# MEDISAFE - STAY AWAY AND DEFEAT DISEASE

2022-143

Project Proposal Report

B.Sc. (Hons) Degree in Information Technology

Department of Information Technology

Sri Lanka Institute of Information Technology

SRI LANKA

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**Declaration**

We declare that this is our 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.

| Student Name | Student ID | Signature |
|---|---|---|
| *Senanayaka S.A.M.A.B.M* | *IT19011608* | |

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

Signature of the supervisor _____

Date _____

## Abstract

As the world have become more civilized, a range of diseases started to spread over the world. The evolution of medicine has resulted in the cure of several diseases. Considering Sri Lanka's history, several diseases have spread throughout the country. Malaria, Hepatitis, Covid-19 and Measles are just a few examples. Vaccines can easily prevent certain diseases, whereas some diseases, such as Leptospirosis and Dengue Fever, are not vaccine-preventable [1] Sri Lanka's health spending accounted for about 3.76 percent of the country's gross domestic product in 2018. (GDP) [2] Despite spending a significant amount of money, Sri Lanka has yet to identify some diseases that are high risk and low risk, as well as how to avoid some diseases utilizing current technologies. Traditional ways of recording diseases are still used in the health-care sector. This research focuses on the recent spreading diseases covid -19 and dengue fever in Sri Lanka. We can discover out the number of patients, deaths, and other danger areas based on statistics from the previous year. We can predict the data for the following year by analyzing past years' data. Use the machine learning module to identify various variables. Create a healthcare intelligence dashboard with analytical tools to make all of the data easier to see in graphs and tables. Even if you have not much technical understanding, this will make it easy to view information and This intelligent dashboard for healthcare also shows which months have the most infections on the diseases. To deal with forecasting challenges, a variety of prediction approaches are widely utilized. In this research, common forecasting models were applied to forecast the COVID-19 and dengue fever: linear regression (LR) and support vector machine (SVM) Finally, all of this data is easily accessible via a mobile app. As a result, the health-care sector receives a lot of predictions about disease in the coming years, and they can effectively prepare for it.

key words: forecast, disease, healthcare intelligence dashboard

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# 1. Introduction

## 1.1 Background and Literature Survey

As the population of the country grew, so increased the number of diseases. Doctors and health officials tried to discover a treatment based on the disorders. It took approximately a year to discover the cure for the covid-19. Furthermore, when technology advances, it aids the medical field. Nowadays, IoT and machine learning provide a significant amount of assistance to the health sector and patients. This study demonstrates how to employ machine learning in the healthcare sector for their progress.

Here are the results of a survey performed by persons who have had experience dealing with the spread of disease:
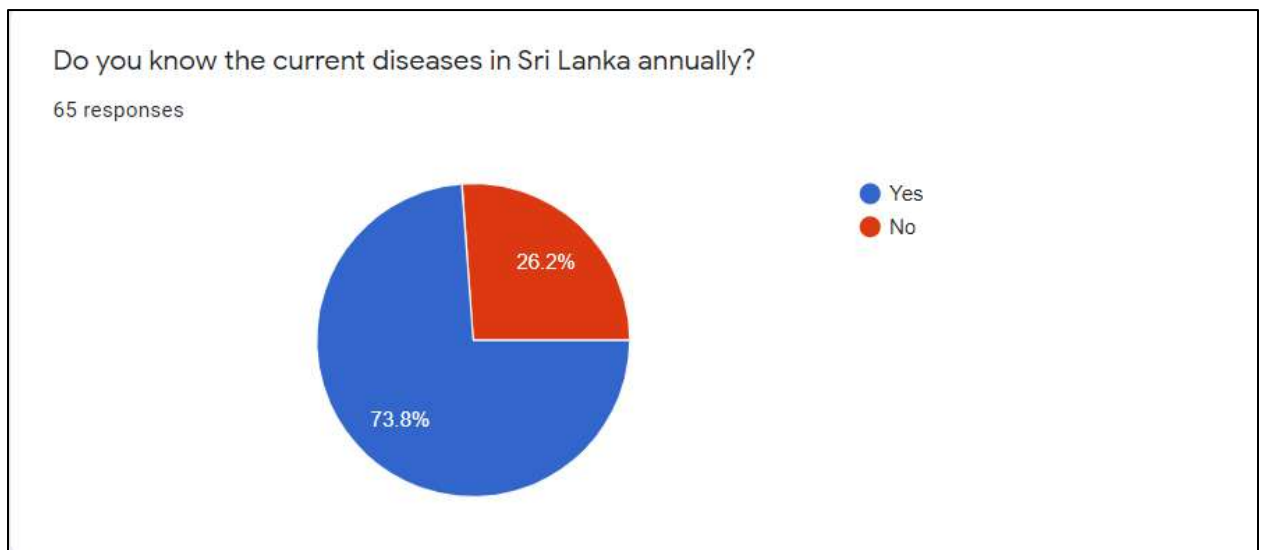


