MEDISAFE - STAY AWAY AND DEFEAT DISEASE

2022 - 143

Project Proposal Report

Thennakoon T.M.B.C.K

B.Sc. (Hons) Degree in Information Technology

Specializing in Information Technology

Department of Information Technology

Sri Lanka Institute of Information Technology

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Declaration

I declare that this is my own work and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The supervisor/s should certify the proposal report with the following declaration.

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

....

Signature of the Supervisor Date

Abstract

The spread of the Covid 19 pandemic has created a huge impact on society in many forms and ways. Along with the outbreak, it became difficult for people to meet the doctor in person. With that, it became unable to diagnose the disease at the right time and take the right decision whether the person can either receive medication by staying at home or should be hospitalized for medication. In such situation that is most important to check body helth status. Several lives were lost, being unable to do so. Therefore, the ideal solution will be to go for a machine which will directly reduce personal contact with the doctor and will have the ability to get the measurements and analyse them accurately. Thus, if analysing the data and the part of making the decision can be done by staying at home it would be the ideal solution for the current situation. Here, temperature, pulse rate, ECG and blood pressure will be measured as parameters. Temperature will be measured by MAX 30205, pulse rate by Pulse Sensor SEN-11574, Exhale detector ugm and blood pressure by pressure sensor, respectively. These data will then be uploaded to the system to be analysed. Finally, they will be sent to the cloud database. Patients can use chatbots to acquire the medicine and medical advice they need as well. With this, it becomes able to create one simple and low-cost device to measure several parameters-temperature, pulse rate, Exhale detector and blood pressure, analyse them and give prescription report to patient what are the areas that patent need to prevent what are the vitamins and specially foods patient need to get, also with after detected Covid 19 and before positive covid 19 with using neural networks, using an expert system to analyse the condition of the patient and make the right decision.

Keywords: Covid 19, symptoms, CNN, Temperature, Exhale detector

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1. Introduction

1.1 Background & Literature survey

During the Covid 19 pandemic, the world has been changed for the worse. In the past, a lot of people tried not to go to the hospital unless it was important. With the help of technology, new ideas were developed during the pandemic.

Considering the background studies, a lot of studies have been carried out regarding Computerized pulse diagnosis. It is gaining popularity as a result of its non-invasive nature and ease of use in determining people's health status. Several acquisition devices have been proposed to obtain more accurate pulse waves and contact pressure signals.

A device has been designed to distinguish diabetic patients' pulses from normal patients' pulses. Here, the aim is to normalize the signals under normal settings before attempting to find variations in pulse characteristics in basic abnormal situations -diabetic instances, for example [4]

A remote patient diagnosis system based on IoT devices and predictive machine learning models that run on patient data from time to time has also been developed [7].

Ayurvedic practitioners are testing the system as a computer-aided diagnostic tool.

Many individuals are choosing not to go to the hospital during the pandemic, denying healthcare providers the opportunity to learn about their health issues as promptly as possible. Alternative tactics are being used by doctors to keep tabs on their patients and limit hospital stays. Existing tools, such as questionnaires or telemedicine, have drawbacks. The former can only collect known risk factors, leaving additional pre-existing and life-threatening factors uncollected. Individual nurses can only visit a limited number of patients during the day, hence telemedicine by nurse practitioners has a bandwidth issue. Here, chatbots play a major role.

When considering the use of chatbots for COVID-19, Penn Medicine, Google, and Verily previously collaborated on a chatbot that answered inquiries about COVID-19 and performed basic symptom assessments. The app is aimed at sensitive populations rather than verified COVID-19 patients, and it relies on basic yes/no and categorical questions rather than NLU-based analysis of a patient's input, such as symptom descriptions. After offering replies, the user experience was immediately measured by asking for feedback. Another chatbot built by University of California academics, was created for the exclusive purpose of screening health system staff and is not intended for general use. [9]

A preliminary COVID-19 chatbot paradigm has been designed to handle the COVID-19 question answering challenge, where the pre-trained Google BERT language model was used. Suggested chatbot was put to the test using the COVID-19 sample questions-answers dataset. Appropriate replies to the query given were generated by the proposed approach, according to preliminary results. It is aimed to add more datasets in the future to improve the accuracy and robustness of the model [10].

The suggested IoT-based solution has the potential to save lives and provide valuable services in the health sector. It could be a valuable tool for medical experts and law enforcement in the fight against infection. This system can also provide critical healthcare to infected and suspected cases, as well as provide proper monitoring. The chance of healthcare service providers becoming infected from treating any patient can be lowered since physical distance can be maintained with the use of the system while delivering treatment. The embedded numerous sensors detected biological and environmental data with great precision [11].

A project to employ an IoT-based chamber to identify probable COVID-19 suspects based on the symptoms has been launched. The technology uses Neural Networks and Artificial Intelligence (AI) to detect COVID-19 symptoms including Fever, Anosmia, Cough, and Shortness of Breath when a person enters the chamber. Fever detection accuracy is 95 %, Anosmia detection is 96 %, and cough analysis is 94 % with the suggested approach [12].

