UNIVERSITI TEKNIKAL MALAYSIA MELAKA

PLANT WATERING SYSTEM

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Computer Engineering Technology (Computer Systems) with Honours

by

MUHAMMAD FIKRI BIN FAINUL HISHAM
B071510157
931018-04-5457

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA

Tajuk: Plant watering system

Sesi Pengajian: 2018

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.....

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Alamat Tetap:

No. 44 Jalan M14,

Taman Merbok,

Bukit Katil,

75450 Melaka

Tarikh: 06 /12 /2018

Disahkan oleh penyelia:

.....

Niza Bte Mohd Idris

Cop Rasmi Penyelia

Tarikh: 06 /12 /2018

DECLARATION

I hereby, declared this report entitled Plant watering system is the results of my own research except as cited in references.

Signature: ……

Author : Muhammad Fikri Bin Fainul Hisham

Date:

APPROVAL

This report is submitted to the Faculty of Engineering Technology (FTK) of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Computer Engineering Technology (Computer System) with Honours. The member of the supervisory is as follow:

Signature: …….

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ABSTRAK

Dalam era sekarang, kekurangan makanan dan kekurangan air berlaku disebabkan peningkatan populasi. Oleh itu untuk mengelakkan masalah ini, kita perlu mempromosikan sektor pertanian. Tetapi pembaziran air lebih banyak dalam sektor ini dalam bentuk pembalakan air sambil menyiram ladang pertanian melalui pengairan. Proses penyiraman manual memerlukan dua aspek penting untuk dipertimbangkan: bila dan berapa banyak air. Untuk menggantikan aktiviti manual dan membuat kerja tukang kebun lebih mudah, kami telah membuat sistem pengairan kilang automatik. Oleh itu, sistem pengairan tanaman automatik perlu direka bentuk untuk bekalan air yang betul di ladang. Makalah ini berkaitan dengan sistem pengairan tanaman automatik yang secara automatik mengesan kandungan kelembapan tanah dan memutuskan sama ada pengairan diperlukan atau tidak dan berapa banyak air diperlukan untuk tanah. Sistem ini menggunakan mikrokontroler ATmega2560. Ia diprogramkan untuk mengesan kandungan kelembapan jika tanah melebihi tempoh masa. Apabila kandungan kelembapan kurang daripada had yang ditetapkan, ia akan mula membekalkan jumlah air yang dikehendaki sehingga mencapai batas. Jadi apabila tanah kering, pam akan secara automatik menyiram ladang dan apabila tanah basah, pam akan secara automatik dimatikan, di sana dengan membasmi keperluan tenaga manusia dan memelihara masa. Kaedah ini juga bermanfaat kepada petani dan isi rumah.

Sistem direka sedemikian rupa supaya ia melaporkan keadaan semasa serta mengingatkan pengguna untuk menambah air ke tangki. Semua pemberitahuan ini dibuat melalui aplikasi mudah alih. Kami berharap melalui prototaip ini kita semua boleh menikmati mempunyai tumbuhan, tanpa bimbang tentang tidak hadir atau melupakan.

ABSTRACT

Within the present time, food shortage and water shortage happens due to the increment in populace. So to avoid this problem we have to be advance the agriculture segment. But water wastage is more in this segment within the frame of water logging whereas watering the agricultural areas through irrigation. The manual process of watering requires two vital viewpoints to be considered: when and how much to water. In order to replace manual exercises and making gardener's work simpler, we have create automatic plant watering system. Subsequently an automatic plant irrigation system must be designed for the proper water supply within the areas. This paper deals with an automatic plant irrigation system which automatically senses the moisture substance of the soil and choose whether irrigation is required or not and how much water is required for soil. This system employments ATmega2560 microcontroller. It is programmed to sense the moisture substance in case the soil over a period of time. When the moisture substance is less than the limit which is predefined, it'll start providing the required amount of water till it reaches the limit. So when the soil is dry the pump will automatically water the areas and when the soil is wet the pump will naturally switch off, there by eradicate the require of labor and conserve the time. The method also useful to the farmer and household.

System is planned in such a way that it reports its current state as well as reminds the client to add water to the tank. All this notices are made through mobile application. We trust that through this model we all can enjoy having plants, without being stressed about absent or forgetfulness.

