

UV Light Disinfection Robot

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Abstract

Ultra violet (UV) light is used for this purpose of disinfection or sterilization of rooms and surfaces. UV-light is specially employed for this purpose because it consists of germicidal properties. Thus, for the purpose of disinfection or sterilization without human interference, a UV Robot has been designed and implemented. It is equipped with three 11W UV lamps which radiates light in all directions. Hence, one of the effective ways to avoid getting infected with Corona virus is by sterilizing rooms using UV robot.

Keywords: *UV Light, Sterilization, HC -05 Bluetooth module, PIR Sensor, Arduino UNO*

INTRODUCTION

Since year 2019 the whole world is suffering from a dangerous pandemic called "Covid-19". Thus many countries came up with new inventions and research. Their inventions played a vital role to fulfill the ultimate goal i.e. to reduce the impact of Covid-19. And one of them which proved as a rich solution in this pandemic is described in our project i.e. the evolving role of robotics in the global

market. In such pandemic situation most of the jobs such as sanitizing and delivering food and medicines are done by robot which proved very helpful for us. In comparison with other areas, hospitals are the highly prone region in this pandemic. Thus maintaining hospital hygiene which includes disinfection/sanitization plays a crucial role. Existing sanitization techniques which are dependent on the manual application of chemical sanitizers

are time consuming and cannot stop the human association. Hence UV light disinfection robot which can act as a alternative disinfection method have potential to overcome the limitations of manual based disinfecting techniques. This method proved prominent on a large scale in health and care field and also in the allied areas concerned with COVID 19. The “UV Light Disinfection Robot” is completely automated and can be operated through the mobile device. Thus, it creates a touch free environment and avoids human association and thereby it reduces spreading of pathogens.

METHODOLOGY

The UV light disinfection robot is designed to ensure the safety of humans. The objective of our project is to minimize the human Association as much as possible particularly in the Health and Care field So the tasks such as sanitization is done with the help of this robot. In our project we connected our UV light disinfection robot with the Android application to fulfill our objective i.e to avoid manual operating of robot and thus it is controlled overall with this application in our smartphones. This connectivity will take place through the bluetooth medium. Thus, here we have used HC -05 bluetooth module in our robot. After connectivity is

established the overall operating of robot is done by the application. We can operate our robot by pressing direction buttons. Every direction button is sending one character like for forward "F" is received. In our project we have used components such as Aurdino UNO, HC-05 Bluetooth module PIR sensor, Motor driver, DC motor and UV light.

Arduino UNO

Arduino is a microcontroller board and it has 14 digital I/O pins, 6 analog inputs, 16 MHz ceramic resonator and reset button. It consists of everything which is needed for the support of microcontroller.

HC-05 Bluetooth module

HC-5 Bluetooth module manages the communication channel. It has been used to control and establish connectivity of our Android application with the robot. It provides a range of upto 10 metre.

PIR Sensors

PIR sensors are used to detect the obstacles present in the way of the robot. So that, if any human or animal suddenly came in front of robot, UV light gets automatically turned off.

Motor driver

Motor driver is the Integrated circuit chip. It has been used for controlling the robots and embedded circuits.

DC motor

DC motor is used for the movement of the robot. It is connected to motor driver as it makes the motor move as per the given instructions or the inputs.

Relay

Relay are used to switch the circuit i.e. to open and close the circuits electronically.

UV light

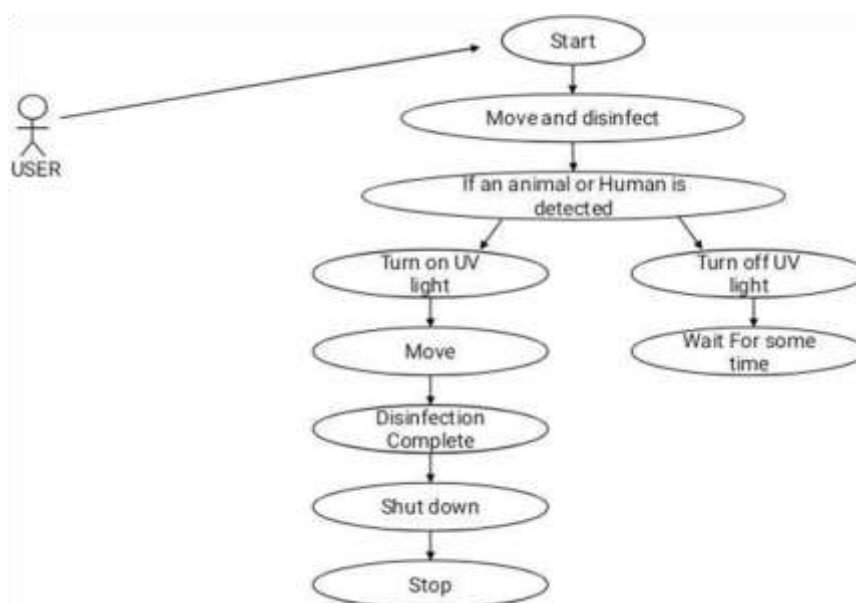
UV light is used for destroying pathogens and other bacteria's present in the surroundings.

