



DISINFECTION ROBOT USING UV RAYS

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Abstract: Service robots are increasingly present in all fields of Medicine. The aim of the present work is to contribute in the fight against the spread of COVID-19, a novel human coronavirus in hospitals, public transport, airlines and any enclosed areas. In this study, we have adopted the physical disinfection method by using UV.

Use of these service robots reduces the risk of infection, cost of traditional cleaning and disinfection, and most importantly acquires confidence and security in medical facilities. For the purpose of disinfection without human interference, a UV-ROBOT has been designed and implemented that follows a predefined path. It was equipped with 20watt UV lamps which radiated light in all directions. Given that UV light can be dangerous to human life, an embedded system based on Arduino along with PIR sensors are employed on top and bottom of the robot that detects human or any objects motion and presence. So one effective way to avoid getting infected with coronavirus is by sterilizing rooms using a UV robot.

Index Terms - Embedded, Arduino Uno, Disinfect, IR Receiver

I. INTRODUCTION

The ultimate goal of environmental control in the hospital operating room or patient room setup is to avoid microorganisms including drug-resistant bacteria to a irreducible minimum in order to provide a safe environment for the patient and healthcare worker. At present, there are as many as 14 to 17% of infections in operating and 38% of hospital infections occur in patients who have surgery.

Therefore, both daily perioperative and terminal cleaning of the OR environment is one of the major effective infection control methods used to accomplish the goal in minimum optimizing the number of microorganisms, dust, and organic debris present in environment.

However, a standard cleaning procedure via cleaning solutions by humans alone cannot reduce the number of these microorganisms as there are many blind spots or unreachable places such as walls and ceilings' Recently, a type of ultra violet could aid hospitals in the ongoing battle to avoid microorganisms

from lingering in patients rooms and causing new infections.

The particular wavelength range which can eradicate microorganisms in the range of 200-280nm, also known as the C band of UV light. The wavelength range is effective in inhibiting bacteria, viruses, and fungus. In addition, it can be used to sterilize in air, water, on the surface and very effective when using disinfection in the OR.

Currently, Fixed UV sterilization systems have many limitations in use. For instance, a UV exposure is harmful to users if they are exposed for a long time in a very large quantity. which can cause redness of the skin and eye infections or ceiling lamp types. Further it can be more, it cannot be used to disinfect in some areas hidden under the shadow of the object. The risks associated with hospitals & communities acquired infections are enormous for both human health and medical costs.

Published studies indicate that only 50% of environmental surfaces in a typical or patient room may be effectively disinfected by routine environmental cleaning. As the result of infection by these pathogens they involve considerable pain, suffering and many deaths. Since there is no other way to force people to disinfect hands, it remains to introduce robots to disinfect.

The robots, which will be described in the project, are an attempt to reduce the risk of hospital infections. Studies have shown that the greatest cause of contact surfaces such as: remote control, door handles or cabinets, a button to call for help, etc.

The UV-C disinfection robot provides an economical and effective measure in limiting the spread of bacteria.

II. OBJECTIVES

The main aim of our project is to develop a sterilization robot with the help of UV rays to disinfect the rooms.

- Our UV disinfection and sterilization robot kills germs in the environment by decomposing their DNA structures, thus preventing and reducing the spread of viruses, bacteria and other harmful microorganisms.
- This disinfection robot sterilizes the room in 360 degrees. If any one is near the robot range, our robot automatically turns off the UV lights to prevent the harmful effects.
- Our robot is capable of operate in manual as well as fully automated mode with the help of Bluetooth
- UVC works to kill microorganisms through a specific light wavelength, the power of UV is in its ability to destroy the proteins within these microorganisms, rendering them entirely harmless.
- Where high-end UVC technology is already used in concentrated form for sanitizing tools and materials.
- Our technology aims to bring UVC to more extensive areas than small, contained spaces , providing higher levels of protection for all