DEDICATION

To

My Amazing Parents

A lovely soul who always support me from behind, those who really contribute much in my report.

My Dear Grandmother

For always being there when I am in need

My Lovely Lecturer

For dedicated in teaching me all this years and for supporting and encouraging me to believe in myself

Myself

For always tried the best and not giving up. A lone soul that need to be guided and being myself.

ACKNOWLEDGEMENT

The greatest thank you ever to my lecturer, Madam Niza Binti Mohd Idris as well as our Dean Prof. Madya Mohd Rahimi Bin Yusoff who open this opportunity to all third year students to make their own project including me with the title “Automatic Watering System”. This kind of chance give me a lot of knowledge start from my project to finish my report.

I would like to thank my father and my mother also my friends who supporting me and guide me till I finish this report.

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CHAPTER 1

INTRODUCTION

2.0 Introduction

Automatic watering system is indispensable for households who want to grow plants but do not have time to water them. This system will provide the user with automatic action according to the sensor reaction. By using soil moisture sensor, the system will detect the dampness of the soil if it needs more water. Next, the ultrasonic sensor start to detect the water level in the water tank. Both sensors are the main component of this project.

The system starts from the sensor detection. Then, the microprocessor will receive the data (response from the sensor). The microprocessor will process the data and if the result hit a certain condition the motor will run. The motor will pump the water through the drip pipe. The sensor will keep sensing the soil moisture and if the moisture hit the optimum value, the motor will stop pump the water to the drip pipe.

For the ultrasonic sensor, the sensor will discover the water level in the tank. If the water level is too low, the LCD will display the water status or notification. By using the IoT technology, the status of the system will be sending to the user through Wi-Fi connection. The data will be sent to the custom made app which can be installed in the android phone. So, the user can get the notification or status of their plants through their android phone.

2.1 Background

This paper will review the research conducted on plant-watering system. The aim of this study was to clarify several aspects of equipment or tools to use in this project. One of the objective of this project is to create a system that is suitable with the irrigation watering system. The research data in this paper is drawn from two main sources, journal and technical report. The result should make a vital contribution towards the field of agriculture. This inquire about gives an energizing opportunity to progress our information of the technology in agriculture. The main reason for choosing this topic is personal interest. Chapter two starts by laying out the hypothetical measurements of the research, and looks at the related researches by others.

Automatic watering system research has been done by many before. Based on previous literature, the soil moisture sensor has been frequently used in this kind of project. The soil moisture sensor will distinguish the soil dampness level. Next, the automatic watering system by using weather forecast. This system is using the humidity sensor. The humidity sensor will detect the humidity of the environment and calculate the value to forecast the weather. The watering system use in this project is the drip irrigation method. The drip irrigation method is a very efficient method to conserve the use of water. Some model from previous literature shown there is a tank for the water storage. Ultrasonic sensor will be implementing in this project to collect the data information on the water level in the tank.

Past writing demonstrated that it is conceivable to understand this venture. Most research use Altel as the microcontroller. With the help of the soil moisture sensor, mostly the research is successful but it is not enough variety of system. The other researches use the humidity sensor to forecast the weather. Some of them try to link them with IoT to make the system more functional. Based on my research, soil moisture sensor is a good tool to use in this project as the sensor can detect the moisture of the soil. However, the

humidity sensor is not suitable to use based on the weather in our country Malaysia. Our weather is not predictable due to the equator circle. To integrate the system with IoT is the best part of this project. This project also adds another sensor to detect the amount of water level in the tank to make sure the system run smoothly.

2.2 Problem statement

This system will ensure the plant will be watered based on their need and the user can aware or informed of the outcomes and status.

Today we have too many failure plants across the neighbourhood. If we ignore this problem; a lot of time is needed to replant the plant. This problem started due to busyness of the households with working and their life. Every household want to have their own crop which they can plant anything they needed in there but they don't have time to watering their plant.

The other problem is the efficiency use of the water. Mostly, household only use normal pipe water to watering their plant. Some plant do not need so much water. Another reason, because of their lacking time, they tend to use so much water to watering their plant in one go so, they do not need to water their plant later.

The next reason is the needed of the plant. Basically humans do not know how moisture their soil is. They can take a guess from their observation but cannot get the exact value of the dryness or moist of the soil. This system will allow the user to get the value of the soil moisture. Because of that, the user is well informed about the soil moisture.

