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ABSTRACT

One area where technology and health coexist is the health sector. People are paying close attention to their health and integrating technology into their daily lives, especially in the wake of COVID. The first goal of this project is to allow users to schedule a remote appointment. The second goal is to allow users to monitor their own health and select the doctor of their choosing.

Keywords: IOT, Mqtt protocol, sensors, Arduino UNO.

I. INTRODUCTION

Health is a positive notion stressing social and personal resources, as well as physical capacities. Health is a condition of complete physical, mental, and social well-being and not only the absence of disease or disability. Recent technological advancements have primarily focused on advances that can save lives and prevent sickness. We will create a desktop application and website for tracking a patient's health-related actions and contacting a doctor by setting up an appointment through the "Arogya bandhu" project. It primarily keeps an eye on the patient's heart activities. The monitoring of biological markers is crucial for preserving the health of cardiac patients. A heartbeat sensor was used to determine a person's heart rate (or pulse rate).

The main contributions of this paper can be summarized as follows:

1) We have made a web application to book the slots with the doctor.

2) We have made a desktop application that monitors the patient.

II. RELATED WORK

Health services are one of the important services that needs more attention and importance in the society. Therefore, availability of these services to people in fast and easy manner is must. This project mainly focuses on providing people health services to remote and also help in achieving contact less service. There have been several previous works done to find the best way to provide health services to the people. But there are none that involves all these features in one. Here are some approaches upon the same. As we examine the methodologies used in this project, let's first have a look at the essential hardware and software requirements that we need.

[1] A mobile device controlled Arduino-based health parameter surveillance platform was proposed by Trivedi et al. Analog sensor data is gathered and transmitted to the Arduino Uno device. The captured analogue values are transformed to digital values via the inbuilt analogue to digital converter into electronic data. Bluetooth sent the physical characteristics to the created tool. The Bluetooth device used an unprotected module broad area. An adaptive IoT safety system was created by Kumar et al. monitoring apparatus. [2] A smartphone-based heart rate monitoring device was unveiled by Gregoski et al. To monitor finger blood flow and determine cardiac output based on blood flow, the system used a portable light and camera. The developed system described an integrated gadget that wirelessly relayed a person's pulse to a computer, enabling users to check their heart rates repeatedly while only needing to look at their phones. Although this design is fantastic, it cannot be implemented if continuous heart monitoring is required. [3] Agnieszka stated that there is neither formal proof for nor against the use of internet videoconferencing for patients with long-term diseases receiving care at home. Its effects on health outcomes are mainly comparable to face-to-face contact, according to the evidence. Mental health disorders appear to have the most support for equality. Additionally, internet videoconferencing appears to be a suitable method of providing care for people with chronic illnesses. According to research, patients who have communicated with doctors via videoconference do so because they find it useful. The evidence supporting healthcare workers' pleasure with this form of communication is, however, scant. The effect of 10 videoconferencing on the price of healthcare services is also little understood.

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The discussion parts of the majority of evaluations frequently make the case for the need for more study in the areas of cost, ethics, and safety, as well as the practical difficulties associated with adopting internet videoconferencing. Finally, this study of reviews only found one review of Skype's use in therapeutic settings. It is challenging to separate the actual impact of videoconferencing from the several assessments that included online videoconferencing as one of several communication routes with the patient. [4] Ayushman is an all-encompassing health monitoring system that can gather, process, store, and display health data in a safe and user-friendly way. There has been a lot of action in this area recently. Health monitoring is typically viewed as an addition to general sensor networks in most of these systems. and rely on a body area network (BAN) of implanted, wearable, medical, and environmental sensors for data gathering and transport. [5] Shashank and his classmate Abhinav Lal talked about the operation of clinics in India and the standard of patient care. The two of them had no trouble coming up with a solution to the issue, but it was worrying because nobody in India had ever tried it. The plan was to improve patient care and clinical operations throughout India by utilising developing technologies. They made an effort to develop computer software that could address the issue. Within a week of beginning their work on the software's coding, the initial version was complete. [6] Rudiger et al. (2012) came to the conclusion that the user-friendly handy IT applications going beyond documentation of patient records and management necessitate an understanding of intricate communication processes between patients and the various caregivers in order to harness the benefits of mobile information technology (IT) solutions with a view to contribute to patients' safety by linking them. The structural deficiencies that home care increasingly encounters can be reduced by integrating IT solutions. Platforms should be well-established when paired with services. [7] One of the innovative uses that is anticipated to be widely adopted in the health and medical fields is telemedicine. One suggestion for assisting telemedicine at rural health clinics in developing nations is video-over-IP. The design and implementation of a prototypical telemedicine video conferencing system are discussed in this paper. This system enables real-time remote monitoring of medical events via the Internet and gives the involved doctors and/or consultants the ability to discuss and confer using both audio and video to help deliver the best medical care at a reasonable price. We discuss the design and construction tools employed, the difficulties faced, and the solutions chosen.

