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# Covid-19 Disinfection Box

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***Abstract***
*Microorganisms present in common practise instruments can induce medical care-related contaminations (HAIs), which can lead to major medical complications in an emergency clinic setting. The objective of this research was to identify the sanitization limit of UV Sanitizer Corvent® - UVSC-, a versatile bright C hardware designed to clean a variety of items as well as to manufacture automated hand sanitizer. Touching surfaces, which must be sanitised to avoid COVID-19 and related illnesses, spread the SARS-CoV-2 virus and other harmful microorganisms. In this study, a prototype of a low-cost sterilizing box for small items is created. The box combines UV and heat beams. UVC-LED boxes shown to be an effective method for sanitising SARS-CoV-2-contaminated surfaces often seen on personal items. A machine that distributes hand sanitizer automatically is useful.*

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## I. INTRODUCTION

Disinfection is a general term for a method that kills many or all pathogenic bacteria in a short period of time. Disinfection is critical for preventing infectious microorganisms from spreading to other people. Failure to follow scientifically grounded disinfection techniques raises the danger of i) breaching host barriers, (ii) person-to-person transmission, and (iii) transportation of environmental pathogens. Industries have recently made numerous claims about the efficiency of disinfection administered in a confined space such as a box, chamber, tunnel, booth, partition, or gate to prevent COVID-19 transmission. So, this project includes the use of disinfection box to sterilize the object, it also contains automatic hand sanitizer. The disinfection box can detect and disinfect anything in the box on its own. It also shows other safety measures, such as proper switches and sensors, to reduce your risk of being injured by UV radiation. Automatic hand sanitizer sanitizes the hand without the need to touch it.

## II. LITERATURE SURVEY

Dhananjay Kumar et. al [1] suggest developing a portable disinfectant device. The inventive design of this equipment, which combines sanitising liquid spraying with UV light-based disinfection processes, contributes to its distinctiveness. This is done by employing two unique disinfection systems: (1) the pump-nozzle assembly for spraying the disinfectant and (2) UV-C radiations to increase viral kill effectiveness.

Rahul Santhosh et. al [2] suggested the proposal Low cost Multipurpose UV-C Sterilizer Box for COVID'19 protection. The article details the building and operation of a UV-C steriliser Box controlled by an AT89C51 microcontroller processor. This project describes characteristics such as a count-down timer, user safety measures, ease of construction, and a lower cost than existing UVC sterilisers on the market. The UV-C Sterilizer Box has a capacity of 0.042m3 and was built with commercially available low-cost materials for about Rs 2500/-.

Nilkamal Mahanta et. al [3] offered a performance analysis of a sterilising box utilising a mix of heat and UV light irradiation for COVID-19 prevention. A cost-effective sterilising box was constructed in this study, and the synergistic impact of UV and temperature on sanitization was investigated. The effect of UV and

heat sanitization on glycoproteins, specifically IgG, and bacterial cells, was studied for this aim. The full results are reported in the next section.

## III. PURPOSE

The Corona Virus illness has rapidly spread around the world. The spread of the Corona virus has increased the number of patients in the hospital. To preserve cleanliness and prevent virus transmission, PPE kits and surgical masks are used. Only disinfecting hard surfaces is insufficient to prevent viral spread; electronic devices, stationaries, foods, and other goods must also be sterilised. However, foods and stationary items cannot be sanitised with a sanitizer. A disinfection box is required to sanitise this. As a result, the goal of this project is to produce a disinfection box to sanitise items that cannot be disinfected with sanitizer. This aids in the prevention of the Covid 19 virus spreading through the surface.

## IV. CONSTRUCTIONAL DETAILS

**1. Arduino UNO:**

The Arduino UNO is a standard Arduino board. The ATmega328P microprocessor powers the Arduino UNO. The Arduino UNO has six analogue input pins, fourteen digital pins, a USB connection, a power jack, and an ICSP (In-Circuit Serial Programming) header. It's written in IDE, which stands for Integrated Development Environment. It is compatible with both online and offline platforms.

**2. Ultrasonic Sensor:**

Ultrasonic sensors, as the name implies, use ultrasonic waves to measure distance. The sensor head generates an ultrasonic wave and detects the reflected wave from the target. The duration between emission and reception is used by ultrasonic sensors to calculate the distance to the target.

**3. LM35:**

Temperature sensors like the LM35 detect and quantify coolness or heat before converting it to electrical impulses. The LM35 is an analogue device that functions as a temperature sensor and comes in a 3-pin TO-92 box. Temperature measurement in HVAC systems is one of its uses. Furthermore, it is inexpensive and dependable.

**4. UVC light:**

UVC light has long been used to disinfect air, water, and nonporous surfaces. UVC radiation has been used successfully for decades to prevent the spread of microorganisms such as TB. As a result, UVC lamps are sometimes referred to as "germicidal" lights. UVC light has been proven to damage the outer protein covering of a different virus from the current SARS-CoV-2 virus. The virus is eventually rendered inactive as a result of the destruction.

