GSM BASED PLANT WATERING SYSTEM

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DECLARATION

TITLE : GSM BASED PLANT WATERING SYSTEM

SESI : DECEMBER 2016

We **1. THINESH A/L SOUNDARAJA**

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are final semester students of Diploma in Electronic Computer Engineering, in Polytechnic Seberang Perai, Jalan Permatang Pauh, 13500 Permatang Pauh, Pualu Pinang.

2. We agree that "GSM Based Plant Watering System" and intellectual property contained within it are the work / design of us without taking or imitate any intellectual property rights of others.

3. We agreed to relinquish ownership of intellectual property of' GSM Based Plant Watering System using Arduino Uno and GSM' to Polytechnic Seberang Perai to meet the needs of completion in Diploma in Electronic Engineering (Computer) Engineering Studies to us.

Made and truthfully recognized by;

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APPRECIATION

Praise to God, the one and only, for giving me strength to complete this final year project. The project delivered in this paper could not have been accomplished without the help of many individuals. First and foremost I would like to take this opportunity to extend my greatest gratitude to my family for their understanding and commitment during my crucial time researching and finishing this final year project.

ABSTRACT

The greenhouse based modern agriculture industries are the recent requirement in every part of agriculture in our country. In this technology, the humidity of plants is precisely controlled. Due to the variable atmospheric circumstances these conditions sometimes may vary from place to place in large farmhouse, which makes very difficult to maintain the uniformity at all the places in the farmhouse manually. It is observed that for the first time an android phone-control the Watering system, which could give the facilities of maintaining uniform environmental conditions are proposed. The Android Software Development Kit provides the tools and Application Programmable Interface necessary to begin developing applications on the Android platform using the Java programming language. Mobile phones have almost become an integral part of human life serving multiple needs of humans. GSM (Global System for Mobile Communication) is used to inform the user about the exact field condition. The information is passed onto the user request in the form of SMS.

ABSTRAK

Dalam projek kami, industri pertanian moden rumah hijau berdasarkan keperluan baru di setiap bahagian pertanian.Dalam teknologi ini, kelembapan tumbuhan tepat dikawal.Oleh kerana, keadaan atmosfera berubah keadaan ini kadang-kadang bole berbeza dari satu tempat ke satu tempat yang menjadi sangat sukar untuk mengekakalkan keseragaman di semua tempat.Diperhatikan bahawauntuk kali pertama android kawalan sistem penyiraman yang memberi kemudahan untuk mengekalkan keadaan persekitaran seragam dicadangkan.Android Software Devolepment Kit menyediakan alat dan programmable interface perlu mempunyai untuk memulakan membangunkan aplikasi pada platform Android menggunakan bahasa pengaturcaraan Java.Telefon Bimbit telah hampir menjadi sebahagian dalam kehidupan manusia.GSM digunakan untuk memeaklumkan pengguna mengenai keadaan.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION TO THE SYSTEM

Drip irrigation is artificial method of supplying water to the roots of the plant. It is also called micro irrigation. In past few years there is a rapid growth in this system. The user communicates with the centralized unit through SMS. The centralized unit communicates with the system through SMS which will be received by the GSM with the help of the SIM card. Global system for mobile communication (GSM) is one of the most trustable wireless communication system that can be accessed and used very easily. The price of the trans-receiver module and subscription fee of the services is very low so it is very cost effective also. Embedded system interfaced with GSM module can widen the scope of embedded design and enhanced the application areas of controlling and monitoring systems to a great extent. After processing, this data is displayed on the LCD. Thus in short whenever the system receives the activation command from the subscriber it checks all the field conditions and gives a detailed feedback to the user and waits for another activation command to start the motor. The main criteria of this project is to water the plants by using the GSM module when we are unable to water the plants and to stop the pump when there is enough moisture in the soil. As this report presents the design for the system which includes microcontroller, moisture sensor, GSM module and the circuit designs.

1.2 RESEARCH BACKGROUND

In today's environment, many people are carrying a heavier workload than were using to, and feeling the crunch. It might not be able to control the workload by the humans, but it can be controlled on how to react to it. People can be choosed to be overwhelmed, or it can be choosed to accept where we are today, while taking steps to improve the situation. In order to cope with all the situations, as a human being need to be prepared with fresh ideas and surround ourselves in a harmony surrounding. There is a way that can help to enhance ourselves and to relax our mind. It is just by having houseplants. When you want to enhance interior spaces with houseplants, you are not just adding greenery. These living organisms interact with your body, mind and home in ways that enhance the quality of life.

