AN IOT INTEGRATED WEB-BASED SYSTEM FOR PREDICTING COVID-19 IN A CLINICAL ENVIRONMENT

BY

SURANJIT KUMAR BAIDYA

ID: 181-15-11197

This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

Supervised By

MD. SADEKUR RAHMAN
Assistant Professor
Department of CSE
Daffodil International University

Co-Supervised By

MD. TAREK HABIB
Assistant Professor
Department of CSE
Daffodil International University

DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

JANUARY, 2022

APPROVAL

This Project/internship titled **"AN IOT INTEGRATED WEB-BASED SYSTEM FOR PREDICTING COVID-19 IN A CLINICAL ENVIRONMENT"**, submitted by Suranjit Kumar Baidya, ID No: 181-15-11197 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 04/01/2022.

BOARD OF EXAMINERS

Chairman

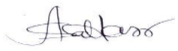
Dr. Sheak Rashed Haider Noori

Associate Professor and Associate Head

Department of Computer Science and Engineering

Faculty of Science & Information Technology

Daffodil International University



Internal Examiner

Abdus Sattar

Assistant Professor

Department of Computer Science and Engineering

Faculty of Science & Information Technology

Daffodil International University

Internal Examiner

_____

Saiful Islam

Senior Lecturer

Department of Computer Science and Engineering

Faculty of Science & Information Technology

Daffodil International University

External Examiner

_____

Dr. Dewan Md. Farid

Professor

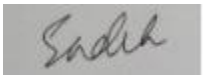
Department of Computer Science and Engineering

United International University

DECLARATION

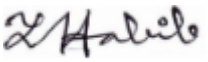
We hereby declare that; this project has been done by us under the supervision of **Md. Sadekur Rahman, Assistant Professor, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

Supervised by:



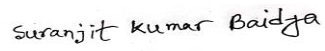
Md. Sadekur Rahman
Assistant Professor
Department of CSE
Daffodil International University

Co-Supervised by:



Md. Tarek Habib
Assistant Professor
Department of CSE
Daffodil International University

Submitted by:



Suranjit Kumar Baidya
181-15-11197
Department of CSE
Daffodil International University

ACKNOWLEDGEMENT

Firstly, I am expressing my heartiest thanks and gratefulness to almighty Allah (SWT.) for his divine blessing makes it possible to complete the final year project/internship successfully.

We are really grateful and wish our profound indebtedness to **Md. Sadekur Rahman, Assistant Professor**, Department of CSE, Daffodil International University, Dhaka. Deep Knowledge & keen interest of our supervisor in the field of **App Developing** to carry out this project. Her endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior drafts and correcting them at all stages have made it possible to complete this project.

We would like to express our heartiest gratitude to **Professor Dr. Touhid Bhuiyan, Head, Department of CSE**, for his kind help to finish my project and also to other faculty members and the staff of CSE department of Daffodil International University.

We would like to thank our entire course mate in Daffodil International University, who took part in this discussion while completing the course work.

Finally, we must acknowledge with due respect the constant support and patience of our parents.

ABSTRACT

Coronavirus disease is the current global challenge of 2019 (Covid-19) The epidemic has crossed provincial, fundamentalist, conceptual, spiritual, social, and educational boundaries with an indicative growth rate and an incompletely understood transmission process. Accurate mortality, spread, and infection dynamics remain somewhat defined due to the unique challenges posed by Covid infections, such as maximum infectivity or just Anterior symptom onset and dominant features in the lungs and lethality is a poorly understood multi-organ pathophysiology. People are unable to ensure the necessary assistance. People infected with Covid-19, as well as patients who are symptomatic due to the rapid spread rate, have shrunk the global healthcare system due to a lack of basic protective equipment and qualified suppliers. The goal of this study is to develop and evaluate an AI algorithm for COVID-19 detection using data from globally diverse, multi-institutional datasets. Here we show that robust models can achieve 0% accuracy in independent test populations, maintain high precision in pneumonia non-covid-1 related cases, and demonstrate sufficient generalizations for patient population/center invisibility. If an artificial intelligence system can be enabled in the healthcare system, then Covid-1 patients are suitable for employing an interconnected system for proper monitoring and care of patients. This arrangement helps increase patient satisfaction and reduces hospitalization rates. AI models are often severely limited in utility due to the homogeneity of data sources, which limits their applicability to other populations, populations, or geographies.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

1.1 Introduction

IP address and through that IP address anybody makes that contraption obvious on the web. From an overall perspective, it began as the "Web of Computers." Research considers having to check a risky progression in the measure of "things" or gadgets that will be connected with the Internet. The subsequent affiliation is known as the "Web of Things" (IoT). The new degrees of progress being developed which license the use of Bluetooth and Wi-Fi have empowered various gadgets likewise have limits of the band together with one another. Utilizing a Wi-Fi as well, go most likely as a Micro web worker for the NodeMcu which executes don't require for a wired connection between the NodeMcu board and PC which lessens the cost and draws in it additionally fill in as a self-governing gadget. The Wi-Fi safeguard needs the relationship with the web from an inaccessible switch or distant space of interest and this would go likely as the entryway for the NodeMcu additionally talk with the web. Considering this, an online home mechanization structure for the controller of home contraptions is orchestrated.

Figure 1.1: Sample of internet of things related services.

1.2 Motivation

The point of building this Covid-19 Detection and Patient monitoring system is to open a new era of health care service. As we all know this pandemic situation is overwhelming for all of us. Getting proper service from hospitals and clinic is kind of impossible cause the world is now affected

by this COVID-19 situation and also giving proper treatment to each person is not possible and that's why we build this system. In this pandemic situation, we will be able to detect COVID by using our x-ray report easily. The basically main motive behind it to maintain social distancing. Also we know monitoring a patient every time is kind of tough and that's why used some hardware sensors to monitor a patient heart rate, oxygen ,level and body temperature every time which will be available at low price.

1.3 Objectives

- Develop an easy home computerization device which is not difficult to introduce and
- Design
- Develop an Iot Based patients monitoring and provide doctor supporting while it's an
- emergency.
- Integrated IoT in the medical Sector for patients and doctor.
- Integrated website in the medical service for taking remote doctor help.
- Apply AI in medical service
- Apply image processing algorithm in medical prescription
- To implement the hardware device in according with website integration.

1.4 Expected Outcomes

- Building a commercial IoT device for doctor and patient's interaction and service gave and taken condition.
- Implementing knowledge of IoT in medical sector
- Introducing web platform with IoT device
- Every patient who thinks they need to take remote doctor service can buy this device from authorized medical company or organization
- Can be used in further research work for better of medical service integration.
- Can be used in technical learning platform where web and hardware integration will be teaches.

1.5 Project Management and Finance

This project was fully funded by myself.

1.6 Organization of the Report

There are five chapters in all in this project report. The first chapter introduces a concept for our project, "A step toward smart medical automation integrating IoT with a web application," and the

second chapter elaborates on that concept. A brief explanation of the project's objectives, scopes, and methods is provided. The history, block diagram, circuit diagram, and component list are all covered in the second chapter. The third chapter covers component descriptions as well as a cost analysis of our system. The fourth chapter examines software and explains how it works. The fifth

chapter then correctly covers the outcome and debate. Provides final observations, limitations of our system, and future work suggestions.

CHAPTER 2

BACKGROUND

2.1 Terminologies

It's an IoT integrated web-based system for predicting covid-19 in a clinical environment system. Mainly this program will run on a server linked with domain hosting. And the hardware section performance by local hosting. So basically, it is an IoT-based IoMT system.

2.1 Related Works

❖ In the literature, several research have used an IoT-assisted robotic system in a variety of applications, including microsurgery, robotic assistive-minimally invasive surgery, and remote surgery. H. Su, J. Sandoval, M. Makhdoomi, G. Ferrigno, and E. De Momi, "Safetyenhanced human-robot interaction control of redundant robot for teleoperated minimally invasive surgery," in *Proceedings of the 2018 IEEE International Conference on Robotics and Automation (ICRA)*, pp. 6611–6616, IEEE, Brisbane, Australia, May 2018.

❖ Ishak and Kit have created a robotic arm that can help a doctor do surgery and care for patients. Gesture and posture data might be used to operate the robotic arm. Design and implementation of roborobot-assisted gery based on Internet of Things (IoT)," in *Proceedings of the 2017 International Conference on Advanced Computing and Applications (ACOMP)*, pp. 65–70, IEEE, Ho Chi Minh City, Vietnam, November 2017

❖ Gupta, P., Agrawal, D., Chhabra, J., & Dhir, P. K. (2016, March). Using an INTEL GALILEO 2ND generation test system, the paper presents the design and implementation of an IOT-based health monitoring system for emergency medical services that can demonstrate flexible collection, integration, and interoperation of IoT data and provide support to emergency medical services such as Intensive Care Units (ICU). By gathering, recording, evaluating, and sharing enormous data streams in real-time and quickly, the suggested methodology allows users to improve health-related risks and save healthcare expenses.

2.3 Comparative Studies

Generally, I can say that my system is quite different and flexible in this era, analyzing any other related work on it. So, comparatively, it's a competitive system based on IoT. I mean it can compete with others.

Table 2.1 Comparative analysis of previous work and our work

Author and year	developed system	Method	Accuracy	My Model
J.O. Obira and R. Sinde. Aug 2021	Has built a Heartbeat and temperature base remote clinical system	Sensor based data stimulation	90-95%	In my system, we use temperature and heartbeat sensors for measuring real time data to predict covid-19 detection possibility
N. K. Tripathi and Pirapong Kitipawang. December 2015	In this project Author focus on cardiac patients by measuring heartbeat monitoring using a wearable device like a smartwatch and patient data is monitored in a remote control management system in integration with the exiting medical system	Wearable technologies controlling by remotely management system	95%	In our technologies we used cloud facilities with saving patients data and compare with previous data which is cared by assign doctors.
Salman,Muhammad Daud,Abdul Qadir Ansari. 2018	In this article, author has developed an android application which can help in any emergency of medical need. The apps will help to find the nearest and easily accessible medical center direction will be given by application database compared to distance and others digital hazard.	Database system develop with mobile application	94%	In our system we develop a system where patients and doctor will be able to interact when its needed and patients will be able to test his/her covid-19 possibility by answering number of possible parameters. Also be able to measure instant body temperature and heartbeat

Horry, M. J., Chakraborty, April 2020	In this research, authors focus on testing covid-19 possibility with the help of image processing and deep learning algorithm where they tried predict a percentage by analyzing x-Ray report weather is there any possibilities of having covid-19 affected.	Image processing, deep learning, open cv.	92-96%	While working on this project we also use such terminologies for this project, in our development project did an analysis of four different algorithms to give a precise prediction and we also take users or patients some symptoms possible percentage to find out a better solution

2.4 Scope of the problem

The system is the scope in this era to solve the problem. Nowadays, IoT or IoMT lead to the maximum healthcare things of human health issues to this society. So, I can barely say this, this is the era we can change the whole matters of covid-19 situation using IoT.