To solve this problem, automatic watering system is created. Automatic watering system will water the plant based on their need and the user is notified about the status.

2.3 Objectives

The goals of this extend are to manifest a watering system that will solve human's problem. First, Technology can make human's life more convenient in the future. By using a system, everything can be automatic. Second, ensure a more efficient use of water in the future. By applying the drip irrigation method, the water can be save a lot. The household can save their expense on the water bill.

Next, to make sure the plants get enough nutrients. By apply the automatic watering system, the watering schedule is automatic so, the plant will continue receive the nutrient from the moisture of the soil. After that, the system can be improved with the crop for big agriculture. By refer to the system, a bigger system can be made to help farmer increase their profit.

Subsequently, the objective of this extend is to plan a basic, simple to introduce microcontroller-based circuit to screen and record the values of soil dampness and fertilizer level that are persistently altered and controlled in arrange to optimize them to realize most extreme plant development and yield. Lastly, to challenge myself to build a system on my own based on information from previous literature review.

2.4 Scopes

The automatic watering system scopes are small. This system is perfect to implement within the household, office and small crop only. The system can only connect to the android smart phone. For this project, the model of the drip irrigation hose will not more than 1 meter. The soil moisture sensor that will be use is one only as the model is small. After that, the water tank use in this project also in small scale. Based on my observations, there's only one pump needed in this project due to the small model.

The scopes can be change based on the size of the project. If the project is using by farmer then, all the limitations can be remove and the components need to be added as the size of the area is larger. The targeted plant is onion only.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This paper will review the research conducted on plant-watering system. The aim of this study was to clarify several aspects of equipment or tools to use in this project. Part of the aim of this extend is to make a system that is compatible with the irrigation watering system. The research data in this paper is drawn from two main sources, journal and technical report. The results should be an important contribution to the field of agriculture. This study about gives an energizing opportunity to progress our information of the technology in agriculture. The main reason for choosing this topic is personal interest. Chapter two starts by laying out the hypothetical measurements of the research about, and looks at the related investigates by others.

2.1 Automated irrigation system by using weather forecast

Over the past decade, most research in the field of agriculture has emphasized the use of soil moisture sensor. Many people have used this method. In later a long time, there has been an expanding sum of writing on the automated irrigation system by using weather forecast or weather prediction. Water is very important to farmer, according to the recent studies; more than one-third of the world populace would confront add up to water

deficiency by the year 2025. Recent evidence suggests that this strategy makes a difference to utilize the accessible water assets more proficiently, (Susmitha *et al.*, 2017). This integration can help to reduce the risk of over irrigation or wastage of water by surface run off which can further ruin the crops, (Malhotra, Saini and Kale, 2017). This method also uses the soil moisture sensor as the input but integrate it with the humidity sensor. The system anticipating the climate by detecting two parameters temperature and mugginess, (Susmitha *et al.*, 2017). Also, depending on the temperature and humidity a crop may need more or less water than usually needed for its optimum growth, (Malhotra, Saini and Kale, 2017). The watering system used in this paper is irrigation. There are four irrigation methods available. Diverse water system techniques utilized are surge water system, man and tube strategy, dribble water system and shower water system, (Susmitha *et al.*, 2017).

