KEMENTERIAN PENDIDIKAN MALAYSIA

POLITEKNIK MALAYSIA
SEBERANG PERAI

FINAL PROPOSAL

-JABATAN KEJURUTERAAN ELEKTRIK (JKE)-

TITLE: AUTOMATIC WATERING PLANT SYSTEM USING ARDUNIO

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ABSTRACT

Plants watering system is a simple and easy to use plant watering system. As we can see, nowadays people do not get engaged to the plants due to the lack of time, and they find it difficult to handle and water their plant time to time. Thus, this will result bad impact for our nature in future. This system is ideal for monitoring the water level of an urban garden or our pet plant. It will detect the moisture of the soil, the temperature of surrounding and alert the owner about the condition of their plants. With the help of this system, it will help the owner for watering the plants.

Therefore, the proposed this system to help and encourage people to take care of their plant easily. With the help of humidity and temperature sensor it will give water automatically to plant. This system will inspire, engage and support people to take their personal responsibility of taking care the environment and making it fun and sustainable. It is a great innovation as the plant and the owner.

ABSTRAK

Sistem penyiraman tumbuhan adalah sistem penyiram tumbuhan yang mudah untuk digunakan. Seperti yang kita dapat lihat, pada masa kini orang ramai tidak terbabit dalam tumbuh-tumbuhan kerana kekurangan masa, dan mereka merasa sukar untuk mengendalikan dari semasa ke semasa. Oleh itu, ini akan mengakibatkan kesan buruk bagi sifat kita pada masa akan datang. Sistem ini adalah ideal untuk memantau paras air di taman peliharaan kita. Ia akan mengesan kelembapan tanah, dan akan melakukan penyiraman secara automatik. Dengan bantuan sistem ini, ia akan membantu pemilik untuk menyiram tumbuh-tumbuhan.

Oleh itu, dicadangkan sistem ini untuk membantu dan menggalakkan orang ramai untuk menjaga tana-tanaman mereka dengan mudah. Dengan bantuan kelembapan dan suhu sensor ia akan memberi air secara automatik kepada tumbuhan. Sistem ini akan memberi inspirasi, secara tidak langsung, melibatkan diri dan menyokong orang ramai untuk memikul tanggungjawab mereka menjaga alam sekitar. Ini adalah satu inovasi besar bagi pecinta tumbuh-tumbuhan.

ACKNOWLEDGEMENT

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Other than that, I would like to express gratitude towards my parents, and my colleague for kind encouragement, co-operation and their willingness to help me out which help better in completion of this project.

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CHAPTER 1

INTRODUCTION

Water is one of our most precious resources. Lawns and gardens make up about half the total water use of an average home. Studies have shown that many of our lawn and garden irrigation systems are poorly planned and/or have very inefficient watering schedules or need repairs.

Hopefully, the tips and suggestions offered will provide us with the tools necessary to create a beautiful landscape while saving water, time, and money. 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, irrigation system design and components, as well as irrigation scheduling must all be considered when creating, or modifying, your lawn or garden irrigation system. Go to the Watering Guide found on the Main Menu for irrigation scheduling information.

1.0 Research Background

In today's environment, many of us are carrying a heavier workload than we used to, and feeling the crunch. You might not be able to control your workload, but you can control how you react to it. You can choose to be overwhelmed, or you can choose to accept where you are today, while taking steps to improve your 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.

1.1 Motivation

My motivation to undertake this project is due to my experience and observation of the inefficiencies of the current system which is watering their plant in a traditional way or manual way. Besides that, I believe that nowadays people are taking for granted about our nature which is, it is much more important to care about the living organisms. These are our oxygen tank that we breathe every seconds and every day. Other than that, I also need to raise awareness in careers of agriculture to all people including children, teenagers, youth, parents and adults. This is because; they lack the knowledge and information about plants.

1.2 Problem description

Irrigation of plants is usually a very time-consuming activity, to be done in a reasonable amount of time, it requires a large amount of human resources. Traditionally, all the steps were executed by humans. Nowadays, some systems use technology to reduce the number of workers or the time required to water the plants. With such systems, the control is very limited, and many resources are still wasted. Water is one of these resources that are used excessively. Mass irrigation is one method used to water the plant. This method represents massive losses since the amount of water given is in excess of the plant needs. The excess water is evacuated by the holes of the pots in greenhouses, or it percolates through the soil in the fields.

In addition to the excess cost of water, labor is becoming more and more

expensive. As a result, if no effort is invested in optimizing these resources, there will be more money involved in the same process. Technology is probably a solution to reduce costs and prevent loss of resources.

1.3 System objectives

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, in order to prevent water loss and minimize the cost of labor.