2.5 Challenges

The main challenging thing is reducing the cost but it's comparatively flexible. Hope best and I will work on it in future to reduce cost. Also accepting all challenges to overcome related to my system.

CHAPTER 3

REQUIREMENT SPECIFICATION

3.1 Business Process Modeling

In this chapter, we will discuss our project which is **IoT based service providing the system with web integration** using the ng website webtroller option. Here will show some work like block diagram of our project, circuit diagram, Flowchart, and is three to components we used in this project.

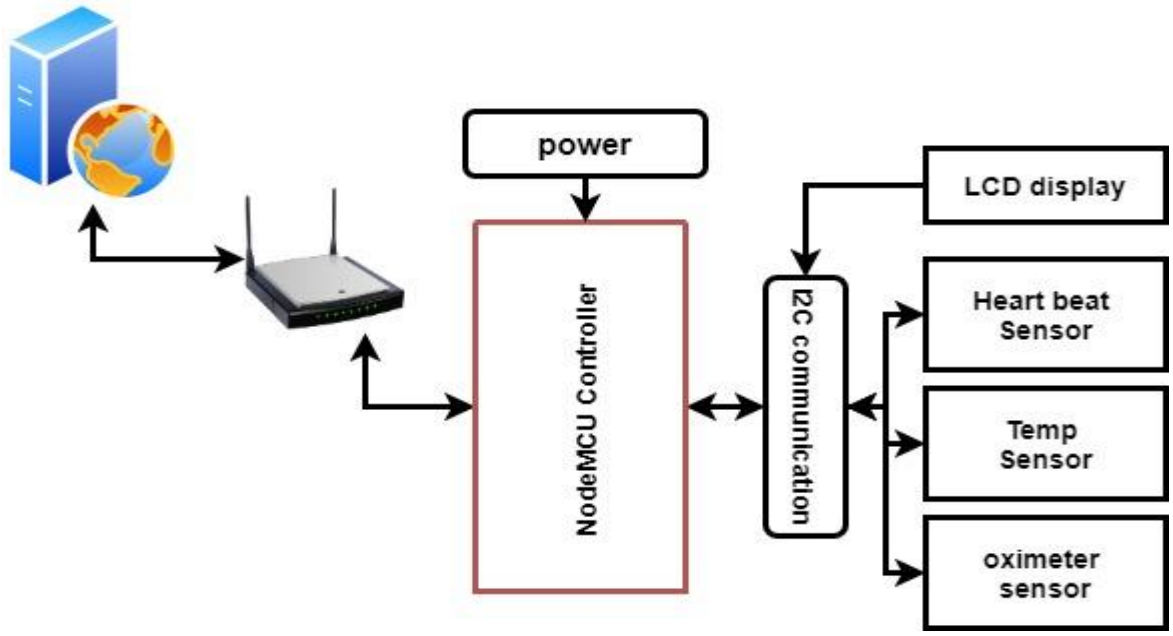


Figure 3.1: Block Diagram of our hardware part.

3.2 Block diagram description

As we can saw that firstly our device connects with web platform through router connection because in our microcontroller has on board Wi-Fi module which can connect our device with internet. Then in the next we have I2C devices which are heart beat sensor, temp sensor and oximeter sensor those sensors will provide us continuous data as get from environment means patients data during test.

3.3 Flowchart Diagram of our project

I. Hardware

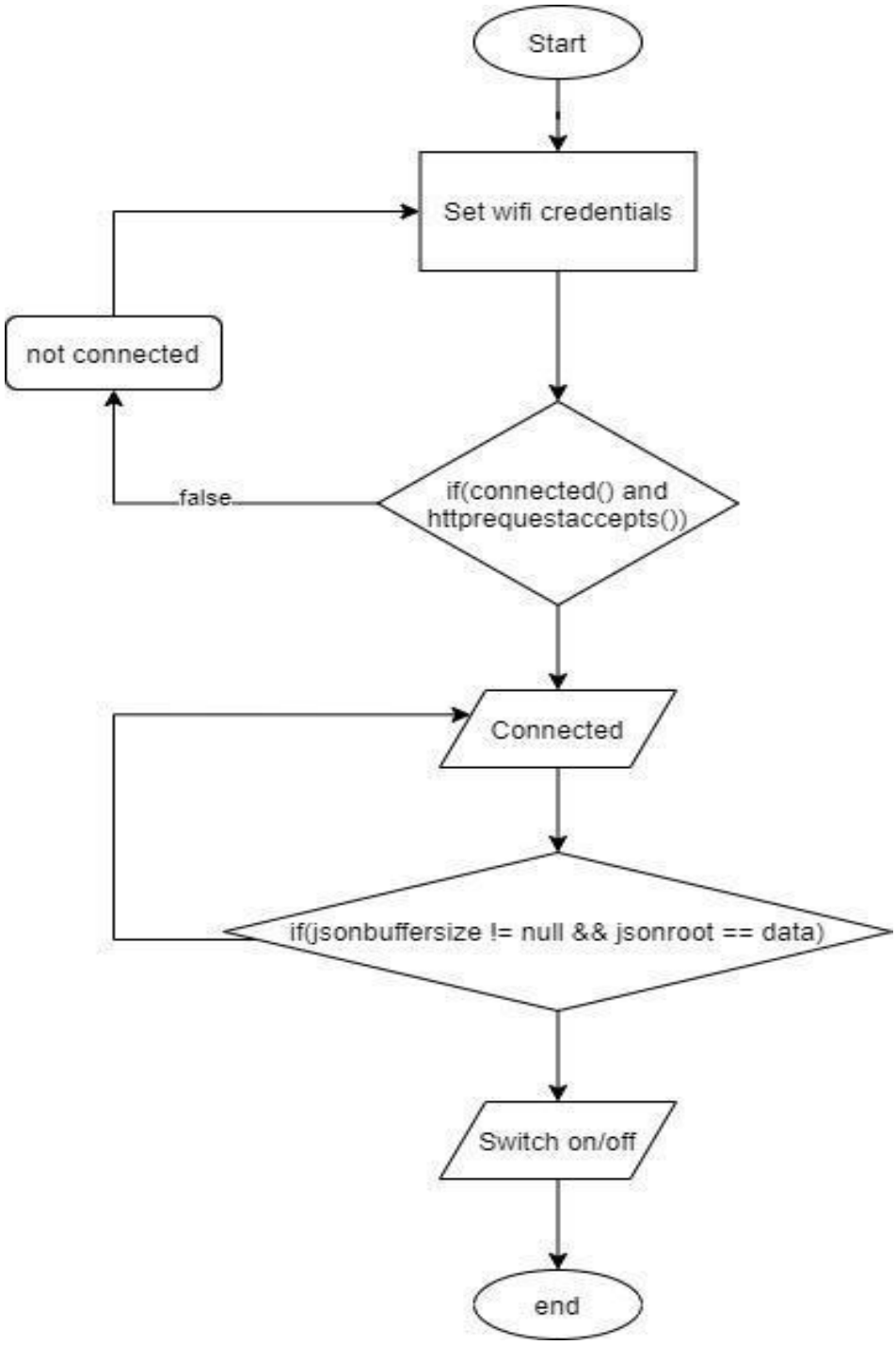


Figure 3.2 Hardware device flowchart diagram

II. Web platform

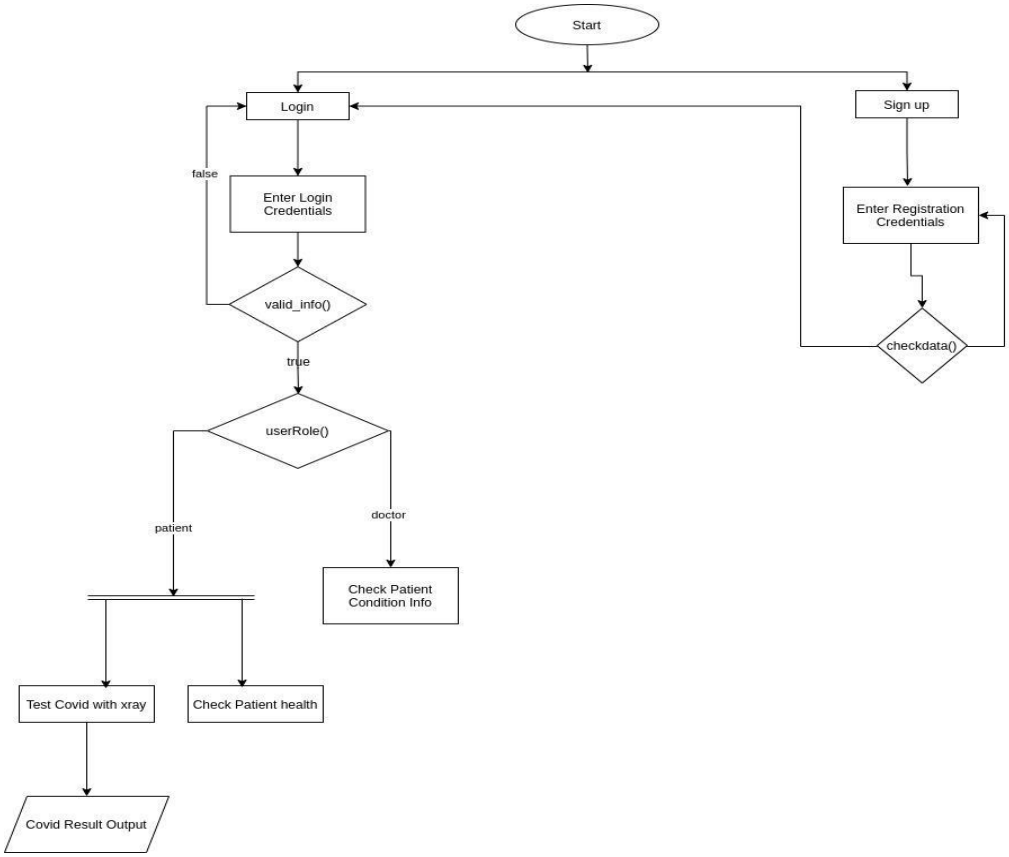


Figure 3.3: web platform flowchart diagram.