*Figure 1.1:Current Diseases*

According to the following data (Figure1.1), most people are aware of current and past Sri Lankan diseases. Therefore, it is significant to be aware of disease because it enables easy identification of symptoms.
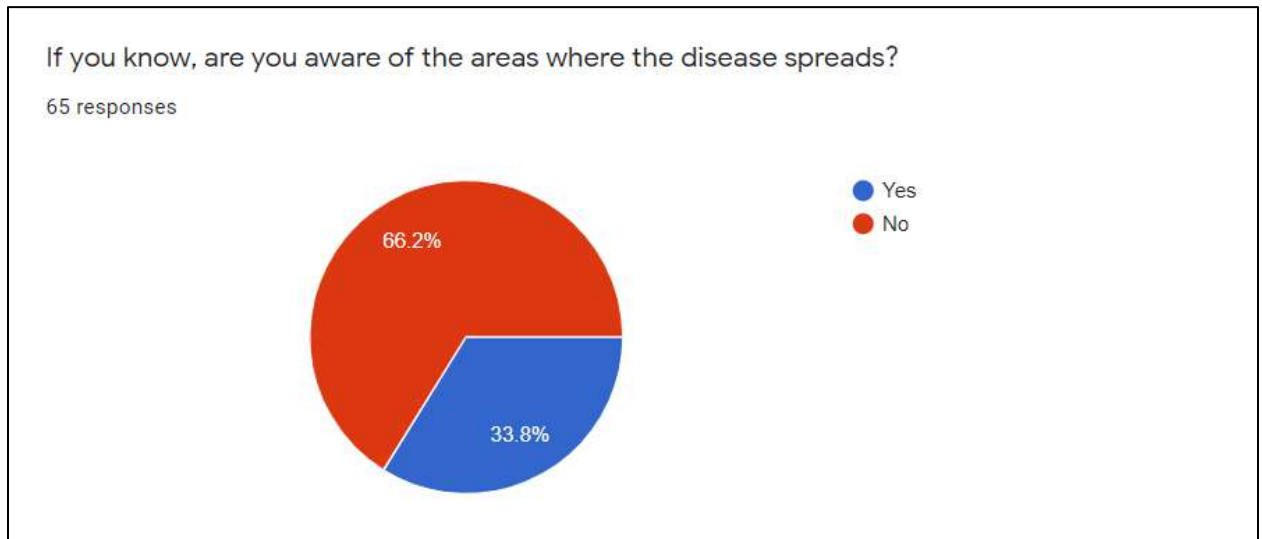


*Figure 1.2:Spread Where disease*

Considering the data above (Figure1.2), most people are aware of the disease's specifics but are unaware of its geographic distribution, which is why our research focuses on this topic.
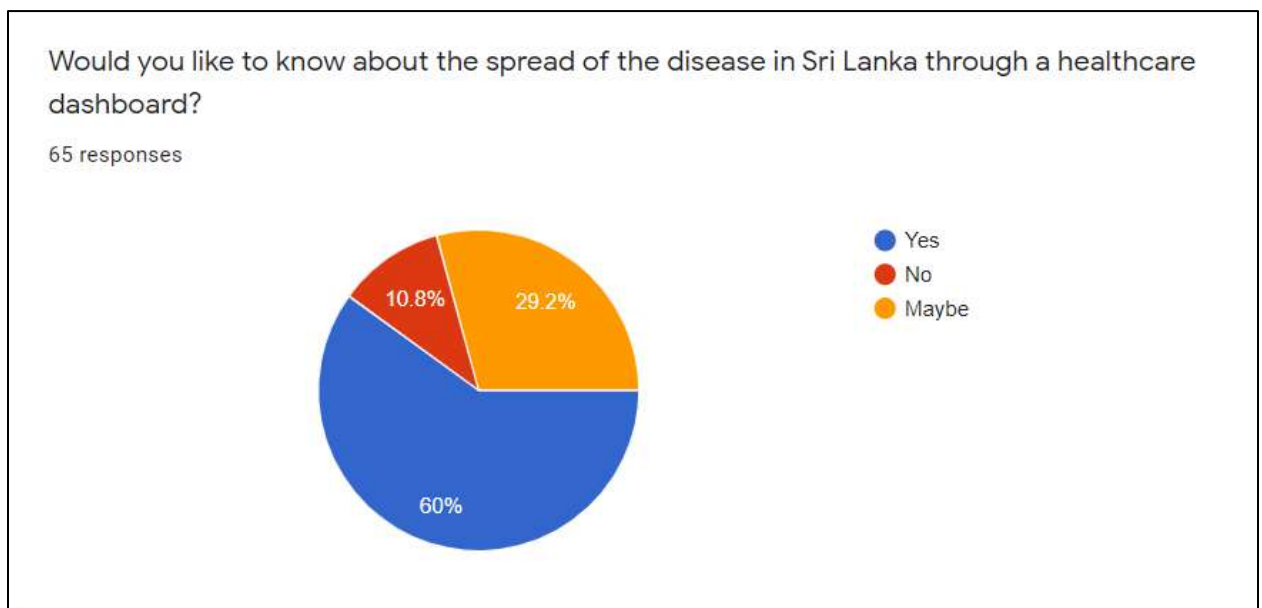


*Figure 1.3:Healthcare Dashboard*

Considering the facts above (Figure1.3), most people prefer to see diseases on a single health care dashboard. This way, they can learn how diseases spread and the many details they can obtain.

One of the branches of artificial intelligence is machine learning. Machine learning can be used to make predictions. Machine learning also aids in the creation of various patterns. Calculations can be performed quickly using this method. Machine learning calculations are more accurate, faster to train, validate, and evaluate, and perform better than traditional physical calculations. ML has been used to make predictions in a variety of disciplines. And, for the most part, those forecasts have come to reality. Machine learning classifiers fall into three primary categories.

1)Supervised machine learning

2)Unsupervised machine learning

3)Semi-supervised learning

When creating predictions, their accuracy is important. When utilizing machine learning to make predictions, the accuracy of those forecasts is extremely high. Nowadays, almost every firm and industry use machine learning in their research and development. Medical services, financial services, government, and transportation are just a few examples.