1.3 PROBLEM STATEMENT

Can we automatically water the plants when I am going on vacation or do I have to bother my neighbors? Sometimes the neighbors do too much of watering and the plants end up dying anyway. There are timer based devices available which waters the soil on set interval. They do not sense the soil moisture to know if the soil actually needs watering or not. Can we know if the soil actually needs to be watered? Irregular watering leads to mineral loss in the soil and might end up rotting the plants. Can we manually water the soil from remote location?

The answer is "Yes, we can" to the entire above problem. The solution provided is simple and economical. It requires to know little bit of electrical and electronics .

1.4 OBJECTIVES

The objectives of the project are to produce a GSM Based Plant Watering system will:

i. To study the water management decision via GSM module.

ii. To monitor and provide accurate amount of water required to plant.

iii. To become a general plant care system.

1.5 RESEARCH QUESTION

This study will answer the following research questions:

- Does the Plant watering system minimizes the human energy?
- Does the project can be as advance as the current technologies?

1.6 SCOPE OF PROJECT

Water plants from time to time no matter how busy we are. Helps to save fauna. Moreover, this project allows us to save the amount of water being watered. Transmission of signal is that how to transmit a signal from the circuit and to water the plants. This system will act like a medium of communication between system and plants. This system also will allow the owner of the plant to water their plant by automatically, when the plant needs water. It is amazing that I can control all the activity that necessary by just setting the coding to make an instruction. Program is about development of the simple program to detect a signal at the parallel port from the transmission of the circuit.
This project uses:

- Arduino UNO
- GSM Module Sim 900a
- Moisture sensor
- Water pump
-

Input:

- As the input, it uses the Arduino UNO which starts the system.
- The moisture sensor used as it had been digged in the soil, as it checks the moisture of the soil and triggers it via the to the GSM.

Process:

- GSM which had been used as the medium of signal when the Arduino UNO notifies and it sends message to the user.

Output:

- Water Valve which had been used as the user sends the message to the GSM and notifies it, then waters the plant.

1.7 PROPOSED SOLUTION

In order to solve the problem that are facing now, as proposed project of a smart watering plant system called as ' GSM Based Plant Watering System'. The 'GSM Based Plant Watering System' is a simple and easy to use plant watering system. Instead of using traditional or manual way to watering their plants, proposed some ideas that injected some intelligent on it to make it more intelligent by the helps of internet. For the system functionalities, it will make sure that the user will be at ease when using this system and it will provide a very user-friendly system to use.

1.8 SYSTEM LIMITATION

The proposed system causes a lot of uncertain situations. For example without the power supply, these systems will be not functioning due to it is fully dependent to the power supply. Besides, the limitation of this system is, if there is any network problem the chances of sending and receiving the message will be interrupted.

1.9 IMPORTANCE OF PROJECT

Water is one of our most precious resources for all the living things in the earth. Water is often referred to as the element of life since it is necessary for any form of life to thrive. Conserving and reserving the water will be one of the important factors. Plants are living things and require water in order to grow well and reproduce. Below are some specific reasons why water is vital to plants. Photosynthesis as this is the process through which plants manufacture their own food. Transpiration as this is the process through which plants lose water into the atmosphere. Water is usually lost through very tiny holes on the leaves called stomata. Nutrient distribution as each part of the plant requires various nutrients in order to develop well. Water helps the plant in transportation of nutrients .Lawns and gardens make up about half the total water use of an average home. Studies have shown that many of the lawns and gardens watering systems are poorly planned or have very inefficient watering schedules or need repairs. This project would create as it makes the plant watering system much more efficient when the user is unable to water the plants and it also helps it with the tools necessary to create a beautiful landscape while saving water, time, and money. Irregular watering leads to mineral loss in the soil and might end up rotting the plants. Plants properly watered are healthy with more blooms, resilient foliage, and an increased resistance to pests and disease. The amount and frequency of watering varies and is dependent upon weather, soil conditions, and type of plant. Plant water needs the watering system design and components, as well as irrigation scheduling must all be considered when creating, or modifying, the lawn or garden of plant watering system.

