"UVC STERILIZER"

A
Project Report
Submitted in partial fulfillment of the requirement for the award of degree of

Bachelor of Technology
In
Electronics and Communication Engineering

Submitted to
RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA,
BHOPAL (M.P.)

Guided by
Prof C A Patil
(Head of the Department)

Submitted By

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CHAMELI DEVI GROUP OF INSTITUTIONS
INDORE (M.P.) 452020

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A Major Project

Software Requirement Specification Report submitted to

Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

Bachelor of Engineering

in

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Under the guidance of

Prof. C A Patil
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Session: 2020-21

Department of Electronics and Communication Engineering

Chameli Devi Group of Institutions, Indore
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DECLARATION

We certify that the work contained in this report is original and has been done by us under the guidance of my supervisor(s).

a. The work has not been submitted to any other Institute for any degree or diploma.
b. We have followed the guidelines provided by the Institute in preparing the report.
c. We have conformed to the norms and guidelines given in the Ethical Code of Conduct of the Institute.
d. Whenever we have used materials (data, theoretical analysis, figures, and text) from other sources, we have given due credit to them by citing them in the text of the report and giving their details in the references.

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CHAMELI DEVI GROUP OF INSTITUTIONS, INDORE

CERTIFICATE

Certified that the project report entitled, "***UVC Sterilizer***" is a bonafide work done under my guidance by **Husain Dhariwala, Mansi Patel, Mayank Kesarwani and Prakhar Chaurasiya** in partial fulfilment of the requirements for the award of degree of **Bachelor of Engineering in Electronics and Communication Engineering.**

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4. Prakhar Chaurasiya ……..…

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Abstract

Implementation of environmental cleaning and disinfection has been shown to reduce the incidences of healthcare-related infections. UVC radiation is a known disinfectant for air, water, and dry surfaces. This radiation has effectively been used for decades to reduce the spread of bacteria, such as tuberculosis. For this reason, UVC lamps are often called "germicidal" lamps. UVC radiation has been shown to destroy the outer protein coating of the SARS-Coronavirus. Due to this reason, it may also be effective in inactivating the SARS-CoV-2 virus, which is the virus that causes the Coronavirus Disease 2019 (COVID-19). UVC radiation can only inactivate a virus if the virus is directly exposed to the radiation. UV-C light of specifically 254 nm (nanometer) in wavelength has been used against viruses and bacteria.

The project UVC STERILIZER uses the same principle of UV type C radiation to disinfect the surfaces, rooms, apartments, offices, etc. when operated for a certain amount of time. The project consists of UV-C Tube lights which are ISI certified for disinfection purposes only.

This report provides a clear picture of the hardware and software used in the system. It also provides an overall view with a detailed discussion of the operation of the system.

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Chapter 1

Introduction:

Chemical-free sterilization and sanitization is a need after the outbreak of COVID-19. UVC (Ultraviolet-C) light is capable of destroying the virus's outer protein layer, which kills the virus. UVC sterilizer is a portable, dry, and cost-efficient way to kill the virus from the surface of the object in a closed room over a limited time. UVC radiation is the highest energy portion of the UV radiation spectrum. This project deals with the implementation of UV radiation with smart controlling system using IoT to control, operate and sterilize an area or a room within the effective radius of radiation. UV type C radiation not only kills viruses but is also effective against several disease-causing microbes.

1.1 Background of Project:

There are many companies like Phillips who are moving towards UVC based sterilization. Some private companies are also going for smart and chemical free sterilization with the application of electronics. Some similar products who have similar functionalities like UVC sterilizer are already present in the market but with manually operated design. Our project is similar to them in working and implementation but has not been implemented. We are using an app that will control the whole project.

1.2 Objective of Project:

The objective of the project is to build a low cost easy to install UVC Sterilizer for effective disinfection. And to let this idea and project get into the reach of shopkeepers, companies, institutions, and Every place of effective application. In the situation where everything has to be made safe before usage, the need to have a subtle approach for the same was much required, so to fight against the novel coronavirus disease - COVID-19, this project "UVC Sterilizer" has to be implemented.

1.3 Problem Statement:

Ever since the coronavirus pandemic began, sterilization has been made a priority by the government. People are looking for a way to quickly and efficiently sterilize large spaces. Spraying a larger room with an alcohol-based sanitizer is not a very feasible option. Sometimes chemical sanitization is not very friendly with some objects and devices, moreover spraying alcohol-based sanitizer on some reactive elements may cause much adverse situation. That's why more and more people are relying on UVC light-based sanitization.

1.4 Scope of Project:

There are several aspects we need to work on our device in the future to meet the user needs. Firstly, we should develop strategies and modify the device based on the user's evaluation results.

1.5 Project Methodology:

A simple but effective project development methodology will be adopted which will be initialized by researching and will be followed by some regular practices and required processes such as –

- Understanding the needs of the end-user.
- Gathering the necessary information about the technology and components used in the project.
- Studying the available disinfecting UVC lamps to make it better.
- Testing and prototyping of the project.
- Implementation and Project Building.

1.6 Literature Survey:

To develop an efficient and working UV light-based sterilization, we needed knowledge of the effectiveness of UV light. The research for this was done by studying various research papers about the germicidal properties of UV-C light. What we found was that there are 3 types of UV light – UVA, UVB and UVC. Out of these three, only UVC is harmful for organisms. UVC works in the range of (250 – 400) nm wavelength. The wavelength of 254 nm is known as the germicidal wavelength because it is most effective against germs. Which is why, we used the 254 nm wavelength tube light in our project.

Also, some research went into the interfacing between the app and the project. We used Google firebase's real-time database as server to interface between the app and the NodeMCU. The app that we are using is also hosted on Google firebase. The app is written in Vue JS web development framework and we selected this framework for its light weight and easy implementation. We tried multiple methods of communication between the app and the hardware. After trying Bluetooth, RF, Wi-Fi, Hotspot and Internet, we found that Wi-Fi + Internet was the best method.

Chapter 2

2.1 Block Diagram:

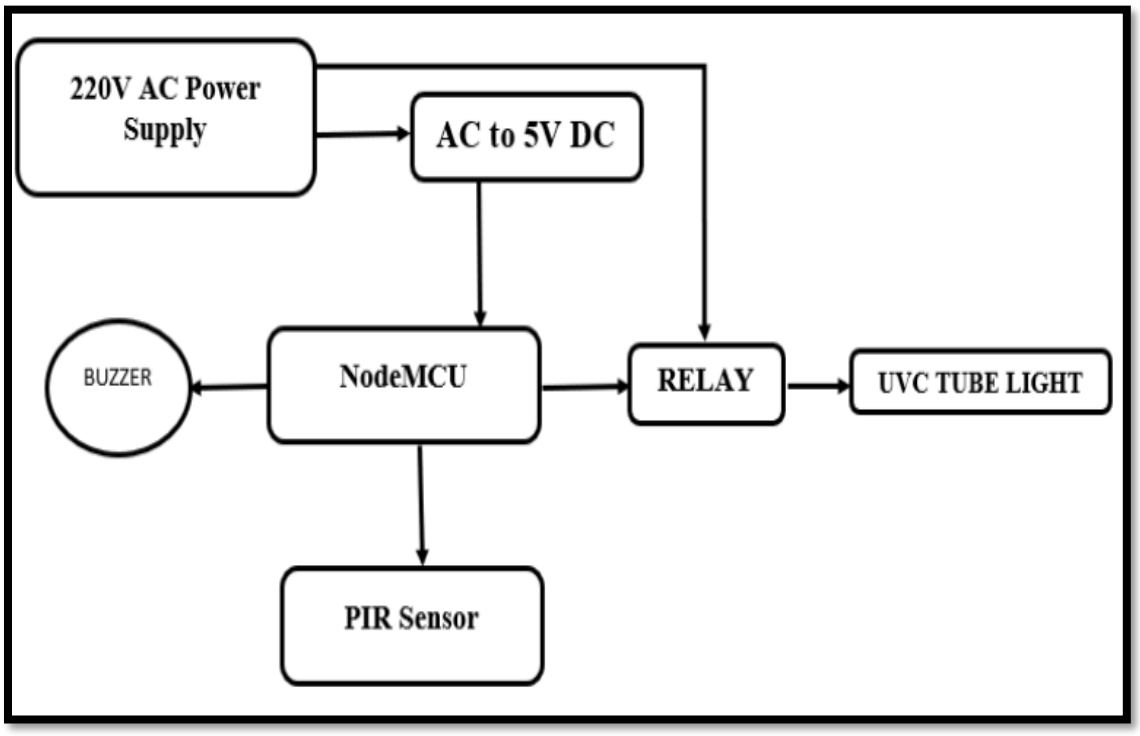


Fig. 2.1 Block Diagram

A block diagram is a diagram of a system in which the principal parts or functions are represented by blocks connected by lines that show the relationships of the blocks.