In the year 2021, research was conducted at Daffodil International University in Dhaka, Bangladesh. Measuring the Risk of Heart Attack Using Different Types of Machine Learning Algorithms was the goal of this project [3]. The major goal of this study is to investigate the possibility of a heart attack. They proposed a model with three primary components: input data, correlation metrics, and split data, for which they applied a variety of algorithms. Bagging, logistic regression, random forest, decision tree, random forest and logistic regression, the best result is taken into consideration. It has an accuracy of 80%. This side did more machine learning research,

but they focused on how to measure the risk of heart attack using new machine learning methodologies.

A research report published in 2021 by the School of Computing Science and Engineering at Galgotias University in India reveals a study on disease prediction using big data for healthcare institutions [4]. They aimed to diagnose or anticipate diseases as soon as possible in order to save human lives. To do so, they used emerging technologies such as machine learning, the internet of things (IoT), and artificial intelligence (AI). They designed a web application that takes some symptoms as input and can successfully forecast diseases based on a fixed dataset in this study report. They use comprehensive databases to increase their disease accuracy. To obtain those symptoms, they applied the python flask framework and Java, as well as decision tree algorithms for machine learning.

The Faculty of Computer Science and Engineering at Patuakhali Science and Technology University in Patuakhali, Bangladesh researched Predicting the Probability of Covid-19 Recovering in South Asian Countries in February 2021[5]. The purpose of this study is to determine whether a healthy eating style can aid in the fight against the Corona Virus. They did so by examining ten cases (patients) and retrieving percentage forecasts from Covid-19 using three distinct types of machine learning algorithms. Three machine learning techniques are used to forecast the recovery rate: Random Forest, KNN, and SVM. They used kaggle.com to obtain the datasets. They selected several criteria from the available data, including Alcoholic Drinks, Animal Foods, Cereals - Excluding Beer, Meat, Vegetable Goods, Others, and Recovered. They observed that when a patient consumes a greater proportion of plant-based foods (e.g., cereals, vegetables) and less animal products, the restored percentage is higher; otherwise, the restored percentage is lower.

five researchers from the Regentrify Institute, Inc. Indiana University – Fairbanks School of Public Health built the Daily Representation of State COVID-19 Health Care dashboard [6]. They launched a community healthcare dashboard for corona viruses such as covid-19, influenza, and others. They employ visual design techniques such as headline graphics and a color palette to draw

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attention to various sections of the dashboard, as well as the filter type to select geographical locations.

This study recommends implementing a dashboard known as a healthcare analytical dashboard. Because what's going on here is about making future decisions. Present state of dashboard should also be used since this examination is based on previous data. Drill drowns and pivot tables are utilized here. Using a healthcare dashboard has several advantages.

1)Easy to use, good navigation

2)Better decision making

3)Interactivity

As a result, in any country, having a healthcare dashboard like this is important. The health-care industry will thereafter be able to compare the most important healthcare metrics and forecast some of them. It is simple to use and simulate situations using the forecast feature to test the accuracy of predicted values. There's no need to waste time processing data with various ways.

## 1.2 Research GAP

The prediction has been made in various medical fields using machine learning. Most previous research papers in the country were done on only one disease. This research paper focuses on various diseases in Sri Lanka (malaria, covid-19, dengue)

In addition, we concentrate on high-risk and low-risk areas throughout the country, previous year's death count, infection rates, and vaccination center locations based on the COVID-19. Previous research papers did not result in the creation of healthcare dashboards. For this research paper, we created a medical dashboard for Sri Lanka in order to identify various details. We can also apply the most up-to-date machine learning techniques, such as K-Nearest Neighbors, Learning Vector Quantization, and Support Vector Machines. Also, previous research papers did not use mobile applications to view disease predictions, so in this research, we focused on implementing a mobile app for that purpose as well. Using the mobile app, you can easily view Sri Lankan disease predictions as well as medical center details. Below table display the briefly research gap

| Research products | Features | | | |
|---|---|---|---|---|
| | Healthcare dashboard | Identify the several diseases | High risk areas and death counts | Identify the geo location |
| Research A | ✘ | ✘ | ✓ | ✘ |
| Research B | ✘ | ✘ | ✘ | ✘ |
| Research C | ✓ | ✘ | ✓ | ✘ |
| Proposed system (MediSafe) | ✓ | ✓ | ✓ | ✓ |

*Table 1.1:comaprison table*

## 1.3 Research Problem

Despite the reality that Sri Lanka spends a lot of money on health care, traditional data collection and analysis methods are still used. However, because the information technology industry is

evolving at a breakneck pace these days, we must adapt as well. and other countries, new technologies are being used to numerous industries, including the health-care sector. Since Sri Lanka has yet to adopt cutting-edge technologies such as machine learning, its disease information is still shown in a table format on their health.gov.lk website [9]. According to the data gathered through a survey (figure 1.2), most people are unaware with the disease's spread areas and major diseases in Sri Lanka.

The approach is to develop a health-care dashboard for health-care providers, then use tools and machine learning to make predictions. It collects data and forecasts based on prior years' results. Sri Lankan doctors and the general public will then have a good understanding of how diseases are spread in Sri Lanka. Considering COVID-19's current situation, Because the government does not define where vaccination centers are located, we recommend using the Google Maps API and our mobile application to locate them.