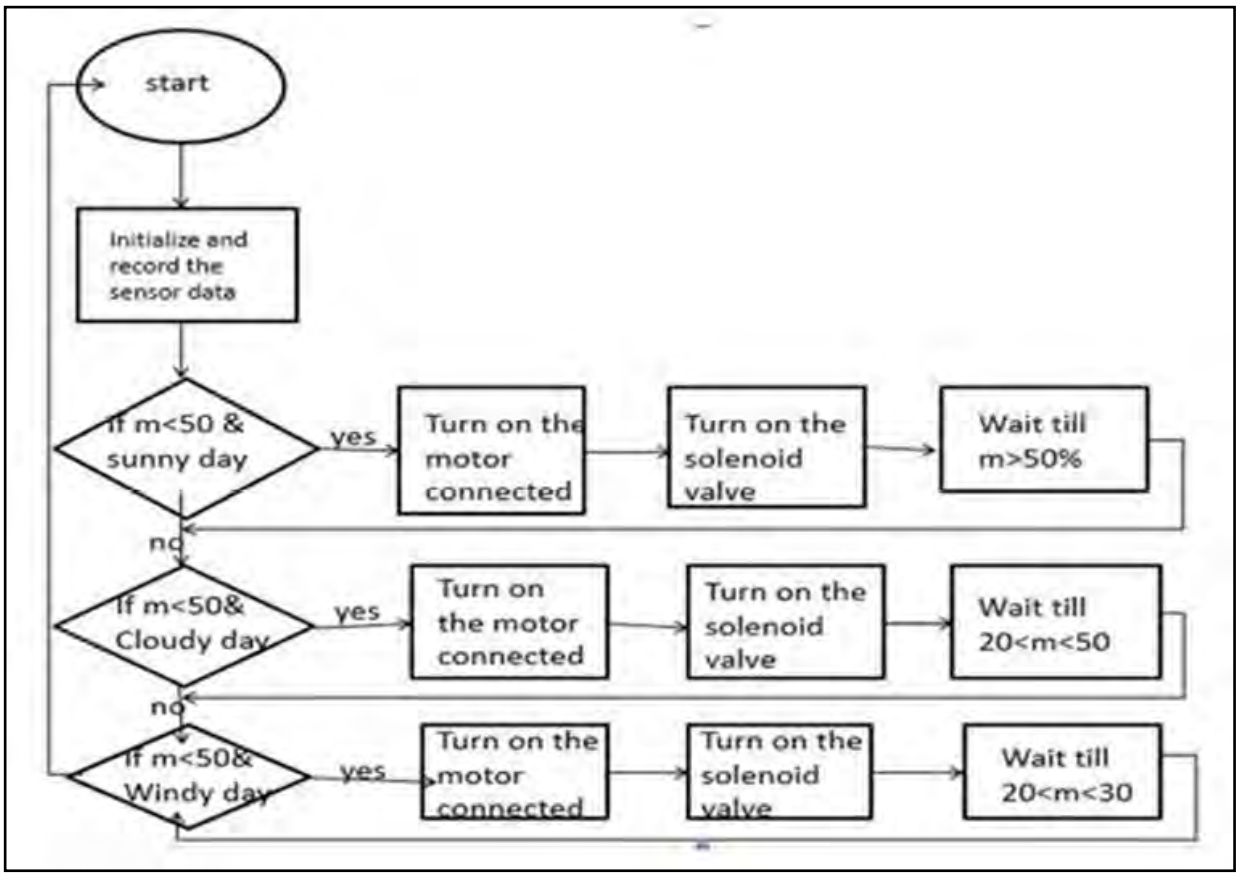

Figure 1: Flow diagram (Susmitha *et al.*, 2017)