3.4 Circuit diagram

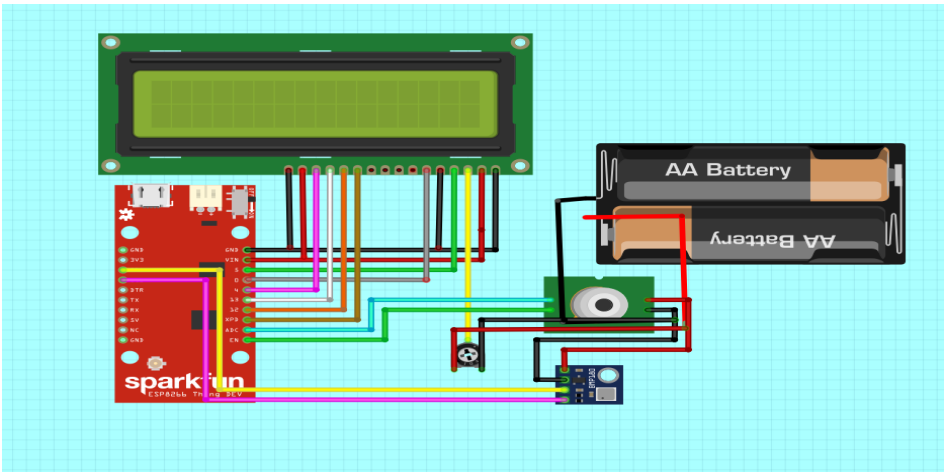


Figure 3.4: Circuit diagram of our project.

3.4.1 Working process our circuit diagram.

The above circuit diagram is completed our project wire though in real work there are little bit change because of user friendly connection of hardware. In the circuit diagram firstly, we will give power to the system and all the system or device will be power up and ready for action. Mean time our microcontroller nodemcu will connect with Wi-Fi and there will be bridge connection of network with server then the sensor will start working like we will get data from sensor as some predefined random data while we start measuring our parameter, they will directly go through in the web portal for monitoring services.

3.5 List of Components used in Circuit

This section we will shows our initial project hardware for clearing the internal devices which we assembled.

Table 3.1 list of the component we used

No	Component Name	Quantity	Used
01	NodeMCU	01	For Processor
02	MLX90614	01	Sensor for data
03	Heartbeat sensor	01	Sensor for data
04	Power supply	01	Power supply
04	Breadboard	01	Wiring connection
06	Adapter	01	Power Supply
07	Some necessary tools	xxx	Completing project

The home computerization framework which utilized in numerous applications on account of its alluring properties like homes, lodgings, enterprises, vehicles.

CHAPTER 4

HARDWARE SPECIFICATION

4.1 Introduction

To get the more effective utilization aftereffect of IoT, we likewise need to think about the administration arrangement of IoT that are available in our home and structures. This framework should be power productive and shopper compelling to improve yield as result. A few frameworks are being proposed regularly by scientists and understudies however every one of the frameworks is in additional trial for the most noteworthy decrease of force misfortune.

4.2 NodeMCU

NodeMCU was created shortly after the ESP8266 was released. Espressif Systems began producing the ESP8266 on December 30, 2013. NodeMCU began on October 13, 2015, when Hong presented the nodemcu-firmware report on GitHub. Two months later, when engineer Huang R supplied the Gerber record of an ESP8266 board called devkit v0.9, the project expanded to include an open-hardware stage. Tuan PM converted the MQTT client library from Contiki to the ESP8266 SoC platform and submitted the NodeMCU project later that month, and NodeMCU was able to handle the MQTT IoT show as well, utilizing Lua to access the MQTT trained professional. On the 30th of January 2015, Devsaurus ported the u8glib as well as the NodeMCU project, involving NodeMCUThe major manufacturers abandoned the firmware initiative in the spring of 2015, and a social gathering of self-governing suppliers took over. By the middle of 2016, the NodeMCU has amassed a collection of 40 outstanding modules.

NodeMCU is an open-source Lua-based firmware that uses an on-module streak-based SPIFFS record format for the Espressif ESP8266 WiFi SOC. The Espressif NON-OS SDK is used to layer NodeMCU, which is written in C.

The firmware was first created as a companion project to the well-known ESP8266-based NodeMCU headway modules, but the task is now in the neighborhood, and the firmware may now be operated on any ESP module.

Pinout Configuration

Table 4.1: Pin Configuration of NodeMCU

Power	Micro USB, 3.3V, GND, Vin	Micro-USB: The Microcontroller board may be connected over USB. 3.3V: To power the circuit, a regulated 3.3V can be applied to this pin. GND: Pins that have been ground Auxiliary Power Source (Vin)
Control Pins	EN, RST	The pin and the button reset the microcontroller
Analog Pin	A0	Used to measure analogue voltage in the range of 0-3.3V
GPIO Pins	GPIO1 too GPIO16	NodeMCU has 16 general purpose input-output pins on its board
SPI Pins	SD1, CMD, SD0, CLK	NodeMCU has four pins available for SPI communication.
UART Pins	TXD0, RXD0, TXD2, RXD2	UART0 (RXD0 & TXD0) and UART1 (RXD0 & TXD0) are the two UART ports on the NodeMCU (RXD1 & TXD1). The system software is uploaded through UART1.
I2C Pins		The I2C capability of the NodeMCU is supported, however you must determine which pin is I2C owing to the inner workings of these pins.

NodeMCU ESP8266 Specifications & Features

Tensilica 32-bit RISC CPU Xtensa LX106 microcontroller Digital I/O Pins (DIO): 16, UARTs: 1, SPIs: 1, I2Cs: 1, Operation Output power: 3.3V, Input Voltage: 7-12V, Digital I/O Pins (DIO): 16 USB-TTL based on CP2102 is included onboard, enabling Plug n Play, PCB Transmitter: 4 MB,Random access memory: 64 KB, Clock Speed: 80 MHz, USB-TTL built on CP2102 is provided onboard, providing Plug n Perform

Fig. 4.1 NodeMCU

4.3 MLX90614 Temp Sensor

The MLX90614 is an infrared thermometer that can estimate temperature without touching it. Both the IR sensitive thermopile detector chip and the sign molding ASIC are housed in a TO-39-style container. A low clamor booster, 17-bit ADC, and excellent DSP unit are all integrated into the MLX90614 to achieve high precision and objective of the thermometer. The thermometer comes with an enhanced SMBus yield that allows complete access to the deliberate temperature in the total temperature range(s) with a 0.02°C aim. The client can arrange for the programmed yield to be balanced by breadth (PWM). Typically, the 10-bit PWM is set up to communicate the desired temperature in the range of - 20 to 120°C, with a yield objective of 0.14°C.

Figure 4.2: MLX906 sensor.

4.3.1 Features and benefits

- Little size and minimal expense
- Simple to incorporate
- Industrial facility aligned in wide temperature range: - 40 to 125°C for sensor temperature and - 70 to 380°C for object temperature
- High precision of 0.5°C over wide temperature range (0..+50 C for both Ta and To)
- Clinical precision of 0.1°C in a restricted temperature range accessible on demand
- Estimation goal of 0.02°C
- Single and double zone adaptations
- SMBus viable advanced interface for quick temperature readings and building sensor organizations
- Adjustable PWM yield for consistent perusing
- Accessible in 3V and 5V renditions
- Basic transformation for 8 to 16V applications
- Force saving mode
- Diverse bundle choices for applications and estimations flexibility
- Car grade

4.4 Heart Beat monitoring sensor.

Competitors and patients must check their pulses since it determines the status of their hearts (just pulse). There are several ways to determine pulse, with electrocardiography being the most precise. A Heartbeat Sensor, on the other hand, is a more straightforward way to check the pulse. It comes in a variety of forms and sizes, and it allows for a moment-by-moment approach to quantifying the heartbeat. Wrist watches (Smart Watches), smart phones, chest lashes, and other devices have heartbeat sensors. The heartbeat is measured in pulsates per minute (bpm), which indicates how many times the heart contracts or extends in a certain period of time.

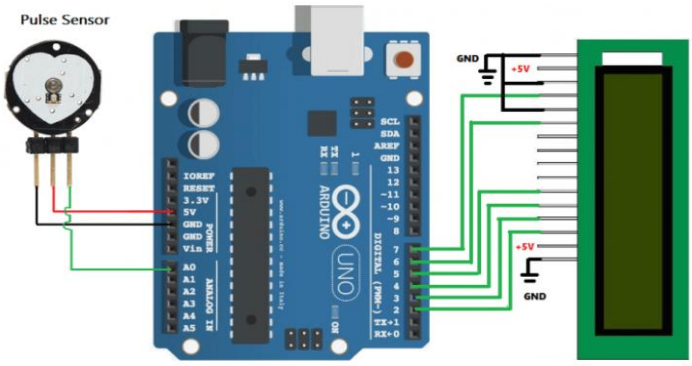


Figure 4.4: pulse sensor with basic arduino

Blood is sucked through the human body and into the narrow tissues when a heartbeat occurs. The volume of these thin tissues increases as a result. However, the volume inside slender tissues decreases in the middle of the two successive pulses. The amount of light that passes through these tissues is influenced by the volume adjustment between pulses. With the help of a microcontroller, this may be approximated.

A light on the beat sensor module aids in determining the beat rate. When we place our finger on the beat sensor, the light that is considered changes depending on the amount of liquid in the fine veins. The yield of the beat sensor may be used to get this variation in light transmission and reflection as a heartbeat. This heartbeat may then be used to gauge heartbeat and then suitably adjusted to read as a heartbeat check using Arduino.

4.5 Description of LCD Display

A fluid basic stone presentation (LCD) is a level board show, electronic visual part, or video show that utilizes the light changing properties of fluid pearls. Fluid tremendous stones don't send light straightforwardly. Here, in this table we're going, also, utilize a monochromatic 20x4 alphanumeric LCD. 20x4 comprehends those 20 characters can be showed up overall of the 4 lines of the 20x4 LCD, as a particularly all out of 80 characters can be showed up at any outline of time.