Here in our project, we have mentioned all the components which are being used and connected using lines to denote which component is been interfaced with whom.

2.2 Hardware Description:

1) Node MCU:

Node MCU is a low-cost open-source IoT platform.it includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The firmware uses the Lua scripting language. The firmware is based on the e Lua project and built on the Espressif Non-OS SDK for ESP8266.

It uses many open-source projects, such as "Lua-cjson". The prototyping hardware typically used is a circuit board functioning as a dual in-line package (DIP) which integrates a USB controller with a smaller surface-mounted board containing the MCU and antenna. The choice of the DIP format allows for easy prototyping on breadboards. The design was initially was based on the ESP-12 module of the ESP8266, widely used in IoT applications.

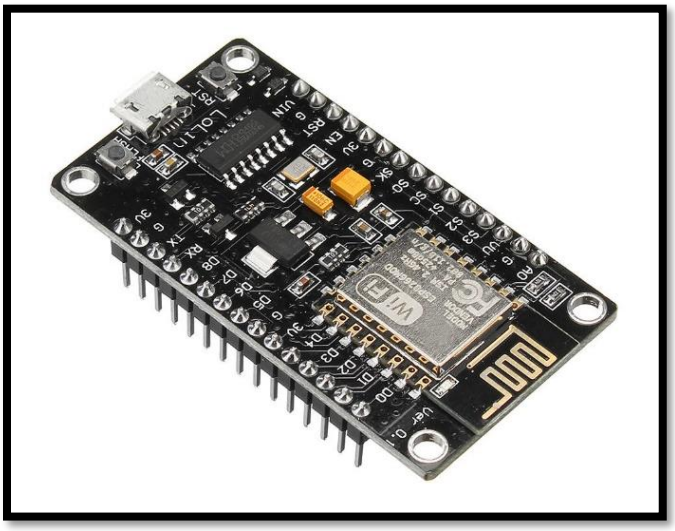


Fig. 2.2 Node MCU

2) Antenna:

An Antenna is a transducer, which converts electrical power into electromagnetic waves and vice versa. Antenna has the capability of sending or receiving the electromagnetic waves for the sake of communication, where you cannot expect to lay down a wiring system.

This is ESP 8266 ESP8266 serial WIFI wireless transmitter module gain antenna MT76813DBI Module. And It is best for indoor applications and fully compatible with the NodeMCU unit. The Random material used to build the antenna is polyurethane, it has flexible cable and stable signal reception and transmission. It has a IPX female to SMA-KY connector. It has an operating Frequency of 900/1800 Hz and a Gain of less than 3 dB with VSWR (Voltage Standing Wave ratio) of less than 1.5.

Fig. 2.2.1 Antenna for NodeMCU

3) Relay Module:

A relay is an electromagnetic switch operated by a relatively small electric current that can turn on or off a much larger electric current. A relay is an electromagnet that has a coil of wire that becomes a temporary magnet when electricity flows through it. This relay module has two channels (those blue cubes). There are other models with one, four, and eight channels. This module should be powered with 5V, which is

appropriate to use with an Arduino. There are other relay modules that are powered using 3.3V, which is ideal for ESP32, ESP8266, and other microcontrollers.

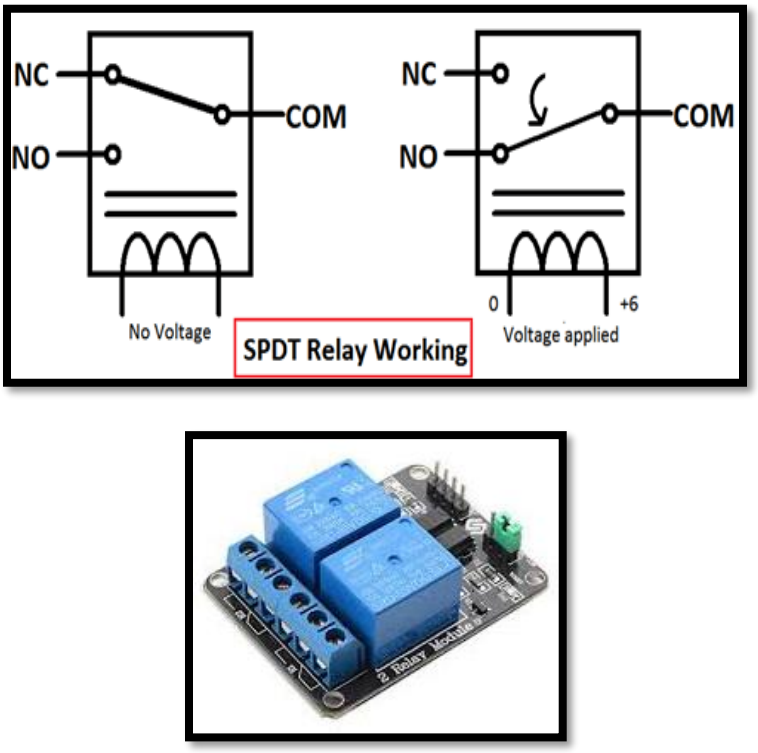


Fig.2.3 Relay Module

Passive electronic components are those that don't have the ability to control electric current by means of another electrical signal. Examples of passive electronic components are **capacitors, resistors, inductors, transformers, and some diodes**. These can be either Thru-Hole of SMD Components.

4) <u>Philips TUV 30W:</u>

The Project uses 30W UVC tube light (Philips TUV 30W) for disinfection purposes. It is powered by Choke for the regulated power supply Philips UVC tube lighter. UV tube lights contain a small amount of mercury, either in a free state within the lamp tube, or embedded within the lamp tube's surface. When electricity is applied

to the lamp, this mercury is “excited” and emits UV light. The exact wavelengths emitted depend on the vacuum pressure within the lamp tube itself.

Fig.2.4 TUV30W

5) <u>Panasonic PIR Sensor:</u>

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved or not. They are small, inexpensive, low-power, easy to use electronic sensors. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.

PIRs are basically made of a pyroelectric sensor that can detect levels of infrared radiation. Everything emits some low-level radiation, and the hotter something is, the more radiation is emitted. The sensor in a motion detector is actually split into two halves. If one half sees more or less IR radiation than the other, the output will swing high or low.

Panasonic Passive Infrared or Pyroelectric PIR Motion Sensors are available in a wide variety of detection types including low profile, long distance, wall installation, slight motion, high density/long distance, horizontally wide, and standard.

The latest PIR Motion Sensor lens design type options are the new "Wide Area Detection" Type offering a wide detection spanning over 10.8 meters and the new "Ultra Slight Motion" Type with improved sensitivity.

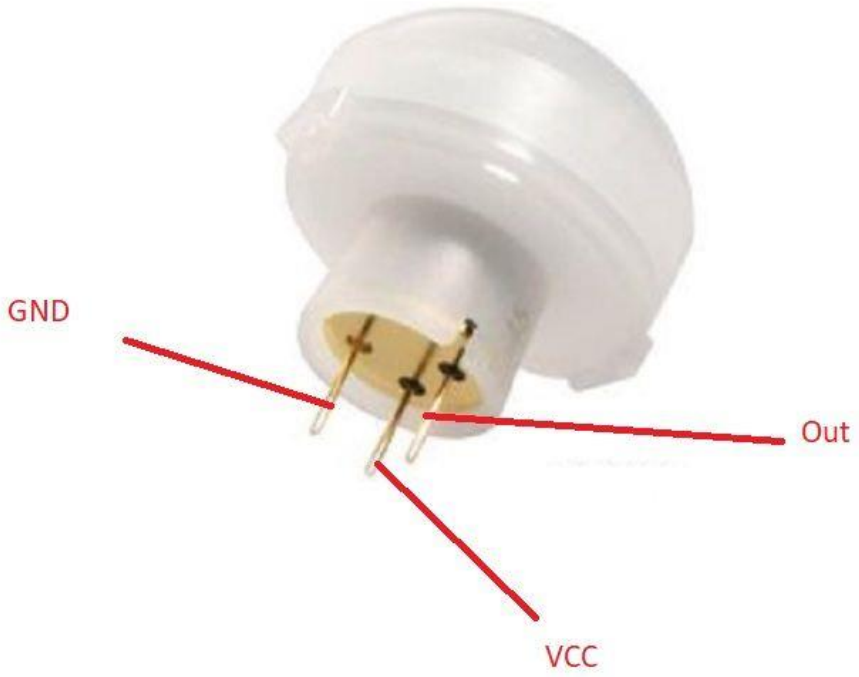


Fig.2.5 Panasonic PIR sensor

6) <u>BUZZER</u>:

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

Fig.2.6 Buzzer

7) LED:

A light-emitting diode (LED) is a semiconductor light source that emits light when a current-flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light is determined by the energy required for electrons to cross the bandgap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.