III. METH0DOLOGY

We have divided the project into 2 sections: one to book the slots, and another to monitor the user.

1.Monitoring system:

In the below block diagram we can see the overview of how the sensors are connected to the Arduino and the connection between Arduino Node MCU. At first we connect Temperature sensor LM35 to Arduino. This sensor has one Vcc pin ,one Ground pin and one output pin which gives analog output which is proportional to the temperature(in degree Celsius).The GND pin of the sensor is connected to the GND pin of the Arduino. Similarly, the Vcc pin of sensor is connected to the Vin pin of the Arduino. Finally, the Out pin is connected to A1 pin of the Arduino. The second sensor that we have used is the pulse sensor. As we can see in the earlier pinout configuration, this sensor also have 3 pins namely GND, Vcc, and Signal. Here also we connect GND to GND, Vcc to Vin and Signal to A0 of the Arduino. The normal pulse rate is between 60 to 100. 23 The third sensor is that of ECG. We have used AD8232 sensor which has pins such as GND, Vcc, Output (ADC), LO-, Lo+, SDN(Shut Down Control Pin).It even has 3.5mm ECG Biomedical Electrode Connector jack which are divided into 3 pins each one for RA(Right Arm), LA(Left Arm), RL(Right Leg).These 3 pins sense the data from human body and feed it into the sensor. They should be placed as shown in the figure below. The pin GND is connected to GND, Vcc is connected to Vin, Output (ADC) is connected to A2 of Arduino. LO- is connected to 11 and LO+ is connected to the 10 of the Arduino respectively. Finally, Arduino is connected to the NodeMcu. As we saw NodeMcu in the earlier section, it has many pins. But, here we connect only 3 pins of NodeMcu to Arduino. As in other sensors, here also we connect GND to GND, Vcc to Vin, and RX of NodeMcu to TX of Arduino. Here RX refers to receiving pin and TX to transmitting pin respectively used for serial communication. At last the data from Arduino is sent to cloud using NodeMcu and send the data to desktop application.

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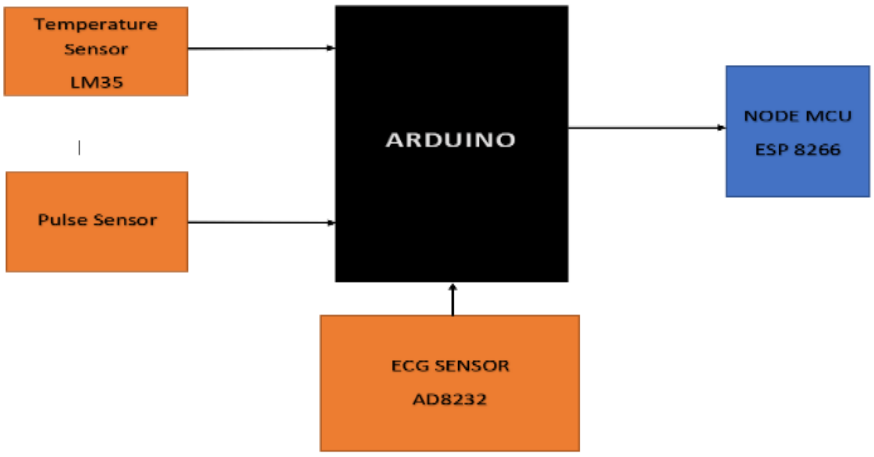

Figure 1: Block diagram of the circuit.

