SMART WATERING PLANT SYSTEM

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ABSTRACT

The aim of this project is, making a smart agriculture system using IOT technology. We emphasize this project using smart irrigation which include smart control and intelligent decision making based on accurate real-time field data. It also, monitors the subject (sunflower) via android application or any smartphone. We named this project with " Smart Watering Plant System " because we can even water this plant while we are far from it or while doing something else. In this project we used soil moisture sensor. The moisture sensors measure the moisture level (water content) of the plants. If the moisture level is found to be below the desired level the moisture sensor sends the signal to the Arduino nodeMCU board and then it will send the exact reading of that exact time to smartphone and informs the user to water their plant. The whole information about the agriculture field is send through an android application. Furthermore, our observation is concentrated on soil moisture and the height of the plant. Based on the analysis, we have found the plant that is watered automatically lush even more than watered without automation watering system. As a conclusion, we have achieved the objective of this object and we are hoping that it will ease the user in their daily life.

ABSTRAK

Tujuan projek ini adalah untuk menghasilkan sebuah sistem "smart agriculture" dengan menggunakan teknologi IOT. Kami menunjukkan projek ini menggunakan "smart irrigation" dengan "smart control" dan membuat keputusan secara pintar berdasarkan data dan masa yang tepat. Seterusnya, memantau operasi melalui aplikasi android didalam semua telefon pintar. Kami namakan projek ini adalah " Smart Watering Plant System " sebab projek itu membolehkan kami menyiram pokok bunga ketika berjauhan dengan pokok itu ataupun sedang membuat kerja lain. Projek ini kita menggunakan sensor kelembapan tanah. Sensor kelembapan tanah ialah bertujuan untuk mengukur tahap kelembapan tanah tumbuhan. Jika tahap kelembapan didapati berada di bawah tahap yang ditetapkan, sensor kelembapan akan menghantar isyarat ke "Arduino nodeMCU board" dan kemudian menghantar info kelembapan tanah tumbuhan ketika itu ke telefon pintar pengguna dan memberitahu kepada pengguna supaya menyiram tumbuhan mereka. Keseluruhan maklumat mengenai tumbuhan akan dihantar ke aplikasi android. Selain itu, pemerhatian kami tertumpu pada kelembapan tanah dan juga ketinggian pokok. Daripada analisis yang dijalankan kami dapati bahawa pokok yang disiram automasi lebih subur berbanding pokok tanpa siraman automasi . Kesimpulan projek ni, kami berjaya mencapai objektif projek kami dan berharap dapat memudahkan kerja-kerja pengguna.

TABLE OF CONTENTS

CHAPTER 2 : LITERATURE REVIEW

CHAPTER 3 : METHODOLOGY

LIST OF FIGURE

LIST OF TABLE

LIST OF GRAPH

LIST OF DIAGRAM

LIST OF ABREVIATION

IOT	:	Internet Of Things
VCC	:	Voltage At The Common Collector
GND	:	Ground
IDE	:	Integrated Development Environment
LCD	:	Liquid Crystal Display
PVC	:	Polyvinyl Chloride
LED	:	Light-Emitting Diode
MARDI	:	Malaysian Agricultural Research and Development Institute

CHAPTER 1

INTRODUCTION

1.0 Overview

Since nowadays, in the age of advanced electronics and technology, the life of human being should be simpler and more convenient, there is a need for many automated systems that are capable of replacing or reducing human effort in their daily activities and jobs [1].Automatic plant watering system, which is actually a model of controlling irrigation facilities that user sensor technology to sense soil moisture with a microcontroller in order to make a smart switching device to help millions of people [2].The objectives of the project are important to ensure the research will fulfill the solution of the problem research.

The automated irrigation system with Internet Of Things IOT is feasible and cost effective for optimizing water resources for agricultural production [1].Next, the system has a distributed wireless networks of soil moisture and temperature sensor places in the root zone of the water level in tank [2].In addition a gateway unit handles sensor information, triggers actuators, and transmits data to a web application [3] .Besides of " Automatic Plant Watering System " ,plants will get the carbon dioxide anytime as it can be found from the air and also daylight [1].Most of the time for the lacking of water, the plants cannot raise well and become morbid [2].Then, supply of excessive water at a time can result a venturesome effect on the plants especially the sensitive trees like bonsai [3].Moreover, the best time for watering is early morning, while environment is cool compared evening and late night.

For the soil moisture is an important parameter in monitoring of plant growth [1].The concept of " Smart Watering Plant System " helps farmers to water the plants as well as do other activities [1].The soil moisture sensor senses the moisture in the soil and gives signal to Arduino [2].It can be the best way of performing agricultural activity.

1.1 Problem Statement

Water is the most important source for plant to make their food in the photosynthesis proses [2].In that proses the plant will use water and carbon dioxide to produce sugar (as we know the plant food) and oxygen. When rainfall is not sufficient, the plant does not get enough water to growth and it need additional water[2].when plant does not get enough water it will die. After that, we know that people do not water their plants in the garden when they are in vacation[2]. Because of that, they have to hire someone to take care their garden while they are in vacation and its very costly. Other than that, many people surmounted to take good care of expensive plants or tree like Bonsai because of improper timing or lack of watering[4]. Finally, if they want to water their plants in the big garden they have to pump the water and wait until all the plants in the garden are properly watered and it will make they to stop doing other activities which are also important for them[5] .So the users can save their time by turning on/off the motor automatically using smartphone.