The following aspects were considered in the choice of a design solution:

- Installation costs.
- Water savings.
- Human intervention.
- Reliability.
- Power consumption.
- Maintenance.
- Expandability.

A critical consideration is the installation costs, since costs generally determine the feasibility and viability of a project. The installation must be simple enough for a domestic user. 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.

1.4 System Scope

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 their plant need water. It is amazing that I can control all the activity that necessary by just setting the coding to make a instruction.

1.5 System Limitation

The proposed system causes a lot of vague situations. For example without the power supply, these systems will not functioning due to fully dependent to the power supply. Besides, the limitation of this system is, it can only be reach by using blinking LED to represent message.

1.6 Proposed solution

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

CHAPTER 2

LITERATURE REVIEW

There is a lot of different irrigation and plant watering systems on the market, but they all have some sort of deficiency lack in certain points. As I could see, some continuously water the plants, some timer systems will water even when it is not necessary, some rely on the water supply network and some of the plant watering system do not providing systems that have an interaction between the system and their plant. Different with the other product that is already available on the market, I believe that my system "Plants Watering System" are much more unique as it is able to interact with the plant and system. At the same time will allow the owner to keep track about the growth of their plant.

2.0 Concept and theories of existing models

Traditionally plant are grown in mold or dirt, potted and being placed at the "lamanrumah" .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 is 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.

2.1 General description of the existing system (problems, weaknesses, opportunities)

People enjoy plants, their benefits and the feeling related to nurturing them. However for most people it becomes challenging to keep them healthy and alive. Some people accidentally kill their plant just because they forgot to nurture and take care of their plant between their busy daily activities.

Other than that, people take care of their plant manually by checking the condition of their plant and they need to water their plant every day. Thus, it becomes problematic to those who don't really have time to spend time on their plant despite

their pack daily schedule. As a results, plants suffer and die, gets discarded and simply replaced by a new one and even worst people stop having plants altogether.

Thus, I taking this opportunity to develop a smart watering plant system to help out these kinds of people as a caretaker for their plant so that the user would feel at ease to monitor their plant. I believe that there is a need for a home gardening system, which take care of all the different aspects in nurturing plants. I also believe that technology can assist people in nurturing plants, not only by automation but also through digital communication with their owner.

2.2 Brief introduction of the proposed work/solution

This smart watering plant system will enable the user to take care of their plant so that it will ease them to keep track the condition of their plant in a more effective way and improve their ways to manage and adjusting the action that they need to do for their plant especially when the owner are not at home to take care of their plant.

As an example, this system will generate watering system by automatically. By using this smart watering plant, departments can track condition of the plant easily; ensuring the water that being given to the plant is enough and owner could adjust the setting and schedule to water the plant according to the performance of it.

This project is designed according to the needs of an individual which it will help the user that use this system to take care their pet plant or garden plant and help

the user or to monitor their plant more efficiently and effectively no matter where they are, either at home or they are outside. Other than that this system also will help to keep track information regarding their plant and in the same way could enhance and make things easier for the owner of taking care their plant compare to the manual way. It could also help to assign action which will need immediate action about their plant condition. Thus, the user will easily water their plant through their portable device and at the same time retrieve information with ease and faster.

