AGRIPRENEURS – A MOTIVATIONAL APPLICATION TO GENERATE ENTREPRENEURS

Project ID - 2021-090

Project Proposal Report

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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.

Name	Student ID	Signature
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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:

Signature of the co-supervisor: Date:

ABSTRACT

Internet of Things act a major role in the technology while enhancing efficiency, effectiveness, and reliability of day to day activities which directly contributed with human life. IoT sensors, data processing/analyzing methods, microcontrollers, data transmission protocols and cloud based databases were discussed in this work. This is mainly talked about improvements and developments of IoT operations based on prediction and analysis. This document demonstrates about how to use the relevant methods such as sensor data retrieving, database handling, data analysis, real time updates in terms of enhance motivational facts of people.

The main purpose of the research is to gather data of selected crops and train a data analysis algorithm to outcome most reliable prediction. Using this system people are able to identify the suitable landscape and crop easily. This work actually motivates people by predicting income from their cultivation after specific duration.

Key words: *IoT, Smart farming, Motivation*

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List of Abbreviation

Abbreviation	Description
IoT	Internet of Things
JSON	JavaScript Object Notation
HTTP	Hyper Text Transfer Protocol
TCP	Transmission Control Protocol
MQTT	Message Queuing Telemetry Transport
RFID	Radio-frequency identification
MLR	Multiple linear Regression
IDE	Integrated development environment

1 INTRODUCTION

1.1 Background & Literature survey

In any developing country like Sri Lanka, becoming a successful entrepreneur has a considerate amount of risk. The main reason is that the lack of social support from the society and the lack of motivation through the government or any other external entity. Then in the most of developing countries, people are not aware of their working capabilities and potential. Because of that reason, they will probably miss great opportunities.

We believe that the easiest domain to excel in this aspect is through agriculture. It is almost certain that a significant number of families would be having a spare piece of land. According to the survey, most of the people are having considerable bare land which can be used for planting. The below figure clearly illustrate the bare land availability.

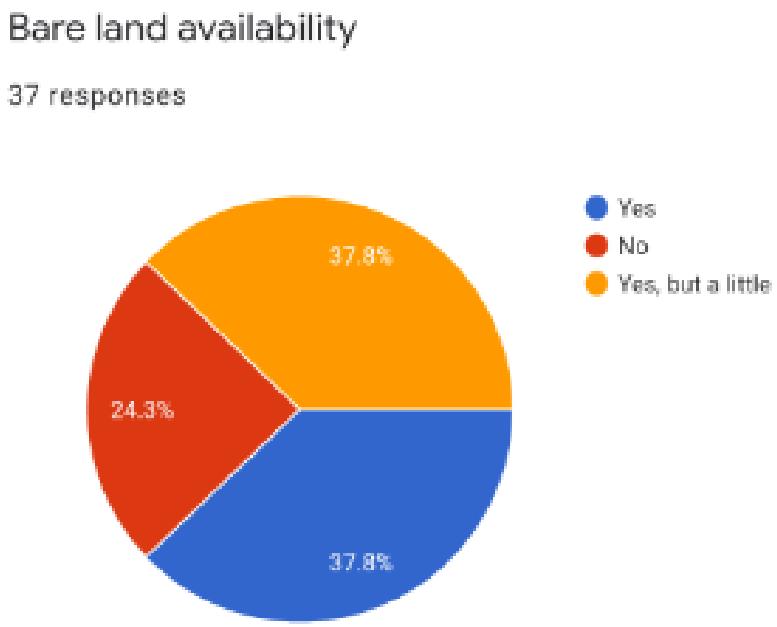

Figure 1.1.1 – Bare land availability

Therefore, around 74% of people have met the basic qualification. Not only that but also if most of people being busy in weekdays, the considerable amount of spare time available on weekends. The below figure clearly illustrate the spare time in a week.

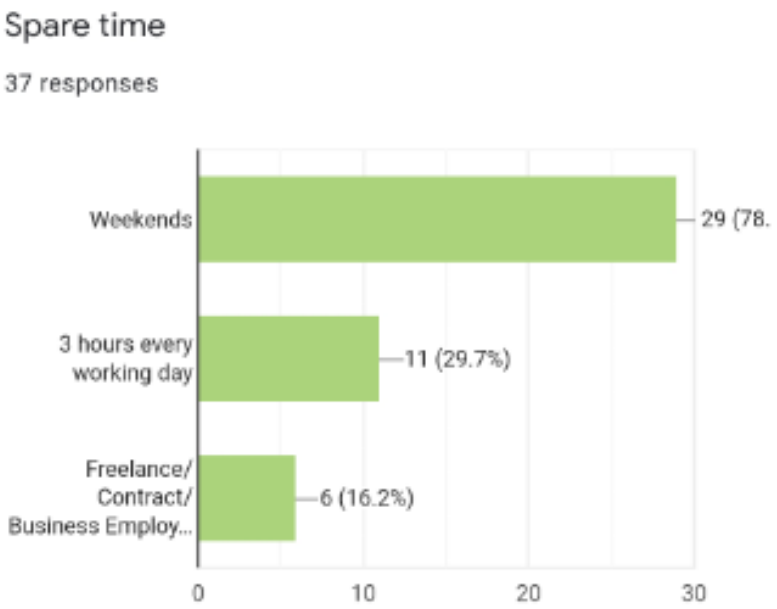

Figure 1.1.2 – Spare time in a particular week

However, just having a spare piece of land will not give the necessary drive for any individual to yield any type of crop or plant. The major problem we have figured out is the lack of motivation for those individuals[1]. The major outcome of the study is to generate self-made businessmen or entrepreneurs by boosting their mindset into positively. This project mainly focuses on busy individuals mainly residing in a more urbanized area with small free land spaces which are of no use. These lands have not been utilized to its full value. Hence, our methodology helps the owner of these lands to earn an extra income with minor effort. On the other hand, it directly affects to enhance foreign exchange of the country. According to the survey, around 66% same of people are earning below hundred thousand rupees. Most often that income not enough for survival of some large families. But this methodology stands for give hands and share knowledge in the specific area. The below figure clearly illustrate the average monthly family income from selected same.