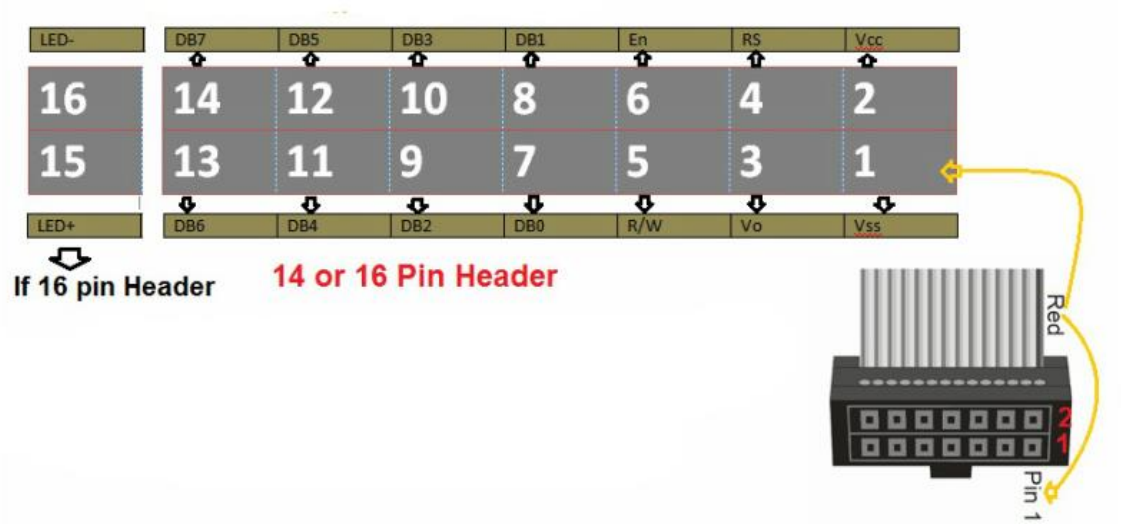


Figure 4.5: Address locations for a 1x16 line LCD

4.5.1 Shape and Sizes

Certainly, even with character-based modules, there is a vast range of forms and sizes available. In one, two, and four-line arrangements, line lengths of 8, 16,20,24,32, and 40 characters are the usual. There are a handful of accumulated LC degrees of advancement. In comparison to the more established "turned nematic" sorts, "supertwist" types, for example, provide better section and study point. A few modules are unprotected by fundamental light, allowing them to be visible in dimly lit environments. The scene light might be "electro-splendid," necessitating the use of a high-voltage voltage source inverter, or essential LED illumination.

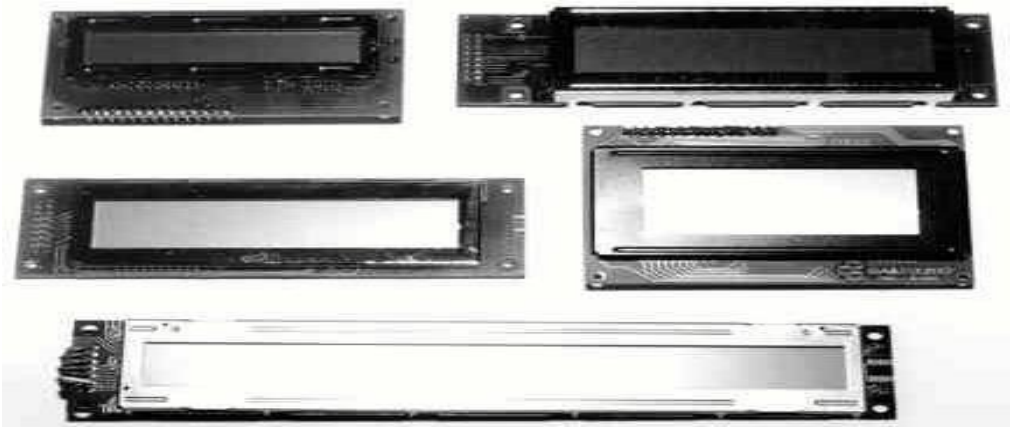


Fig 4.6 LCD Different Models.

4.5.2 Pin Description

Most LCDs with 1 regulator has 14 Pins and LCDs with 2 regulator has 16 Pins (two pins are extra in both for backdrop illumination LED associations).

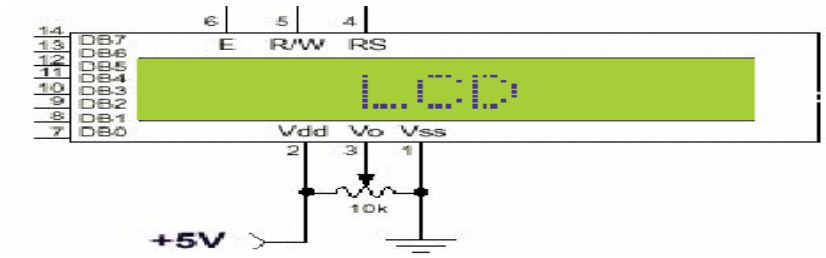


Fig 4.6 Pin Diagram of 16x2 line LCD.

Table 4.3 Pin Description of LCD

PIN	SYMBOL	FUNCTION
1	Vss	Power Supply(GND)
2	Vdd	Power Supply(+5V)
3	Vo	Contrast Adjust
4	RS	Instruction/Data Register Select
5	R/W	Data Bus Line
6	E	Enable Signal
7-14	DB0-DB7	Data Bus Line
15	A	Power Supply for LED B/L(+)
16	K	Power Supply for LED B/L(-)

4.5.3 Control Lines

"Lock-in" is the EN Line that is given out. This control line is also used to inform the LCD that data is being sent. Also, transmit data to the LCD, and our software should ensure that this line is low (0), and then adjust the other two input lines and put data on the data transport a short time later. Bring EN high (1) and screen items for the basic degree of time necessary by the LCD datasheet (this development from one LCD strangely another), then bring it low (0) again after all lines are fully prepared.

The "Register Select" line is the RS Line. When RS is low (0), the facts are unmistakably comparable and should be viewed as an allusion as well as a fresh bearing (like clear screen,

position cursor, etc) The data being delivered at this time, when RS is high (1), is text data, which should, in turn, show on the screen. Furthermore, if you were to display the letter "T" on the screen, you would set RS to a high value.

RW Line is the "Poor down/Write" control line. Unequivocally when RW are low (0), the information on the data transport are being stayed in contact with the LCD. Unequivocally when RW are high (1), the program are suitably tending in like way (or researching) the LCD. Essentially a solitary bearing ("Get LCD status") are a gotten request. All others are made orders, so RW will regularly below. Finally, the data transport hardens 4 or 8 lines (subordinate upon the system for improvement picked by the customer). By rules of 8-digit data transport, the lines are proposed besides, DB0, DB1, DB2, DB3, DB4, DB5, DB6, and DB7.

4.6 Wires

Fig 4.7: Female to Male Jumper Wire.Fig 4.8: 1Male to Male jumper wire.

In this endeavour we need couples of Female too, Male and Male too, Male jumper wire. Those are for interfacing Bluetooth module and move module too, the Arduino UNO board.

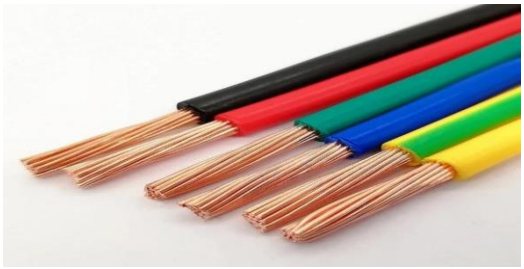


Fig 4.9: 220v carried wire.

And we need some 220v carried wire to connect load in the relay module.

4.7 Power supply

An AC connector, AC/DC connector, or AC/DC converter are a particularly outside power supply, as unendingly as possible encased for a condition like an AC plug. In the power supply pack, we use one phase-down transformer in like manner data down the voltage from 220-volt ac in like way, 9-volt dc. The yield of the transformer is correspondingly connected with the two-diode circuit. Here two diodes fill in as a full-wave rectifier circuit. The yield of the full-wave rectifier is at present kept by the capacitor. Capacitor changes over the beating dc into smooth dc with the help of charging and passing on sway. The yield of the capacitor is before long made by the IC 7805 regulator. IC 7805 gives a 5-volt rule correspondingly, the circuit and gives an organized 5-volt power supply. The yield of the regulator is as of now again channel by the capacitor. In the yield of the capacitor, we use one resistor and one drove in approach other than offering a visual piece of information additionally, the circuit.

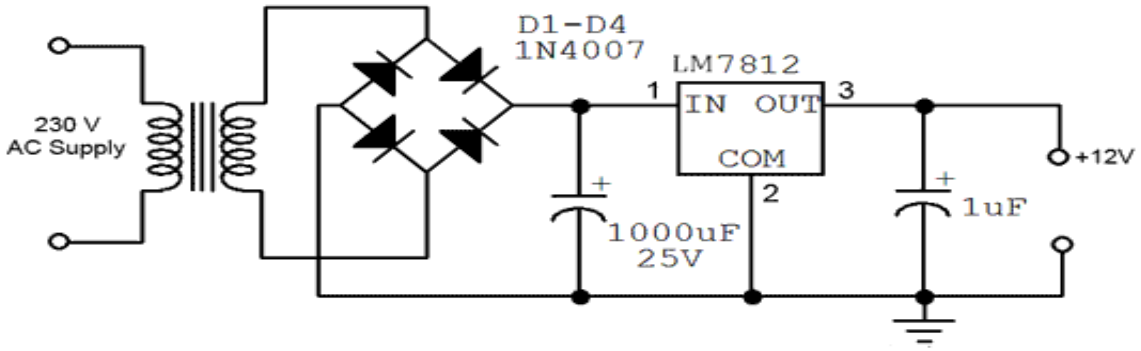


Fig 4.10 12v Power supply.

4.8 Cost Analysis

Here we decide to analysis the cost of this project, while studying of this project we analyze the online market where the electronics of this project will be available and we find some reliable source where we got estimate cost idea for this project. In the below section we are going to mentioned the cost list and product.

4.8.1 Cost Sheet

Table 4.5 Cost Sheet

No	Component Name	Quantity	Purchase Price (TK)
01	NodeMCU	1	330.00
02	MLX90614	1	1300.00
03	Heart beat monitor sensor	1	300.00
04	Power Supply	1	350.00
05	Arduino Software	1	Free
06	Wires	8	100.00
07	breadboard	1	80.00
08	Others tools	xxx	1000
	Total Cost		**=3460.00**

Comparison:

Our all segments are accessible on the lookout. We get all parts at are truly sensible cost. So we make this task more expense effective.

4.9 Conclusion

Five primary Component and a few devices are utilized in this framework to make it. This Project is utilized to control the house machines. Our segment is basic &available in our national market.

CHAPTER 5

DESIGN SPECIFICATION

5.1 Introduction

Developing a web service that meets the requirements for managing loads in the HMS. Buying a hosting server, a web hosting plan, purchasing server space, and registering a domain name are all steps in the process. Using HTML, CSS, and JavaScript to develop the website, as well as PHP, a server-side programming language, to handle inputs/outputs and interactive elements on the website. Using MySQL, a relational database management technology, to design and maintain the essential datasets, as well as linking them to the PHP code. During completion phase, publish the web pages and test them.

5.2 Our Design web application features.

- Admin log in panel
- Doctor login panel and Dashboard
- User log in panel
- Covid detection
- Question and answer-based prediction.
- Live data monitoring
- Changing password
- Specific room management
- Dashboard

There has some major point which should be discussion regarding web application.

Registration

All of the people will be registered in this system; Registration should be done by a unique ID number (Example-NID). All the doctors and Hospital/Ambulance Service/Pharmacy are also registered in this model. All the service of medical especially COVID related services will create a data set for further use in emergency.

Symptomizing:

From the previous case study common symptom and are decided basis on previous data of covid affected patients like Fever, Cough, Fatigue, etc, and a parameter will be set for every symptom.