Unlike a laser, the light emitted from an LED is neither spectrally coherent nor even highly monochromatic. However, its spectrum is sufficiently narrow that it appears to the human eye as a pure (saturated) color. Nor, unlike most lasers, is its radiation spatially coherent, so that it cannot approach the very high brightness characteristic of lasers.

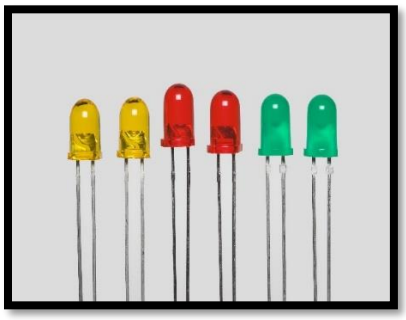


Fig.2.7 LED

8) Additional Electronic Components:

Passive electronic components are those that don't have the ability to control electric current by means of another electrical signal. Examples of passive electronic components are **capacitors, resistors, inductors, transformers, and some diodes**. These can be either Thru-Hole of SMD Components.

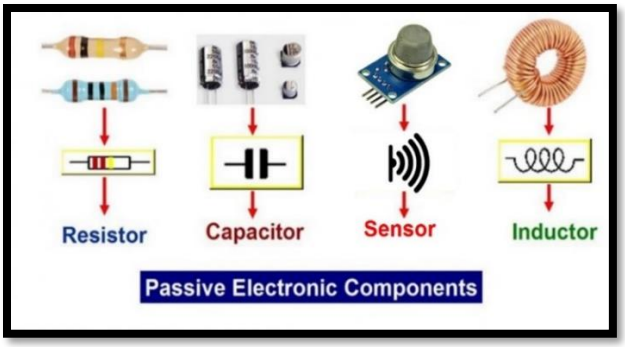


Fig.2.8 Electronic Components

9) Connecting wires:

A connecting wire (also known as jumper wire, or jumper) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

Fig.2.9 Connecting wires

10) 40W Choke:

Tube light choke is a major electrical component for inducing a high voltage into the tube light for its proper function. The purpose of the choke is to provide a very high voltage initially between the filaments (across the two ends of the tube light).

Once the gas in the tube is ionized the choke provides a low voltage. A choke is basically a coil of wire. It also acts as a constant current source for the tube lights.

Fig.2.10 Choke

11) <u>Rocker Switch</u>:

A switch is an electrical component used to turn on and off or to make or break connections between two electrical components. The switch internally contains a metal strip that gets connected to the terminal which is to be connected to turn on the device and when the switch is turned off, the strip gets off from the terminal, and the current stops passing.

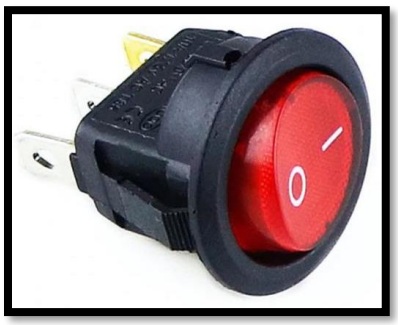


Fig.2.11 Switch

12) <u>Structure</u>:

The structure of the project is made from 12mm laser-cut MDF sheets which not only provides strength to the body but also provides an electrical insulation to the project. A 1-inch stainless steel pipe is also attached to the center and extends up to

80cm from the top of the box, to provide rigidity to the structure and hold the tube lights up straight.

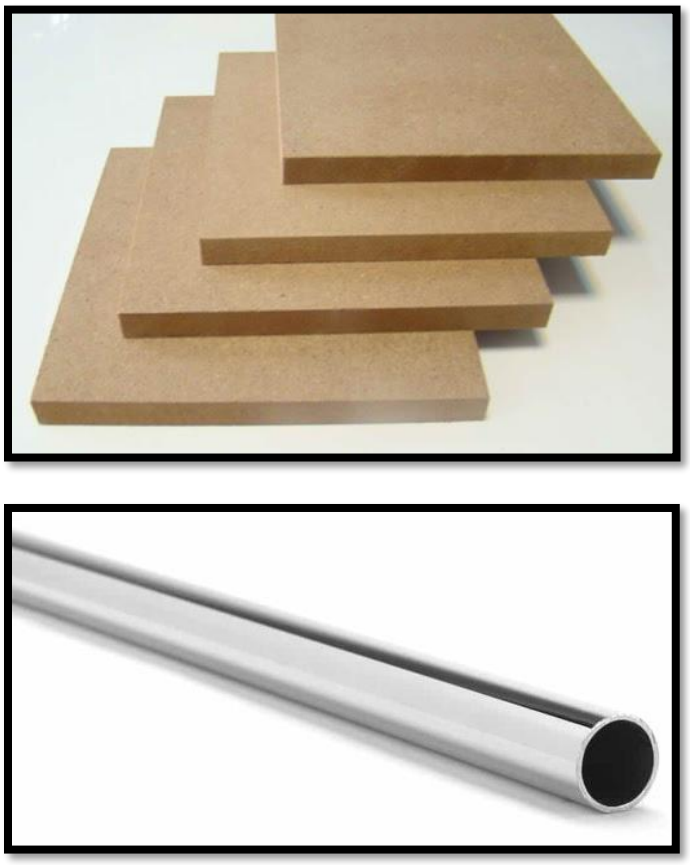


Fig.2.12 Structure Materials

2.3 Software Description:

13) Arduino IDE:

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards.

The source code for the IDE is released under the GNU (General Public License), version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that is compiled and linked with a program stub main () into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program AVR dude to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

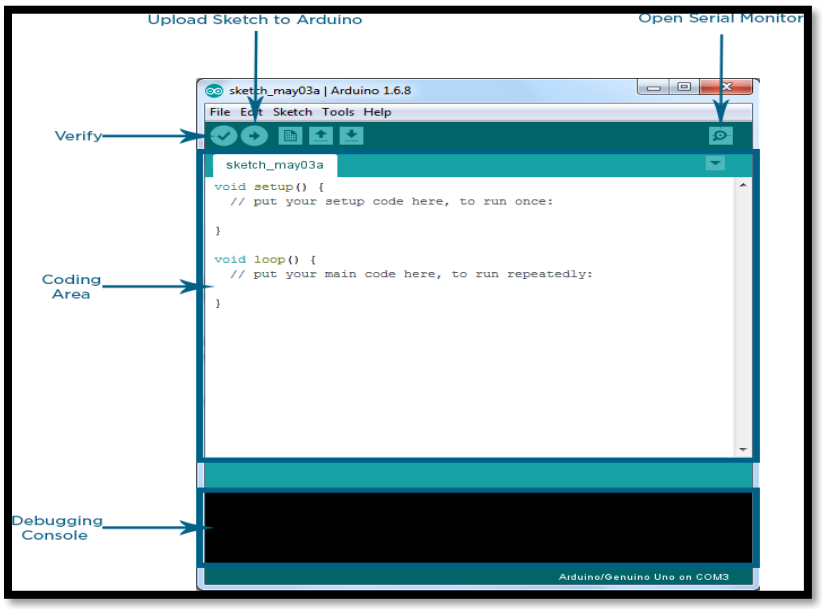


Fig. 2.13 Arduino IDE user interface

14) EAGLE:

EAGLE is a scriptable electronic design automation (EDA) application with schematic capture, printed circuit board (PCB) layout, auto-router and computer-aided manufacturing (CAM) features. EAGLE stands for Easily Applicable Graphical Layout Editor is developed by Cad Soft Computer GmbH. The company was acquired by Autodesk Inc. in 2016. EAGLE contains a schematic editor, for designing circuit diagrams. Schematics are stored in files with '.SCH' extension, parts are defined in device libraries with '.LBR' extension. Parts can be placed on many sheets and connected together through ports. The PCB layout editor stores board files with the extension'. BRD'. It allows back-annotation to the schematic and auto-routing to automatically connect traces based on the connections defined in the schematic. EAGLE provides a multi-window graphical user interface and menu system for editing, project management and to customize the interface and design parameters. The system can be controlled via mouse, keyboard hotkeys, or by entering specific commands at an embedded command line.