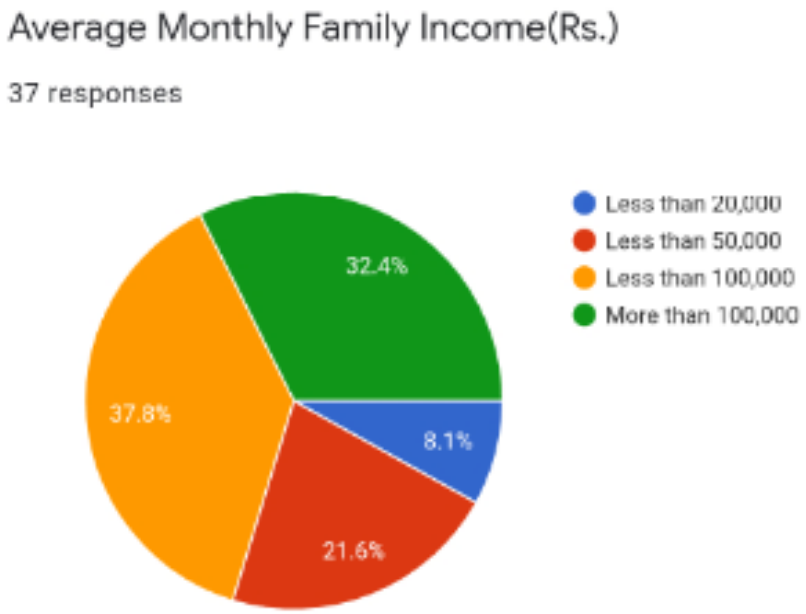

Figure 1.1.3 - Average monthly family income

There are 6 main factors which affects an individual from avoiding taking this entrepreneur risk in the agriculture domain. The main factors are Unfavorable Soil/Farm Conditions, Unavailability of Resources, Lack of social support, Policies, and regulations, Fluctuating prices and Climate changes[2].

IoT plays a major role in agriculture domain which have ability to feed 9.6 billion populations on the earth by 2050. To accommodate the requirements of that expanding population, the agriculture industry need to have align with new machinery to obtain a much-needed verge. Nowadays new agricultural functions in precision and smart farming via IoT enables the business to enhance production efficiency, decrease waste of resources, lower costs, and build-up the element of the yield. Smart farming is the most frequent word that can be heard while taking about IoT contribution in agriculture industry. So, what is smart farming? Smart farming is a perception which invokes to inspecting farms applying contemporary communication and information technologies to enhance the quality and quantity of final outcome during improving the human strive required [3]. Through the technologies that have been using in present day are; sensors (e.g. water, soil, humidity), software, connectivity (e.g. cellular and LoRa), location (e.g. GPS and

satellite), robotics and data analytics. Equipped with such technologies, farmers are able to tracking field conditions without even attending to the yield and take critical decisions for the entire farm or for a particular single plant. In terms of environmental problems, farmers are able to obtain great benefits such as more efficient water/fertilizer usage, or gain inputs and treatments in more efficient. The below figure clearly illustrate the applications of IoT in agriculture industry.

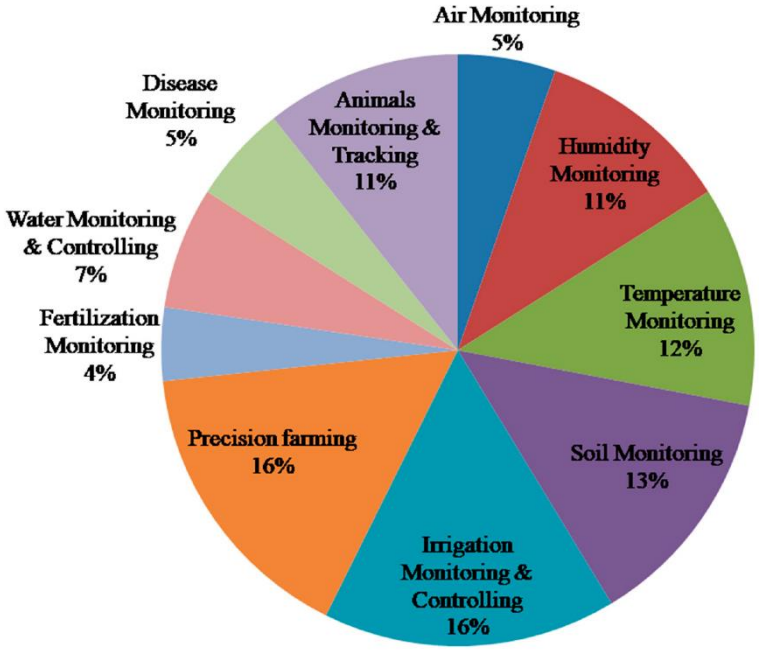

Figure 1.1.4 Applications of IoT based smart farming

The IoT phrase was fabricated by K. Ashton in the year of 1999 [4], as well as invented the communication and computing, where all the protests of the planet will be allowed to link each and every people, along with contribute the real time values and ambiences, eventually catering new methodologies to mankind[5]. Freshly, the modern world focused out assurance of enhancing agricultural productivity by ratifying IoT-associated methodologies[6]. Smart Agriculture supports to decrease desolation, efficient management of fertilizer and thereby accelerate the farm. Early study by Rajalakshmi.P and Mrs. Devi Mahalakshmi concerned in develop a system to analyze crop yield by IoT sensors such as soil moisture, heat, humidity, daylight and irrigation automation system. The data which is retrieved by IoT sensors were

delivered to web server using wireless communication protocol. In the database the JSON format encodes values. The irrigation will be automated if the temperature as well as moisture of the crop yield comes down under the brink. Additionally, light fervency regulator can be automated to irrigation at green house environment. The messages are delivered to farmers' cellular phones frequently. The farmers can keep track of crop-field health from any place[7]. Temperature and soil moisture of the land will be the critical parameters. The electromagnetic devices can be operated to determine moisture of soil. This technique fulfill 52% of water assimilated to sprayer irrigation[8]. In order to accelerate the progress of productivity, many other industries deploy IoT and ICT. In detail, automated crop systems, implemented through actuators and wireless devices, helps to study the environmental estate and handle the implemented components corresponding to the gathered values via wireless and wireline access systems[9]. Lin and Liu demonstrated a casually controlled field which people are able to observe and handle using cellular phones without physically attending[10]. Akshay et. al demonstrated the parallel activity[11]. Yeo and Lee presented a pig farm supervising platform, that is able to productively handle a pig field by watching the substantial values using warmth, moisture sensors, and CCTV camcorders as well as respectively handle yield facilities like air conditioners as well as humidifiers[12]. Kawmard et. al proposed an automatic platform basis on Wi-Fi sensor system methodologies, implemented to check crop-field[13]. The same person also implemented and advanced some irrigation systems for assemble environmental information as well as enable distant control feature of the process through cellular phone. Nowadays, the entire world on the incline of a technical revolution that called as IoT. Jaeseok Yun, Minwoo Ryu and Ting demonstrated an interconnected farm, that focus on providing satisfactory environment for growing plants. In this project whole actuators and sensors for growing and monitoring plants are linked with a device software platform for IoT networks, called &Cube. Then gateway talks with an IoT service server called as Mobius. The Mobius not only communicate with remote farms, but also communicate with matured farming knowledge based systems[9]. K.L. Ponce-Guevara and J.A. Palacios-Echeverria introduced a system which uses big data and data mining techniques that aimed at inspecting elements that impact the growth of

the crops as well as adjudicate a predictive miniature of soil moisture [14]. Ramesh et al. introduced an application which evaluates rice production based on the past rainfall data for particular geographical area. They have applied different machine learning algorithms such as multiple linear Regression (MLR) which is applied to predict on past data like year, rainfall, area of sowing, yield and fertilizers. Data mining methodology (Density – based clustering technique) is used to analyze and verify the result which was obtained from MLR [15].