1.10 CONCLUSION

By end of this chapter we have identified the problem that we have to overcome and had a clear vision on the project that we have to work on. Other than that we have also created and set a clear view of OBJECTIVES and also the IMPORTANCE of the project that had been done to follow the flow of the project as this gives the clear overview of the project. We also provided our project scope and also the limitations to make it more understandable and executable.

CHPATER 2
LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter, the discussion will highlight several literatures that are related to this project area. It includes the detailed descriptions technique and approach that will be discussing can be vised as a guidance or guideline to develop prototyping of the **GSM BASED PLANT WATERING SYSTEM.**

The literature review also focus on the understanding of relevant topic to convey the knowledge and ideas that have been established based on journals, articles and web sites that are related to methodologies and approaches. Besides that, this section describes other similar or relevant project that related to the **GSM BASED PLANT WATERING SYSTEM.** . Other than that, software and hardware design review also being pinpointed under literature review section.

2.2 CONCEPT AND THEORIES OF EXISTING MODELS

Traditionally plant are grown in mold or dirt, potted and being placed at the lawns .Due to this, plant are dependent on regular nurturing as the owner will need to water them daily and in the same time they need to make sure that their plant will be provided with the right amount of sunlight and water in order to stay alive and grow well. Here are some of the existing system that already in the market and some of it are Systems like Moisture Matic make use of a sponge wick to keep watering for up to 7 days. CobroCo Plant Sitter and the Self Watering Probes use a ceramic sensor to measure when the plants need watering. There are also systems like the Moisture Sensor Meter which only tells you the moisture level of your plant, but is not capable of watering.

2.3 RESEARCH AND EXPERIMENT

Journal 1

YEAR	AUTHOR	TITLE	OBJECTIVE	CRONOLOGI
July-August 2014	by Pavithra D. S	GSM based Automatic Irrigation Control System for Efficient Use of Resources and Crop Planning by Using an Android Mobile	The system supports water management decision, which determines the controlling time for the process and monitoring the whole system through GSM module. The system continuously monitors the water level in the tank and provide accurate amount of water required to the plant or tree (crop). The system checks the temperature, humidity and dew point so as to forecast the weather condition. Low cost and effective with less power consumption using sensors for remote monitoring and controlling devices which are controlled via SMS using a GSM using android mobile.	The GSM based irrigation system may offer users the flexibility to regulate and control the operations of their irrigation systems with little intervention to reduce runoff from over watering for improvement in crop yield. This enables users to take advantage of the globally deployed GSM networks with its low SMS service cost to use mobile phones and simple SMS commands to manage their irrigation system. It will be possible for users to use SMS to monitor directly the conditions of their farmland, schedule the water needs of crops, automatically control watering, and set control operational conditions in accordance with the water needs of crops. This will help minimize overwatering and crop production cost.

Journal 2

DATE	AUTHOR	TITLE	OBJECTIVE	CRONOLOGI
May 2015	By Ashish Mohite	Automatic plant watering system	An electronic device that will water the plant automatically as on when required. Sensors which will switch on LED to give reminder or will switch on electric pump to water the plants.	The soil contains different types of ions which carries current from one probe to another. Ion is an atom or molecule in which the total number of electrons is not equal to total number of protons, giving the atom net positive or negative electrical charge. The ion which carries negative charge called anions and cations which carries positive charge.

Journal 3

DATE	AUTHOR	TITLE	OBJECTIVE	CRONOLOGI
16 May 2005	By Marie France Leroux	Automated irrigation System	The objective of this project was to design a small-scale automated irrigation system for indoors that would use water in a more efficient way. The water savings was also an important aspect, since there is a demand to minimize water loss and to maximize the efficiency of water used. Since the objective is to minimize the cost of labor, minimal supervision and calibration must be needed. The system must operate with optimized consistency. The power consumption must also be monitored. For maintenance, the replacement parts must be readily available and easy to install in the case of failure. Finally, the possibility for implementing the system at a larger scale (e.g. in greenhouses) should be investigated.	Depending on type of plants to be irrigated the required soil moisture for growth and maintenance varies. It is also useful to determine the amount of after that the plants absorb during a certain period of time to choose the size of reservoir and also the refilling frequency. The user will not have to know how much water the plants consume, only their required moisture levels.