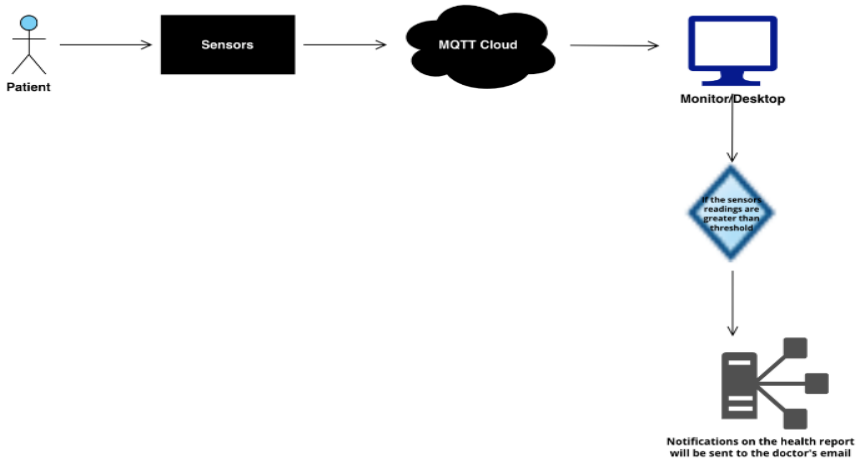

Figure 2: System architecture diagram of Monitoring System.

1.Slot Booking System:

We have made a local web application using nodejs, html, css, ajax and using the xampp web server as database a structured one. As we can see below there are different actors who can use the application in different ways.

1. Patients (Guests): View Clients Pages: It includes that of clinics, specialists, doctors, handbook, making an appointment, send feedback, search for information.

2. Doctors: View statistical information , Create their own schedule, Sending the invoice to patients.

3. Supporters (Counselors): Confirm the patient's appointments, Create posts(handbook), Manage the patient's feedback.

4. Admin: CRUD (create, read, update, delete): users, clinics, specialists. We can see below the different different actors and their applications.

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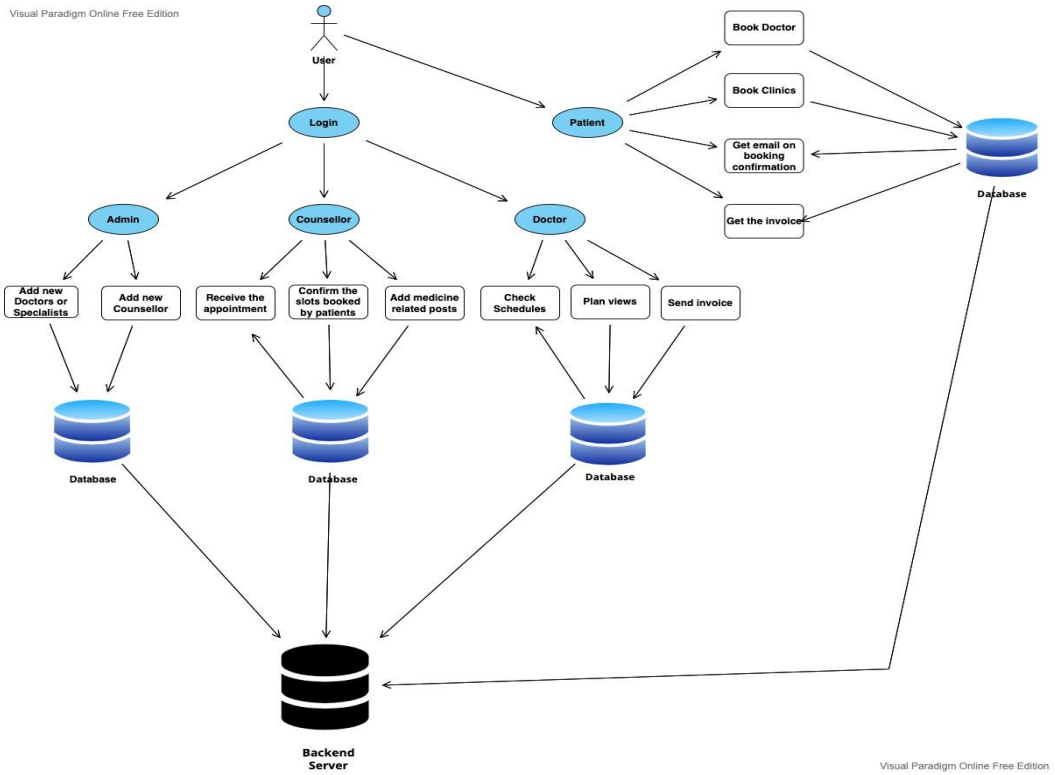

Figure 3: System architecture diagram of Slot Booking System.