An IoT-based UAV-based approach to collect raw data using on-board thermal sensors has been presented, in which a thermal image of a huge crowd in a metropolis acquired by a thermal camera is used to identify prospective people who may have covid 19 based on the temperature recorded. An efficient hybrid approach for a face recognition system is proposed to detect humans in infrared photos collected in a real-time situation who have a high body temperature. Furthermore, a face mask recognition feature is added to determine whether or not a person is wearing a mask on his face [13].

Since the viral epidemic, infrared thermometers have been deployed in public places to assess people's body temperatures in order to detect infected people among the throng.

This prevention is still lacking because it takes a long time to check each person's body temperature, and the most important factor is that close contact with the infected could spread it to the person who performs the screening process or from the person in charge of screening to the people who are being screened. Using a smart helmet with a mounted thermal imaging system, it proposes the creation of a system that can detect the coronavirus automatically from a thermal image with minimal human input. The thermal camera technology is integrated into the smart helmet and paired with IoT technology for real-time data monitoring during the screening process. Furthermore, the proposed system is equipped with facial-recognition technology and can show the pedestrian's personal information as well as take their temperatures automatically [14].

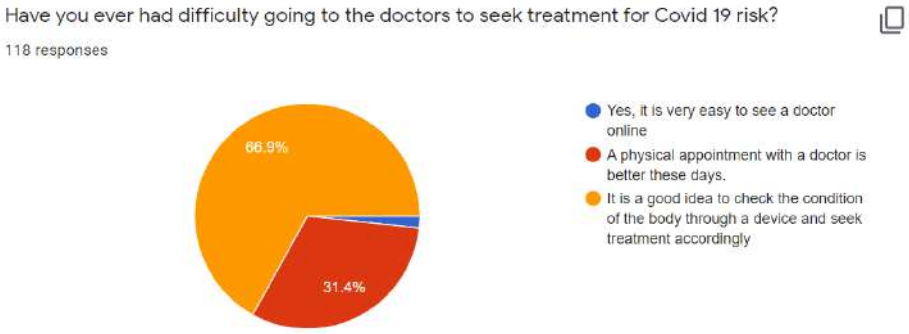

Figure 1.1: Willingness to see the doctor

According to the survey, majority of the people agree that it is a good idea to check the condition of the body through a device and seek treatment other than having a physical appointment with a doctor these days (Figure 1.1)

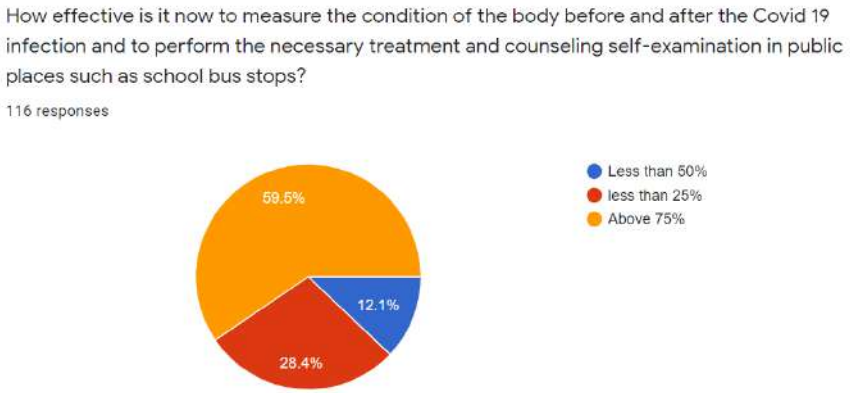

Figure 1.2: Effective of measure the condition:

According to Figure 1.2 equal number of people find it effective (above 75% and less than 50%) to now measure the condition of the body before and after the Covid 19 infection and to perform the necessary treatment, counselling and self-examination in public places

like school bus stops. The main reason for this can be that these types of public places are the areas with the highest possibility for spread of this type of disease.

1.2 Research Gap

There are several reasons to mistrust e-precisions. But it got renowned during the pandemic situation. Because there is no face-to-face dialogue, the doctor's assumptions may be erroneous in some cases. Some consumers are still unfamiliar with the modern equipment. Most of them still prefer talking to someone and getting medication. However, with the Covid 19 pandemic, doctors were busy. Also, the user must have the hardware equipment's to check.

At present, there are separate instruments in the market for measuring the parameters-blood pressure, pulse rate, temperature and ECG pattern which are expensive and thus cannot be afforded by majority of people. And also, even if these tests are done externally in external laboratories, a certain amount of money has to be spent. Therefore, attention should be focused on designing one device to measure several parameters where the device should be simple, non-invasive and low cost.

The biggest concern at the moment is the discomfort caused by Covid 19 and the trouble breathing that comes with it. These illnesses are extremely important to be aware of on a frequent basis. However, what is the situation of the patient who has received a large amount of input from the same device, and what kind of therapy is necessary? The doctor informs the patient about the prescriptions he or she has to take. Unquestionably, making such researches available for usage in congested areas such as schools bus stops would be a wise decision.