## 1. Objectives

## 2.1 Main Objectives

Many people are locking themselves in their homes to prevent the spread of the covid-19, which is now under control, but new covid-19 variations are emerging all the time. It's important to note that the main objective of this research is to provide patients with information and health advice based on a patient's Iot device results, so that they can better understand their own health and avoid unnecessary hospitalizations. This is especially important for the elderly, who suffer from a wide range of diseases. In addition, the latest technologies are being used to obtain patient details and analyze the data, to detect diseases in their earliest stages. Based on information gleaned from the questionnaire and the patients' descriptions of their symptoms and conditions, suggest medical advice and instructional videos for patients Sri Lankan disease spreading information can also be accessed by anyone who wants to learn more about using our implementation. Web and mobile applications so that everyone can access any application at any time based on their preference.

## 2.2 Specific Objectives

Aside from the overall goal, there are also specific objectives to consider.

1)An IoT device was developed to capture the patient's various health information.

2)diagnose diseases based on the patient's pulse rate

3)The chatbot provide medical advice and treatment information to the patient.

4)Presents insight about the country's current disease status.

I'm working on the fourth key point considering the previously mentioned key points. What happens here is that several machine learning algorithms are used to forecast the details of future diseases based on historical data. Predictive data is displayed on a healthcare dashboard.

## 2. Methodology

The following key areas were covered by our research "medisafe" implementation:

1)Using the implement equipment, assess the patient's present health state. (Temperature, Exhale detector, Pulse detector, Blood pressure)

2)The device determines and diagnoses the diseases based on the pulse rate result.

3)Based on the details of the user's questionnaire and symptoms, the chatbot recommends treatment and suggests videos using multiple languages.

4)Predict the information on Sri Lankan diseases.

key points previously mentioned in this study's implementation, I'm working on the fourth major point. I applied machine learning techniques to identify diseases in Sri Lanka. I also used several machine learning algorithms for this (Linear regression, Decision tree, KNN algorithm, Random Forest algorithm.) Then, on the healthcare web application, all of the prediction output results are displayed. We also intend to implement the functions of a mobile application. Considering the current scenario with the Covid-19 mobile application, we recommend that the vaccination center locations be added as well.

