



## Hospital Sanitizing Robot

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**Abstract :** The aim of present work is to avoid the spread of viruses, bacteria, using UV light. In this ,we have adopted UV-C LED light disinfectant method .This robot is efficient to inactive the growth of micro organisms and sanitize the room. The robot controlled by RF wireless remote under 100 meter radius. Wireless camera is mounted on the robot for live streaming of surrounding.

**Keywords –** Arduino Uno , ATmega328, RF433MHz Tx/Rx, UV LED, L293D, Wi-Fi Camera

### INTRODUCTION

The sanitization of hospital room with human effect is not an easy task. The goal of environmental control in patient room is necessary to keep safe environment for patient and health care worker. Health care associated issues are measure complication now a days. The infections occur in connection with the admission while examining taking care of patient.

The source of infection can be to the hospital staff to the patient or to the visitor also equipment and environment as well. Basically the infection rate can be reduce if the chain of infection gets break. So studies form that the UV light can be useful for the disinfection rate. For this the robot is design to remove the bacteria, viruses , which is cost efficient. This will increase the operating time of hospital thus limiting the patient complaint .Also , it provides the high quality experience.

The WHO has advised people to follow social distancing to prevent transmission of Covid 19. In the Amidst of this global pandemic, sanitization has become important part. In preventing from exposure of this virus. The objective of project is to reduce the human efforts with the help of robot

### METHODS AND MATERILS

#### 1 BLOCK DIAGRAM:

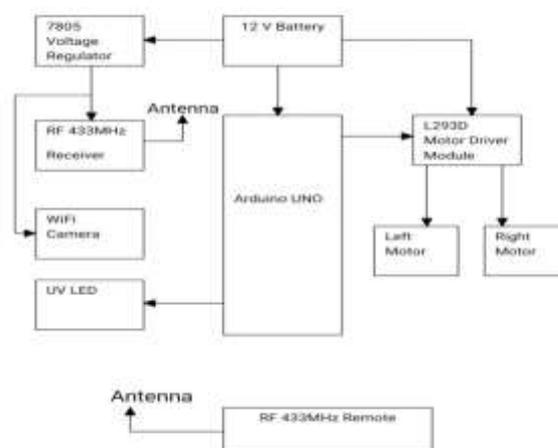


Fig 1.Working system

## Components description:

**Arduino Uno :** Arduino uno is a microcontroller board based on Atmega 328p. Atmega 328p acts as a brain of the board. It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack and a reset button. It contains everything needed to support the microcontroller.

**L293D motor driver module :** L293D is basically a high voltage high current 4 channel driver used to drive motors. It acts as current amplifiers, as it converts low current signal to high current signal. By using L293D we can use DC motors and The module can drive DC motors that have voltages between 5 and 35V, with a peak current up to 2A. It is known as H-bridge. This means it can essentially reverse the direction of current and thus, reverses the direction of motor. The motor operations of two motors can be controlled by input logic at pins 2&7 and 10&15. Input logic 00&11 will stop the corresponding motor. Logic 01&10 will rotate it in clockwise and anticlockwise directions respectively. It can control both speed and spinning direction of two DC motors

**UV LED-** UV-C rays are harmful for the human body so I have used 3 LED connected in series with transistor and resistor, to represent the UV-C LED in this prototype as a demonstration purpose.

**DC motors-** This provides motion to the robot. Motors are arranged in a fashion called HBridge. Hbridge is an electronic circuit which enable a voltage to be applied across a motor in either direction. It allows a circuit full control over a standard electric DC motor. That is with an H-bridge a microcontroller, logic chip, or remote control can command the motor to go forward, reverse, left, right and stop. A geared DC motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM. The gear assembly helps in increasing the torque and reducing the speed can be achieved by reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. This insight will explore all the minor and major details that make the gear head and hence the working of geared DC motor.

**433Mhz RF Module :** RF communication works by creating electromagnetic waves at a source and being able to pick up those electronic waves at a particular destination. These electromagnetic waves travel through the air. At near the speed of light. The wavelength of an electromagnetic signal is inversely proportional to the frequency the shorter the wavelength.

**RF TRANSMITTER :** This wireless data is the easiest to use, lowest cost RF link we have ever seen! Use these components to transmit position data, temperature data, and even current program register values wirelessly to the receiver. These modules have up to 500 feet range in open space. The transmitter operates from 2-12V. The higher the voltage, the greater the range. We have used these modules extensively and have been very impressed with their ease of use and direct interface to MCU. The theory of operation is very simple. What the transmitter 'sees' on its data pin is what the receiver outputs on its data pin. If you can configure the UART module on a uc, you have an instant wireless data connection. The typical range is 500ft for open area. This is an ASK transmitter module with an output of up to 8mW depending on power supply voltage. The transmitter is based on SAW resonator and accepts digital inputs, can operate from 2 to 12 Volts, DC, and makes building RF enabled products very easy.