III. RESEARCH METHODOLOGY

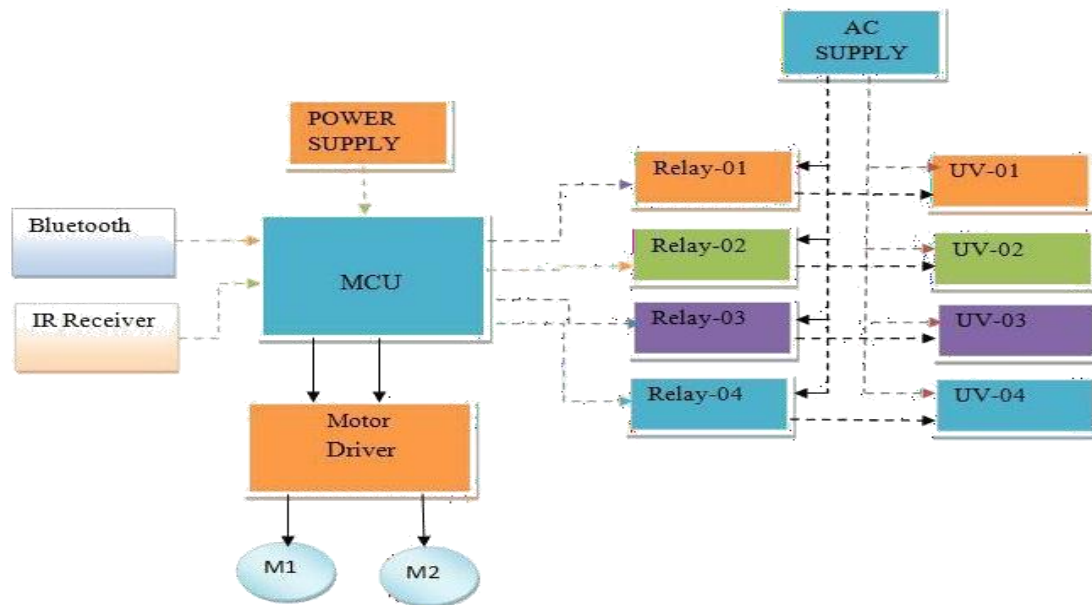


Fig1: Block Diagram of Disinfection Robot

- ❖ The Bluetooth controlled Robot moves according to the button touched in the android Bluetooth mobile app. To run this project first we need to download a Bluetooth app from Google play store. After that we can use any Bluetooth app that supports or can send data.
- ❖ When we touch the forward button in the Bluetooth controller app then the robot starts moving in the forward direction and moves continuously forward until the next command comes. In this both M1 and M2 moves in clockwise directions
- ❖ When we touch the backward button in the Bluetooth controller app then the robot starts moving in reverse direction and moves continues reverse until next command comes. In these cases both M1 and M2 move in anticlockwise directions. When we touch the left button in the Bluetooth controller app then the robot starts moving in the left direction and moves continues left until the next command comes. In these conditions the front M1 rotates in anticlockwise and M2 rotates in clockwise direction.
- ❖ When we touch the right button in the Bluetooth controller app then the robot starts moving in the left direction and moves continues left until next command comes. In this condition the front M1 rotates clockwise and M2 rotates in anticlockwise direction and by touching the stop button we can stop the robot.