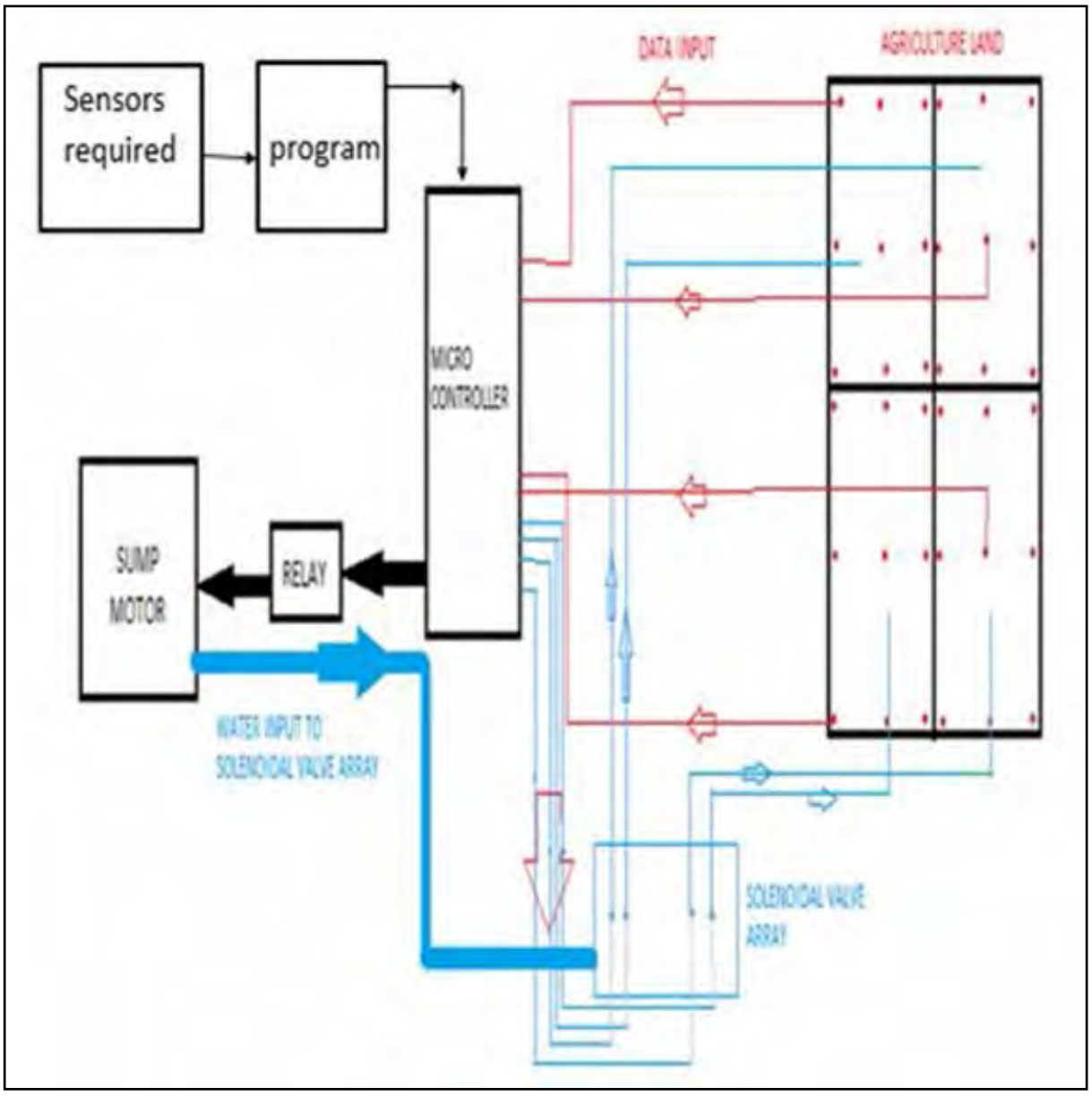

Figure 2: Block diagram of the methodology used (Susmitha et al., 2017)

Weather forecast solely based on the sensor only. Moisture sensor set within the soil, temperature sensor, humidity sensor faculties the current values and sends the information to information acquisition framework, (Susmitha *et al.*, 2017). Microcontroller will process the data. These information will be prepared utilizing a few code which can offer assistance us for the climate expectation and the yield is assed to the microcontroller, (Susmitha *et al.*, 2017). Based on the later literature, the comparison been made is positive. By applying the weather forecast system, the system is

much better than the old system. Productivity of water supply been expanded by 20 percent by presenting climate expectation into our proposed model, (Susmitha *et al.*, 2017). There has been a slight increment within the photosynthesis rate than the over specified show by 22 percent, (Susmitha *et al.*, 2017). The result is interesting. Based on the sensor, the data collected to determine the amount of water need by the plant. There are several action for the system based on the sensor reading. For an example, adequate watering, minimal watering, excessive watering or no watering at all, (Malhotra, Saini and Kale, 2017). There is also condition to watering the plant to the optimum. As state from a journal, Adding water at night would mean water logging for most part of the day, as there would be no sunlight to photosynthesize and use water, (Malhotra, Saini and Kale, 2017). Adding water at noon means water would get hot and this hot water on reaching roots would damage them, (Malhotra, Saini and Kale, 2017). The main objective is to form the utilization of the water more productive by utilizing automatic water system. The other important thing is the type of microcontroller used in the literature. The Arduino controls the water pump based on the reading from the moisture sensor, (Malhotra, Saini and Kale, 2017). Together these studies provide important insights into the weather forecast system integrate with the old watering system. The weakness of this system is the weather in our country is irregular and hard to predict. Based on my personal experience, the weather could be dark at a time and then, in a few minutes it can change drastically. One more thing is the use of many sensors. By using many sensors, it is hard to make the program and to let microprocessor choose the one that needed based on the condition at a time. More sensor means more complex program need to be create to make the all the sensor functions. One more thing is that the system does not have manual function if there are some problems with the system in the future. The system does have the positive impact on human. If the sensor is working together then, it is very convenient to the human and the crop itself. The water also can be use efficiently and it can lower the cost. Water could be use efficiently and this is a large contribution to the field of agriculture.