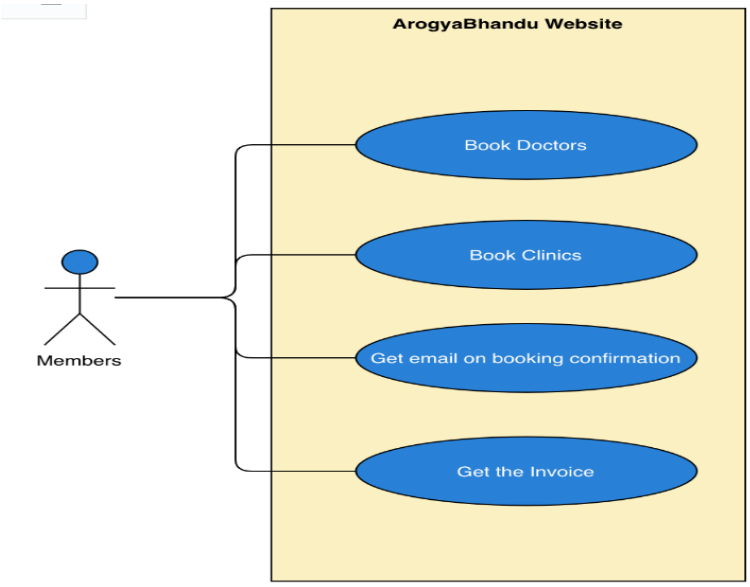

Figure 4: Use case Diagram – Patient.

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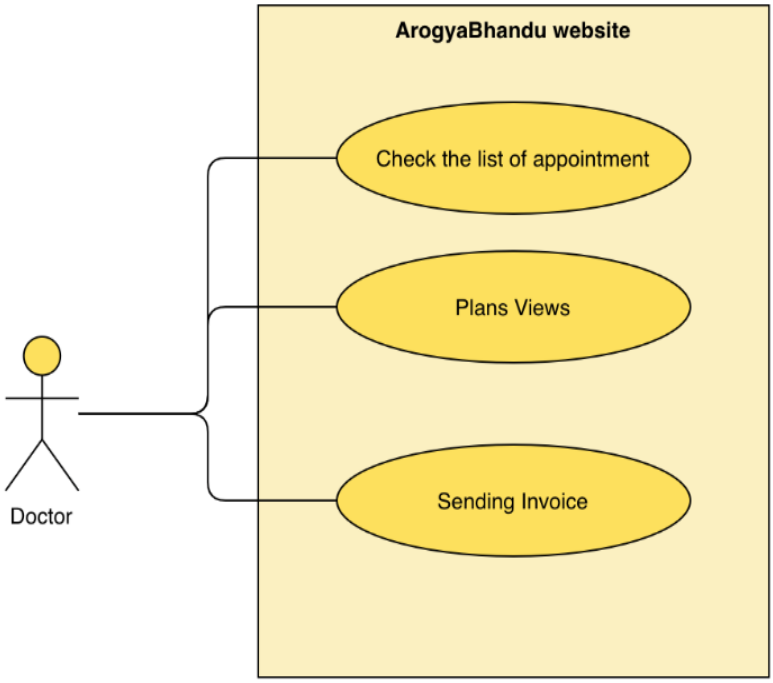

Figure 5: Use case Diagram – Doctor.

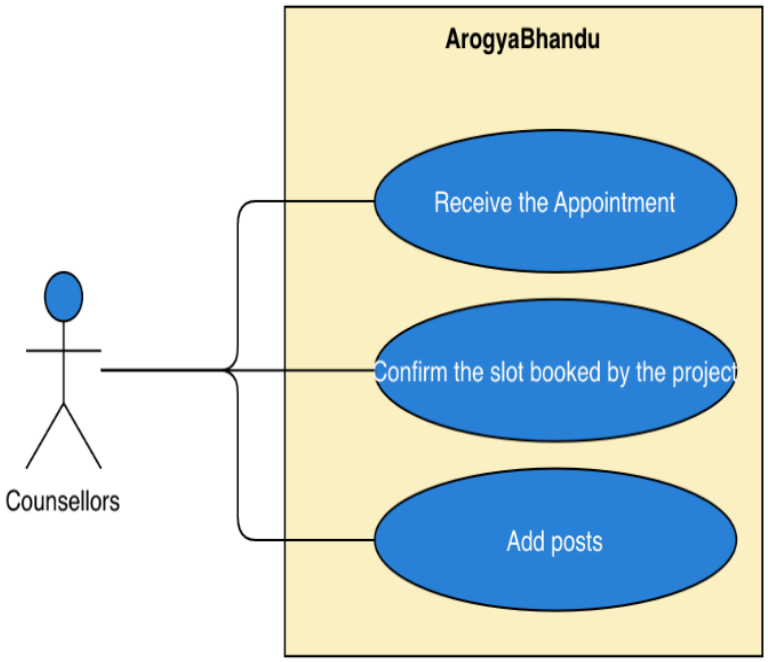

Figure 6: Use case Diagram – Counsellors.