Fig. 2.14 Auto EAGLE opening screen

15) VS Code:

VS code was used to edit the front end of our project. VS code is a free and open-source code editor that supports almost all languages. Visual Studio Code is a lightweight but powerful source code editor which runs on your desktop and is available for Windows, macOS and Linux. It comes with built-in support for JavaScript, TypeScript and Node.js and has a rich ecosystem of extensions for other languages such as C++, C#, Java, Python, PHP, Golang and runtimes such as .NET and Unity.

It is a great application for fast and efficient code editing. This editor made the editing of our web application very easy. As you code, Visual Studio Code gives you suggestions to complete lines of code and quick fixes for common mistakes. You can also use the debugger in VS Code to step through each line of code and understand what is happening. The Intellisense tool built in visual studio code offers great autocomplete that saves a lot of time during development.

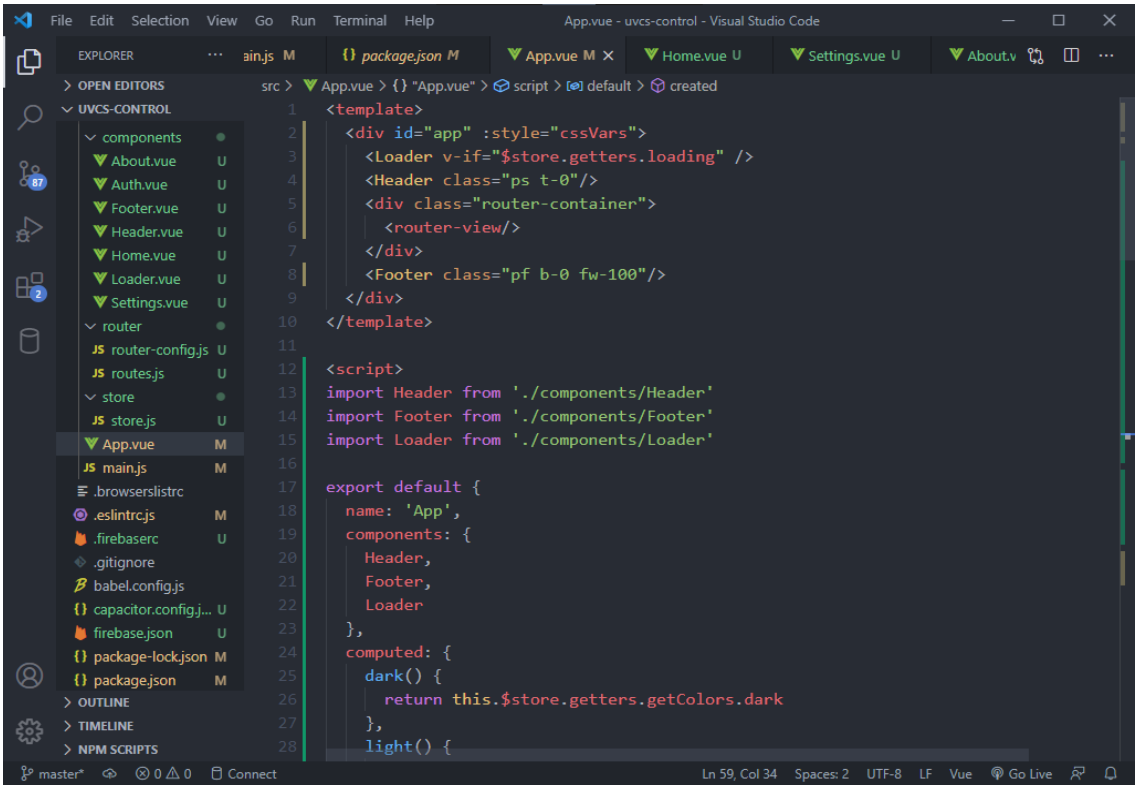


Fig. 2.15 Visual Studio Code

16) Google Firebase:

The web-application of our project was hosted on Google Firebase. Firebase is Google's mobile and web application development platform that helps you build, improve, and grow your application. After deploying our app on Firebase, we received a URL that can be used to access our application.

Other than this, we also used the Google Firebase Realtime Database to host our server and hold our instances. The GET and POST requests on the Firebase Realtime Database are very fast and the response times are also very good. Firebase is developed by Google and it is extremely secure such that no one else can access our server or our application without the password.

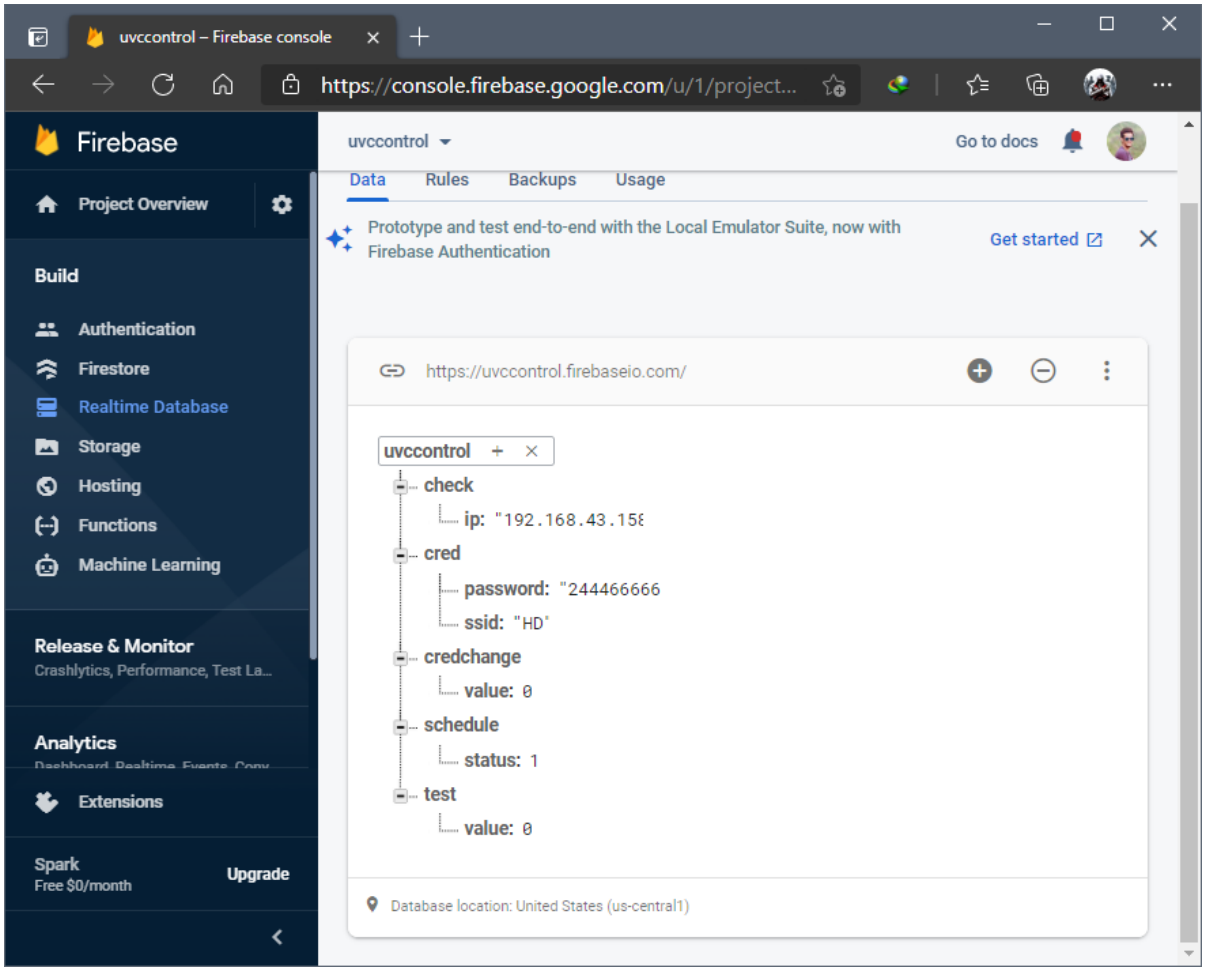


Fig. 2.16 Firebase Realtime Database Console

17) Tinkercad:

Tinkercad is a free, online 3D modeling program that runs in a web browser, known for its simplicity and ease of use. Tinkercad uses a simplified constructive solid geometry method of constructing models. A design is made up of primitive shapes that are either "solid" or "hole". Combining solids and holes together, new shapes can be created, which in turn can be assigned the property of solid or hole.[4] In addition to the standard library of primitive shapes, a user can create custom shape generators using a built-in JavaScript editor. We used this software to create a 3D model of our project so that it can easily be used to assemble the product.