Research products	Features			
	Identify all measurements using single device	Development of advanced equipment	Analyse parameters and give prescription, Etc to patient	Provide prescription with 4 measurements
Research A	✓	×	×	×
Research B	×	✓	×	✓
Research C	×	×	×	×
Proposed system (MediSafe)	✓	✓	✓	✓

Table 1.1: Comparison

1.3 Research Problem

With the spread of Covid 19 epidemic, the number of Covid victims increased day by day and doctors became extremely busy. As it was highly contagious, meeting the doctor physically became difficult. As the epidemic spreads around the world, face-to-face conversations do not take place and physicians do not have the opportunity to make accurate diagnoses based on patient information. A need was created for patients as well to have a hardware device to check their blood pressure, pulse rate, temperature, and ECG pattern, and if they do not have one, they had to purchase one. As the available hardware to test such conditions was expensive, many people could not afford to buy this hardware at the time of the collapse of the economy with the Covid 19 epidemic and did not even have the opportunity to leave home.

But there are also users who are unaware of the latest technology. However, they have to keep up with the technology. By 2020, it was obvious that the corona virus's original and alpha versions had caused three common symptoms: cough, fever, and odour loss, as well as at least 20 more, as were abnormalities including skin rashes, sore throat, and red eye. The disease can be spread from touching but the symptoms such as skin rash, sore throat and red eye cannot be identified without contact with the patient directly.

People are hesitant to use chatbots because they can currently only use one word and because there is no better connection between people and chatbots.

Nowadays, majority of people do not watch television or read newspapers and instead, they rely on mobile phones and web applications, so they do not receive clear information about the Covid 19 situation. In addition to that, people should be regularly reminded of to wear masks properly, sanitize themselves and follow safety health guidelines.

2. Objectives

2.1 Main Objective

Provide the user with the opportunity to monitor the results of monitoring blood pressure, pulse rate, temperature and ECG pattern and external symptoms and to obtain the necessary guidance from home using the health care system to maintain a healthy lifestyle and make accurate diagnosis of the disease. Design and develop a non-invasive, simple, low-cost, and painless computer-aided system that can detect blood pressure, pulse rate, temperature, and pulse pattern. It involves analysing the observed data using an expert system and then uploading the resulting data to the cloud in order to develop solutions. Being able to quickly and simply determine which exercises a person suffering from Covid should perform on a daily basis is really beneficial. Allow the patient to send lengthy messages and to convey information in the language that people of all social classes want to hear. It also serves to provide a channel of communication between people and chatbots.

In order to better comprehend the disease and its spread rate, the user may utilize the mobile and web applications. He or she can also obtain some advice on how to protect themselves from the sickness by using the applications. Allow a single device to monitor many parameters of a patient, including temperature, heart rate, ECG, and blood pressure.

2.2 Specific Objective

MediSafe is a system that simply takes in inputs and then routes them to the proper setup in order to present the patient with the necessary instructions and information about it. Once the necessary information has been gathered, an algorithm can precisely render inputs such as blood pressure, pulse monitoring, and the quantity of air that can be held in the chest once it has been calculated.

In this way, the patient may be adequately educated by examining the situations of persons with and without corona infection. They will also be told whether there are any therapies or conditions that are appropriate for them.

3. Methodology

There are four main sections to this investigation. The fundamental aspect is that the device is constructed from several sensor kinds, and that the data collected is analysed before being sent to the patient as needed. Medisafe is distinguished by the capacity to communicate with patients using talking robots, which can react fast and precisely to their questions and concerns. Detailed explanations of future activities to be performed to prevent and prevent disease are provided, as well as ongoing monitoring of disease conditions and related data