As we discuss the data transfer protocol, there're MQTT based researches have been considered by many researchers. Luzuriaga and Cano have involved to enhance the performances of protocol by decouples the pure data. It was established on technology that termed as "intermediate buffering". That method helps for restoration during the delivery tunnel presents interruption durations, if these are persistent and closing for last moment, the position where TCP decline to reclaim from [16]. A. Saxena , M. Tyagi and P. Singh has proposed a system which aims to implement unique identification recording system of each individuals based on RFID technology and MQTT protocol in order to make wireless connection between Raspberry-Pi and NodeMCU [17]. P. Alqinsi has involved on develop UPS monitoring system using MQTT protocol in terms of solving UPS monitoring issues[18]. R. Kawaguchi and M. Bandai has proposed an MQTT broker architecture which enhances system availability without broadcasting client data like broadcast notifications or subscriptions. In terms of numerical calculations, the prospective method automatically decreases the number of shared notifications between brokers[19].

As we consider early works using nodemcu microcontroller are,

Early work by Jayaysingh, David, Joel Morris, Daniel and Blessy Telagathoti was concerned with a system to frequently monitor the patient's vital sign using nodemcu[20].

1.2 Research Gap

There are many existing Smart farming systems have been implemented in different ways. According to the literature survey, already existing smart farming platforms could be increased by utilizing IoT methodologies in 2 aspects:

1) Make it smooth to boost systems by accepting new type of devices to be accurately and effectively integrated into smart farm yields (developed to automate irrigation process, temperature controlling and etc.);
2) Promote horizontal smart farm systems, that enables all smart farms to be connected and take advantage of experts' (i.e., experienced farmers) farming proficiency.

Most of the researches conducted includes the,

- Agricultural activity automation (e.g. irrigation controlling, soil monitoring, light controlling, humidity monitoring and etc.)
- Connecting each other smart farms together
- Monitoring status of the growing crops

According to the reviewed research papers [7]- [14] and other resources there many kinds of researches evolved on the IoT based Smart farming methodologies for automating and monitoring the agricultural activities. Many researches are chiefly focused with the IoT applications related with the monitoring and controlling functions. Research A [9] has been concerned about connecting farms, which targets to grant all actuators and sensors turn communicate with IoT service server and make connection with expert farming knowledge platforms using the gateway. Research B [7] has involved about automate irrigation process using wireless sensor nodes which frequently senses the crop field based on the field conditions. Research C [14] has been concerned about Data Mining and Big Data on vegetable plants data from a greenhouse by implementing the 1st version of a software tool, that called

GreenFarm-DM. This tool was aimed to analyze crop factors and determine soil moisture.

But in this scenario, there is lack of generating/motivating new people to farming. In terms of atmospheric status keep changing expeditiously, farmers fall prey to the scarcity of knowledge that is required to measure what kind of farm conditions, methodologies as well as soil type is important for growing a type of crop. Furthermore, every so often it goes on that prolong use of a particular fragment of land to such a quantity that it leaves the land destitute of all minerals. Hence, it is essential to be able to predict and calculate the interpretation of the crop for all kinds of environmental status. On the other hand, these kind of systems only help for farmer who currently engaged in the profession. And these systems not contribute to motivate people to start business and keeping touch with until the final stage(success) in agriculture domain. Although IoT sensors and protocols are being used only for data gathering task and automate the farming activities. Then we need to have some kind of motivational platform for generate entrepreneur/ businessmen which helps to be success. There are various platforms which is based on IoT technology, available for automate farming activities with different ways. The comparison between existing systems and proposed system is given below.

	Yield forecast	Motivation model (generate new entrepreneurs)	Using IoT sensor data to best crop prediction	Real time update
Mobius using &Cube (Research A)	NO	NO	NO	YES
Smart Agriculture app (Research B)	YES	NO	NO	YES
Green Farm-DM (Research C)	YES	NO	NO	YES
Agripreneurs-A motivational app(proposed solution)	YES	YES	YES	YES

Table 1.2.1: Comparison between related work

1.3 Research Problem

This work is proposed to implement a system that provide solutions to the issues already present in the society that have no precise platform for generate and help people to be success. To accomplish this task, we need to collect information of different kind of crops, and some techniques of agriculture. It's not an easy task to collect those data from experts in agriculture domain. Thus, it's better to collect those required data from user guides, official web site that have been publish by Agriculture Department of Sri Lanka. As well as it's better to visit Agriculture Department of Sri Lanka physical and collect the data.

2. OBJECTIVE

2.1 Main Objective

The main objective is focused on implementing a motivational platform trough a mobile application which will provide the users or those specific individuals to run their own business. Hence to make them more confident on the risk that is going to be taken, we will be providing clean statistics via our application by applying it to different data sets beforehand. Hence the application keeps in touch with every single individual from the crop/plant growth or initial stage to the final and through to the export or selling state. This platform will be providing the users with real-time updates on the current market value of the specific crops that are to be sold and a guidance on how much time effort and investment they will have to put forward and the relative benefit they will gain. These results alone will cover up majority of the motivational model.

2.2 Specific Objectives

1. IoT data analysis model to identify suitable areas of the land, which is most appropriate for a crop, nutrition of the soil, humidity/water (dry or wet land).

2. Update the users of the entire platform according to the data analysis model of the suitable crops to be grown in a specific month of the year.

3. Real time data analysis by sending data to cloud

3. METHODOLOGY

The proposed "Agripreneurs - A motivational application to generate entrepreneurs" is a motivational application that has the outcomes of, making gamification model to motivate users by predicting suitable crop to be grown in specific area. The user is motivated in 5 main aspects; gamification model with reward schemes, crop/income prediction, integrated bidding platform enabling entrepreneurs to sell the crops on a price being bid by different buyers in the platform and diseases analysis model to provide fast and reliable solution.

In this work, IoT model holds the initial part which provides facility to check soil and weather condition of selected area by sending real time updates across all users in the platform. This IoT model will be come up as a single device to end users which aimed on enhance the portability and user-friendliness of the product. This is the physical product that interact with end users and make connection with cloud database directly. As the last operation of the model, the all gathered data will be sent to crop prediction model to make prediction of the best crop that need to be grown in the specific period of the year.

3.1 System Architecture

The system architecture is shown in the figure 3.1.