Suggesting Solution:

Covid affection has been increased for not maintaining the social distancing, making gathering those who have mild symptoms the will suggest staying away from the social gathering and if more than 10-15 smartphone are using in that place the mild symptom person will be alrmed.

Giving Diagnosis:

On the basis of symptoms, the mild symptom people will be suggested some related medicine. Doctors reputedly suggested common and generic medicine will be prescribed to that person

5.3 Web Development Environment.

An application development environment is a collection of hardware, software, and/or computing resources used to create application software (ADE). The basic network setup, such as servers, PCs, and portable devices that will host the service, is included in an ADE. These are employed with systems engineering resources like the Integrated Development Environment (IDE) for a programming language and other performance evaluation software applications.

We used below tools for server side or back-end site programming

- Python
- Django & Django Rest Framework.
- Vscode.
- Git.
- Gunicorn
- Nginx

5.4 Service

Our web server is running on an apache server. As we haven't bought any domain or hosting yet we are running it on our localhost (127.0.0.1). To do this we are using Django's default running processes to the whole project.

5.5 Database:

Now to create a database and handle it we are using sqlite database. As we know sqlite is a portable database we are using it for temporary time but we will shift our database in mysql during hosting our web app to any hosting server.

5.6 Development Model:

Now to build this project I am using Agile Development Life System which will follow this way for further development.

→ Design
→ Develop
→ Test
→ Deploy
→ Review

So, in order to complete this project, we created an SDLC and a web platform. Then, in the following step, we used a variety of techniques and methods to create it. After that, we tested how it works before deploying it and receiving feedback from other end-users. Now, if they have any difficulties, we will repeat the process to improve it.

5.7 Platform

As you may be aware, this is an IoT-based project that retrieves data from the internet. As a result, our work platform includes both software and hardware. We utilized Django and the Django Rest Framework, JavaScript, HTML5, CSS3, and Bootstrap4 to create the online platform. In terms of hardware, we utilized the following libraries to implement it:
Esp8286WIFI.h -- for wifi connection

1. LiquidCrystal.h -- for using the display
2. ESP8286HTTPClient.h -- for handling http connection and to fetch the exceptions

3. ArduinoJson.h -- for getting the json value and representing it
4. WIfiUdp.h -- for wifi connection

5.8 Node MCU Connection and Data Pass:

As we know we can't directly pass our data over internet without any medium. So to pass our data from web server to NodeMCU we take a little bit help off Json which is basically a set of data. Here in web server we have encoded the data set into a json formatted data like this:

{

"heart_rate" : <heart_rate from max30100>

"oxygen_level" : <oxygen_level from max30100>

"temperature" : <temperature from mlx90614>

},

In NodeMCU we used a library which will calculate the buffer size of this json data and decode it and also make it workable. Before decode the json formatted data we have to check that the HTTPClient connection is working or not. In our code we have checked it with <http.begin()> method. Here <http.POST()> method helps to link us with our server by which we send our data to our back-end server. Let's go for an example:

Here is a link of json data: (http://localhost/json/). Now to get the value from this we will right http.begin(http://localhost/json/) and after that we will be able to get those data.

Now let's go for flow chart of those different components which has been merged in this project:

1. Software Section(web version of this project)
2. Hardware section(NodeMCU and Other Components)

5.9 Arduino IDE for project coding in Hardware section

The Arduino ecosystem is the world's most popular open-source hardware and software platform. The firm provides a variety of software tools, hardware platforms, and documentation creation services. Arduino is a popular IoT development tool as well as one of the most effective STEM / STEAM education tools. Hundreds of thousands of designers, engineers, students, developers, and makers use Arduino to create innovations in music, games, toys, smart homes, farming, autonomous cars, robots, and other fields throughout the world. Writing code and uploading it to the I/O board is simple with the open-source Arduino environment. It's compatible with Windows,

Mac OS X, and Linux. The environment is developed in Java and is based on open-source tools like as Processing, avr-gcc, and others. The Arduino screen shot is given here.

Fig: 5.1 Arduino Software

It can also compile and upload programs to the board with a single button press. Editing make files or running programs from a command-line interface is rarely necessary. Although certain third-party programs, like as Ino, make it feasible to build from the command line if necessary. The Arduino IDE includes a C/C++ library called "Wiring" (from the same-named project), which simplifies many common input/output operations. Arduino programs are written in C/C++, however to create a runnable program, users simply need to declare two functions: Setup () is a function that is called just once at the start of a program and may be used to initialize settings. Loop () — a function that is called over and over until the board shuts down.

5.10 Conclusion

In this chapter we discussed about our web development which we developed for this smart home automation project. Here we use couple of software programming, compiling, executing command for web response and drawing hardware evaluation for our project and setup wireless communication between project hardware .thus software are free and open source that's why it's reliable to us for making project or prototypes project. Reliability it is used in other fields. Software analysis is a very important part of our system. A Software analysis makes sure good design. A proper Software analysis and its burn into NodeMCU the project to a smooth end.

CHAPTER 6

IMPLEMENTATION AND TESTING

6.1 Introduction

The framework extended comprises 5 significant modules especially, the NodeMCU, Relay with the microcontroller, Wi-F-technology. It utilizes Nodemcu that is an 8-digit microcontroller. Also web integration parts allow our hardware to connect with wireless configuration for globally access. It finds wide application due too its highlights and low force. During this part, we are going also to examine the trial of our undertaking.

6.2 Experimental Setup

NodeMCU are the base of the framework. The sources of info given to the microprocessor are the yields of esp8266 and relay. The yield of the regulator is given to the hand-off module. The Output of the relay module is given to the D0, D1 …D8 pin of Nodemcu. The signal from Nodemcu pass over to relay module to switching our home appliances.

Web platform during development and testing

A. Web site as first look

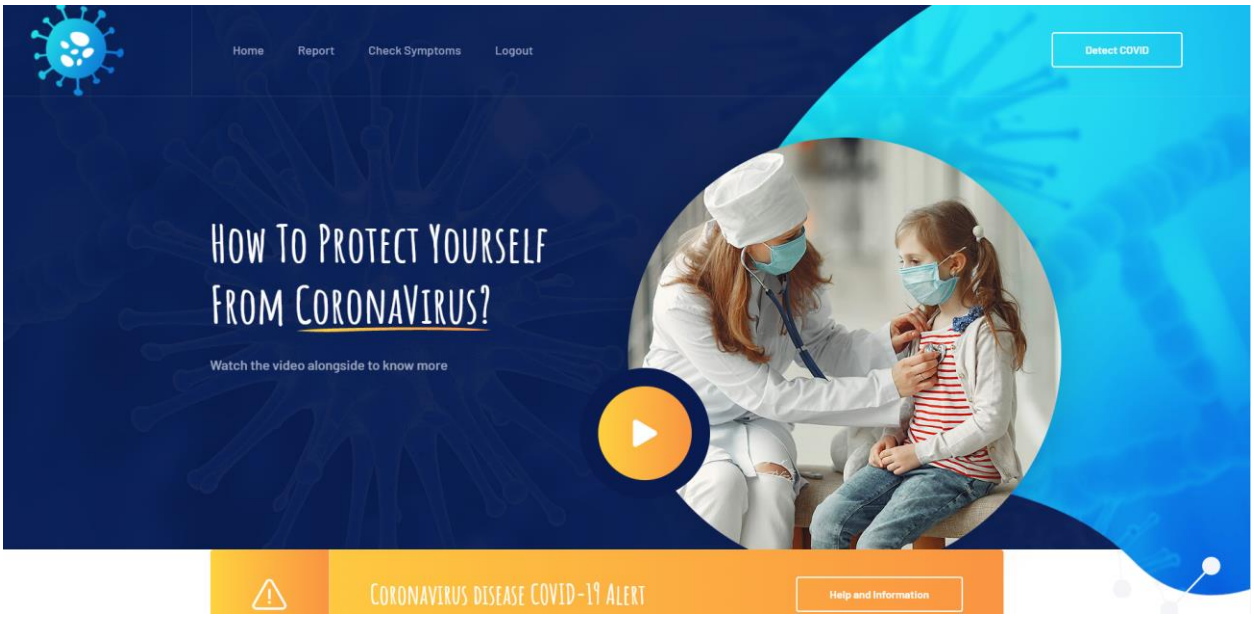


Figure 6.1: Graphical interface of first look.

B. **Registration panel for patients.**

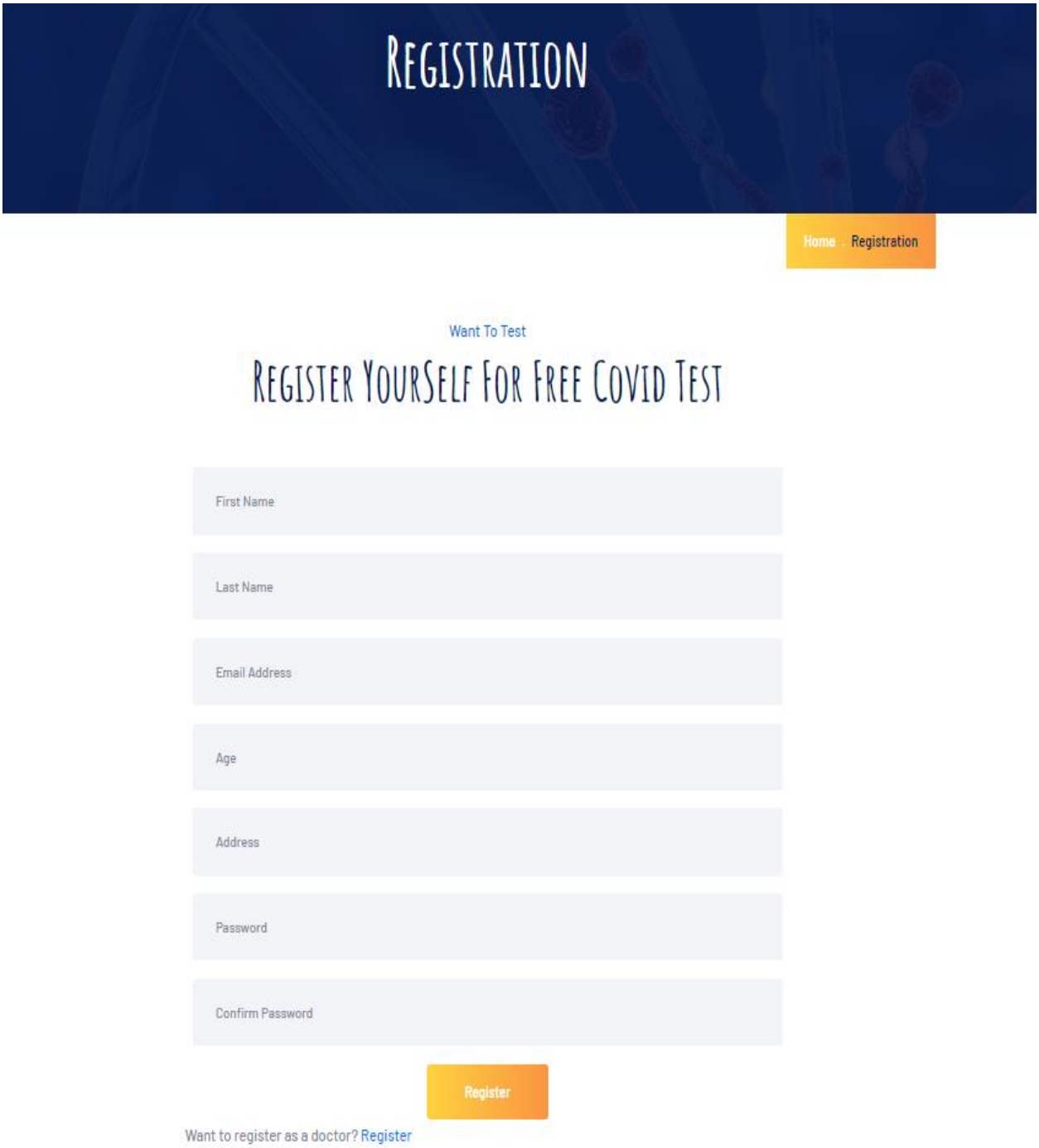


Figure 6.2: Registration panel for patients.