3.1 System Architecture (overall)

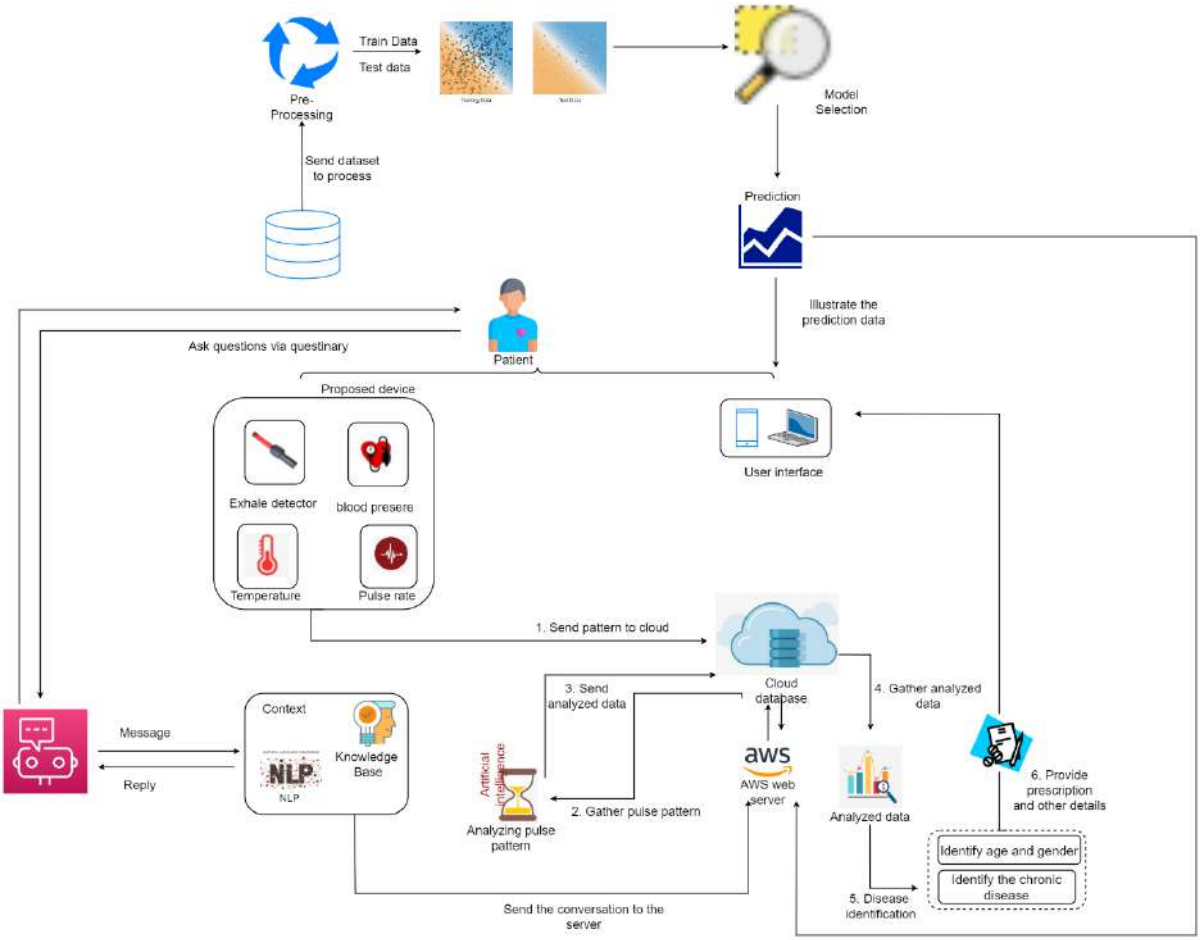

Figure 3.1: Overall system architecture

3.2 Software solution

The software will be developed using the Agile process. During the development, the supervisor will examine the system twice a month (after 10 days) to see if any adjustments or revisions are necessary. To make the system more user-friendly and simpler, the Agile methodology will allow new adjustments and needs.

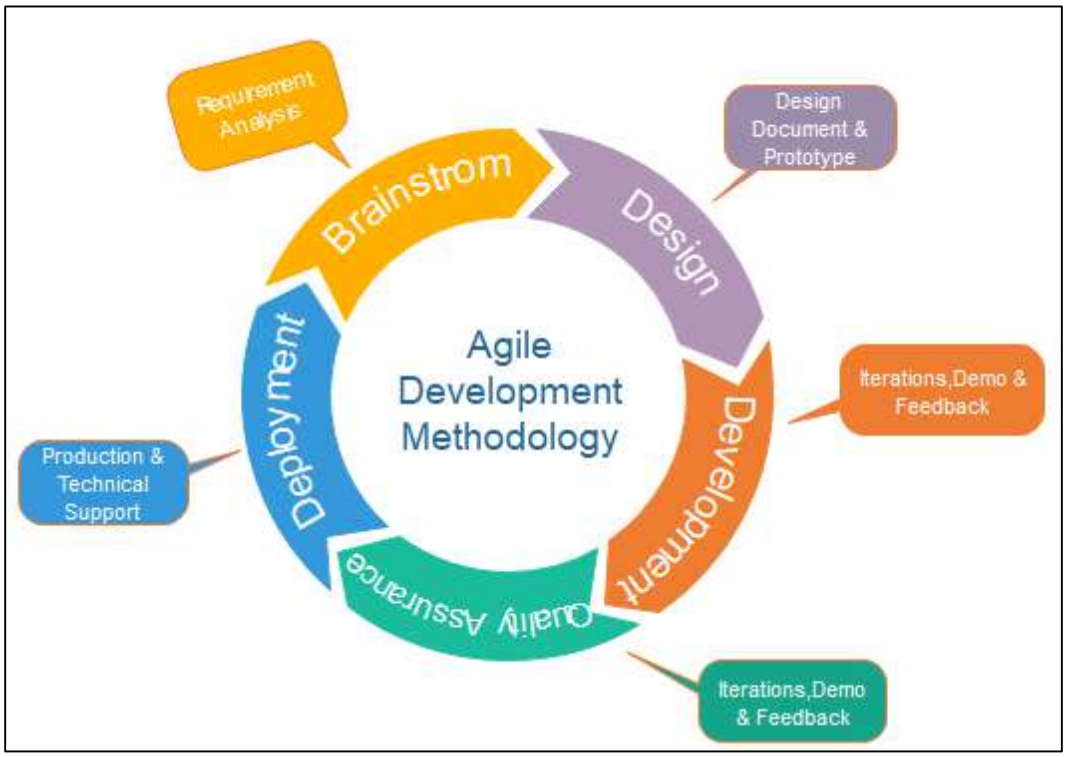

Figure 3.2: Agile methodology

- Requirements gathering – functional and non-functional

- **Functional requirements**
  - Reliability
  - Portability
  - Usability

- **Non-functional requirements**
    - Security
    - Recoverability
    - Capacity

- Design the requirements
- Construction/ iteration
- Testing/ Quality assurance
- Deployment
- Feedback

4. Description of Personal and Facilities

4.1 monitoring device for the Covid-19 system and advice on how to avoid negative effects.