2.3 Full system block diagram

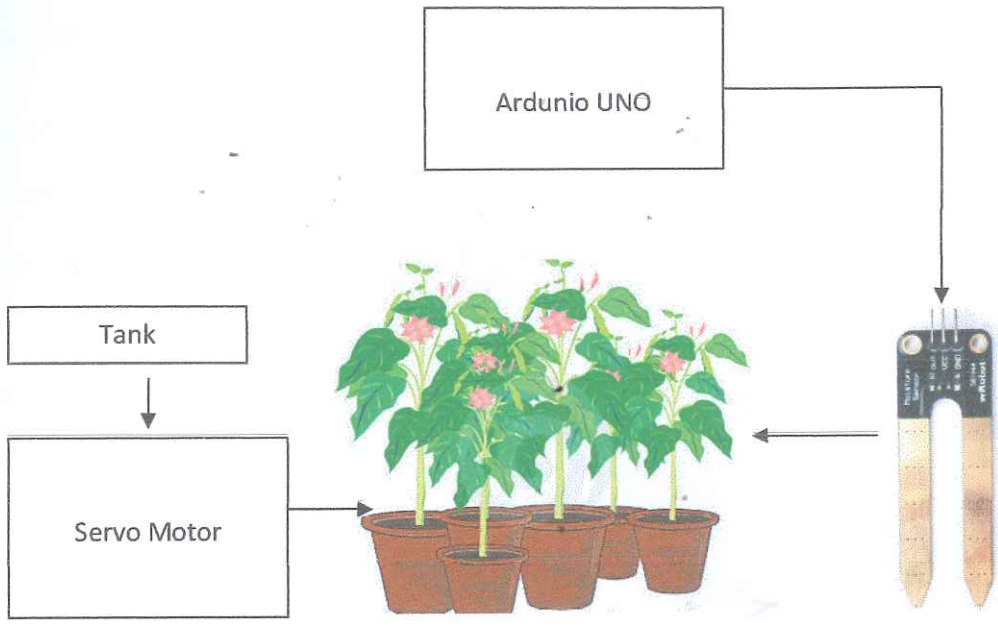

Figure 2.3 : Full system block diagram

This system controlled by Ardunio Uno, then solenoid valve and moisture sensor will connected to the Ardunio Uno. Moisture sensor and the solenoid valve will be controlled instruction on Ardunio. Moisture sensor will be measure the humidity of plant then when plant need watering solenoid valve will be act to watering plant until the humidity of plant at the normal range. Ardunio is the main board circuit, they is to control the whole instruction of the system by using Ardunio Software.

2.4 SOFTWARE

Software to write code to Ardunio Uno is Arduino, which has written in Ardunio Software. Below is the code to for this system

```
int moistureSensor = 2;
int relay = 3;
void setup()
{
 pinMode(relay,OUTPUT);
 Serial.begin(9600);
}
void loop()
{
 int sensorValue = digitalRead(moistureSensor);
 Serial.println(sensorValue);
 digitalWrite(relay,HIGH);
 if (sensorValue == 1)
 digitalWrite(relay,LOW);
 Serial.println("Watering");
 delay(10000);
 Serial.println("Finished watering");
 delay(1000);
}
```

2.5 FLOWCHART OF PROJECT

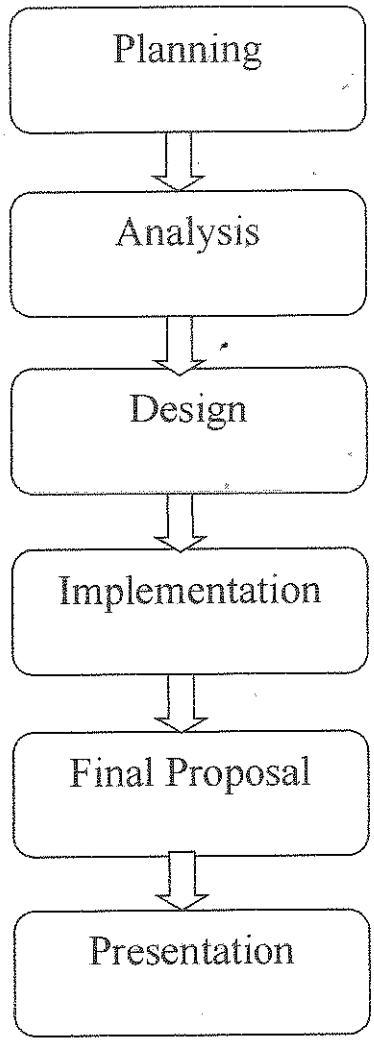

Figure 2.5 : Flowchart of project

2.6 Component of projects

This is the proposed for Plant watering system of material as on planned.

COMPONENT OF PLANT WATERING SYSTEM	
DESCRIPTION	**QUANTITY**
BOARD 1	
Ardunio Uno	1
Power DC	1
Diode 14001	1
Capacitor electronic 10μf	4
Capacitor electronic 2.2μf	1
Capacitor 0.1μf	3
Capacitor 0.001uf	1
Resistor 330Ω	2
Resistor 680Ω	2
Crystal oscillator	1
Moisture Sensor	1

Table 2.6 : Component of Projects

a. Diode

In electronics a diode is a two-terminal electronic component which conducts electric current asymmetrically or unidirectional; that is, it conducts current more easily in one direction than in the opposite direction. The term usually refers to a semiconductor diode, the most common type today, which is a crystal of semiconductor connected to two electrical terminals, a P-N junction. A vacuum tube diode, which was the first type of diode invented but is now little used, is a vacuum tube with two electrodes; a plate and a cathode.

The most common function of a diode is to allow an electric current in one direction (called the forward direction) while blocking current in the opposite direction (the reverse direction). Thus, the diode can be thought of as an electronic version of a check valve. This unidirectional behavior is called rectification, and is used to convert alternating current to direct current, and remove modulation from radio signals in radio receivers.