## 3.1 System Architecture
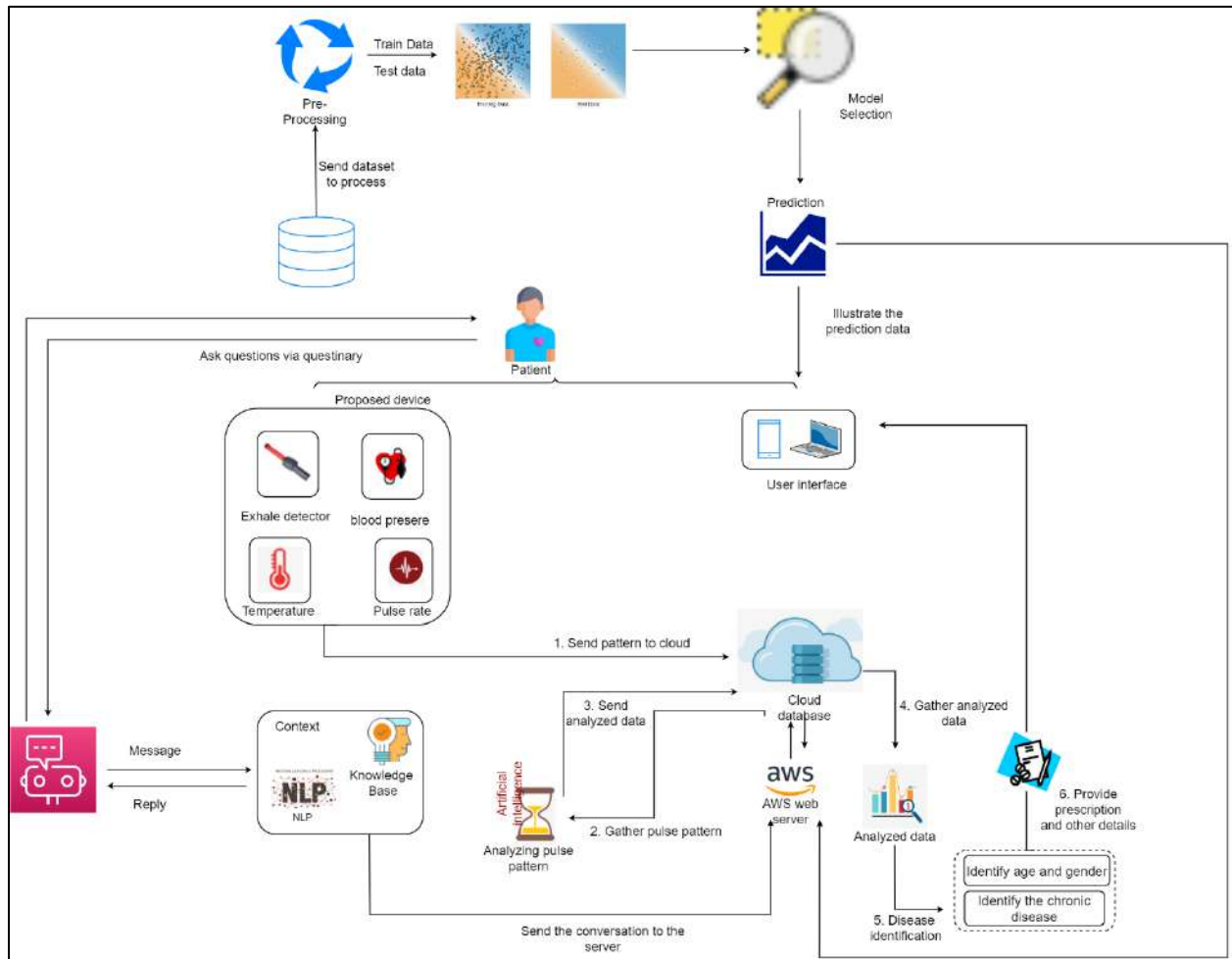


*Figure 2.1:System architecture*

## 3.2 Software solution

We implement agile technique for the development part. Scrum is the methodology that will be applied under the agile approach. Scrum is straightforward, with easily manageable sprints and excellent efficiency, as well as the ability to adjust implementations based on feedback (surveys).
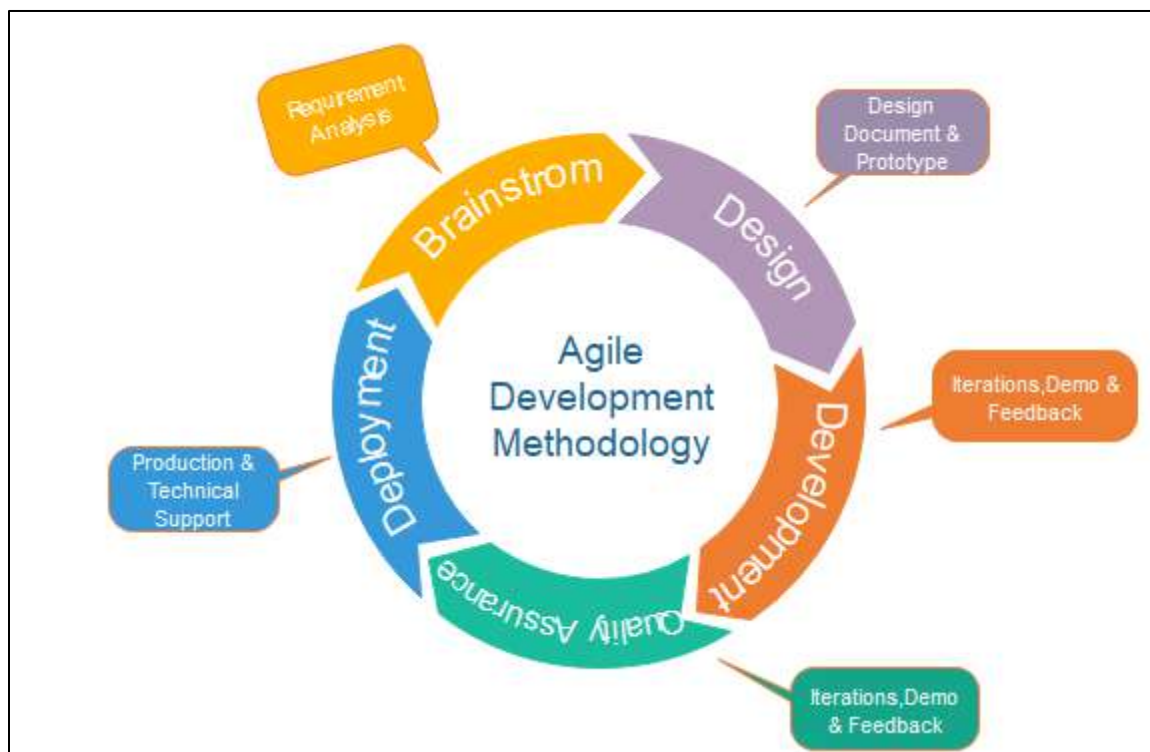


*Figure 2.2:Agile Methodology*

- **Requirements gathering**

  The requirements gathering procedure will be the first phase.

  Survey result: First, get to the users' results by filling out a Google form to obtain a sense of the out-of-research issues. In order to accomplish this, we created a questionnaire concerning our research study**.**

- **Functional and non-functional requirement**

  This section contains the functional requirements for my implementation.

  1)find out geo location vaccination centers

  2)Using a chart view, depict the present state of diseases.

  This section contains the non-functional requirements for my implementation.

  1)Reusability

  2)Scalability

  3)Performance

- **Feasibility Study**

  1) Scheduling Feasibility: The most crucial aspect of project success is scheduling; after all, if a project is not completed on time, it will fail. We plan to cover all areas within the timeframe without delay because this project must be completed this year.

  2) Technical Feasibility: To effectively finish the proposed project, project members should have some expert level expertise in fundamental electronics, machine learning, and artificial

intelligence. To achieve this, we will focus on studying these topics separately so that we can learn about the implementation component.

- **Implementation**

We design healthcare dashboards utilizing machine learning algorithms. As a result, we develop web and mobile applications. Separately for that we aim to utilize react js for the frontend because it is the most popular frontend framework these days, and spring boot for the backend. We used a database to store the information. The main data storage place will be the MongoDB database. MongoDB is a document-oriented, open-source database that is highly scalable. We utilized Amazon Web Services to deploy the application. Amazon Elastic Compute Cloud (EC2) is a cloud computing service that offers safe, resizable compute capacity. It's intended to make web-scale cloud computing more accessible to programmers. The easy web service interface of Amazon EC2 allows developers to quickly access and configure capacity.