2.2 Drip Irrigation System Using Internet of Things

Traditionally, it has been argued that the Internet of Things, commonly known as Internet of Thing (IoT) could be a promising region in innovation that's developing day by day, (Kissoon, Deerpaul and Mungur, 2017). The most interesting finding was that it is conceivable to utilize low cost gadgets to screen and be informed approximately the status of an agricultural area in real time, (Kissoon, Deerpaul and Mungur, 2017). The technology integrated with the drip irrigation to develop a system. Previous strategy is an confined water system system where the rancher doesn't upgraded with the water system status and afterward slacks in savvy utilization of water due to client command without considering the condition of soil, (Parameswaran and Sivaprasath, 2016). As said by later literature automated innovation of water system the human mediation can be minimized, (Kansara *et al.*, 2015).

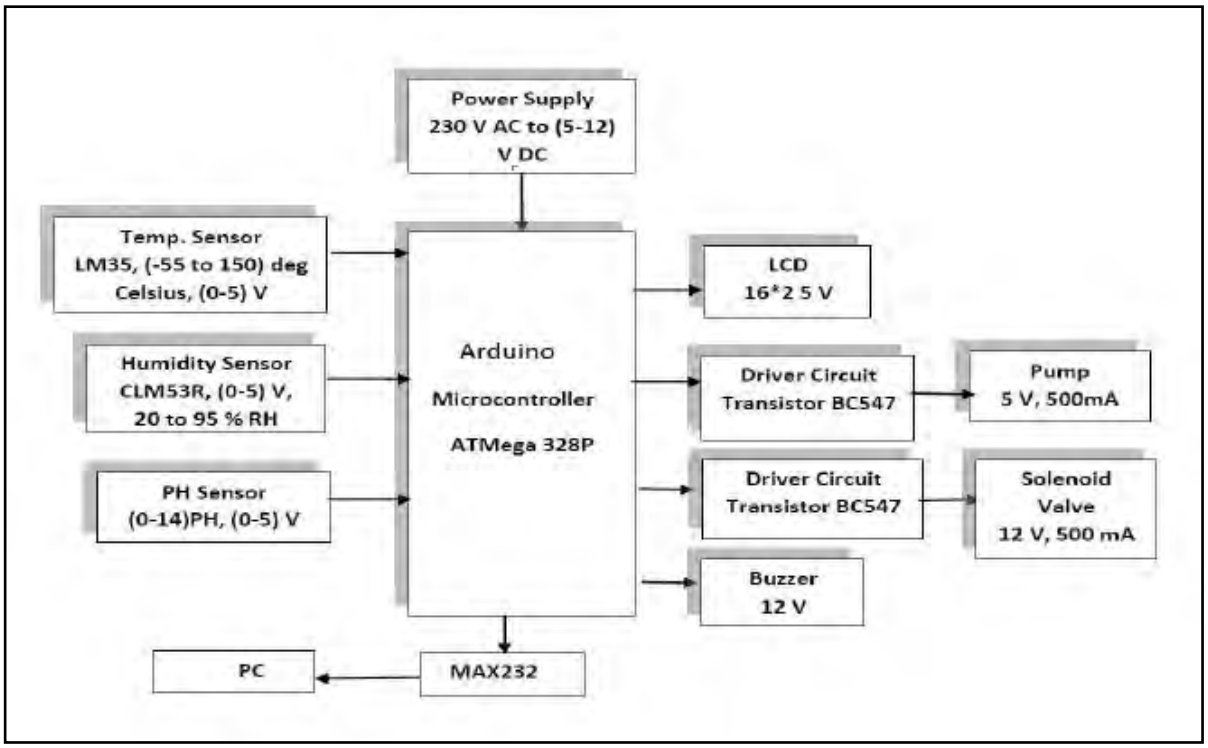

Figure 3: Block diagram of Smart Drip Irrigation System, (Parameswaran and Sivaprasath, 2016)