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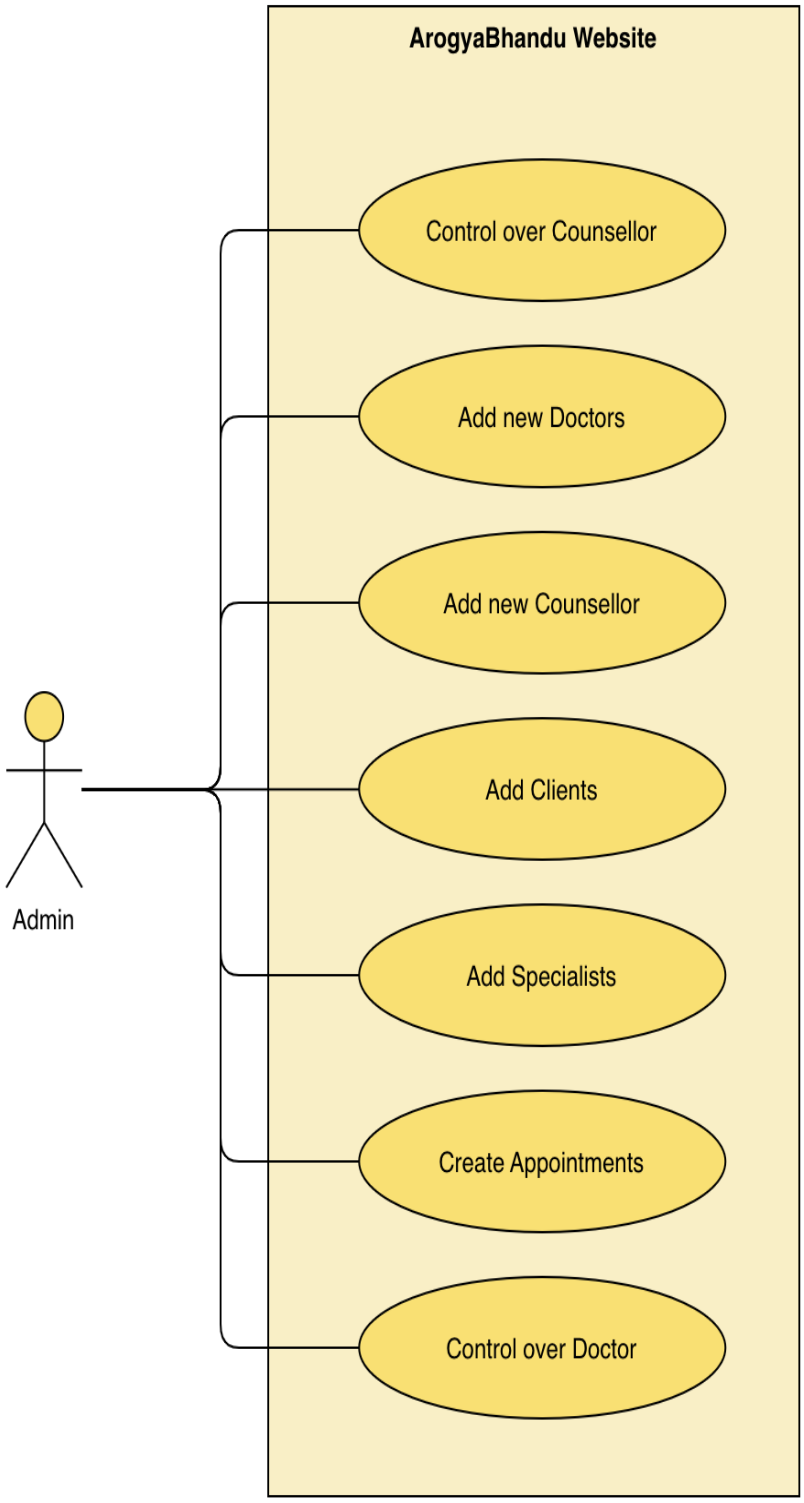

Figure 7: Use case Diagram – Admin.