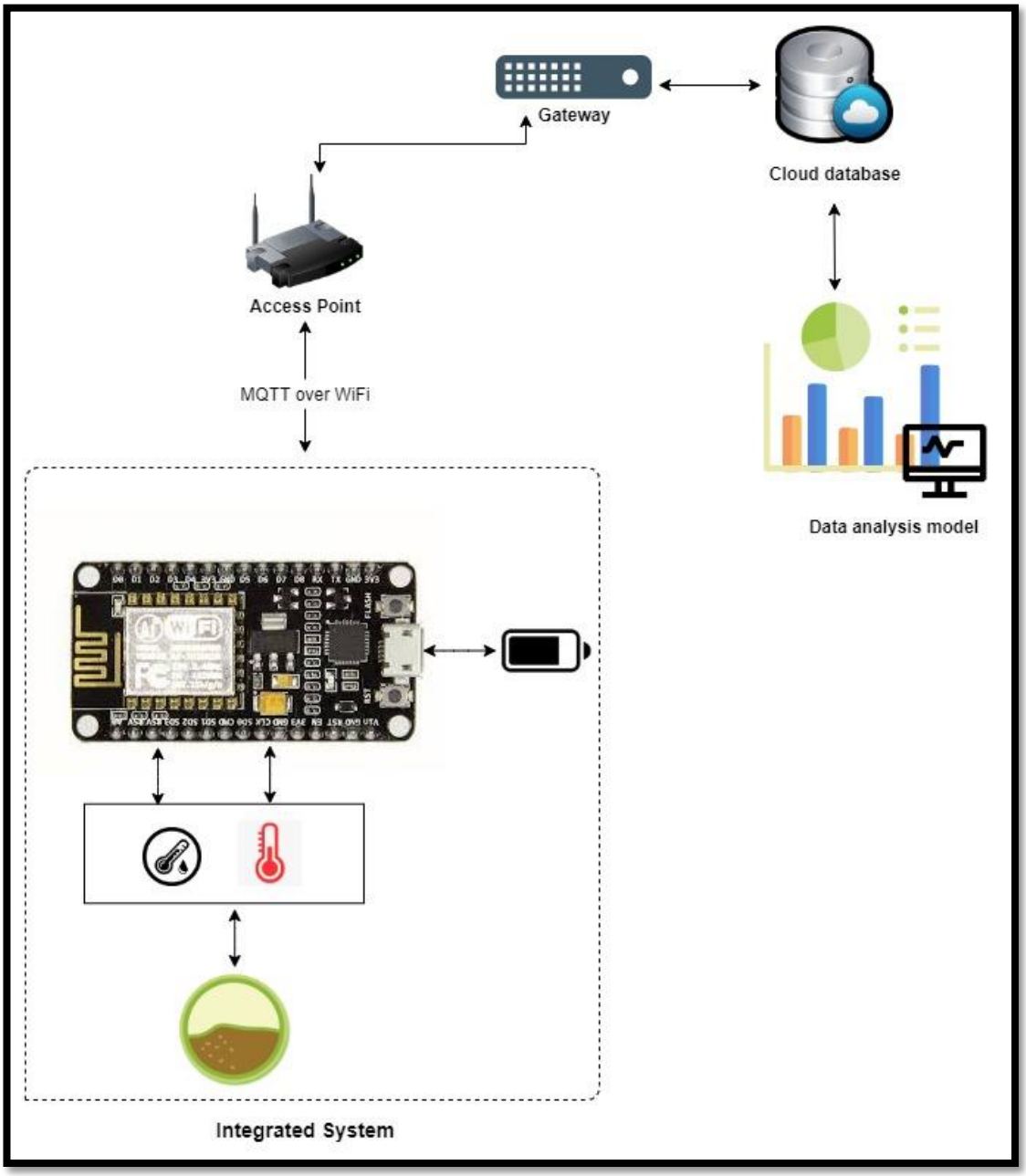

Figure 3.1- High Level System Architectural Diagram

3.1.1 Hardware Solution

The circuit diagram is shown in the figure 3.1.1.1.

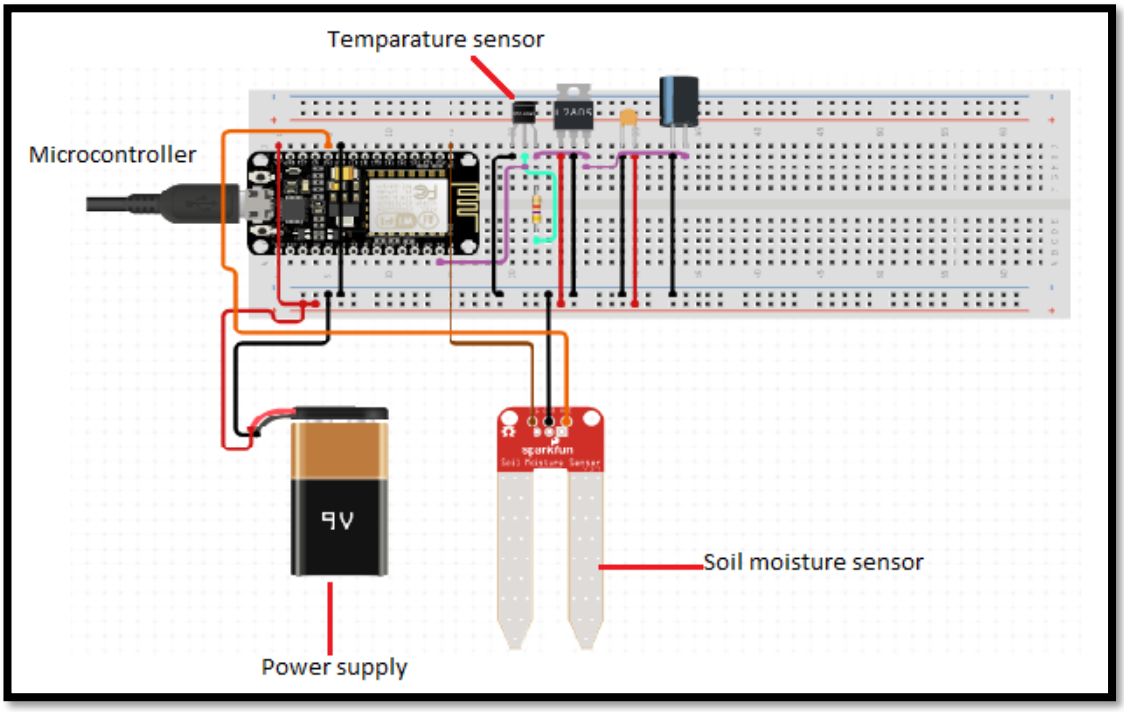

Figure 3.1.1.1- Circuit diagram of IoT model

3.2 IoT Devices

As the initial part of the project, the motivational system need to collect data from IoT soil moisture and temperature sensors and the collected data need to be sent to a centralized cloud data base to optimization. The IoT moisture and temperature sensors should be compatible with Lua platform to accomplish the data processing operation

- **Soil Humidity Hydrometer Moisture detection sensor YL-69**

  After a sensor comparison in the industry, Soil Humidity Hygrometer Moisture Detection Sensor module is proposed to

be used as the moisture detection sensor. The Operating Voltage in-between 3.3V-5V and supports dual output mode; analog output, digital output. It contains LM393 comparator chip for stable data reading.

- **DSI8B20 Digital temperature sensor**

  As a temperature sensor, it should have wide range of temperature and more accuracy within minimum response time. DSI8B20 Digital temperature sensor operates between 3V and 5.5V. It has an ability to read in wide range of temperature (**-55°C to +125°C**).