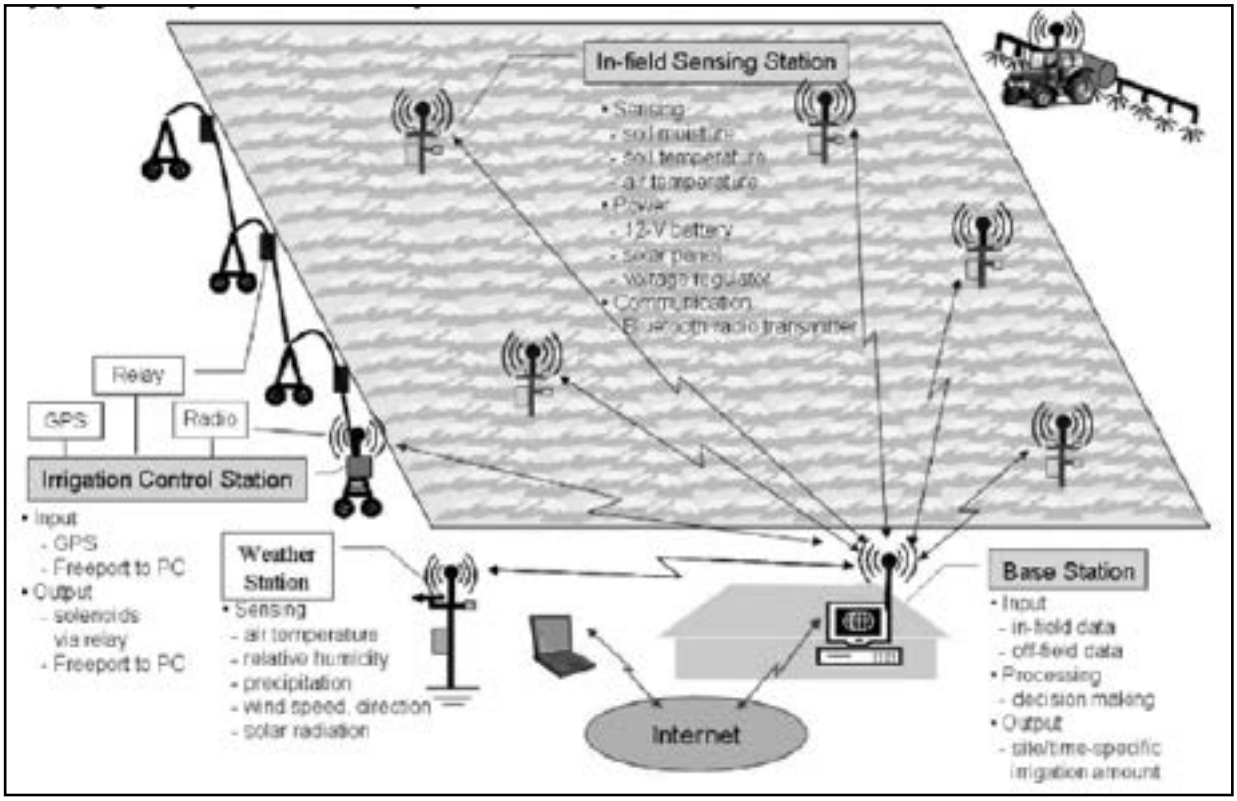

Figure 4: Diagram of IoT system, (Kansara *et al.*, 2015)

The Internet of Things (IoT) is the arrange of physical objects that can be implanted with hardware, computer program, sensors, and organize network, which empowers these objects to gather and trade information, (Parameswaran and Sivaprasath, 2016). IoT is the gateway of communication among things, (Kissoon, Deerpaul and Mungur, 2017). A smart irrigation system that can be controlled and monitored has been devised to manage the usage of water more efficiently, (Kissoon, Deerpaul and Mungur, 2017). Another literature state that automatic irrigation system which makes use of Android smart phone for remote control, (Kissoon, Deerpaul and Mungur, 2017). There are several reason to implement IoT. One of them was to analyze sensor devices, which take in some physical information and address it back to the user, (Kissoon, Deerpaul and Mungur, 2017). The reason is for improve the security of crops from pests and insects in grain stores. Actually how IoT works. The concept of IoT and web services have been used in order