IV. RESULTS AND SNAPSHOTS

None of the systems we make are 100% efficient and the sensors we used may be not cent percent accurate. But we think we have tried to adopt technology to life. This project has given us satisfactory results. Here are the snapshots of our project.

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1.Monitoring System:

We have a made a desktop application where a person can monitor himself with the doctor of his choice. As we see below is the home page of our application. Here as of now we are using 3 sensors one is the ecg, and the temperature, and pulse. Below the patient can choose doctor of his choice and enter his email id. And once he presses start button the application starts to monitor the patient and if it crosses the threshold a mail will be sent to doctor with the values. Once the values crosses the threshold a mail will be sent to the doctor as shown in the figure 8.

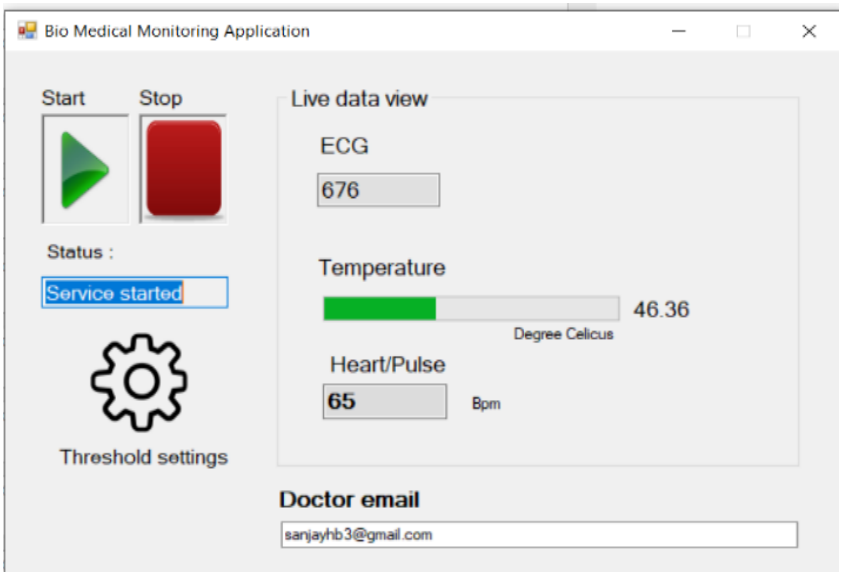

Figure 8: Snapshot of Monitoring System.

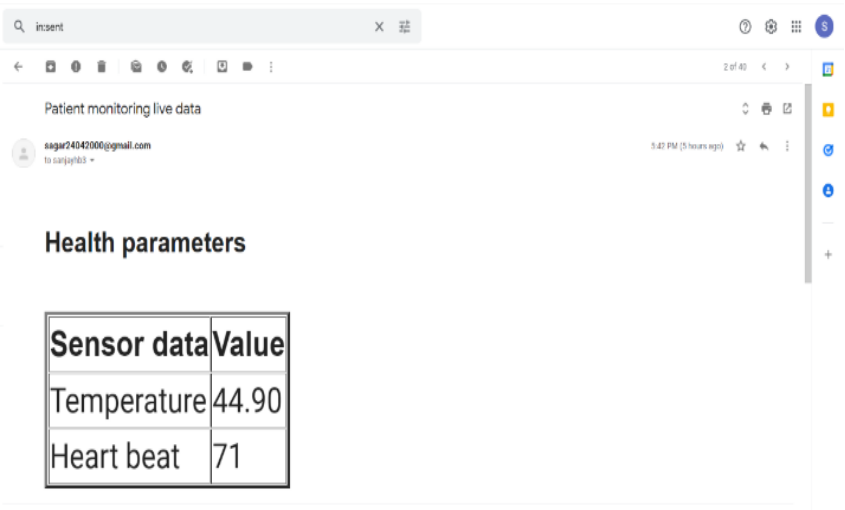

Figure 9: Snapshot of email.

2.Slot Booking System:

The other part of the project is the slot booking system. We can see the home page of the website in figure 9.Above we get know how different actors can interact with the website.