1.2 Objectives

The objectives of this project are :

1. To build monitoring system by using smartphone
2. To build smart watering systems for plants
3. To makes farmer's work become easier

1.3 Contribution Of The Research Work

This study work provides knowledge on how technology can help our daily work such as farmers. The result it can make the work become easier by using technology.

1.4 Scope

The scope of this project are :

The project can automatically determine if the soil-moisture is below the minimum allowable limit, ensures plants are not effected by moisture stress at critical growing times, decreases human intervention, will be using a microcontroller to control the right amount of water to release based on the moisture content of the soil, uses a solar panel as the power source of the system, can simply determine the water level condition of the water tank by water level indicator.

1.5 Limitation Of The Project

Some chemical reaction erode the sensitivity and physical structure of sensor. Next, this project focus on outdoor and radius this project in 3cm-5cm.

1.6 Project Questions

1. What is automatic plant watering system ?

   - Most people are too lazy to water the potted plants everyday
   - This section a simple and exciting automatic plants watering system that you can build yourself

2. How do you build a self-watering system for plants ?

- Convert them to self-watering devices to help keep your plants properly watered when you are out of town
- Through moisture the soil in container
- Connect Arduino NODEMCU, soil moisture sensor
- When all circuit done, arduino must to connect with phone

3. How do soil sensor work ?

- Electromagnetic sensors use electrical circuits to measure changes in texture, salinity, moisture and more
- Optical sensors measure reflected light and help users predict things like moisture content

1.7 Conclusion

In this chapter, we make planning first to give we complete the project easier. Then we prepare the components like Arduino MCU, soil moisture sensor, motor pump, water tank and others that we need use in the project. Furthermore, most people are too lazy to water the potted plants everyday, so we build this project to make users work become easier and not waste time.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This project is based on Internet of Thing (IOT). A model of controlling watering facilities will help millions of people. All knowing, soil moisture level will reduce the number of unnecessary irrigation events. This model are showing the basic switching mechanism of water/pump using sensor.

2.1 Smart Watering Plants System

Firstly, in the age of advanced electronics and technology, the life of human being should be simpler and more convenient, there is a need for many automated systems that are capable of replacing or reducing human effort in their daily activities and jobs [1].Smart watering plants system is actually a model of controlling irrigation facilities that uses sensor technology to sense soil moisture with a microcontroller in order to make a smart switching device to help millions of people [2].Can we automatically water our home and garden plants without bothering our neighbors when we decide to go on vacation or somewhere else for a long period? These are some question that can be heard quite often and answer on all of them is encouraging because advanced technology provides us very wide range of possibilities nowadays. Actually, there is a very simple and economical solution for all these question and perplexities. In the form of unique intersection between biological engineering and electronics, the solution requires only a little bit knowledge of electronics as well as knowledge related to botany and plant physiology .

Most people are too lazy to water potted plants on their rooftop garden or indoor every day. Irrigation control technology that improves water application efficiency is now available. All knowing soil moisture level sensors will reduce the number of unnecessary irrigation events [1].The objectives of the project are important to ensure the research will fulfill the solution of the problem research. The temperature sensors, soil moisture sensor placed in root zone of plant and gateway unit handles the information about sensor and carry data to a web application [2].Sensors sense water level regularly and give the information to farmer through smartphone [3].Farmers or users controls the motor using smartphone without going garden or farm [4].If the water level reaches at danger level, automatically motor will be stop without conformation of users. Another than that, automatic irrigation technique irrigated using wireless sensor network [5].This idea was developed by improve irrigation system and reduced cost of irrigation water level. This information stored at center monitor and also passes to more data collection interface and then broadcast to the wireless sensor node.

The automated irrigation system with Internet of Things (IOT) is feasible and cost effective for optimizing water resources for agricultural production [1]. This automated irrigation system with IOT allows it to be scaled up for larger open fields [2]. The system has a distributed wireless networks of soil moisture and temperature sensor placed in the root zone of the plants and water level sensor is placed in tank for monitoring the water level in tank. The core elements of photosynthesis are light, water and carbon dioxide. Plants will get the carbon dioxide anytime as it can be found from the air and also daylight can be provided if it is kept in the right place [1].Most of the time for the lacking water, the plants cannot raise well and become morbid [2].Another than that, supply of excessive water at a time can result a venturesome effect on the plants [3].Such trees also need timely water supply for the perfect growth. Morever, the best time for watering is early morning, while the environment is cool. The watering system for gardening using WSN controlling the irrigation system using a valve [4].The system only uses soil moisture sensors which is not enough to detect the level of water in field as water doesn't instantly absorb by soil . Morever, the system is not optimized for the best timing of watering.