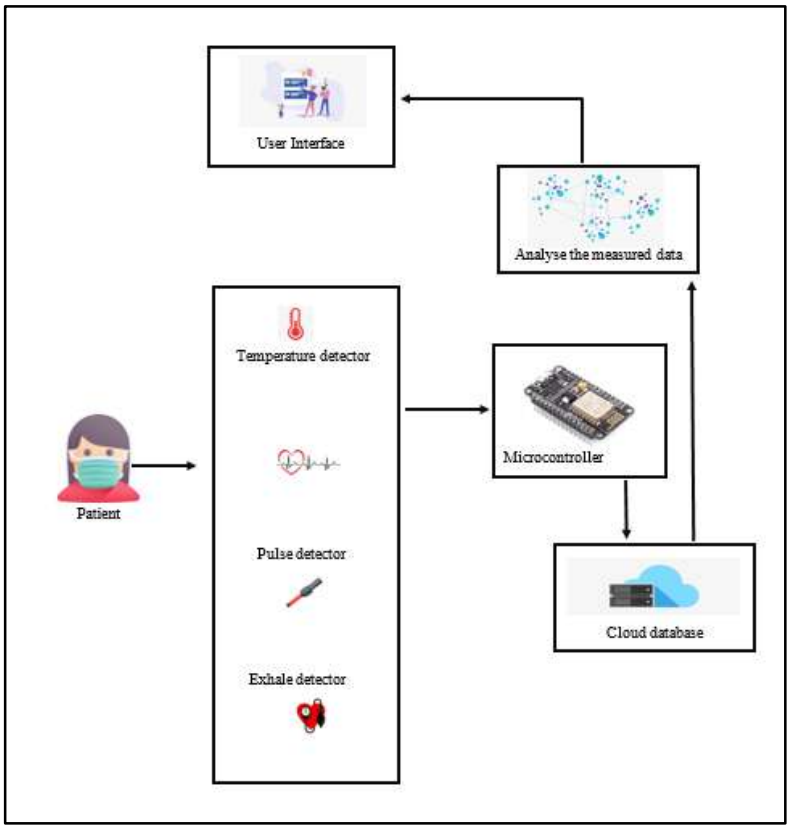

Figure 4.1: Device implementation

- Collect sensor (Temperature sensor, Pulse detect sensor, Exhale sensor, Blood pressure sensor) data from various data sources as needed.

  - Medisafe system should collect data from the sensors and transmit it to an external cloud storage using microcontroller so that the following operations may be conducted. All of the information gathered is transferred to a database and then routed to a microcontroller for processing. All of the information is input and then processed.

- The data collected from the database is analysed by the neural network, and if the patient is a corona infected person, the Algorithm will determine at what level of the body he or she should seek medical attention, as well as whether or not there is a potential of getting any illness.