Journal 4

DATE	AUTHOR	TITLE	OBJECTIVE	CRONOLOGI
10 October 2014	By S. V. Devika, Sk.Khamuruddeen, Sk.Khamurunnisa, Jayanth Thota, Khalesha Shaik	Arduino Based Automatic Plant Watering System	To make the gardener works easily, the automatic plant watering system is created. There have a various type using automatic watering system that are by using sprinkler system, tube, nozzles and other. This project uses watering sprinkler system because it can water the plants located in the pots.Next, will be to sense the moisture level of the plants and supply the water if required. This type of system is often used for general plant care, as part of caring for small and large gardens. Normally, the plants need to be watered twice daily, morning and evening. So, the microcontroller has to be coded to water the plants in the greenhouse about two times per day.	There are two functional components in this project. They are the moisture sensors and the motor/water pump. Thus the Arduino Board is programmed using the Arduino IDE software. The function of the moisture sensor is to sense the level of moisture in the soil. The motor/water pump supplies water to the plants. This project uses Arduino Uno to controls the motor. Follow the schematic to connect the Arduino to the motor driver, and the driver to the water pump. The motor can be driven by a 9 volt battery, and current measurements show us that battery life. The Arduino Board is programmed using the Arduino IDE software. The moisture sensor measures the level of moisture in the soil and sends the signal to the Arduino if watering is required. The motor/water pump supplies water to the plants until the desired moisture level is reached.

Article 1

DATE	AUTHOR	TITLE	METHOD	WEBSITE
19 December 2016	by Rakesh Bute	Moisture sensing automatic plant watering system using 8051.	This project is about a moisture-sensing Automatic Plant Watering System using 8051 Microcontroller. The system simply senses the moisture level and switches on the irrigation pump when the moisture is below the set limit. The system switches off the pump when the moisture rises above the set point. The moisture level threshold can be set using a trim pot on the system. The status of the pump (whether ON or OFF) is displayed on 16x2 LED Display.	http://www.circuitstoday.com/automatic-plant-watering-system-using-8051

Article 2

DATE	AUTHOR	TITLE	METHOD	WEBSITE
15 December 2015	by Tarun Agarwal	Automatic Plant Watering System	This project is about an automatic plant watering system for automatically watering your gardens, plants, etc. Frequently, we cannot set the time for watering the plants due to which the soil of the plants becomes dry. So, for a proper care, we have to water the plants whenever the soil gets dry. This circuit contains two probes, which will sense the moisture of the soil and switch on the relay at the specific value of dryness. You can connect any sprinkler system or pump with the relay to switch the circuit on automatically to water the plants.	https://www.efxkits.us/automatic-plant-watering-system/

2.4 ELECTRONIC COMPONENTS

2.4.1 Arduino UNO

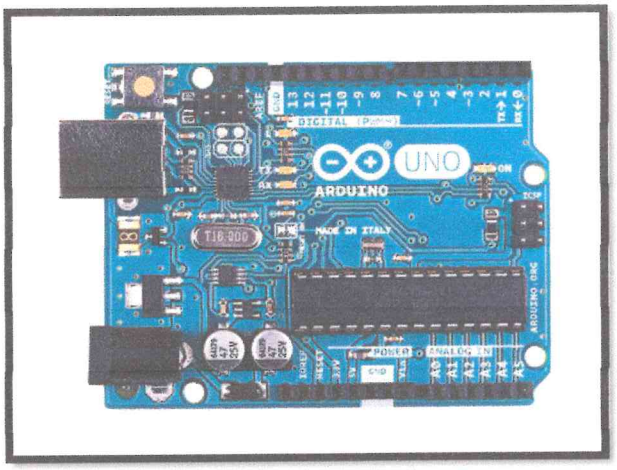

Figure 1: Arduino Uno

Power:

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts. The power pins are as follows: • VIN. The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin. • 5V. The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.

• 3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

• GND. Ground pins.

Memory:

The Atmega328 has 32 KB of flash memory for storing code (of which 0,5 KB is used for the bootloader); It has also 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

Input and Output:

Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions:

• Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. TThese pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip .

• External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details.

• PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analogWrite() function.

• SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication, which, although provided by the underlying hardware, is not currently included in the Arduino language.

• LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.