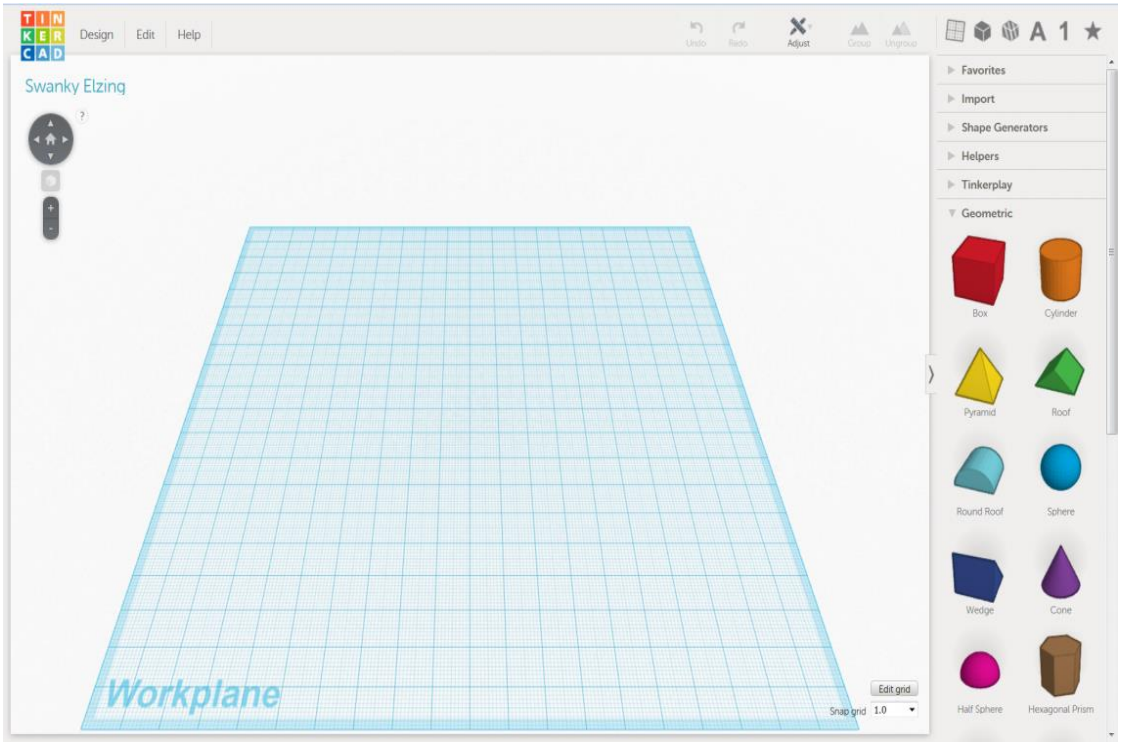


Fig. 2.17 The default view of Tinkercad

18) Vue JS:

Vue JS is a frontend web-development framework that adds reactivity to a web application. It is an approachable, versatile and performant framework. It has an incrementally adoptable ecosystem that scales between a library and a full-featured framework.

It is a progressive framework for building user interfaces. Unlike other monolithic frameworks, Vue is designed from the ground up to be incrementally adoptable. The core library is focused on the view layer only, and is easy to pick up and integrate with other libraries or existing projects. On the other hand, Vue is also perfectly capable of powering sophisticated Single-Page Applications when used in combination with modern tooling and supporting libraries.

An external framework called capacitor JS was used to convert our pre-existing Vue JS web application to an android app. The android application is lightweight and fast and does not require much space to work.

Chapter 3

Working Methodology:

3.1 Flow chart:

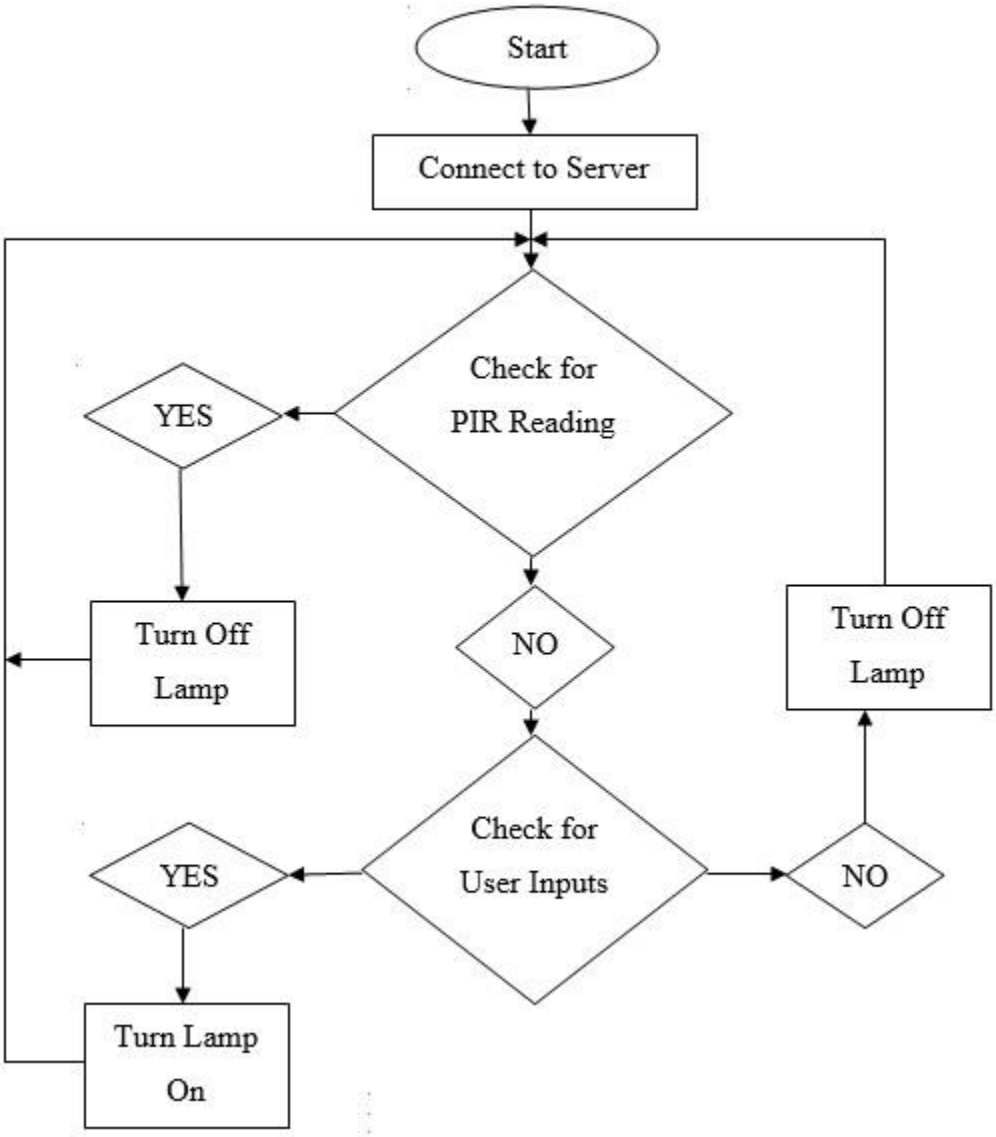


Fig. 3.1 Flow chart

A flowchart is a type of diagram that represents a process of work. It can also be defined as a diagrammatic representation of an algorithm or a step-by-step approach to solving a task. Here the required task was to operate the system via mobile application through Iot to control the hardware system which sanitizes a specific area or a room.

As soon as the system is powered on, the NodeMCU connects to the available and pre stored IP address of a WIFI with Internet Access which ultimately synchronize it with the server. Then the turning on of the Tube Light depends on the PIR readings, if the PIR readings are HIGH (when it detects human movement around it), Tube light is not turned on due to dangerous effects of UVC radiation on humans. But if there is no one around the system then the PIR readings are LOW, hence, the system is ready to operate and the power is provided to the Tube Light, meanwhile to sanitize for a specific time and with a particular delay, there is an inbuilt timer in mobile application, wherein specific inputs can be given.