Features :

434MHz or 315MHz Transmitter operation

100m. Range- Depending on Transmitter power supply

2400 or 4800bps transfer rate

Low cost

Extremely small and light weight

**RF RECEIVER :** This receiver type is good for data rates up to 4800bps and will only work with the 434MHz or 315MHz transmitter. This wireless data is the easiest to use lowest cost RF link we have ever seen! Use these components to transmit, position data, temperature data, even current program register values wirelessly to the receiver. These modules have up to 500 ft range in open space. The receiver is operated at 5V. We have used these modules extensively and have been very impressed with their ease of use and direct interface to an MCU. The theory of operation is very simple. What the transmitter 'sees' on its data pin is what the receiver output on its data pin. If you can configure the UART module on a uc, you have an instant wireless data connection. Data rates are limited to 4800bps. The typical range is 500ft for open area. This receiver has a sensitivity of 3uV. It operates from 4.5 to 5.5 volts-DC and has digital output. The typical sensitivity is -103dbm and the typical current consumption is 3.5mA for 5V operation voltage.

Features :

434MHz or 315MHz operation

500ft. Range- Dependent on Receiver power supply

4800bps transfer rate

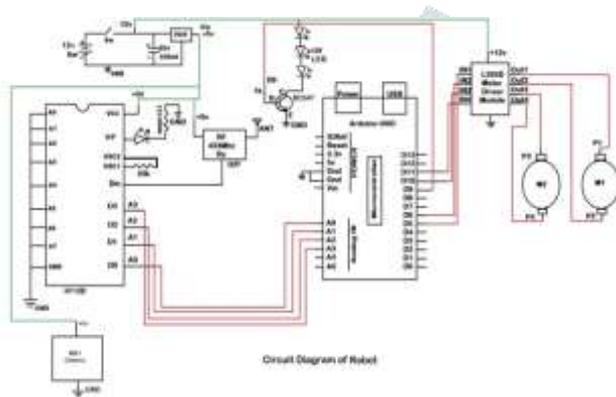
Low cost

Externely small and light weight

**WI-FI CAMERA-** Here we are using a wireless WiFicamera to take live video streaming using WiFi network in mobile application. Mobile camera application allows us to take picture, transmit audio, listen audio and rotate camera head to any direction in 360 degree

**Microcontroller(ATmega328):-**A **microcontroller** is a small computer (SOC) on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Program memory in the form of Ferroelectric RAM, NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM.

### WORKING :



In this system we have used Microcontroller Arduino UNO development board for controlling the whole system. The robot is powered by 12v DC rechargeable battery . As per block diagram system have main blocks as, motor driver module, WiFi wireless camera, Arduino Uno, RF433 MHz receiver and UV disinfecting LED.

The 12v power supply is given from battery to the ardiuon, UV LED and L293D motor driver module which drives the 12 v dc gear motors as signal received from Arduino Uno and programming. 5volt dc power from 7805 voltage regulator is given to RF decoder circuit and WiFi camera. As per circuit diagram the connections are made with Arduino Uno.

RF remote contains Atmega 328p microcontroller, RF433 MHz transmitter and it is powered by DC 9 volt battery. RF remote has 7 keys which is interfaced to microcontroller as input keys to control robot. The signals received by RF receiver are then decoded by HT12D decoder IC and fed to Arduino board. Arduino detects which key is pressed on remote and then robot will operate as per commands written in code.

WiFi camera controlled by android application, so live video streaming, Audios and Camera rotation will be operated by any smart phone

### Advantages :

- Easy to use, because it is cordless.
- 100 meter operating range
- Both side voice transmission and reception.
- Light weight
- Rechargeable.
- Less power required.

### Disadvantages :

UV light is not good for living thing like human, so it is only use for disinfecting non living things.

**Application :**

- For hospitals
- For hotels
- In malls

**Result Table/ Specification :**

The result show prototype of ultraviolet hospital sanitizing robot with Wi-Fi wireless camera interfaced on it, the live streaming can be watched using any smart phone using a Wi-Fi camera application.

1	Remote Control distance	100 Meters
2	Wi-Fi Camera Range	120 Meters
3	UV LED Range	3 feet
4	Battery Backup	2 Hours
5	Time Takes To Kill Germs	1 To 2 Minutes
6	Area Covered By UV Rays	180 Degree

**Conclusion :**

The proposed system is to kill germs and bacteria. The UVC devices are studied and classified according to their disinfectant units, complementary devices, combined disinfection agents, mobility, and order types. A mobile robot is the most efficient device to inactivate microorganisms, so we have developed a robot called UVC Robot.

**ACKNOWLEDGEMENT**

History of all great works into witness that no great work was ever done without either active or passive support of a person. Thus is it not hard to conclude how active assistance from senior could positively impact the execution of a project. The authors are highly thankful to our learned faculty Prof.V.K.Bairagi for his active guidance throughout the completion of the project. Their contributions are sincerely appreciated and gratefully acknowledged.

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