C. Registration panel for doctor

Figure 6.3: registration panel for doctor

D. Login panel for patients

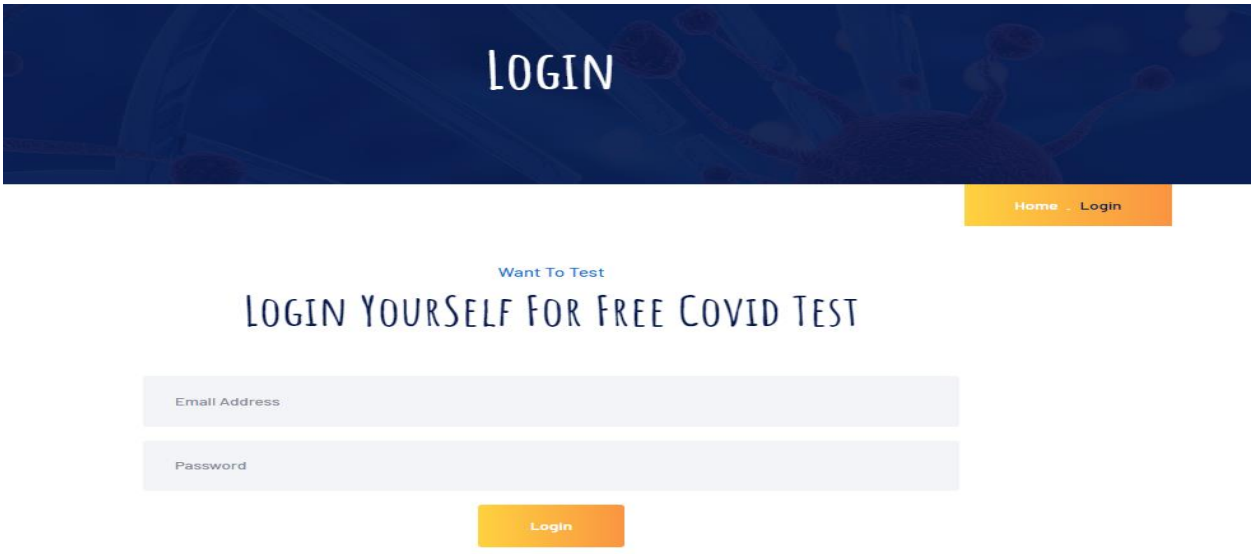


Figure 6.4: login for patients

E. Checkup data monitoring panel.

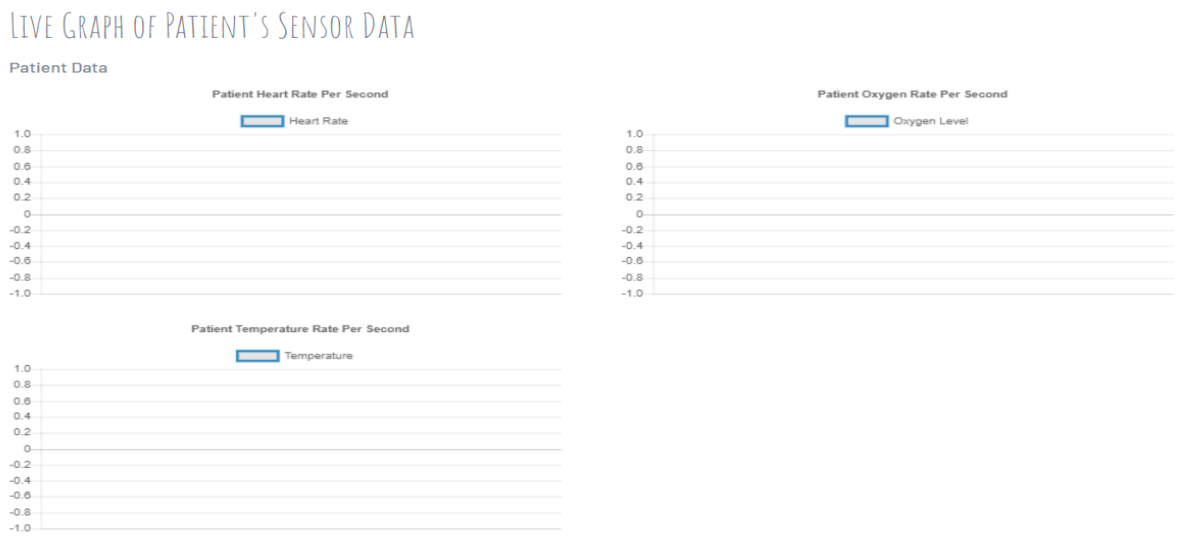


Figure 6.5: getting data from sensor in live monitoring for patients end

F. Test covid symptoms for patients end

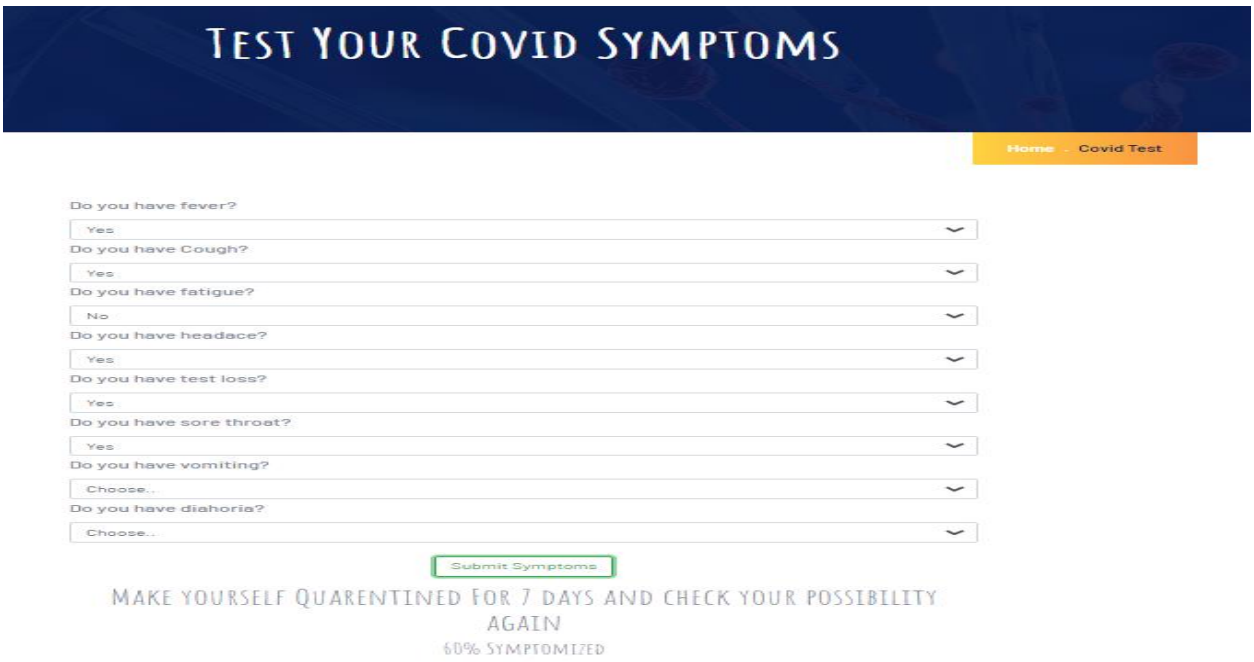


Figure 6.6: Check patient's Covid symptoms

G. Covid Detector checkup by X-ray report analyzing through upload.

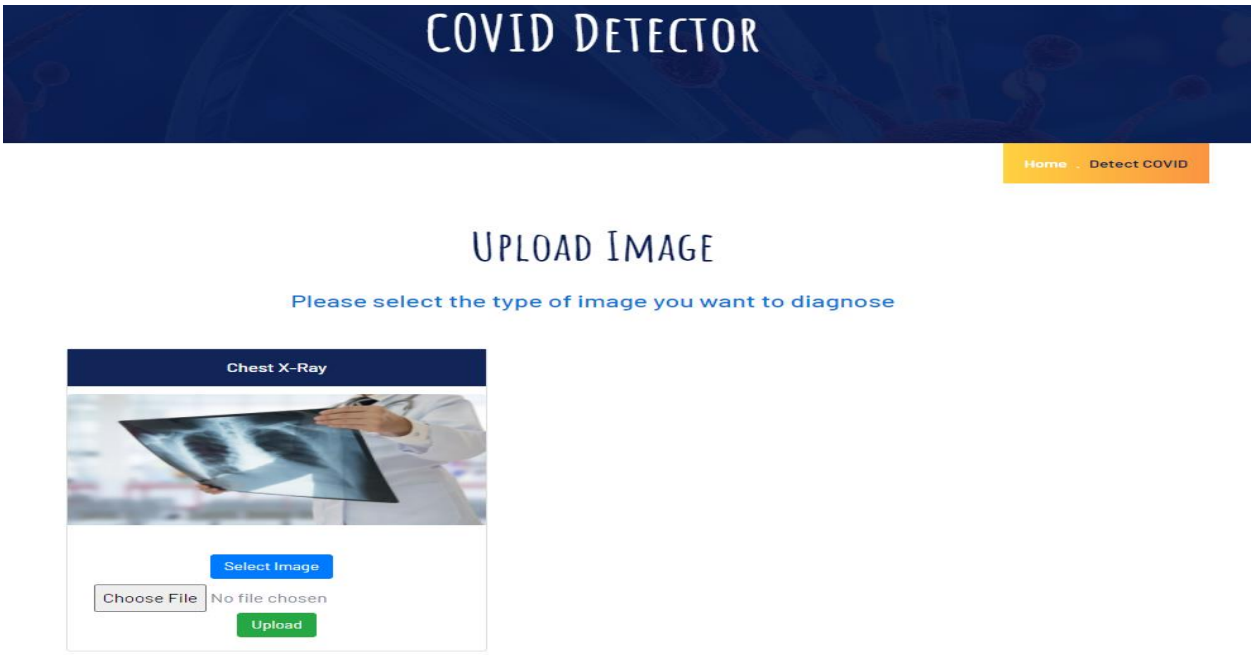


Figure 6.7: Check covid through X-ray report upload in server.