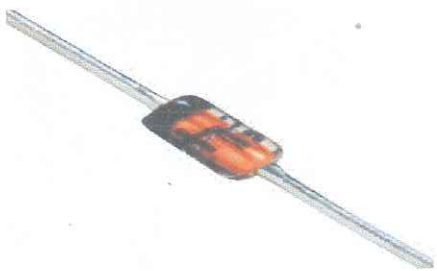

Figure 2.6a: Diode

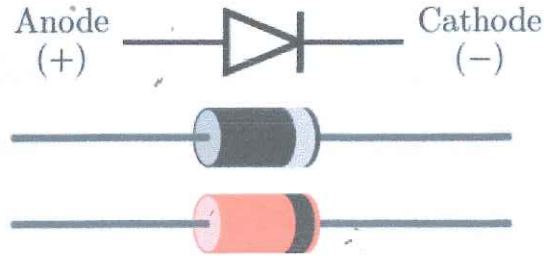

Figure 2.6b.: Diode Symbols

b. USB type B

Universal Serial Bus (USB) is an industry standard developed in the mid-1990s that defines the cables, connectors and communications protocols used in a bus for connection, communication, and power supply between computers and electronic devices.

Figure 2.6c :usb type B

c. Capacitor

A capacitor (originally known as a condenser) is a passive two-terminal electrical component used to store energy electrostatic electric field. The forms of practical capacitors vary widely, but all contain at least two electrical conductors(plates) separated by a dielectric. The conductors can be thin films, foils or sintered beads of metal or conductive electrolyte, etc. The non-conducting dielectric acts to increase the capacitor's charge capacity. A dielectric can be glass, ceramic, plastic film, air, vacuum, paper, mica, oxide layer etc. Capacitors are widely used as parts of electrical circuits in many common electrical devices. Unlike are resistor, an ideal capacitor does not dissipate energy. Instead, a capacitor stores energy in the form of an electrostatic field between its plates.

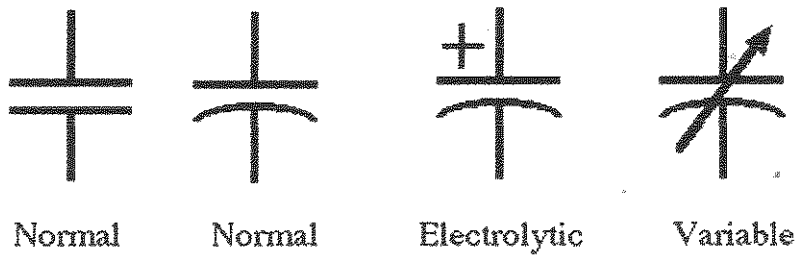

Figure 2.6d : Symbol of capacitor

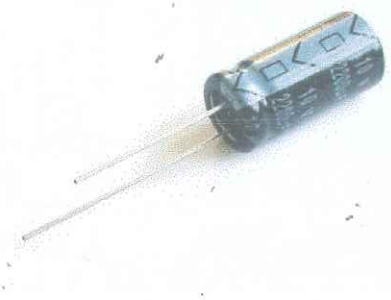

Figure 2.6e Capacitor

d. Ardunio UNO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter 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.

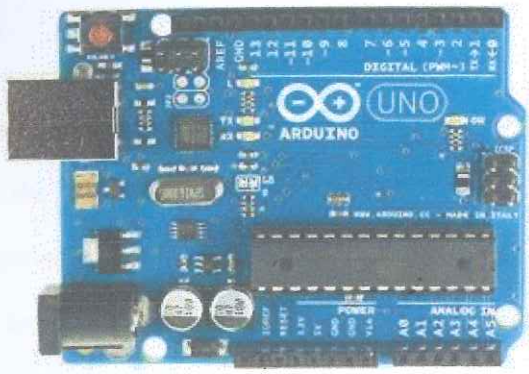

Figure 2.6f : Ardunio UNO

e. Moisture Sensor

The Soil Moisture Sensor uses capacitance to measure dielectric permittivity of the surrounding medium. In soil, dielectric permittivity is a function of the water content.

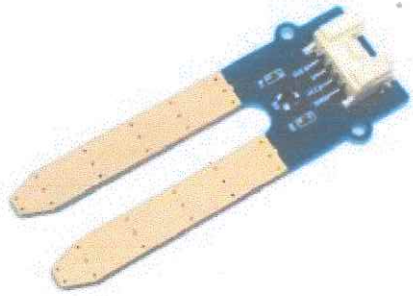

Figure 2.6g : Moisture Sensor

f. Ceramic capacitor

A ceramic capacitor uses a ceramic material as the dielectric. Ceramics were one of the first materials to be used in the production of capacitors, as it was a known insulator. Many geometries were used in ceramic capacitors, of which some, like ceramic tubular capacitors and barrier layer capacitors are obsolete today due to their size, parasitic effects or electrical characteristics. The types of ceramic capacitors most often used in modern electronics are the multi-layer ceramic capacitor, otherwise named ceramic multi-layer chip capacitor (MLCC) and the ceramic disc capacitor.

Figure 2.6h : Ceramic capasitor