Problem Formulation

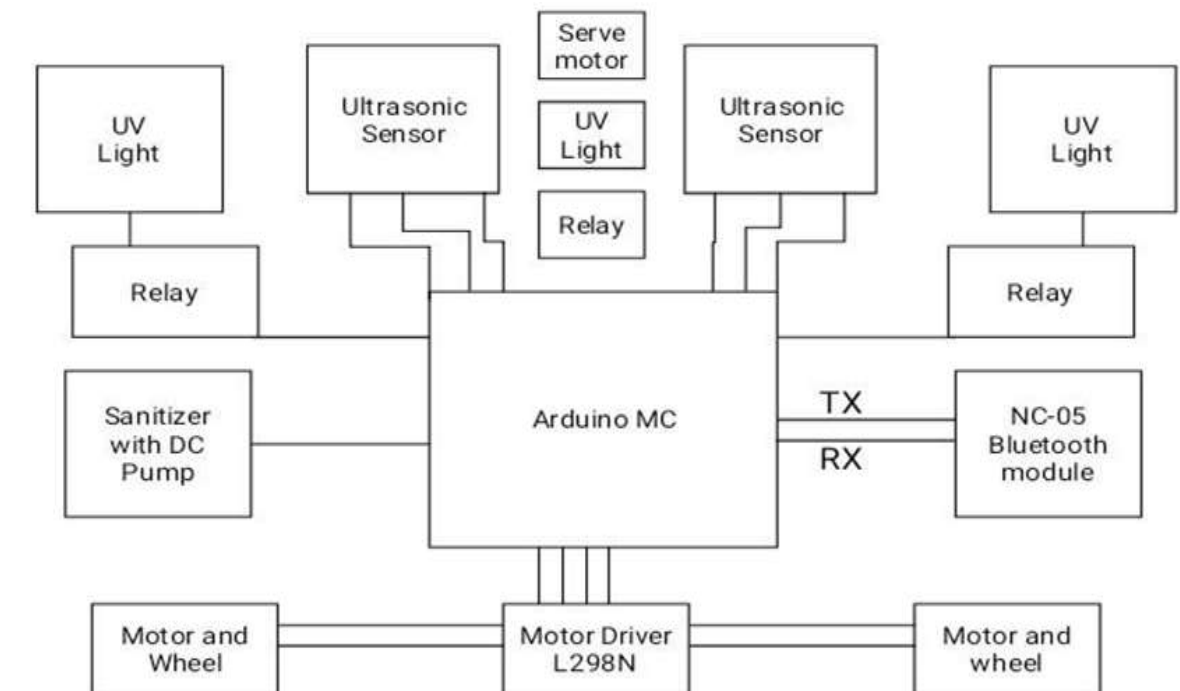
Hospital sanitization is a big issue in now-a-days. The turnaround time of sanitizing rooms in hospitals is less but when it contains high occupancy level of bed in one room then it takes additional time for sanitizing the hospital rooms than normal time.

Most of the disinfecting/sanitizing methods include manual application. And as we know in hospitals there are different kinds of patients with different kinds of diseases including contagious diseases. Thus, manual disinfection procedures leads to spread of many contagious diseases which becomes a critical issue.

SYSTEM DESIGN



Block Diagram



The working of UV-light disinfection robot is as follows

First of all download the IP address web cam application from playstore in another android device that we put it on our UVC robot.

Now start the IP web cam android application and also start the hotspot of that device or connect with WIFI device and then start the server of the android device and get the IP address.

Now start simulator UV robot application first of all enter IP address that we got from IP web cam android application and then press cam connect button after that

camera will be connected with over device.

Start Bluetooth from device and also power on our robot so we can connect our simulator with HC-05 Bluetooth module. After connecting with HC-05 Bluetooth module it continuous blinking of LED on HC-05 will stop. Now our UV robot android simulator application and robot are connected with each other. Now we can operate our robot by pressing direction buttons. For turning on UVC tube light we also provide button for that in our application.

Buttons working

Every direction button is sending 1 character like for forward “F” is received to HC-05 send to Microcontroller then microcontroller give output command as per the given function and work.

ADVANTAGES

1. UV light disinfection robot is safe and advance solution for sanitization issue.
2. It is effective against germs and bacteria compared to chemical based disinfectants/sanitizers
3. It kills pathogens with 100% surety.
4. It consumes less time for sanitization than the disinfection procedures which are carried out manually.

LIMITATION

1. It's quite expensive.
2. It requires high maintenance.

FUTURE WORK

1. The main future scope of UV Light Disinfection R
2. Robot is in the medical field it provided a rich solution for hospital sanitization issues.

3. Not only in the medical field but also it can be used for class room sanitization of schools and colleges, which can prove useful from the point of view of student's safety.
4. It also have a huge scope in areas such as a vehicle sanitization, kitchen
5. Equipments and medical equipments sanitization.

CONCLUSION

This project presents a comprehensive overview of the robotics potential in medical and allied areas with special relation to the control of the COVID-19 pandemic. The introduction of medical robotics has significantly augmented the safety and quality of the health management systems compared to manual systems due to healthcare digitization. Finally, we conclude that the UV-light disinfection robot perform important role in medical field, especially in Covid Centres or other hospitals.

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