Output result

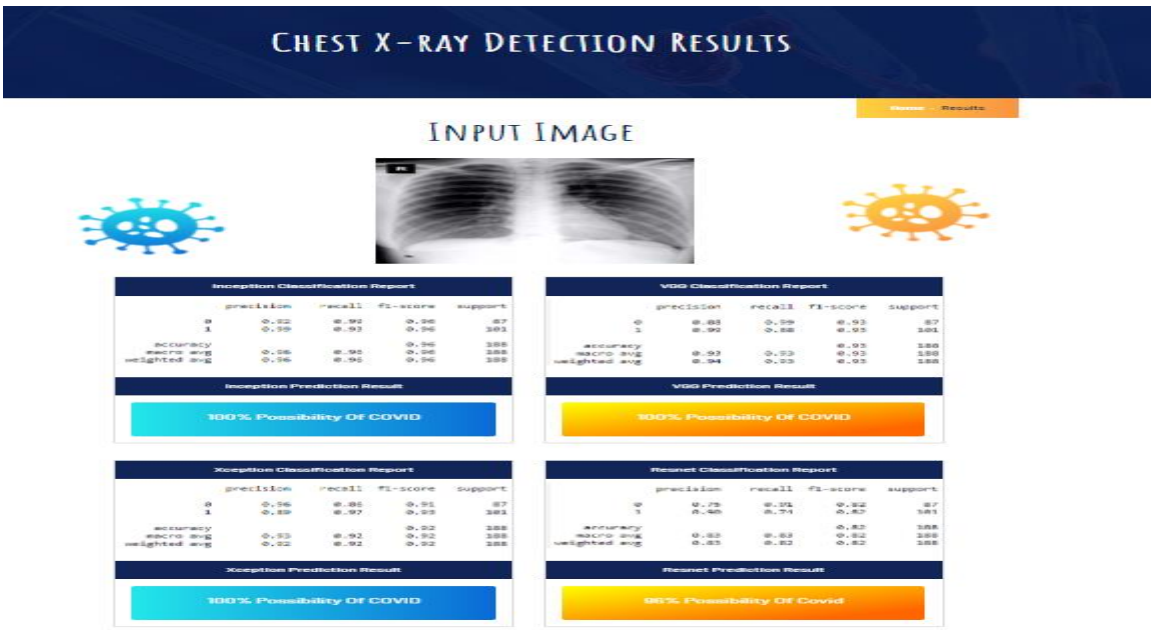


Figure 6.8: result of X-ray report analysis

H. Login as Doctor for administrational service.

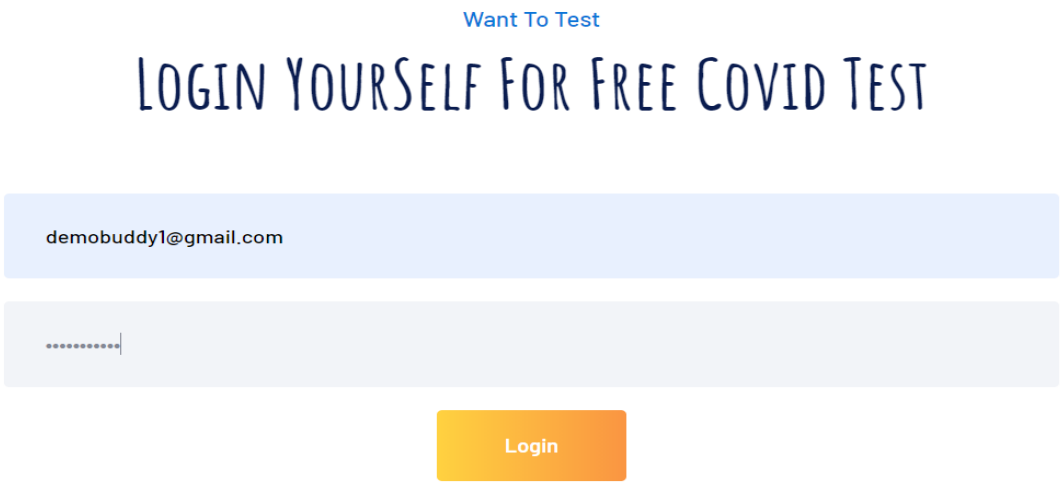


Figure 6.9: Doctor login panel

I. Doctor profile/Dashboard

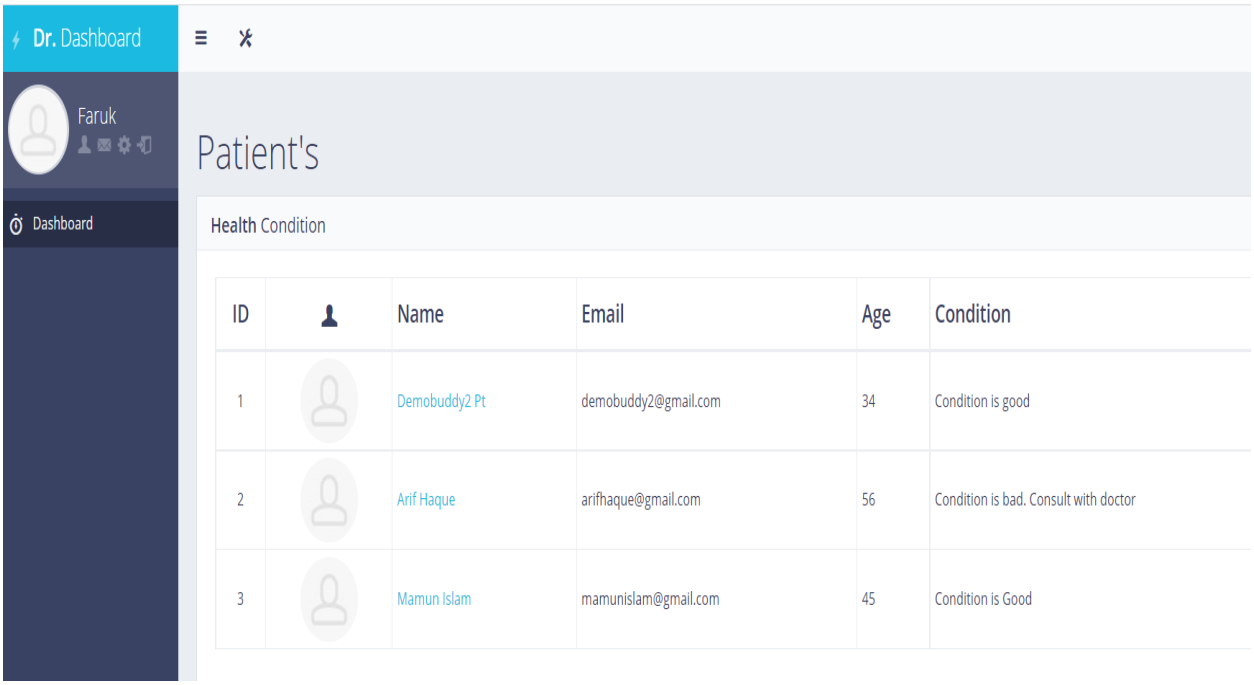


Figure 6.10: Doctor profile/Dashboard for patients monitoring

J. List of patients in Doctor profile with condition

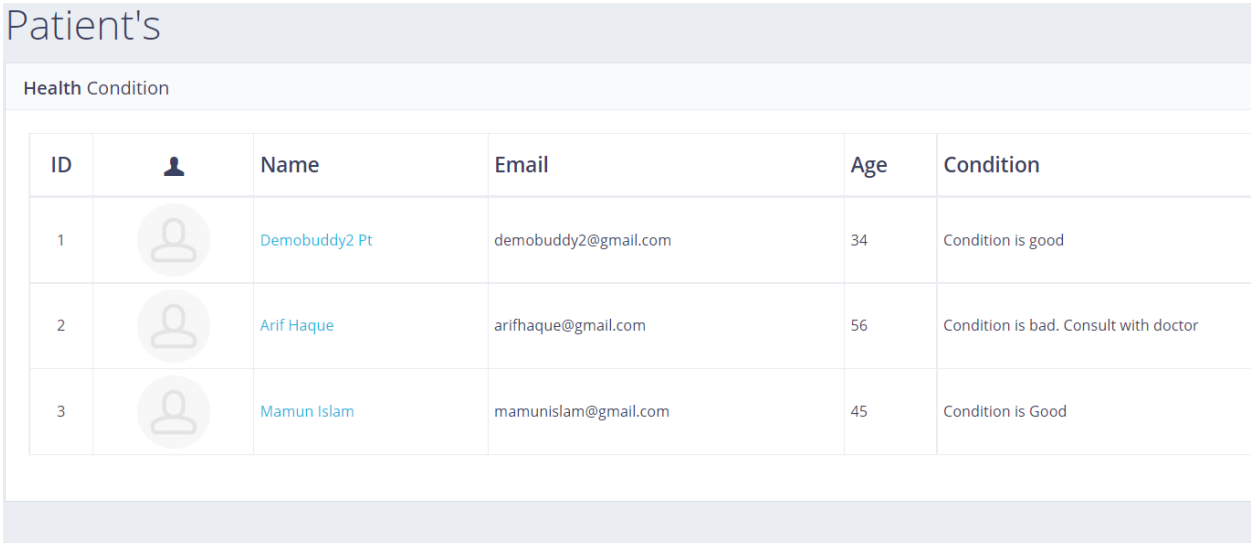


Figure 6.11: patients list with their data and health condition.