- **Microcontroller**

The NodeMCU development board is expected to be used as the microcontroller unit for the handle data retrieval and delivery part of the system since the data is expected to be available wirelessly. NodeMCU is an open source firmware which is developed by ESP8266 open source community. The major reason for taking NodeMCU was the enabled Wi-Fi function in the board and both the firmware and prototyping board architectures are open source.

3.3 Development process

After many methods considerations, Iteration development model has been identified the most suitable method for this research among other process models as the identified processes heavily depend on the previous process outputs.

In the iteration model, the entire requirement for the project is separated into different phases. In each iteration, the development process goes through the sequence of steps; planning, requirements gathering, analysis, design, implementation testing and evaluation phase. The reasons for choosing this model is,

- The requirement of the system is precisely defined. Although, some of the functionality might evolve or change with the research duration.
- While the development duration of the project, new methodologies can be used bases on the process requirements. Thus, it is essential iterate the steps when there is a modification like these.

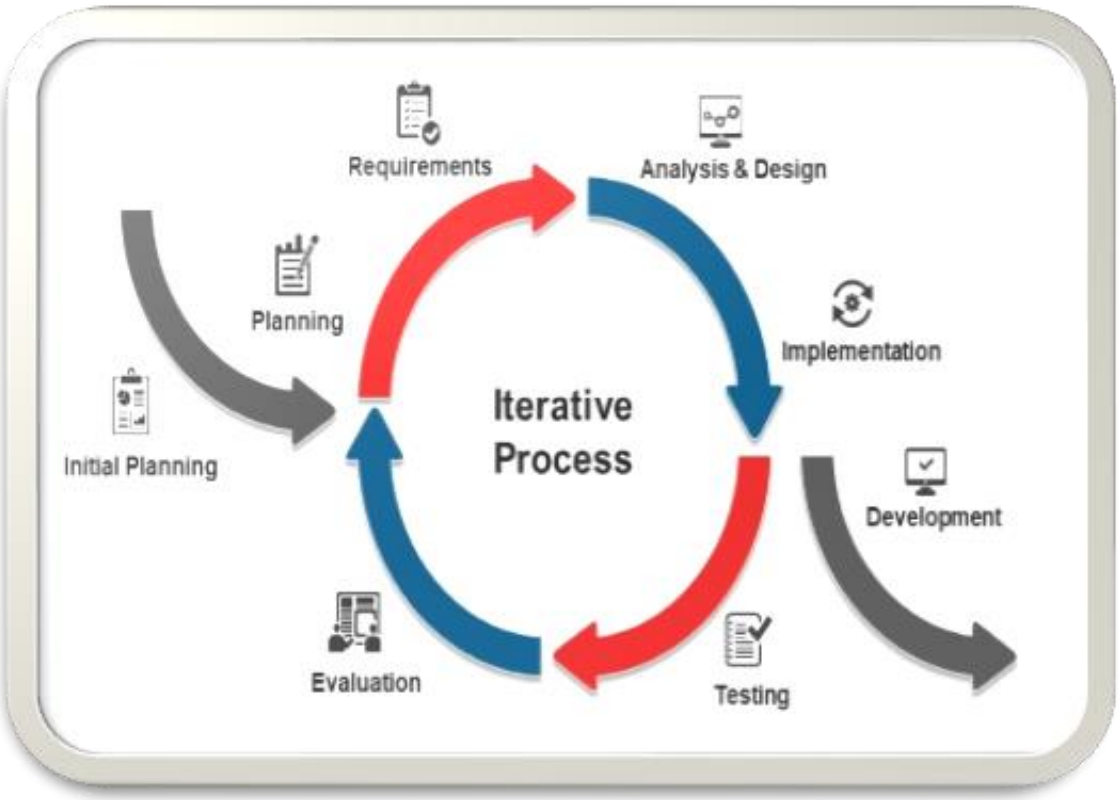

Figure 3.2- Iterative Process

3.4 Requirement Gathering and Analysis

The First phase will be the requirements gathering process.

- **Survey Results**

  Time allocation in a requirement gathering questionnaire is most important to get whole idea about what people think about their income, free time, agriculture and business.

- **Crop data gathering**

  Crop details and other agricultural techniques will be collected by web site of agricultural department and open data portal of Sri Lanka.

3.5 Feasibility study

- **Schedule feasibility**

  The proposed work should be concluded in the defined time limits completing each phase with credible outcome while continuing timeline. And present with the finalized product on the planned due date.

- **Economy feasibility**

  A solution couldn't be an achievable solution unless the troubled subjects use the solution, even though the final output of the study, the proposed project works perfectly as expected providing preferred exact outputs without any mistakes, it cannot identify as a success if it costs high. The elements that will be used must be less expensive and more reliable.

- **Technical Feasibility (Skills)**

  - ✓ Basic electronic, IoT and coding knowledge

  To obtain the outcome of the project, all members need to have some expert level of knowledge in basic electronics, IoT and coding techniques.

3.6 Implementation

The implementation phase complies with the development of the functionalities below,

- Retrieve the data of soil sample using IoT sensors
- Data analysis model to identify suitable areas of the land, which is most appropriate for a crop, nutrition of the soil, humidity/water (dry or wet land)
- Update the users of the entire platform according to the data analysis model of the suitable crops to be grown in a specific month of the year.
- Real time data analysis by sending data to cloud database.

The above functionalities will be executed so that a view will be provided to the user using a mobile application.

- **Data analysis and prediction model**

  After gather soil and weather status data, the data need to be analyzed and make decisions based on soil/weather condition of the particular land area on specific month of the year. To accomplish this task, the Random Forest algorithm has been expected to use since it has ability

to create an average from multiple data samples in parallel. Random Forest is a most popular classification algorithm which capable of both regression and classification.

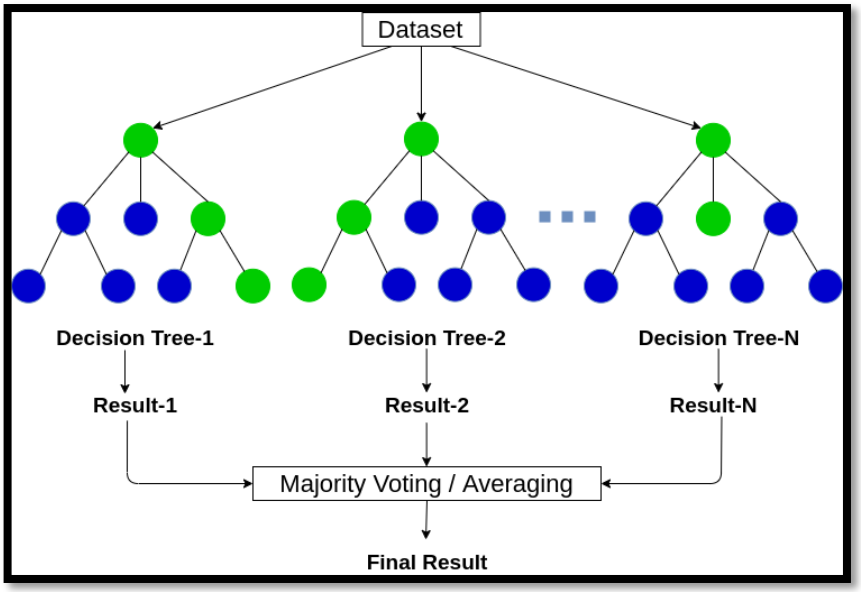

Figure 3.6.1 – Random Forest algorithm overview

- **Database Handling**

The IoT device generates big amount of data to the server. Databases have a vital role to play in handling IoT knowledge adequately. Therefore, besides a correct platform, the correct information is equally vital. As IoT operates across various atmosphere within the world, it becomes difficult to decide on associate adequate information. Sometimes there will be nothing data structure (unstructured data). There are some factors that need to be considered before choosing a database for IoT based applications are:

