Sanitizing Chamber using UV Radiations for Covid 19

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Abstract - *In the COVID-19 pandemic, sanitization has been the primary job of every individual. Whether it is human body or any smallest possible substance, everything must be sanitized, to prevent exposure of virus. Hence, if there is a system that can sanitize objects without human contact would probably be the best possible way to stay away from direct contact of virus. Use of UV radiation in place of actual sanitizer for sanitizing could be another great way of disinfecting. This system is made from two main fragments one is UV radiations and other is conveyor belt. Henceforth, the object to be sanitized will enter from one side of conveyor belt, pass through the chamber, then it will get sanitized according to the timer set at the entry and it will leave from the exit ultimately making it safe for use. This system is handy and can be used at home or any workplace which will help items to get sanitized before human contact. By using this we can sanitize packet-food, daily products, and other stationery material.*

Key Words: **Radiations, Conveyor belt, Sanitization, Pandemic, Chamber**

1.INTRODUCTION

The year 2020 taught us the importance of cleanliness and the danger of minute virus that's invisible to our eyes. Sanitization from a small coin to an adult became the primary requirement of every family throughout the world. People were facing a lot of problems while sanitizing objects as the COVID-19 virus stays live up to hours depending upon the quality of the substance. Like it stays live on metal for 5 days, on wood for 4 days, on plastic for 2-3 days, on shipping boxes made of cardboard for 24 hours, on glass for 5 days, and on paper from a few hours up to 5 days, etc. So, the spreading of the virus increased because of such a long life of it. Which led to the disinfection of these objects becoming the most important need to stay away from contact. Sanitization of objects led to a huge requirement for sanitizers. Initially, there came a lag in the availability of sanitizers in markets as people were buying in huge amounts and almost every individual required the same. Another major problem for the increasing number of cases is the casual disposal of used masks, PPE kits, etc. from hospitals. This led to a need for making a product that can disinfect these substances without much process and is user-friendly so that anyone disposing of them can first disinfect them so that it is safe for disposal. Looking at all these issues, there was a need for making a product safe and affordable for all humans that could eliminate the use of sanitizers and direct contact of humans to the object and make disposal safe.

2. MAIN COMPONENTS

Below is the table of components which gives a clear specification of components.

Table No. -1: Components of UV sanitizing chamber for covid-19

Components	Specifications	Quantity
AC Source	220Vrms, 60H , 0° (V1)	1
CenterTapped Transformer	5:5:10 (T1)	1
Diode	1N4007G (D1,D2)	2
IC 555	555_TIMER_RATED	1
LED	Orange (LED 1)	1
Diode	BT136 (D3)	1
UV-C	120V_250W (X 1)	1
Resistance	68kΩ (R1)	1
Resistance	10kΩ (R2, R3)	2
Resistance	1000Ω (R4)	1
Resistance	25MΩ (R5)	1
Resistance	45Ω (R6)	1
Capacitor	10Nf(C1)	1
Capacitor	470µF (C2)	1
Key	S2	1

2.1 Conveyor Belt

Conveyor belt is a machine that takes friction as a driving force to transport materials in a continuous way. The equipment consists of a frame, conveyor belt, support, roller, tensioning device, driving device, etc. From the used material charging point to the materials discharging point, it generates a transport process on a certain transport line. A conveyor belt works by using two motorized pulleys that loop over a long stretch of thick and durable material. When motors

attached to the pulleys operate at the same speed and they spin in the same direction and thus belt moves between the two. If objects are particularly heavy or bulk or if the conveyor belt is carrying them for a long-distance or time, the rollers may be placed on the sides of the conveyor belt for support. Rollers keep objects in place and keep the belt from sagging.

2.2 IC 555

IC 555 generally operates in 3 modes/states :- Astable, Mono-stable, Bi-stable modes. Astable means This means there is be no stable level at the output. Mono stable has one stable and one unstable state. The stable state can be chosen either low or high by the user. In bistable mode, both the output states are stable, here in this system monostable state of ic555 is used.