3. **Description of Personal and Facilities**

4.1 **Using IoT device capture the patient details**
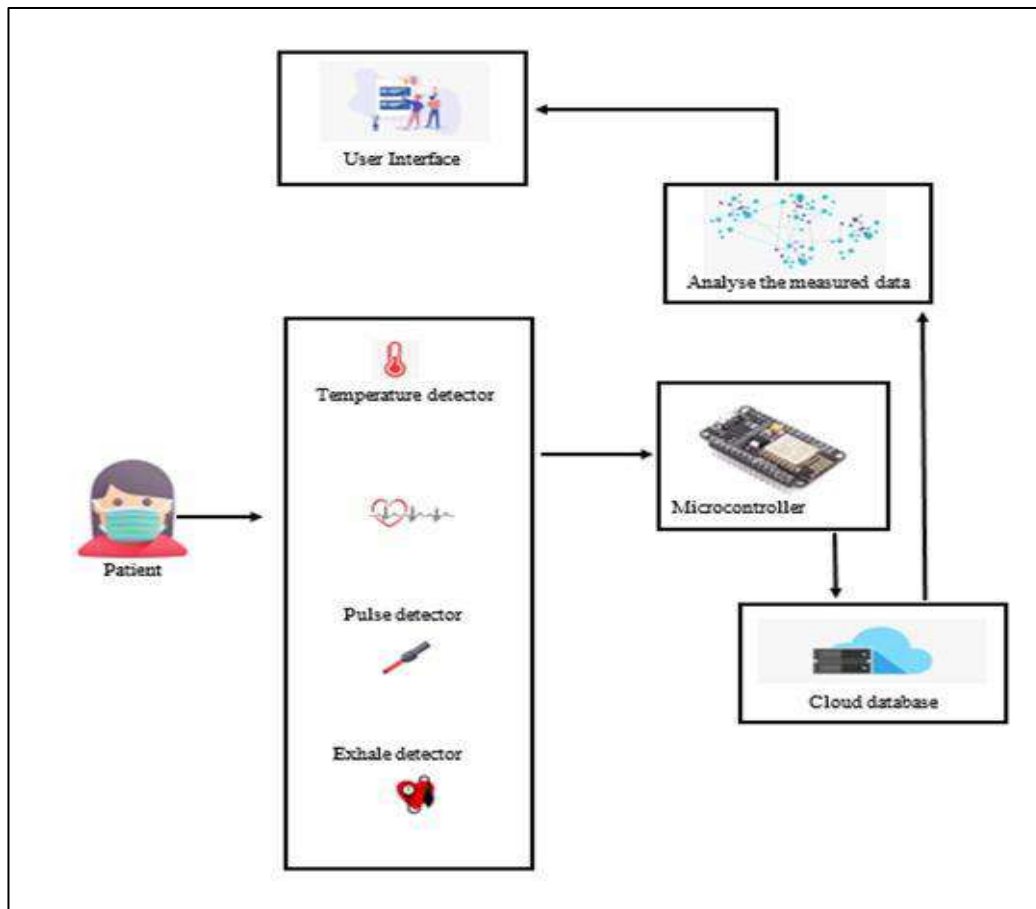
*Figure 3.1:IOT Device*

using the various sensors like (Temperature sensor, Pulse detect sensor, Exhale sensor, Blood pressure sensor) sent all data using microcontroller cloud platform then all the data processing after that processing completed if the patient identify corona in defected or not and gives early diseases details

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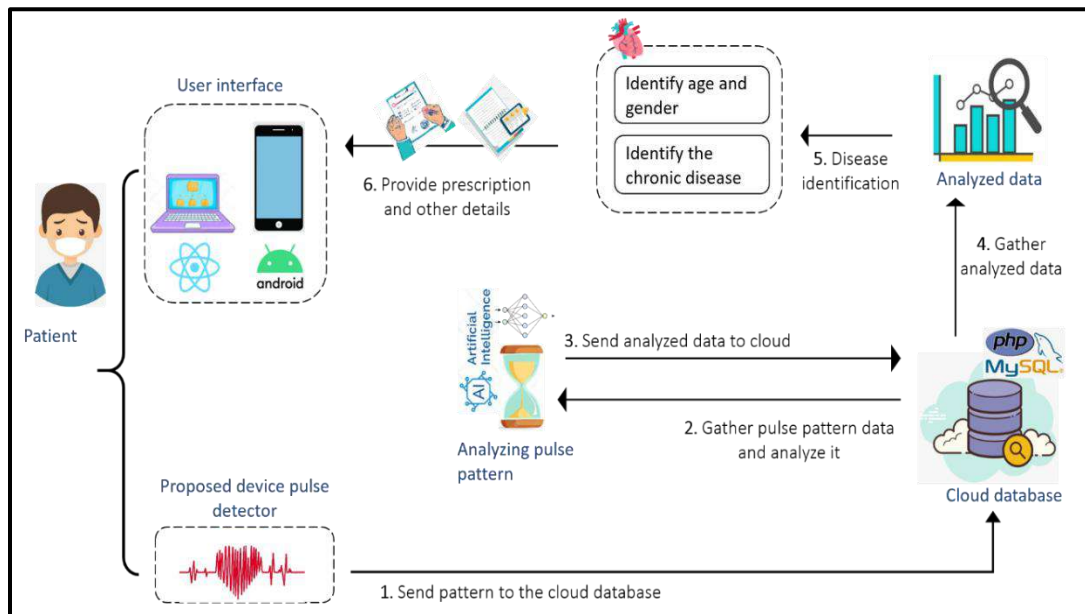


*Figure 3.2:Pulse*

The IoT device collects patient data by pulse detect sensors and sends it to an AWS server, which anyone can simply access via mobile or web applications. After analyzing data and determining the patient's pulse rate, the patient can receive western or ayurvedic treatment suggestions via mobile applications.