- ✓ Scale, size and indexing
- ✓ Effectiveness while Controlling a huge amount of data
- ✓ Transactions and Process modelling

- ✓ Portability
- ✓ Query languages
- ✓ Security and cost

There are many types of data in IoT are:

- ✓ RFID
- ✓ unique identifiers
- ✓ Descriptive data
- ✓ Sensor data
- ✓ Historical data
- ✓ Physics models*:* Models that are templates for reality

Based on below factors CrateDB, InfluxDB, GridDB, PostgreSQL(TimescaleDB), MongoDB and Firebase are most suitable databases for perform. Among these databases, InfluxDB is most popular but that clustering is only available in paid version. GridDB is IoT-oriented and faster than InfluxDB. According to the survey, Firebase has been identified as the database of the project since it's a NoSQL cloud database which synchronizes data across all users in real-time as well as remains accessible when app goes offline.

- **Microcontroller Programming**

NodeMCU development board will be used as the microcontroller unit of the project. The most compatible and supportive development IDE that called as Lua has expected to use to code microcontroller. Why Lua rather than Arduino? The reason for selecting Lua is that more powerful, lightweight, fast, embeddable scripting language. Lua combines easy procedural syntax with powerful knowledge

description constructs supported by associative arrays and protractible linguistics**.** Lua is dynamically written**,** runs by decoding bytecode for a register-based virtual machine, and has automatic memory management with progressive trash pickup**,** creating it ideal for configuration, scripting, and fast prototyping. Since firmware uses Lua scripting language and based on eLua project, it will be more supportive and compatible using Lua over Arduino.

- **Data Communication Protocols**

The message transportation system is a most important part in an IoT component for gathering data or send data. Push protocol is not heavier than polling protocols, that is implemented in IoT components extensively. Then devices no need to be implemented with large number of code lines in terms of get up and running with the MQTT data communication protocol. It uses the pub/sub pattern and translates messages between applications, devices, and servers. MQTT protocol supports subscribe and the publish messaging model, i.e., when the is message is dropped by a client (The connected devices in the MQTT protocol) it'll be settled in a queue of the message-broker(The intermediate that handle data transmission between clients) edge and thereafter, all users subscribed to the queue automatically invoke as push messages. Sensors transmit the data to the microcontroller through serial communication. MQTT protocol is used to build the connectivity between the ESP8266 chip and the cloud server.
Why use MQTT over HTTP protocol,

Parameter	**MQTT**	**HTTP**
Protocol Design	Data centric	Document centric
Complexity	Less Complexity	More Complexity
Size of header	2 bytes	8 bytes
Message size	Less as it uses binary format	More as it uses ASCII format

Table 3.2.1 – comparison between MQTT and HTTP protocols

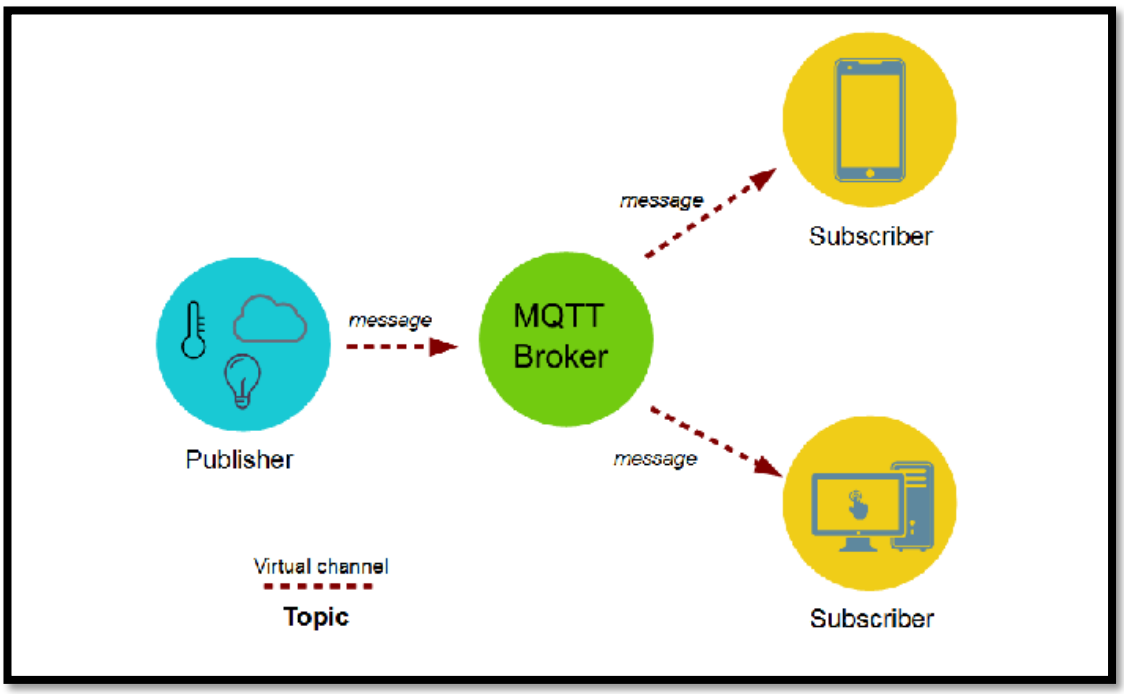

Figure 3.2.2 – IoT based real time data acquisition by MQTT protocol

3.7. Testing

Software and hardware testing must be done along with the development process to figure out the errors and defects that were made while the development phases. As well as it's very essential to ensure the quality of the final outcome. A constant testing process is required each and every phase that we are following in IoT based development life cycle like unit testing, integration testing, system testing as well as user acceptance testing.

3.7.1. Unit Testing

Unit testing is a one of testing method to make sure the each and every single component such as piece of code and hardware devices are doing what it's supposed to do. Constant testing process is required for an impressive performance of the IoT based product. Because many current leakages, sensor errors and other hardware issues can be occurred during the implementation. Volt meters, testers and multimeters can used for accomplish the reliable testing process. As well as code lines can debug using required IDEs.