3.2 Circuit Diagram:

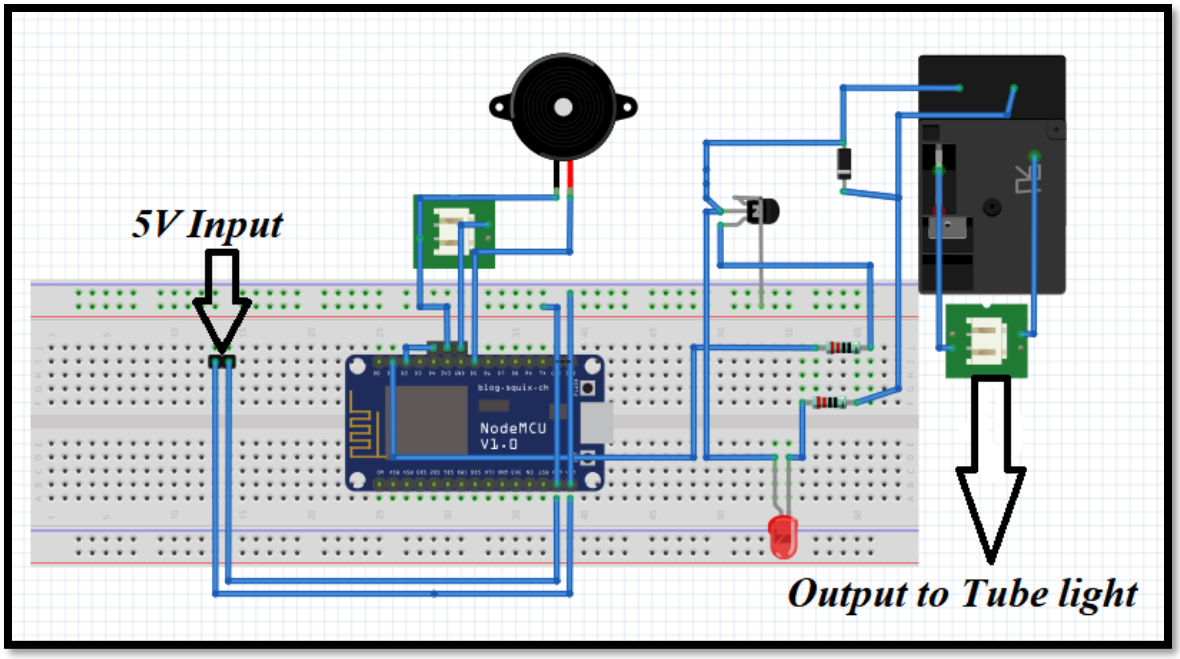


Fig. 3.2 circuit diagram

A circuit diagram is a graphical representation of an electrical or electronic circuit. It represents the connections of electrical and electronic components through a pictorial format.

The system UVC sterilizer uses a simple and small circuit with both electrical and electronic components, it has a NodeMCU as a microcontroller, a 5V adapter for regular and controlled power supply for the electronic circuit, a relay switch for providing power to the Tube Light on the signal of Microcontroller, it also has a buzzer for noise indication. The main switch controls the overall supply to the system.

3.3 Schematic Diagram:

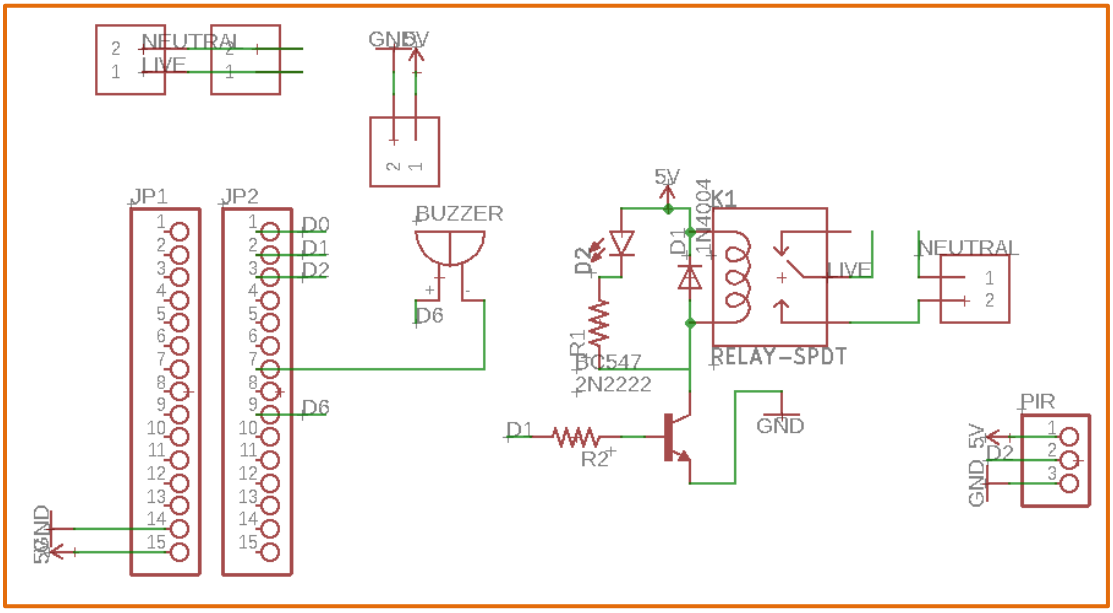


Fig. 3.3 Schematic Diagram

A schematic diagram is a simple pictorial representation of the circuit diagram, with replacing original picture of the element by graphic symbols. Here the schematic diagram is basically used for development of PCB, designing a circuit on the schematic software and then fabricating a PCB through that data.

Schematic diagram holds the proper connections of all the components to be mounted on the PCB, and for designing the PCB.

3.4 Board Diagram:

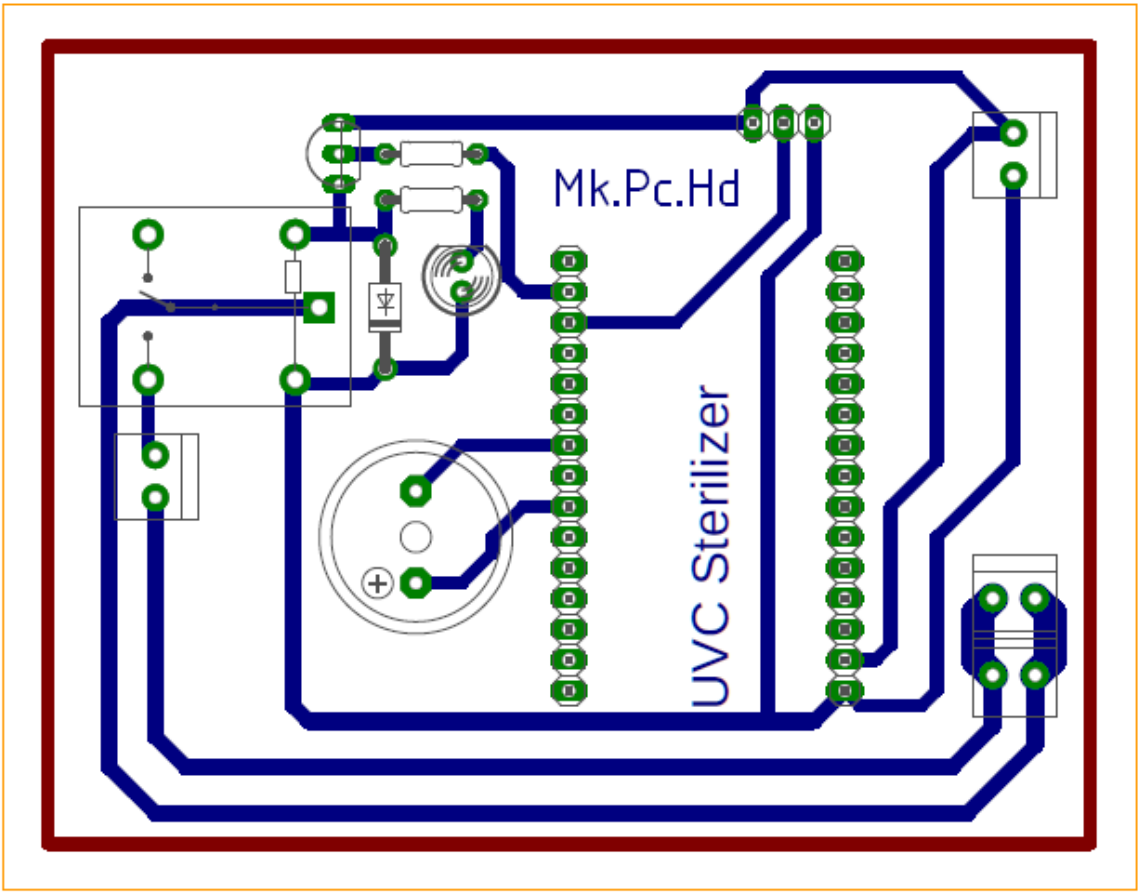


Fig. 3.4 Board Diagram

A board diagram is the final output of a schematic diagram, where all the components and elements have to be placed properly to ensure minimum space usage. The board diagram is then printed for further fabrication process of the PCB.