3. DESIGN AND WORKING PRINCIPAL

3.1 Objective

1. To make a product using UV radiations with no requirement of sanitizer.
2. To make sanitization safe and convenient without direct contact of a person
3. Easily affordable for everyone
4. Long-lasting and handy.
5.Convenient and user-friendly

Above mentioned are objective which would satisfy need of the hour.
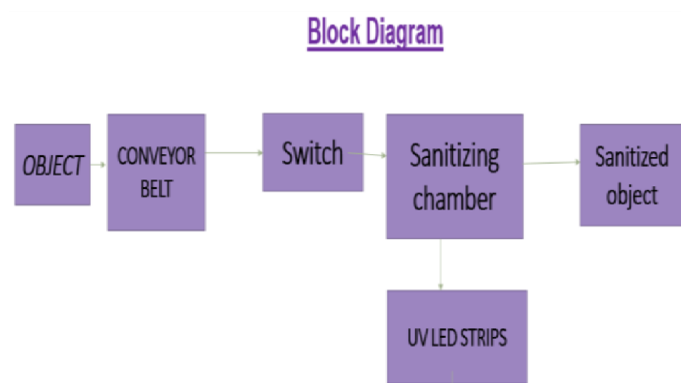
3.2 Block diagram

Fig -1: Block diagram of chamber

3.3 Working Principle

From the AC source the current passes to the circuit. First it goes into the transformer T1 and then to diodes the entire combination is known as full wave rectifier. This process is done to basically convert AC source to required DC. After which the current goes to IC555. Getting the output at pin 3 which is ultimately connected to UV lamp which sanitizes the object and object comes out through another side of conveyor belt. Timer could be set according to the convivence by changing the resistor capacitor configuration which is with respect to ic555 monostable configuration. [2]

4. IMPLEMENTATION

The primary implementation of the project is a solution for the problems generated after a survey in different places that included grocery store, households for disinfecting masks, food items, and daily articles found, generated, or disposed of by the same. The chamber consists of a conveyor belt underneath it, which ensures that there is no requirement of manual touch for the sanitizing process and the item to be sanitized can be done automatically by entering the item from one side and receiving the sanitized one from the other. The curtains at the entry and end of the chamber ensure that the UV light doesn't escape the chamber as any contact with the UV rays is dangerous to human skin. Inside the chamber, the UV strip is present which when in one state sanitizes the product completely and eliminates the danger of the virus

4.1 Software implementation

For a software implementation, all the required connections were made. So basically, by software implementation one will get to know the proper connections in the circuit, apart from that if there are some errors then that can be rectified. If connections were done manually before going on to multisim then one wouldn't get the required output, as many errors could be detected. So, the aim was to switch the LED lamp ON which would detect the proper working of the project. So as soon as the key was closed the LED light glowed resulting in correct circuit making. Therefore, this circuit proved that using UV rays we could sanitize items which is 100% effective against the coronavirus which was the main aim/objective of the system.

4.2 Hardware implementation

In hardware implementation the proper working of the project is checked and whether the required output is achieved or not. Therefore, first, the working is checked by proper connections or if there are any kind of errors. First, the plug is connected to the main supply, and the switch is turned on, the conveyer belt starts rotating resulting in proper connection of the same, then the UV light is turned on which turns off at the required time. This finally proves that the connection made is proper. Then to check whether the UV rays are disinfecting items passing through it or not. For this we take a used mask and put it upon the entry point on the conveyer belt and turn on the machine. The mask slowly moves on the belt and enters through the curtain inside the chamber and sanitizes the object.

4.3 PCB implementation

For the implementation components were mounted on the PCB board. After arranging the components, soldering was done for proper support to avoid any kind of errors. As soon as the LED glowed, this confirmed that the circuit was correct and the system was ready to be used.

Fig -2: Conveyor belt visualization

Fig -3: Sanitizing chamber

Fig -4: Demonstration of sanitizing chamber

Fig -5: UV sanitizing chamber for covid-19

4. CONCLUSIONS

The conclusions drawn from this project is that it helps in sanitizing objects that is the primary need in this current pandemic situation of all humans globally, another major reason that is tackled is the unsafe disposal of wastes like masks, PPE kits, etc. from hospitals leading to increase in the probability of getting in contact of the virus. One may not realize the danger while disposing of it. Just by disposing the virus isn't killed, it might be alive and anyone who might be a scavenger might come in contact and ultimately get affected. Finding a solution to it became the most important need of everyone. Second, this can sanitize a large number of items till the UV-C light is in function, third, it works with minimal human contact therefore it is safe, fourth it is small in size so can be carried from one place to another without much effort, fifth it can be effectively used anywhere from homes to grocery stores to hospitals, sixth it is user-friendly, seventh one don't need any sanitizer or refilling as UV-C light can disinfect more beneficially than sanitizers and last but not the least it is cheap and durable. So basically, this project fulfills need and is productive

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