3.7.2. Module Testing

Module testing is described as a software testing typecast, which analyzes individual subprograms, classes, subroutines, or procedures in a program. It provides facility for debug small pieces of the program instead of testing whole program. By using this method, more sophisticated of testing can be easily managed.

3.7.3. Integration Testing

Integration testing is a one of testing method to analyze whether different sub parts of the product are working/functioning properly together. Then it's really helps for

check whether IoT module and data communication are functioning properly with other sub modules. This testing is required to do by individual member.

3.7.4. System Testing

System testing could be a level of testing that validating the entire and integrated product. It provides the evaluating facility for end-to-end system specification. This testing process can be done by single member of the group.

3.7.5. User Acceptance Testing

This is a type of a testing achieved by the client or the end user to justify/ accept the final product before deploy the application to the live environment. This is very helpful for production team to identify and fix the problem in the product. This is required to fulfill by the end users based on their requirements.

3.8. Work breakdown chart

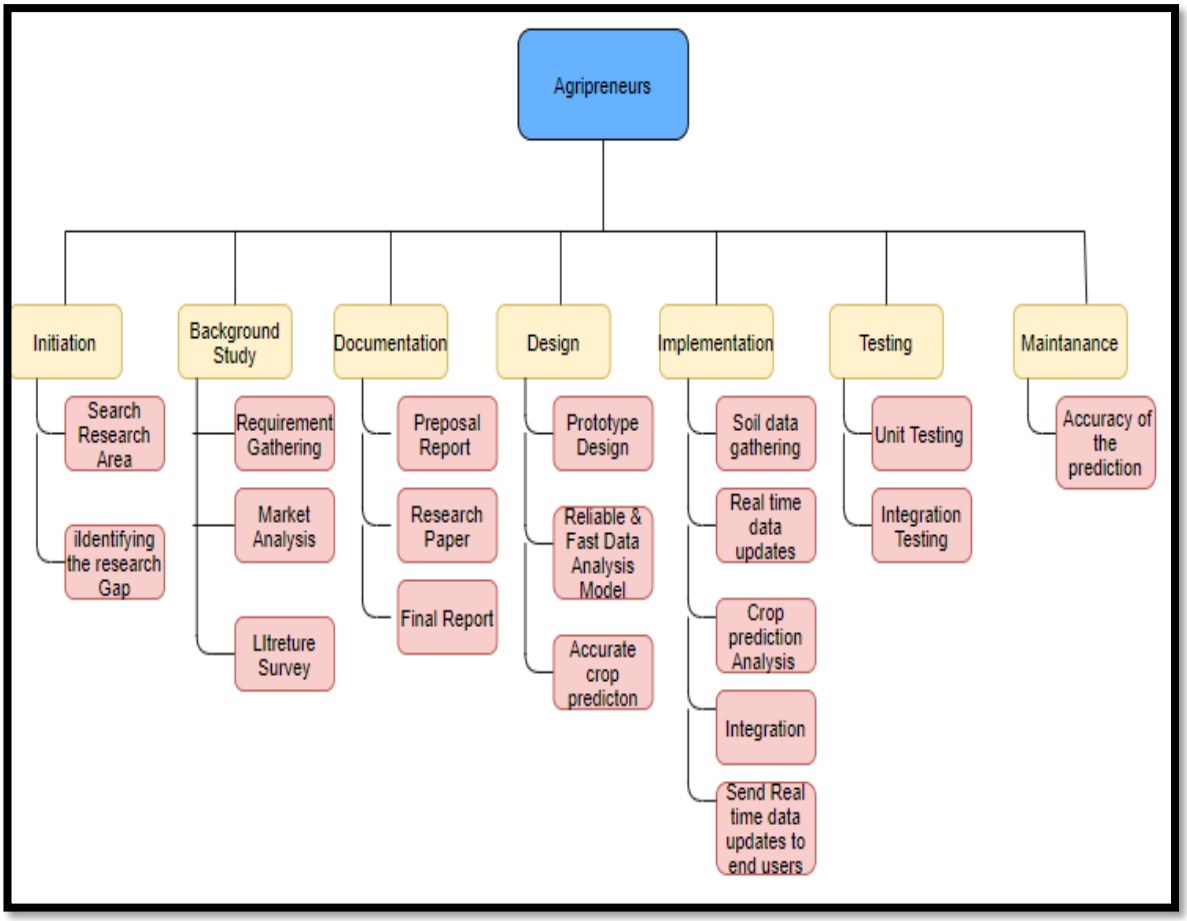

Figure 3.8.1 - Work breakdown chart

3.9. Gantt chart

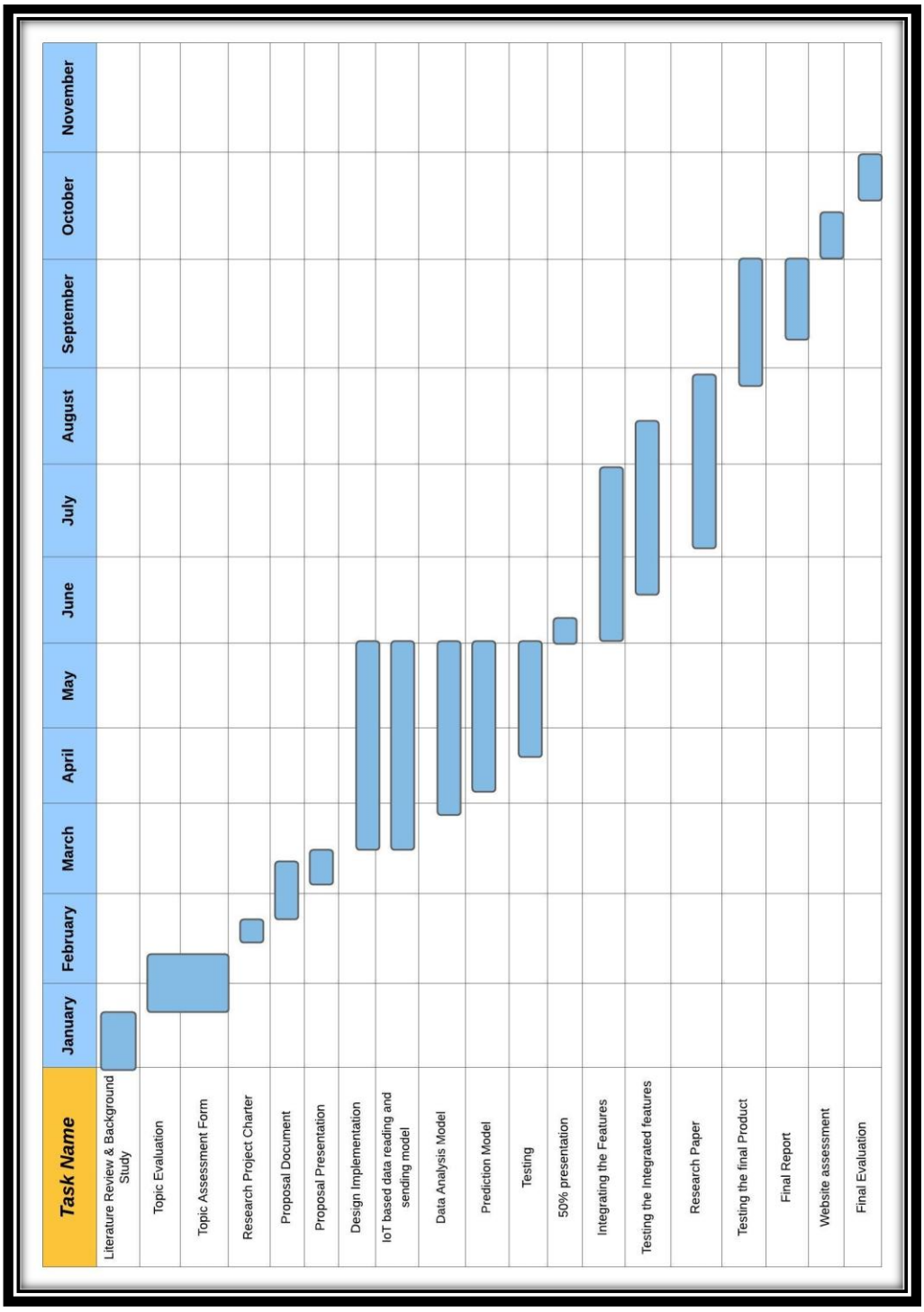

Figure 3.9.1 – Gantt chart

4. DESCRIPTION OF PERSONAL AND FACILITIES

4.1. Optimal data capturing and processing

1) The sensor data must be occupied precisely

   - There will be soil moisture and temperature sensors used to grab soil moisturizer and air temperature.

2) Conclude the number of times need to be collected the data for same location

   - In terms of get most accurate value, the number of data capturing must be decided.

3) What kind of sensor data must be stored in the database

   - The data captured from the sensors will be evaluated, and the data sets which is required in order to utilize as inputs of algorithm will be saved in the database.

4.2. Analysis of sensor data using real time data updates for best crop prediction

1) Capture the required sensor data from the sensors

- Retrieve the soil and weather data from the cloud server to analyze according to the logged consumer.

2) Analyze and detect the soil/weather data of the particular area

   - The data collected from data sources will be analyzed in terms of identify the soil/weather condition of the location.

3) This process (2) is real time and end-users are able to see the soil and weather condition using their mobile application.

   - The mobile application provides, will have the facility of providing a graphical view of the land condition.

4) According to the final average value of the soil/weather of the location, the best crop/s will be predicted