3.5 3D Cad Design:

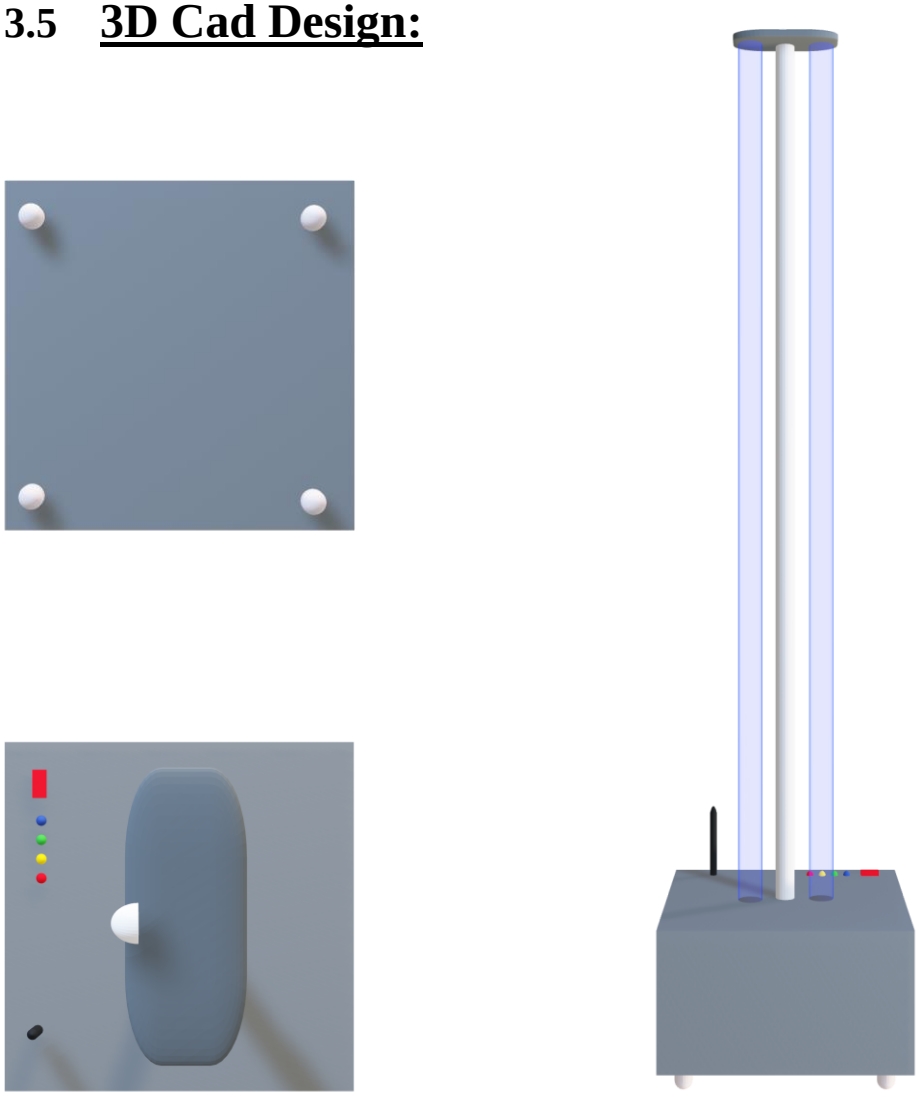


Fig. 3.5 3D View

Chapter 4

Conclusion & Future Scope of Study

4.1 Conclusion:

The conclusion is that UVC Sterilizer is not as complex as it sounds. It is much easier, friendly, and fun to implement. Lack of sterilization has caused bacteria and viruses to grow. These viruses cause illnesses like flu, fever, cold, etc. To improve the safety and health of people by killing these bacteria and viruses or rendering them harmless, this project has been developed.

It is one of the most challenging and critical issues for people to find efficient ways for sterilization of large places. The practical model of this paper proved to be a very efficient, cheaper, and reliable system for sterilization. Any individual can purchase the project and use it for the sterilization of any room. UV Sterilizer aims at making our lives automatic rather than manual, which is why it has an app that controls the project from enough distance and with acceptable delay.

In conclusion, the implementation of UVC Sterilizer was successful. The results show that it is ready to be implemented in practical scenarios.

4.2 Future Scope of Study:

Some features can still be implemented to this project to make this even more accessible by the end-user. For instance, the project can be scheduled to sterilize rooms automatically when the user is not present. It can also synchronize with other UVC sterilizers to make it more efficient.

Overall, there's still much that can be done to make this project even better but at present the added functionalities has all required features.

Project Snaps:

Fig. 5.1 Project Snapshots

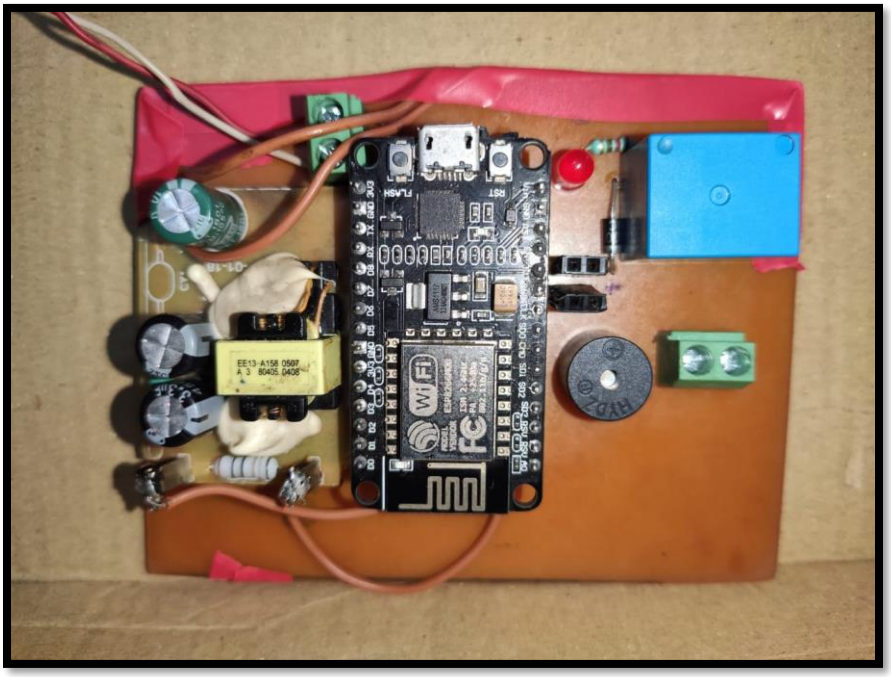


Fig. 5.2 PCB Snapshot

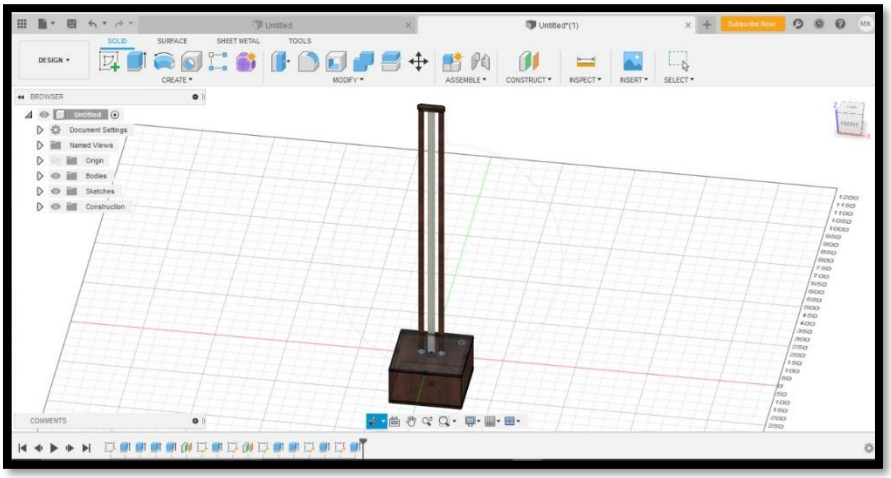
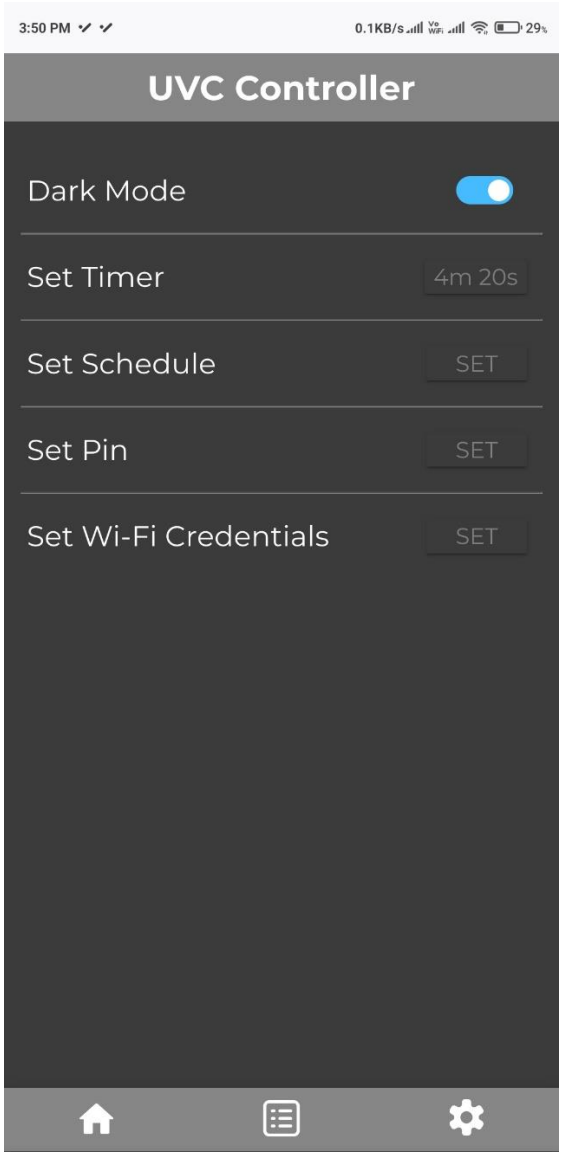