## 4.3   Using chatbots to provide health advice to patients
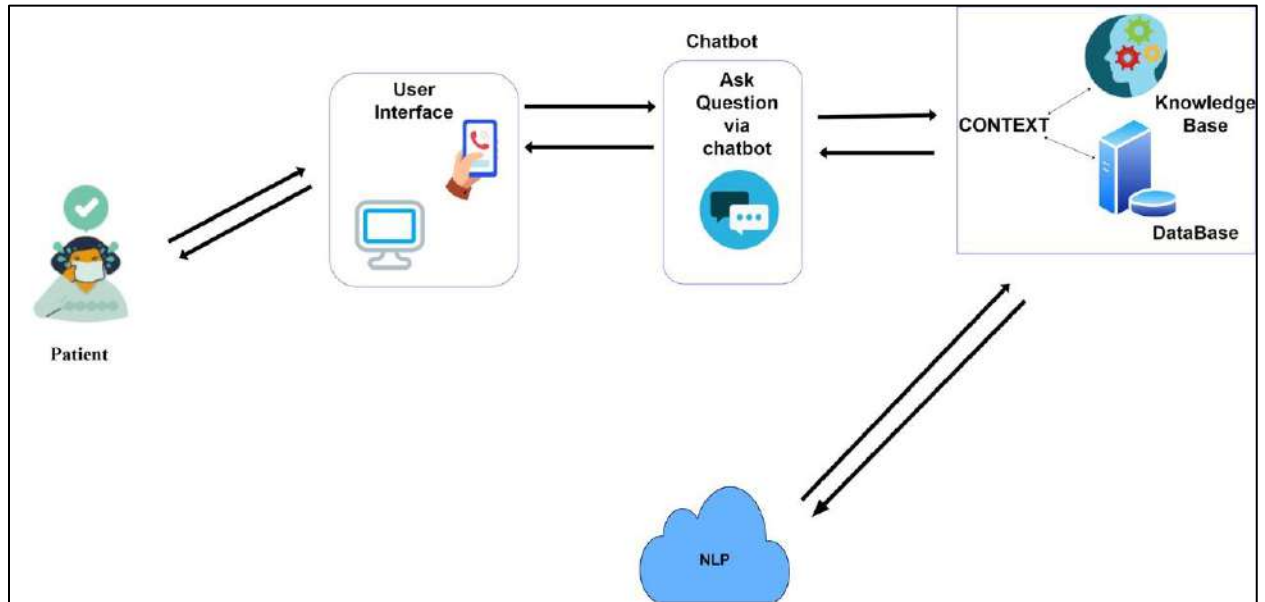


*Figure 3.3:chatbot*

Given that the mother tongue of Sri Lanka is Sinhala, this chatbot can communicate in multiple languages. Additionally, it employed lengthy sentences to communicate, which enabled it to interact with both hardware and human thoughts. Additionally, the chatbot gains a general understanding of the patient's ailment and sends medical recommendations and videos.

## 4.4 Identify the disease
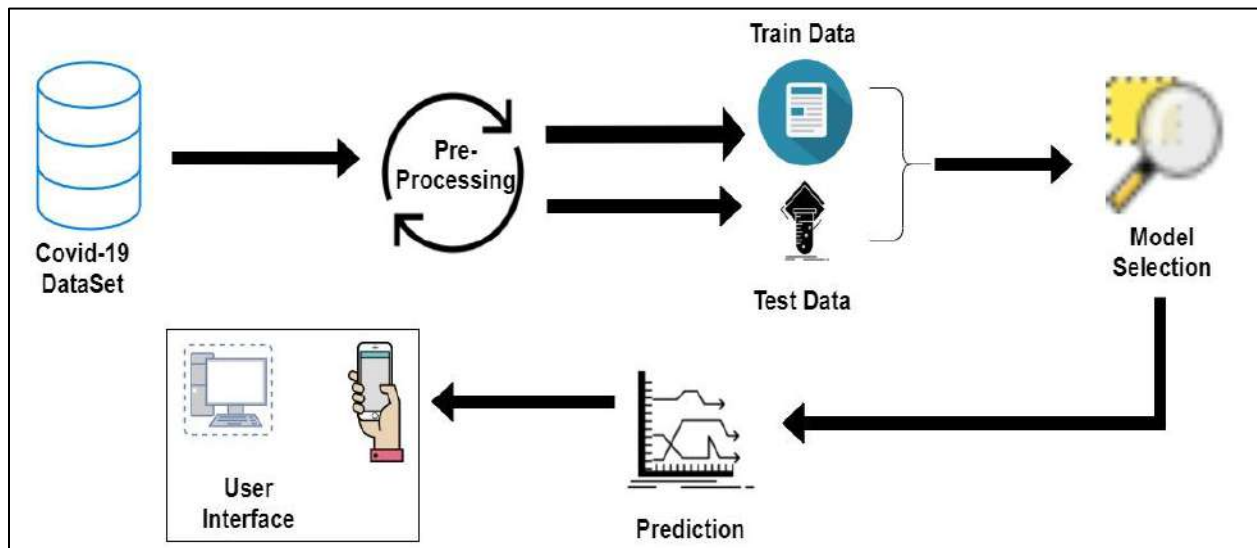


*Figure 3.4:Identify Disease*

The flow of the process is described in the identify the disease diagram.

gather data from a variety of sources

- To acquire an accurate result utilizing a prediction, one must first gather the data. As a result, we use various websites, including the Sri Lanka Ministry of Health and the Kaggle website. So that we might receive precise data, we gathered data from the previous ten years. so that we can forecast disease for the upcoming year.