K. View patients' profile from dashboard

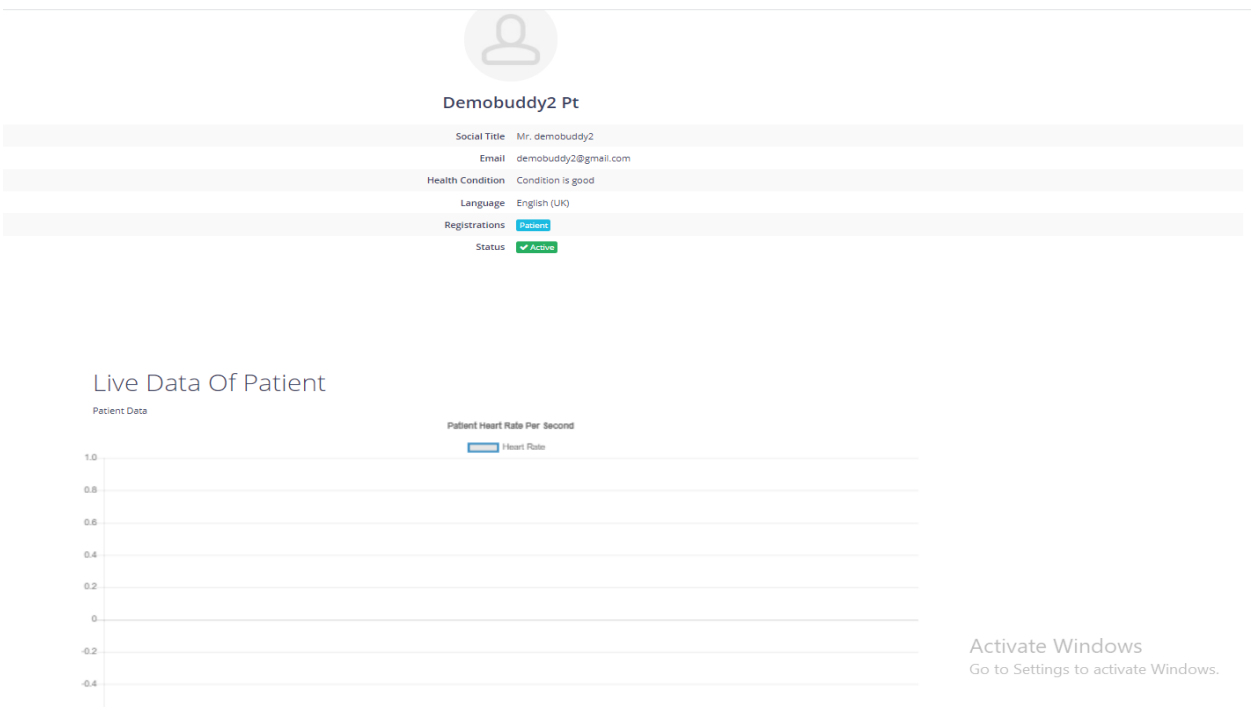


Figure 6.12: monitoring patients profile condition with live data from patient's bed.

6.3 Hardware Section Experiment

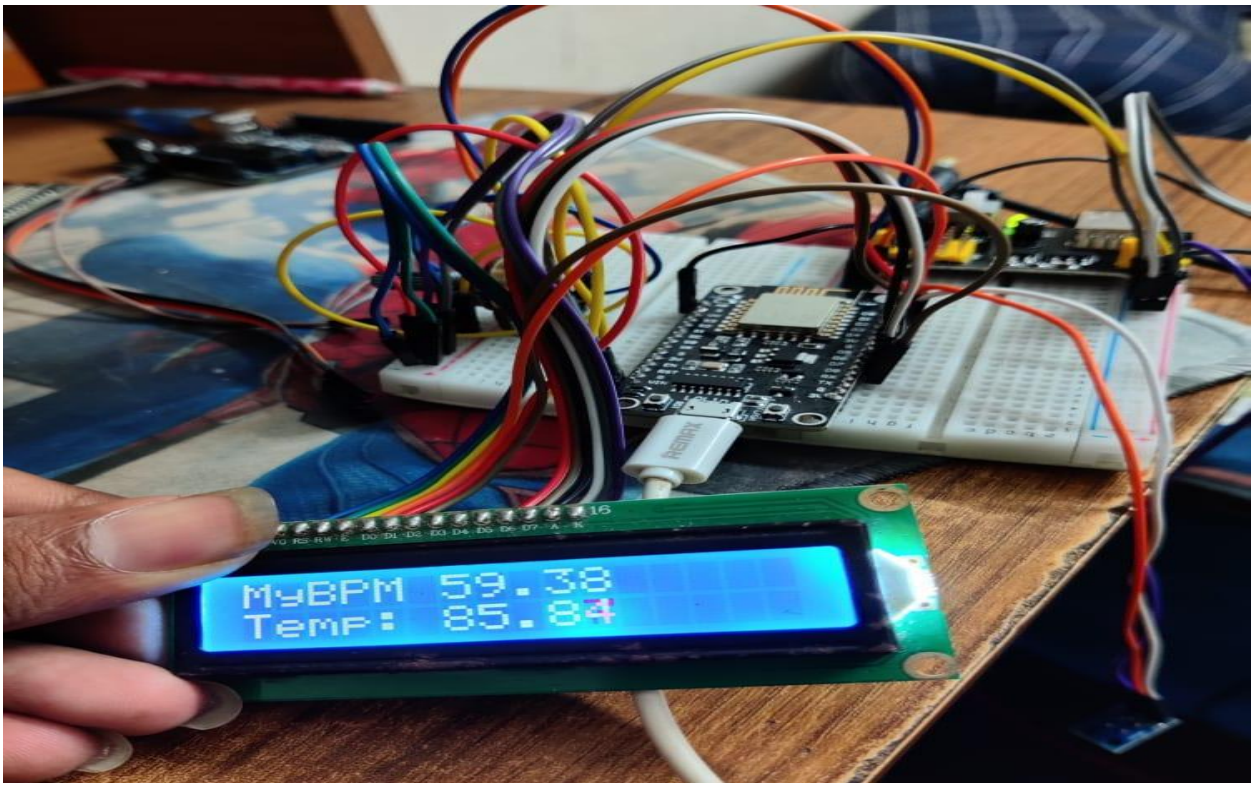


Figure 6.13: experimental setup of our project

Here we show that our IoT based medical service provider project in hardware section for testing purpose. We can see that our connection and module section is ready for action

6.4 Result

After simulation and experimental work we did able to complete our project to run with the integration of web. As we already discuss that our project can be a great assist of medical service during pandemic or any brutal health crisis. Though in normal daily life we can use this medical service for taking doctors suggestion and prescribe medical we can eradicate our health problem. Now finally we can say that our project is complete and run as we want. Our project is now able to receive signal from our web application and saw live data regulatory of patients. Our undertaking is finished with a fruitful execution and testing. It tends to be seen that yield. So we said that our framework was a viable quick reaction generally secure and simple to build.

CHAPTER 7

CONCLUSION AND FUTURE SCOPE

7.1 Conclusion

We tried our project to run simultaneously and it's worked appropriately. Toward the start of the code area, we use unit testing. At the point when we made our modules, we test them by unit testing. After the total advancement cycle of our full framework, we test it by mix the testing framework. In each test area, we discovered a few issues and we take care of those issues at the earliest opportunity. After finishing all cycle including testing, we are guaranteeing that it's prepared for home and business use.

This pandemic brutally hit to our healthcare system. The healthcare system is totally collapsed for this pandemic. Healthcare employee are suffering a traumatic pain to giving support to extra patient and also our healthcare resources are limited. Beside this the isolated people who are needed to test their conditions the data have to input by physical test, where a manpower we need. In future all the value of the patient can be taken from multiple sensor and scanner, where system can be giving more accurate result. Beside this we can enlarge the system for treatment also where multiple sensors will monitor the patient and diagnoses on the basis of past treatment and previous patient data also can be used for giving treatment.

7.2 Advantages

- It is strong and simple too utilize the framework.
- No additional preparation is needed for utilizing it.
- All the control would be in your grasp by utilizing this home mechanization framework.
- This undertaking can give the office of observing every one of the machines with in the correspondence range through Bluetooth.
- By utilizing this framework, the clients can check the situation with the machines at whatever time.

7.3 Disadvantages

- Before buying a domain and hosting we cannot able to control our devices from anywhere as we discuss in the project.
- If server is down, we have to face some issues whiling controlling our device
- When the new clients need to interface the first download application programming then the code and arrangement should be finished.

7.4 Future Scopes

This system will be customized for any kind of future pandemic and any kind of adaptation can be included according to the flowchart. Data can also use for future diagnoses and research on dataset can be done because data will be stored in central system. Which will help the doctor to take decision on during time of applying vaccination.

REFERENCES

[1] Pavithra, D., and Ranjith Balakrishnan. "IoT based monitoring and control system for home automation." *2015 global conference on communication technologies (GCCT)*. IEEE, 2015.

[2] Kodali, Ravi Kishore, et al. "IoT based smart security and home automation system." *2016 international conference on computing, communication and automation (ICCCA)*. IEEE, 2016.

[3] Das, Nimai Chandra, et al. "PatiCare: Patient Health Care Monitoring System." *2021 10th Mediterranean Conference on Embedded Computing (MECO)*. IEEE, 2021.

[4] Cole, Michael S., Heike Bruch, and Bernd Vogel. "Emotion as mediators of the relations between perceived supervisor support and psychological hardiness on employee cynicism." *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior* 27.4 (2006): 463-484.

[5] Stanley, David J., John P. Meyer, and Laryssa Topolnytsky. "Employee cynicism and resistance to organizational change." *Journal of business and psychology* 19.4 (2005): 429-459.

[6] Devi, R., et al. "Social Robot in Health Care Monitoring." *2021 5th International Conference on Trends in Electronics and Informatics (ICOEI)*. IEEE, 2021.

[7] Gupta, P., Agrawal, D., Chhabra, J., & Dhir, P. K. (2016, March). IoT based smart healthcare kit. In *2016 International Conference on Computational Techniques in Information and Communication Technologies (ICCTICT)* (pp. 237-242). IEEE.

[8] Baker, S. B., Xiang, W., & Atkinson, I. (2017). Internet of things for smart healthcare: Technologies, challenges, and opportunities. *IEEE Access*, *5*, 26521-26544.

[9] Ennafiri, M., and T. Mazri. "Internet of things for smart healthcare: A review on a potential IOT based system and technologies to control COVID-19 pandemic." *The Proceedings of the Third International Conference on Smart City Applications*. Springer, Cham, 2020.

[10] Dautov, Rustem, Salvatore Distefano, and Rajkumaar Buyya. "Hierarchical data fusion for Smart Healthcare." *Journal of Big Data* 6.1 (2019): 1-23.

[11] Tissaoui, Anis, and Malak Saidi. "Uncertainty in IoT for Smart Healthcare: Challenges, and Opportunities." *International Conference on Smart Homes and Health Telematics*. Springer, Cham, 2020.

[12] Alford, Kristin, Sarah Keenihan, and Stephen McGrail. "The complex futures of emerging technologies: Challenges and opportunities for science foresight and governance in Australia." *Journal of Futures Studies* 16.4 (2012): 67-86.

Plagiarism Report