   - The best crop/s will be justify according to data by suitable algorithms.

5.PROJECT REQUIREMENTS

5.1 Functional Requirements and Non-Functional Requirements

The following attributes were considered to improve the quality and performance of the system.

Functional requirements of this system are;

- The soil data reading process should be accurate more than 95%.
- The data analysis algorithm should be accurate more than 95%.
- Data transmission – The IoT data must be updated in real time.
- Data Transmission protocols should be fast and reliable.

Non-Functional requirements of this system are;

- Throughput
- Interoperability
- Portability – The IoT based integrated model need to be operated easily and should be handle it easily.
- Waterproof / Dustproof – The IoT based integrated model should be use in any weather condition.
- Concurrency

5.2 Technology and Tool selection

Technologies

- MQTT
- NodeMCU microcontroller
- Cloud computing and server management

Tools

- Microcontroller Programming – Lua IDE
- For crop prediction – Random Forest
- Cloud database - Firebase

6. COMMERCIALIZATION PLAN

The “Agriprenuers” application mainly focuses on non-farmers who are looking for additional monthly income. The majority audience that focused on this application are earning less than 100,000. Then our primary purpose is to generate entrepreneurs in Sri Lanka. Then we are planning to make that solution commercial and additional features can be added in the future. The main physical device won’t be expensive and mobile application most likely free available on playstore. But there will be addition cost for application maintenance.

7.CONCLUSION

This research project is based on IoT methodologies for motivate non-farmers who lack of proper knowledge but interest on farming. The entire project comes up with a user-friendly gamification model that being with a customer until selling stage. This work mainly focuses with IoT, data analysis and prediction models. Finally, the IoT model has been planned to release to the market in high quality, user-friendly and resistance.

In the project duration of the year, initial half of the year is to design the IoT hardware model to collect soil/ weather condition and sending the collected data into cloud platform via MQTT protocol. And the rest of the year will be allocated to train the data analysis model and make compatible the model with real time data updates.

8. Budget and Budget Justification

The survey illustrates (Figure 6.1) the number of people hope to spend on a "Agripreneurs".

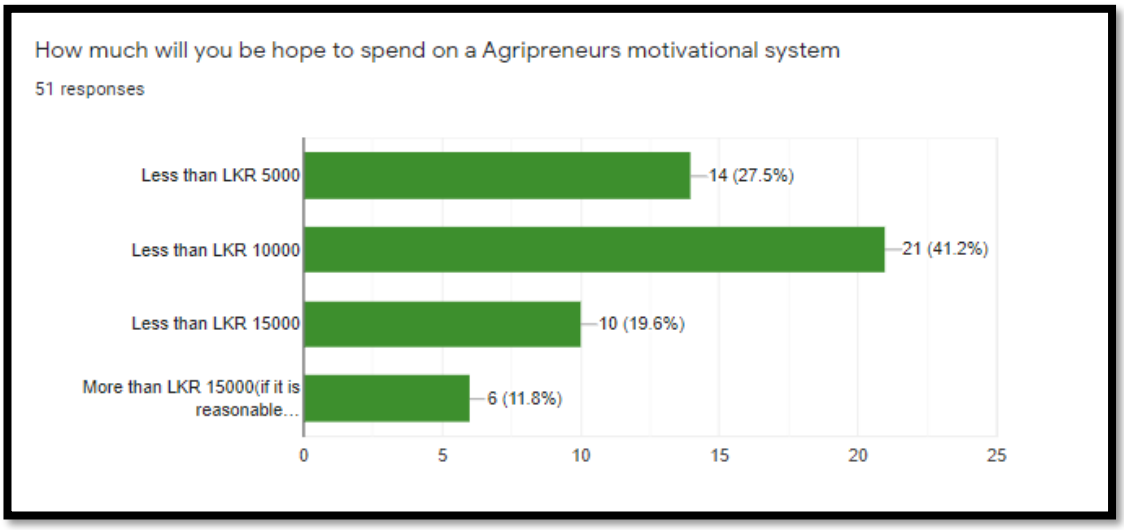

Figure 6.1 – summary of responses of the budget

ITEM	PRICE
Humidity and temperature Sensor Module	LKR. 200
Soil moisture sensor module	LKR. 150
NodeMcu Lua CH340G ESP8266 WIFI Internet Development Board Module	LKR. 730
Battery + Charging circuit	LKR. 600
TOTAL	LKR. 1680

Table 6.1-Budget

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