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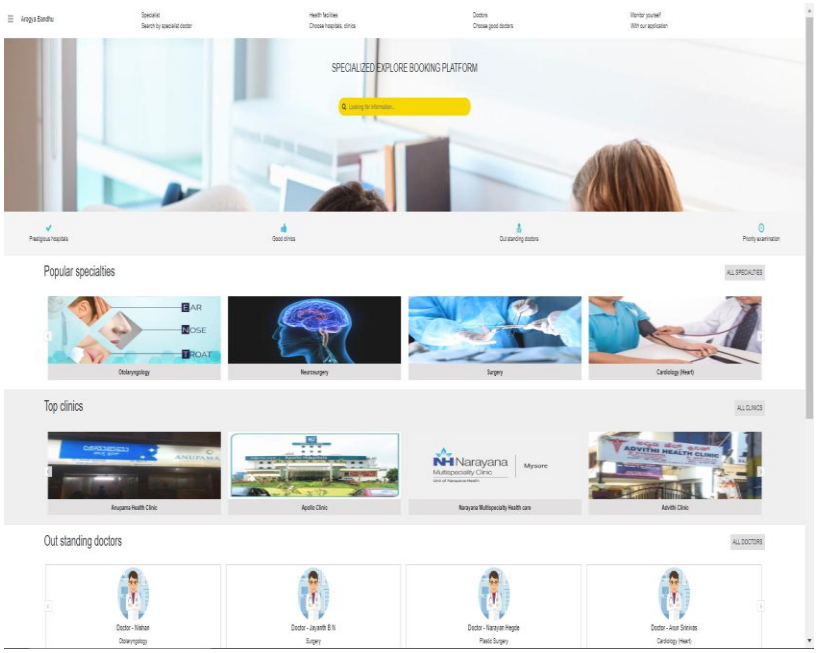

Figure 10: Snapshot of homepage of the website.

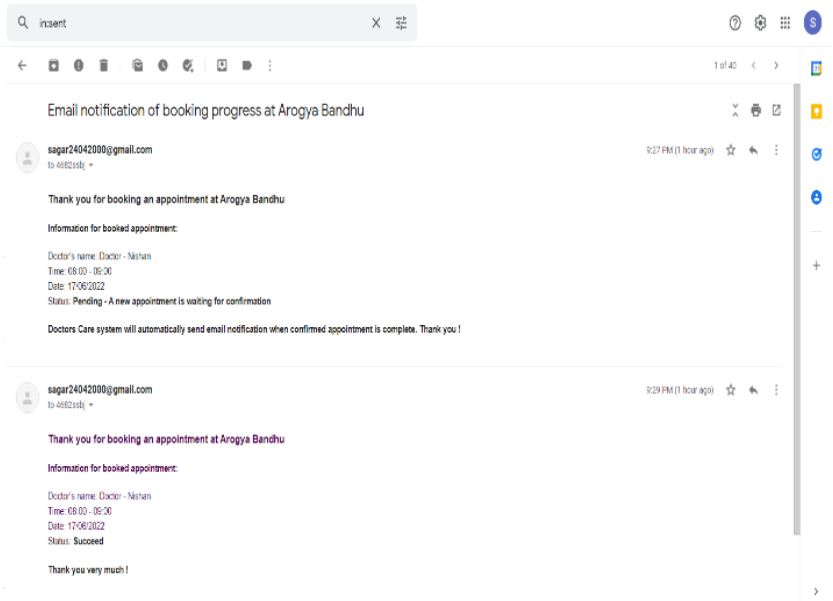

Figure 11: Snapshot of email in Slot Booking System.

V. CONCLUSION

Our project contains two sections, one is the slot booking system (Arogya Bandhu) that is the web application. Here the patient can book the doctor of his choice and the specialty or the stream to which he should check up with doctor. And in return he gets the mail for the confirmation of the appointment. In this both patient as well as doctor are benefitted, as in patient need not wait for the doctor. The other section of the project is the desktop application which is used to monitor the patient. We thought of integrating this with our web application where a user can download the application. By monitoring system, patient can contact the doctor of his choice and doctor can monitor him. If there is any difference in his heath, doctor gets a notification email and he can respond suddenly. In this post covid time this will be very helpful.

VI. ACKNOWLEDGEMENTS

First and foremost, we would like to express our gratitude to Prof. Varsha V, our lecturer, mentor, and project advisor, without whose help and direction at each stage, this endeavor would not have been successful. We

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