**5. Limit Switch:**

A limit switch is a switch that is activated by the movement of a machine part or the presence of an item. They are used for machine control, as safety interlocks, or to count items passing by a point. Standardized limit switches are industrial control components that come in a range of operator configurations, including as lever, roller plunger, and whisker. Limit switches can be actuated mechanically by moving the operational lever. A reed switch can be used to detect the presence of a magnet installed on a moving element.

## V. WORKING

When the Arduino is connected to a power source. One LED should be turned ON to signify power, while the other should be turned off to signal that the UV light within has been turned off. The personal gadget to be disinfected must be maintained in the box, and the container's lid must be tightly closed until the indication LED turns ON. The indication LED on the side of the box indicates that the switch sensors have detected closure and that the disinfection mode has begun. Wait until the indication LED turns off before proceeding (after 15 minutes). This means the box has finished sanitising your personal devices and you may remove it. Note: Depending on how you wired the relay module, the UV lights may turn on and stay on if the Arduino is not powered on, therefore make sure Arduino has constant power. The disinfection box can autodetect and disinfect anything in the box. In hand sanitizer, a person must place his hand in front of the machine, which will then automatically dispense the sanitizer. There is a sensor called an ultrasonic sensor that detects the existence of something in front of it and sends the information to the system, which responds appropriately. The system receives information from the ultrasonic sensor, analyses it, compares it to the required condition, and sends instructions to the water pump to take the sanitizer out.

