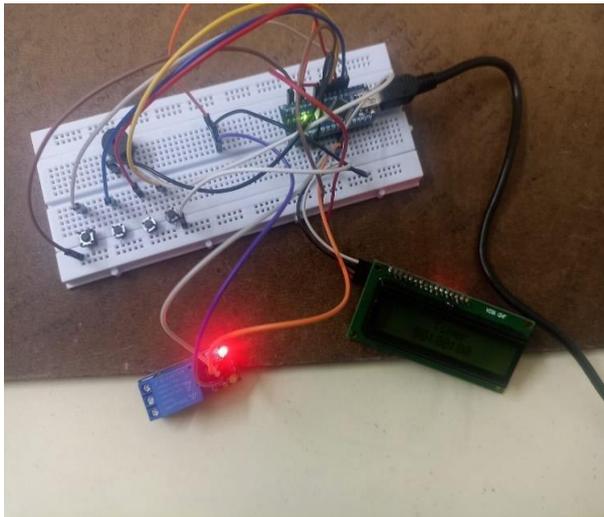
- Arduino Nano
- LCD Display 16 X 2
- UV C Tubes
- Relay Module
- Jumper Wires
- Piezo Buzzer
- Push Buttons

We constructed a box equipped with one UV tubelight (254 nm). We can safely insert files/ papers into the chamber. Theuv rays will disinfect the articles placed in the chamber and kill the microbes. The lamp energy, exposure time, and lamp-file distance could be controlled remotely. The whole chamber will be designed in such a way that harmful UVC radiation won't escape out of the box. We always wanted to

build something useful to the society and the world. Having been experienced in doing several science projects in electronics and IoT, We wanted to utilize my skills in such a way that most of the front-line workers are benefited from that. Due to the ongoing pandemic, things have changed a lot. We need to wear masks everywhere, sanitize our hands time to time, etc. One such issue that We found was, after using our mobile phones or other things outside, we often forget to sanitize them or we do it with liquid disinfectant. Thus, We wanted to build something that could help people stay away from germs by disinfecting their essentials without touching the disinfecting machine itself. A touch-free germs disinfecting device that can disinfect anything from masks, wallets to mobile phones, killing maximum germs using UV-C.

4. EXPERIMENTAL RESULTS

The Aurdino Nano is set to ouput power and the 220V power supply is connected to the relay module side. Aurdino Nano is starts working the timer is set to a particular time after choosing the disinfect option, the relay is ON, thus turning on the UV-C lamp for minimum 6 seconds and then automatically relay will OFF.



Prototype

5. CONCLUSION

In this project, we have focused on sanitization of essential things like mobile phones , documents, cash, and other essential things. By using this UV DISINFECTOR , it is a non contact sterilizing device which helps to sanitize essential things . It works on the principle of UV-C rays, which will kill or inactive the microorganisms by emitting radiation predominantly at a wavelength of 25.7nm. it is very useful during covid situations. It is environment friendly. It provides 360 degree disinfection. It is very easy to use. The whole setup will be designed in such a

way that harmful UVC radiation won't escape out of the box.

6. REFERENCE

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