4.2 The frequency distribution of pulse rate variability data use to diagnose the disease.

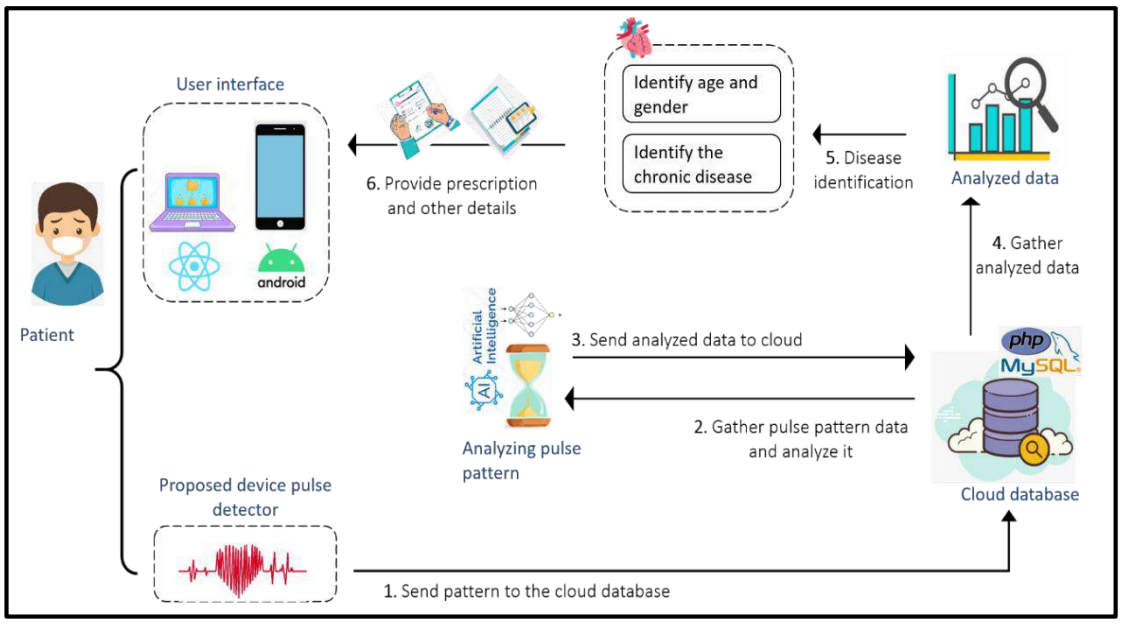

Figure 4.2: Pulse analysis

The Pulse rate analysis diagram (Figure 4.2.1) depicts the process's flow.

Collect the appropriate sensor (Pulse detect sensor) data from various sources.

The suggested gadget shall collect sensor data and transfer it to a central server to perform the following tasks. Because the server is in the cloud, all data should be sent there. To send the data to the server, utilize your existing Wi-Fi network.

Due to the real-time method, patients may observe their current pulse rate as a graphical depiction using their mobile app or desktop program. An algorithm will calculate the user's pulse rate using current and past data.

After analysing the pulse rate, the results will reveal the disease, present status, and recommended therapies.

4.3 Chat bot

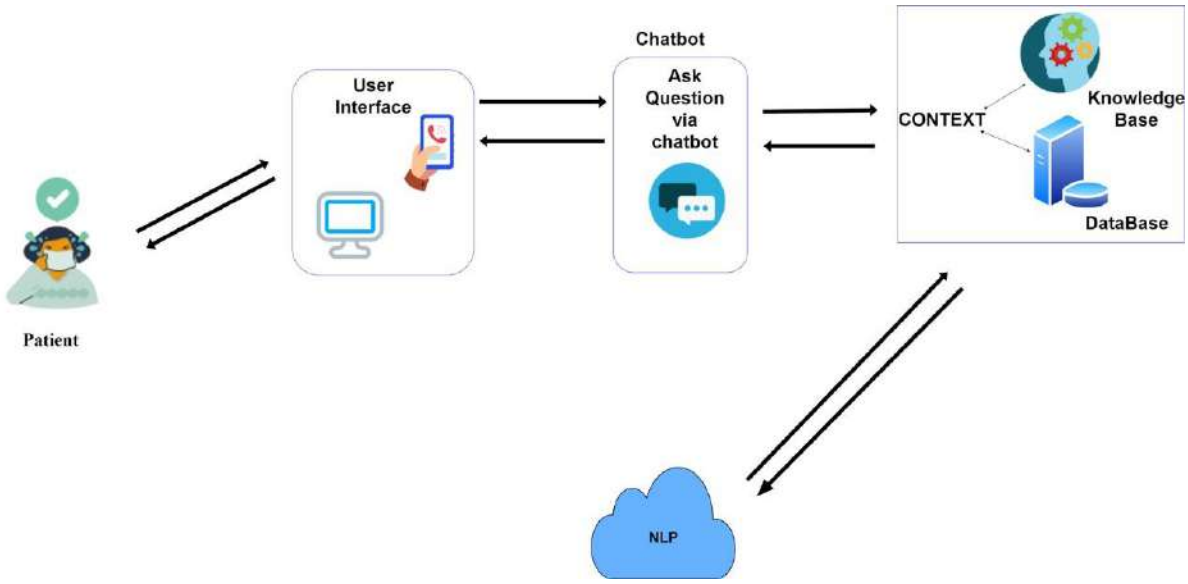

Figure 4.3: Chatbot

The MediSafe system provides services in both the English and Sinhala languages. Humans may ask for long words for any condition. The Chatbot will answer your questions. Obtain data from the questionnaire. Analyse and detect symptom changes. With this online application, users may observe their symptoms in real time. The present and historical chatbots.