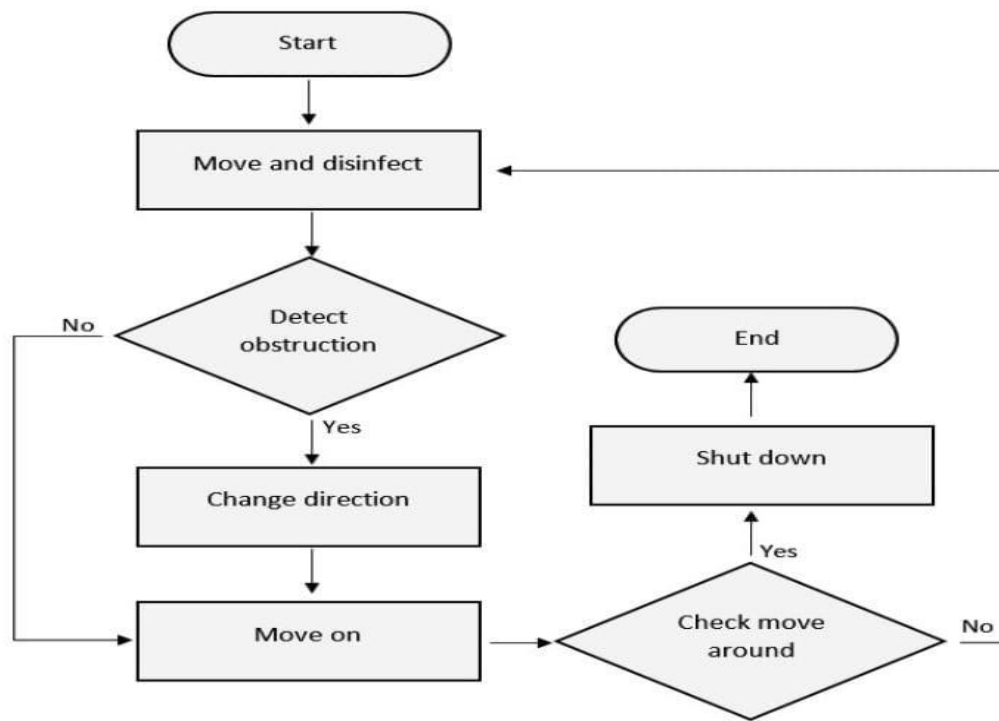


Fig 2 : Flow Chart

The flow chart shows the moment of the Disinfection robot, initial robot will be in an off state once the robot is ON it starts moving in a direction controlled by the operator using Arduino Bluetooth application, I in this process robot disinfects all the surrounding location when the robot detects any obstruction, the operator can change the direction and the robot moves in that direction and starts disinfecting that place, once the robot completes disinfecting operator will shut down the robot

IV. RESULTS

The risks associated with hospitals & communities acquired infections are enormous for both humans health and medical costs. Scientific literature confirms that *Clostridium difficile*, MRSA, VRE, *Acinetobacter baumannii*, and influenza are transmitted via environmental surfaces. Published studies indicate that only 50% of environmental surfaces in a typical or patient room may be effectively disinfected by routine environmental cleaning. As a result of infection by these pathogens often involve considerable pain and suffering and many deaths. Since there is no way to force people to disinfect hands, it remains to introduce robots to disinfect.

Thus our project provides solution for above mentioned problems in any hospitals or clinic due to human interface there is lot of bacteria affected in the area, traditional method currently followed by many hospitals and clinic are Human in real disinfecting the place due to this their is high chances of bacterial contact which is not good for health

Our project provides solution for this problem we are using a remote control (Arduino bluetooth) to control the moment of the robot which is used for disinfecting the room

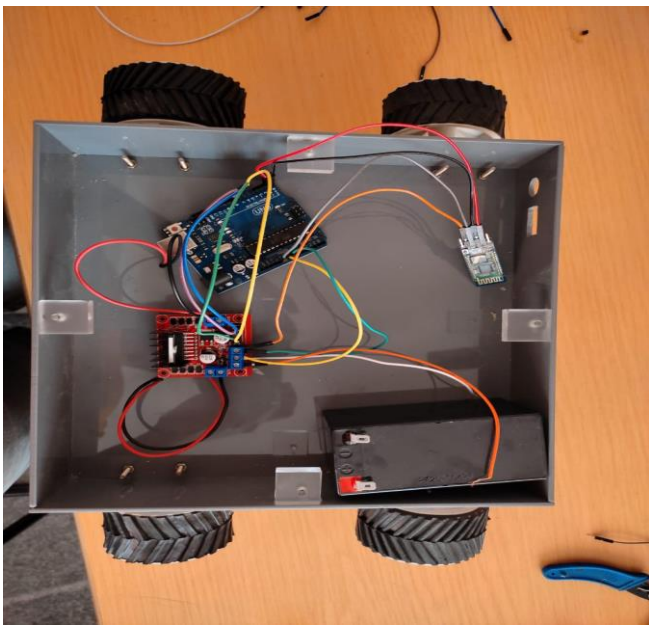


Fig 3: Interior Connection of Robot



Fig 4: Model of Disinfection Robot

vi. Conclusion and Future Scope

- The need of an effective supervision system for the robots in the Medical field has guided these researchers and the engineers to improve and implement several user interfaces designs and communication control architectures. Depending on the operation configuration, the mission tasks, and the floor specifications
- The supervision system design and development is a big challenge to be addressed, in order to run a project properly Based on our review concerning the development of a robotic supervisory system in the Hospitals, the guidelines of the research work and the implementation of the UV-robot.
- A suitable design of a user interface and coverage planner for controlling and monitoring the UV-robot for typical coverage style Hospital area operations proposed. The cross-platform user interface allows the person to specify the hospitals including wards, Operation Theatre, mortuary, pathological labs and all needed specifications, well optimized to fit the hospital requirements.
- Many factors are to be addressed in order to create the ideal network architecture, mainly the coverage planner, the power consumption and the operation efficiency. In an advanced stage, an innovative task to be defined, addressing the development of the cloud management and a web server, aiming to collect data information about the treatment operations and to set the optimal management plan for a specific mission and using an autonomous fleet of UV-Robo
- In any hospitals or clinic due to human interface there is lot of bacteria affected in the area,traditional method currently followed by many hospitals and clinic are Human in real disinfecting the place due to

this there is high chances of bacterial contact which is not good for health our project justifies all the objectives

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