Train a Machine Learning Model and use it to make predictions about the disease.

- To process data, first prepare it in an appropriate format, then separate it into two variables and split it into two sections. One segment is for testing and the other is for training. We may then apply a

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variety of machine learning methods to separate the data in eighty to twenty percentage points. finally, merging the results and illustrating the desired outcomes

Develop Healthcare Dashboard

- After completing the forecast based on previous disease data, the full-featured healthcare dashboard is displayed, allowing the health-care sector to have a clearer sense of what should be done next to prevent diseases.

# 4. Gantt chart

| Task Id | Task | 21-Dec | Jan-22 | Feb-22 | Mar-22 | Apr-22 | May-22 | Jun-22 | Jul-22 | Aug-22 | Sep-22 | Oct-22 | Nov-22 | Dec-22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **MediSafe - Gantt Chart** | | | | | | | | | | | | | |
| 1 | Feasiblitiy | | | | | | | | | | | | | |
| 1.2 | Identify the opportunity | | | | | | | | | | | | | |
| 1.3 | Evaluate feasibility and background study | | | | | | | | | | | | | |
| 1.4 | Discuss with supervisor | | | | | | | | | | | | | |
| 1.5 | Making changers | | | | | | | | | | | | | |
| 2 | Enviornment setup | | | | | | | | | | | | | |
| 2.1 | Background survey | | | | | | | | | | | | | |
| 2.2 | Requirement gathring | | | | | | | | | | | | | |
| 2.3 | Submit topic assesment form | | | | | | | | | | | | | |
| 2.4 | Requirement anlaysis | | | | | | | | | | | | | |
| 3 | Proposal | | | | | | | | | | | | | |
| 3.1 | Project proposal presentation | | | | | | | | | | | | | |
| 3.2 | Initial proposal report submission | | | | | | | | | | | | | |
| 4 | Hardware requiremnets specification | | | | | | | | | | | | | |
| 4.1 | Identifying the functions | | | | | | | | | | | | | |
| 4.2 | Getting used to the technologies | | | | | | | | | | | | | |
| 4.3 | Gathering information | | | | | | | | | | | | | |
| 5 | Software requiremnets specification | | | | | | | | | | | | | |
| 5.1 | Identifying the functions | | | | | | | | | | | | | |
| 5.2 | Getting used to the technologies | | | | | | | | | | | | | |
| 5.3 | Gathering information | | | | | | | | | | | | | |
| 6 | Software and Hardware design | | | | | | | | | | | | | |
| 6.1 | Cording | | | | | | | | | | | | | |
| 6.2 | Progress presentation 1 | | | | | | | | | | | | | |
| 7 | Implementing software and hardware | | | | | | | | | | | | | |
| 7.1 | Intigration testing | | | | | | | | | | | | | |
| 8 | Research paper submission | | | | | | | | | | | | | |
| 9 | Progress presentation 2 | | | | | | | | | | | | | |
| 10 | Final Doc, Presentation & Viva | | | | | | | | | | | | | |
| 10.1 | Final documentation | | | | | | | | | | | | | |
| 10.2 | Final presentation & viva | | | | | | | | | | | | | |
| 10.3 | Final report submission | | | | | | | | | | | | | |

*Figure 4.1:Gantt chart*

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## 5. Work Breakdown Structure

| Identifying the Sri Lankan Diseases Information |
|---|

| Initiation | Planning | Execution | Control | Testing |
|---|---|---|---|---|
| Topic assessment evaluation | Draft a rough scope statement | Identify user requirements | Time management | Plan the test |
| Getting approval to research | Select project team | Arrange meetings | Risk management | Unit Testing |
| Charter submission | Arrange meetings with team | Design software and hardware | Project management | Smoke Testing and API Testing |
| Prepare for the proposal presentation | Develop project plan | Development stage | Quality management | UI Testing |
| Proposal presentation done | Discussions with supervisor | Installation of software | Development of project plans | |

*Figure 5.1:Work breakdown*

## 6. Budget and Budget Justification

| Component | Amount (Rs) |
|---|---|
| Reset Button | 60 |
| Power Battery | 450 |
| 5V Power Supply | 170 |
| Cloud Service and servers | 3900 |
| DERobot PT100 Temperature Sensor Probe | 1650 |
| Flexible Cable | 200 |
| Mega NodeMCU WeMos ESP8266 | 4000 |
| **Total** | 10,450 |

*Table 6.1:Budget*

## 7. Commercialization

Considering the family utilization of this IoT device, it was developed at a reasonable cost, so that any family can purchase it at an affordable price.

Nowadays, the ideal platform for publishing a device is social media, which is why we decided to develop fan pages for each social media network (Facebook, Instagram). After that, we promote our device on social media pages to encourage more users to interact with it. To do so, we enhance the web page's popularity and spend some money. Transitioning to the social media marketing strategy To begin, we identified a target audience for this mobile and online application. Specifically, we focused on middle-aged adults. After that, we make questionnaires and distribute them on social media to collect data, analyze it, and then create a social media statement. Finally, we employ some marketing strategies to promote our product, such as discounts and giveaways

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# 9. Appendix

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