4.4 death count in faction rates. Vaccination centres based on the Covid-19

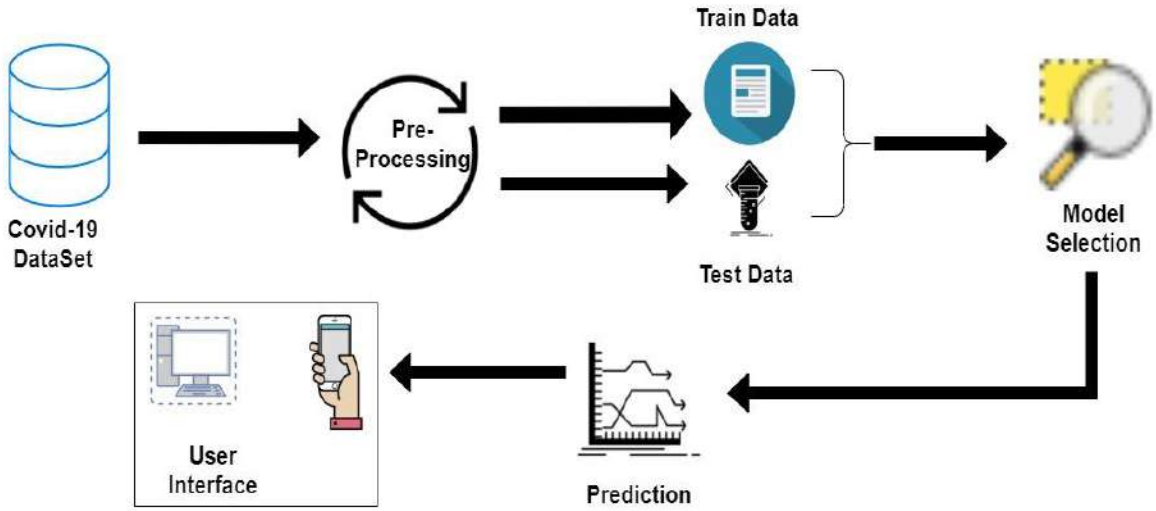

Figure 4.4: Diseases prediction

Considering the Sri Lanka previous years' death count in faction rates. Vaccination centres based on the Covid-19 and also implement all decease in healthcare dashboard additionally that implement all the data mobile application