Fig. 5.3 3D Model

Web Application Screenshots:



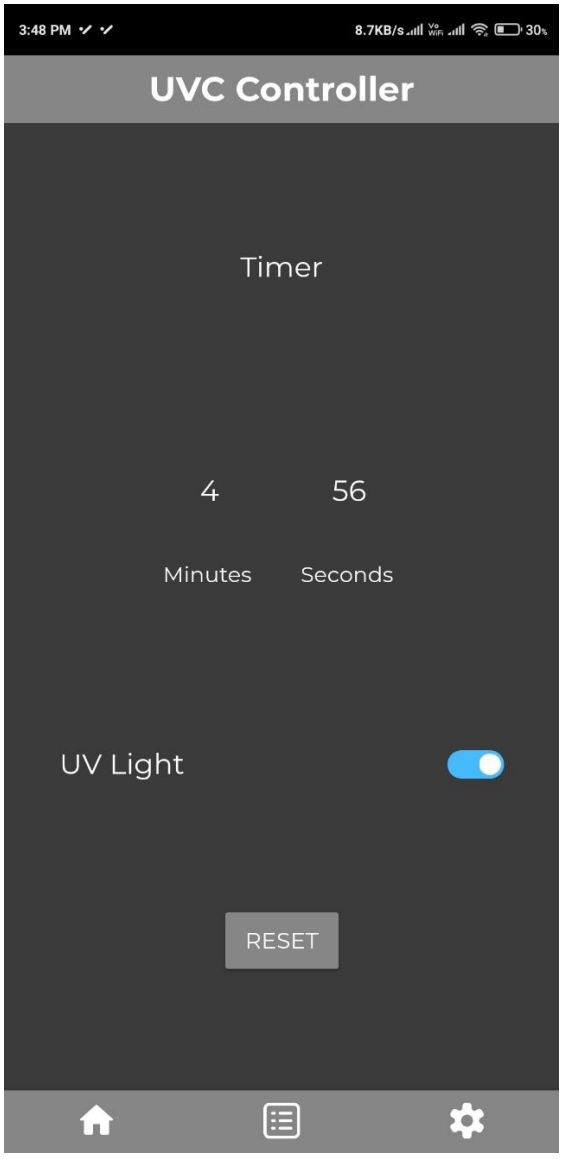


Fig. 5.4 Application Screenshots

List of References:

The research for this project was done by studying various research papers about the germicidal properties of UV-C light. The most significant sources of information were,

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3292282/
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6801766/

Also, some research went into the interfacing between the app and the project. The significant sources of information were,

- https://www.codeproject.com/Articles/1273236/NodeMCU-and-Wi-Fi-Remote-Control-Apps-for-Mobile-P
- https://circuitdigest.com/microcontroller-projects/iot-firebase-controlled-led-using-esp8266-nodemcu

Appendix A

BC547

Overview

1.6.1 BC547 Transistor Features

- Bi-Polar NPN Transistor
- DC Current Gain (h_{FE}) is 800 -maximum
- Continuous Collector current (I_C) is 100mA
- Emitter Base Voltage (V_{BE}) is 6V
- Base Current (I_B) is 5mA maximum
- Available in To-92 Package

FAIRCHILD
SEMICONDUCTOR®

BC546/547/548/549/550

Switching and Applications
- High Voltage: BC546, V_{CEO}=65V
- Low Noise: BC549, BC550
- Complement to BC556 ... BC560

TO-92
1. Collector 2. Base 3. Emitter

NPN Epitaxial Silicon Transistor

Absolute Maximum Ratings T_a=25°C unless otherwise noted

Symbol	Parameter		Value	Units
V_{CBO}	Collector-Base Voltage	: BC546 : BC547/550 : BC548/549	80 50 30	V V V
V_{CEO}	Collector-Emitter Voltage	: BC546 : BC547/550 : BC548/549	65 45 30	V V V
V_{EBO}	Emitter-Base Voltage	: BC546/547 : BC548/549/550	6 5	V V
I_C	Collector Current (DC)		100	mA
P_C	Collector Power Dissipation		500	mW
T_J	Junction Temperature		150	°C
T_{STG}	Storage Temperature		-65 ~ 150	°C

Electrical Characteristics T_a=25°C unless otherwise noted

Symbol	Parameter		Test Condition	Min.	Typ.	Max.	Units
I_{CBO}	Collector Cut-off Current		V_{CB}=30V, I_E=0			15	nA
h_{FE}	DC Current Gain		V_{CE}=5V, I_C=2mA	110		800	
V_{CE} (sat)	Collector-Emitter Saturation Voltage		I_C=10mA, I_B=0.5mA I_C=100mA, I_B=5mA		90 200	250 600	mV mV
V_{BE} (sat)	Base-Emitter Saturation Voltage		I_C=10mA, I_B=0.5mA I_C=100mA, I_B=5mA		700 900		mV mV
V_{BE} (on)	Base-Emitter On Voltage		V_{CE}=5V, I_C=2mA V_{CE}=5V, I_C=10mA	580	660	700 720	mV mV
f_T	Current Gain Bandwidth Product		V_{CE}=5V, I_C=10mA, f=100MHz		300		MHz
C_{ob}	Output Capacitance		V_{CB}=10V, I_E=0, f=1MHz		3.5	6	pF
C_{ib}	Input Capacitance		V_{EB}=0.5V, I_C=0, f=1MHz		9		pF
NF	Noise Figure	: BC546/547/548 : BC549/550 : BC549 : BC550	V_{CE}=5V, I_C=200μA f=1KHz, R_G=2KΩ V_{CE}=5V, I_C=200μA R_G=2KΩ, f=30~15000MHz		2 1.2 1.4 1.4	10 4 4 3	dB dB dB dB

h_{FE} Classification

Classification	A	B	C
h_{FE}	110 ~ 220	200 ~ 450	420 ~ 800

Rev. A2, August 2002

BC546/547/548/549/550

Appendix B

RELAY

Overview

Relay Pin Configuration

Pin Number	Pin Name	Description
1	Coil End 1	Used to trigger(On/Off) the Relay, Normally one end is connected to 5V and the other end to ground
2	Coil End 2	Used to trigger(On/Off) the Relay, Normally one end is connected to 5V and the other end to ground
3	Common (COM)	Common is connected to one End of the Load that is to be controlled
4	Normally Close (NC)	The other end of the load is either connected to NO or NC. If connected to NC the load remains connected before trigger
5	Normally Open (NO)	The other end of the load is either connected to NO or NC. If connected to NO the load remains disconnected before trigger

Features of 5-Pin 5V Relay

- Trigger Voltage (Voltage across coil): **5V DC**
- Trigger Current (Nominal current): **70mA**
- Maximum AC load current: 10A @ **250/125V AC**
- Maximum DC load current: 10A @ **30/28V DC**
- Compact 5-pin configuration with plastic molding
- Operating time: 10msec Release time: **5msec**
- Maximum switching: **300 operating/minute (mechanically)**