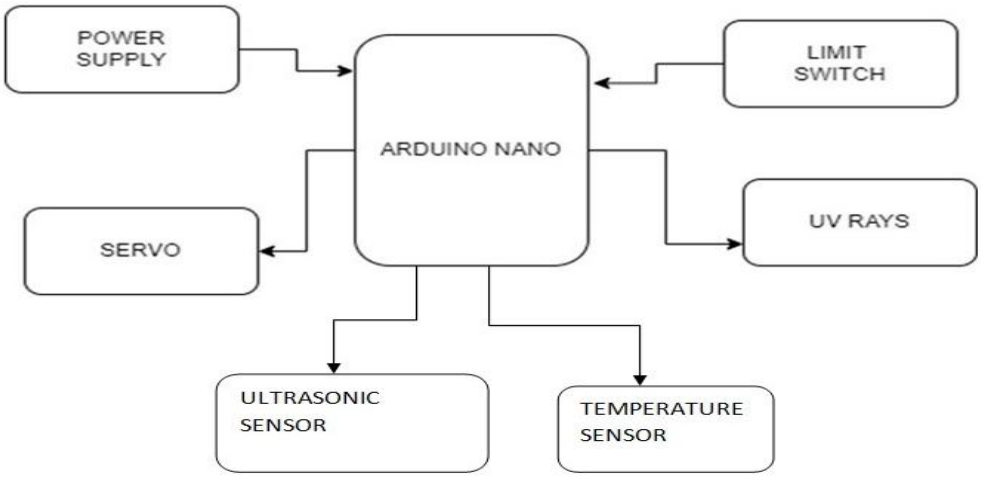


**Fig 1: Block Diagram**

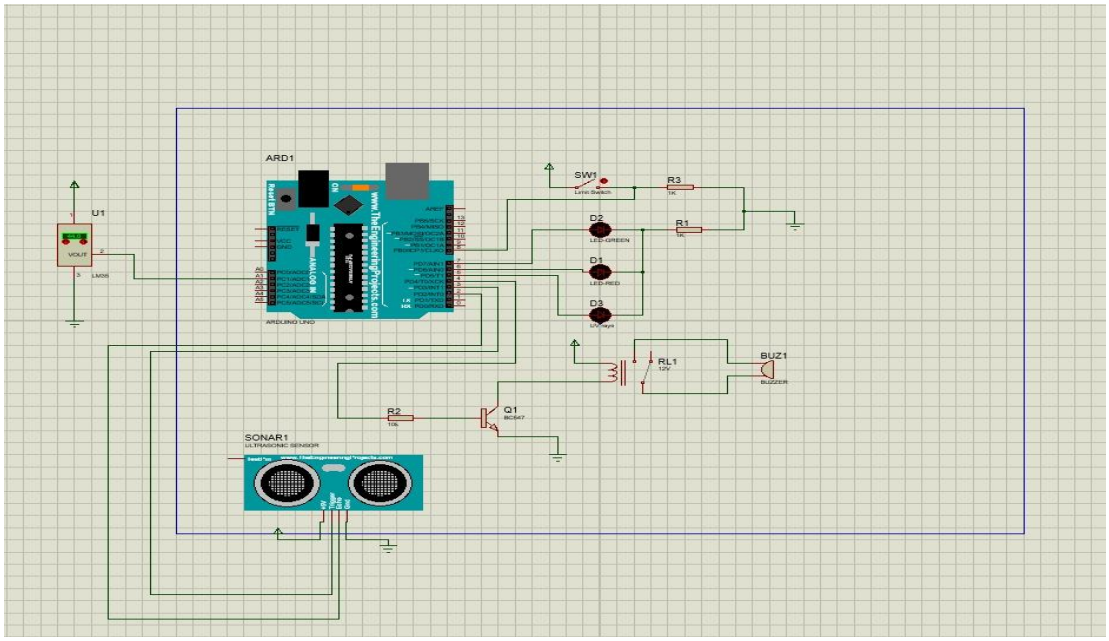


**Fig 2: Circuit Diagram**

## VI. RESULT AND DISCUSSION

Arduino is utilised as a microcontroller in the preceding research to control the operation of UV lamps. When an object is placed in a box, the disinfection process begins for around 15 minutes, and a buzzer Sounds. If a human opens a lid during this time range, the procedure will immediately cease for safety reasons. In this hand sanitization project, an Ultrasonic Sensor is utilised to compute the distance between the sensor and the hand placed beneath it. If it is less than 10cm, the pump starts and the hand is sterilised.

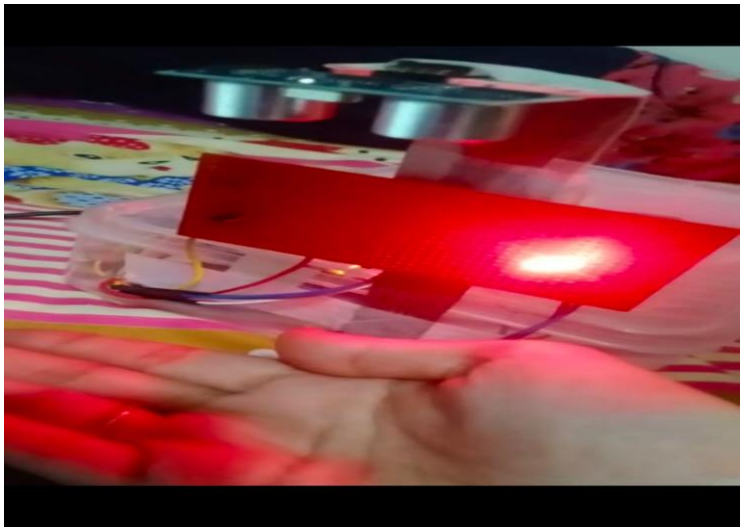

**Fig.3: Hand sanitization Using Ultrasonic Sensor**

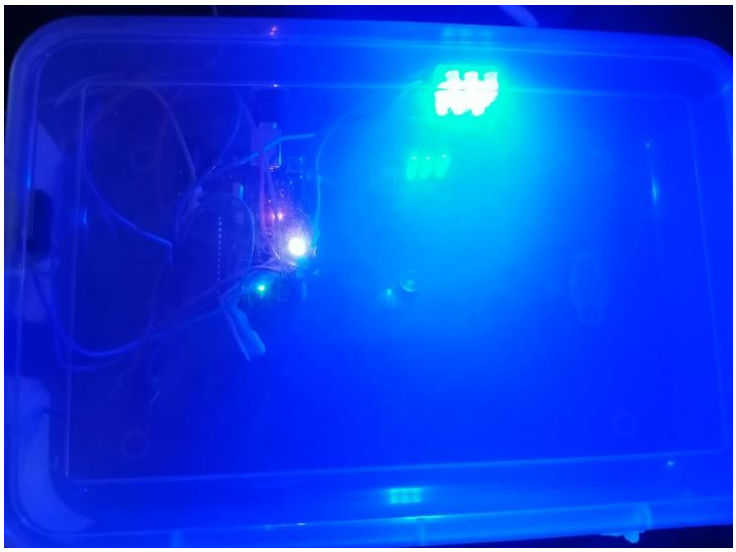

**Fig 4: Disinfection Using UV-light**

## VII. CONCLUSION

Given the catastrophe caused by the COVID-19 pandemic, a sterilisation box (prototype) was conceived and built to disinfect objects of daily usage such as face masks, wallets, belts, and wristwatches. The box contained UV-C lights as well as certain electrical components. According to the article, noncontact dispensing is also vital for preventing disease spread, and finally, hand cleanliness is critical and must be part of our everyday lives. The article discusses the design and operation of a UV-C steriliser Box controlled by a microcontroller chip Arduino Uno.

## VIII. FUTURE WORK

Depending on the availability of the items, U light can be produced in the future by employing more than one UVC lamb. Furthermore, the UVC gadget is controlled by an Arduino board, and it is possible to extend its range by connecting it to a mobile device through a WIFI module. Furthermore, the addition of a time use register might be a significant improvement. The disinfection box offers numerous scopes for cleaning the delivery cargo on the move. We sometimes need to sterilise with huge A4 paper or a large deck of sheets, which makes it impossible to put these items in a box; alternatively, we can expand the size. A novel product for guaranteeing operator operation or UV light blocking can also be developed for safety.

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