5. Gantt chart

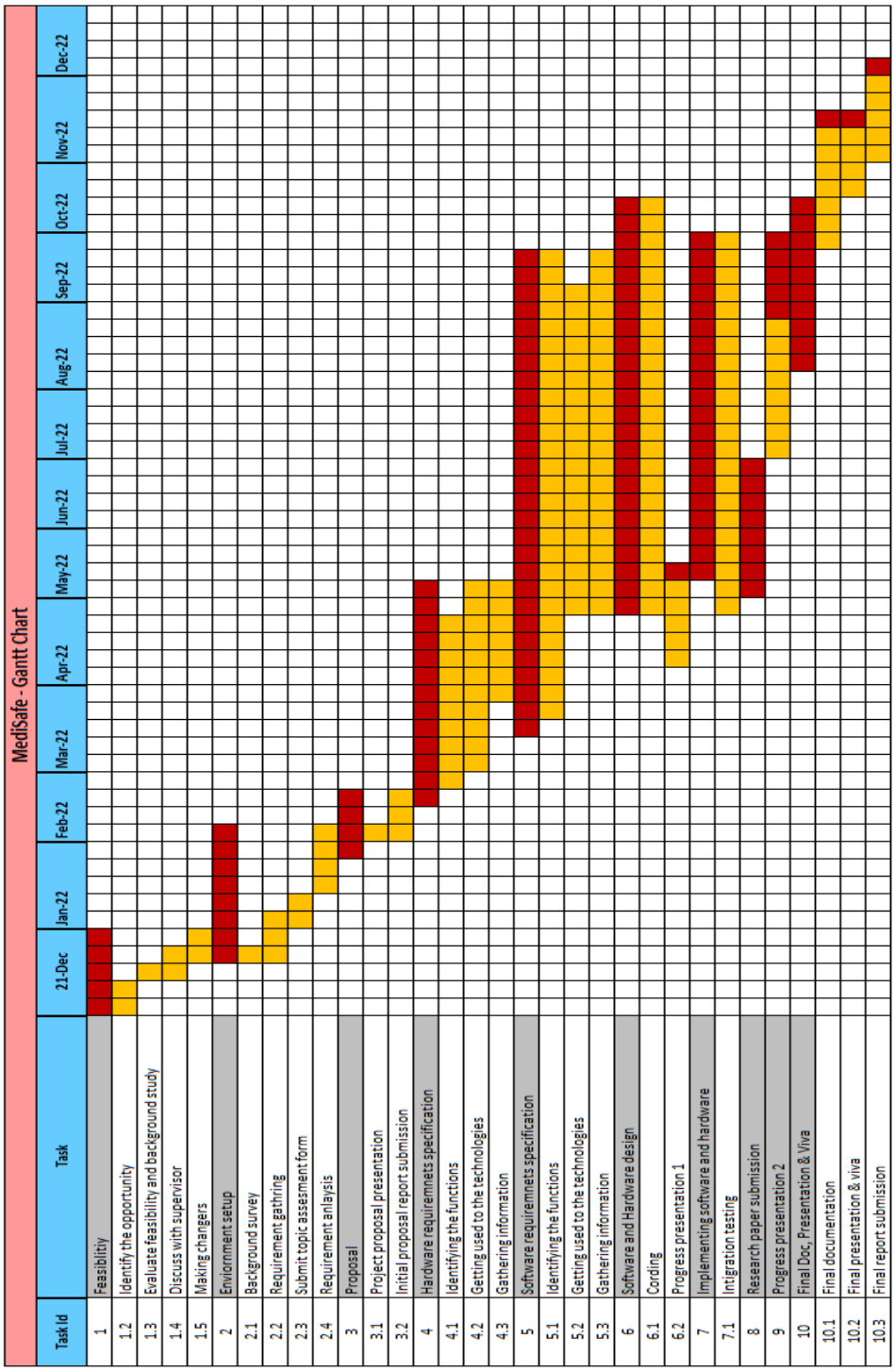

Figure 5.1: Gantt chart

6. Work Breakdown Structure

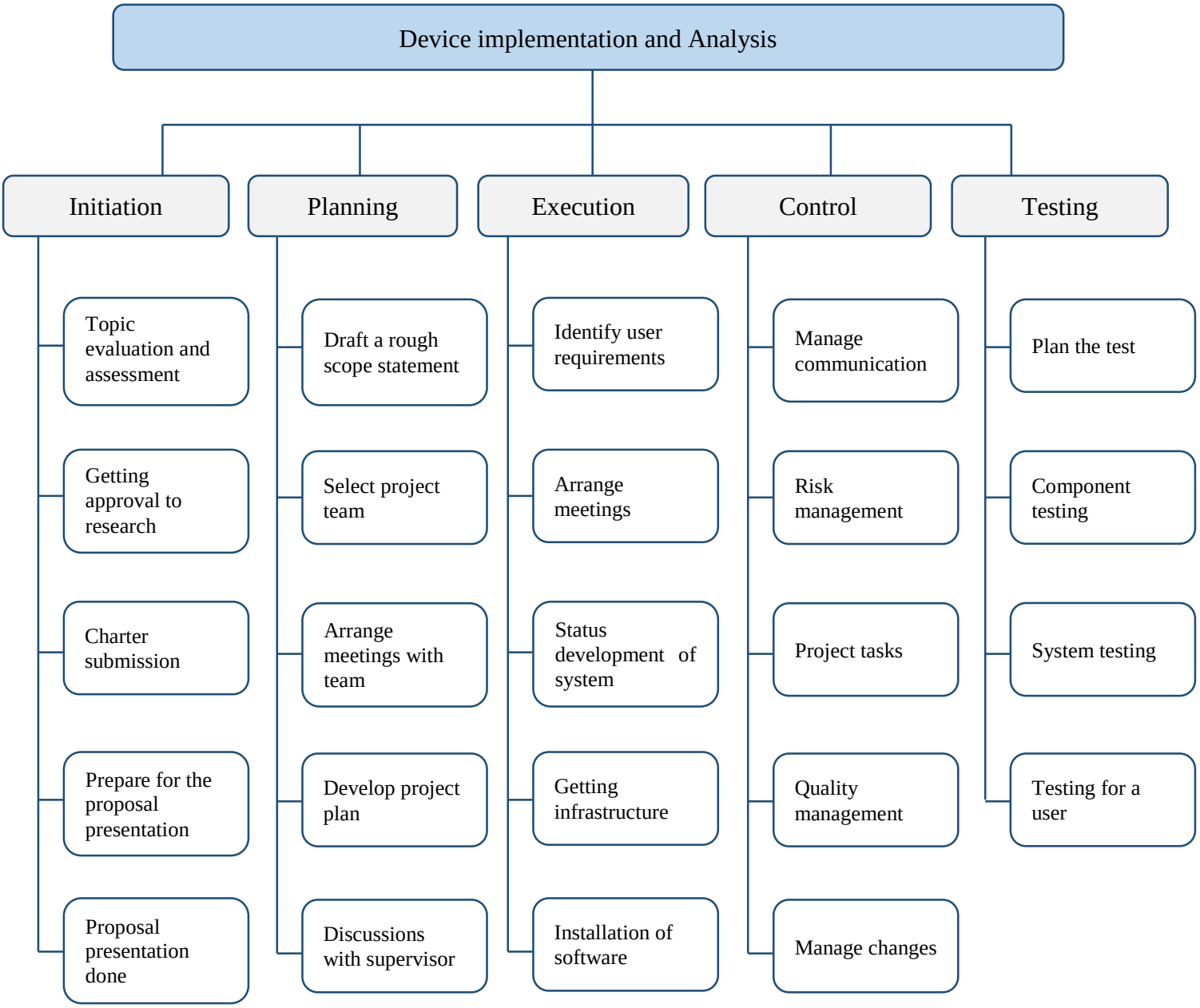

Figure 6.1: Work breakdown structure

7. Budget and Budget Justification

Component	Amount (Rs)
Mega NodeMCU WeMos ESP8266	3900
DFRobot Gravity Heart Rate Monitor pulse Sensor for Arduino	1650
DFRobot PT100 Temperature Sensor Probe	1100
Exhale detector ugm	850
Flexible Cable	200
5V Power Supply	170
Power Battery	450
Reset Button	45
Cloud Service and servers	3500
Total	11 865

Table 7.1: Budget

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Appendix


Match Overview
18%
Currently viewing standard sources
View English Sources (Beta)
Matches
1 Submitted to Sri Lanka ... 8%
Student Paper
2 Submitted to Ghana Te... 3%
Student Paper
3 Ahmed Barnawi, Pratee... 1%
Publication
4 Submitted to Universiti ... 1%
Student Paper
5 Rashini K. Liyanarachc... 1%
Publication
6 Submitted to Sunway E... 1%
On