POLITEKNIK

SULTAN SALAHUDDIN ABDUL AZIZ SHAH

AUTOAUTOMATIK RECYCLE WATER SPRINKLER ROOF VIA APP 2022

NAME	REGISTRATION NO
MUHAMMAD AIMAN NURUDDIN BIN ABDUL JALIL	08DEU20F2012

JABATAN KEJURUTERAAN ELEKTRIK

SESI 1 2022/2023

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MUHAMMAD AIMAN NURUDDIN BIN ABDUL JALIL	08DEU20F2012

This report submitted to the Electrical Engineering Department in fulfilment of the requirement for a Diploma in Electrical Engineering

JABATAN KEJURUTERAAN ELEKTRIK

SESI 1 2022/2023

CONFIRMATION OF THE PROJECT

The project report titled "automatic recycle water sprinkler roof via app 2022" has been submitted, reviewed and verified as a fulfils the conditions and requirements of the Project Writing as stipulated

Checked by:

Supervisor's name : KHAIRUL NAPISHAM BIN ABD RAZAK

Supervisor's signature :

Date :

Verified by:

Project Coordinator name :

Signature of Coordinator :

Date

"I acknowledge this work is my own work except for the excerpts I have already explained to our source"

1. Signature :

Name : MUHAMMAD AIMAN NURUDDIN BIN ABDUL JALIL

Registration Number : 08DEU20F2012

Date :

DECLARATION OF ORIGINALITY AND OWNERSHIP

TITLE : AUTOMATIK RECYCLE WATER SPRINKLER ROOF VIA APP 2022

SESSION: SESI 1 2022/2023

1. I, **1. MUHAMMAD AIMAN NURDDIN BIN ABDUL JALIL (08DEU20F2012)**

   is a final year student of **Diploma in Electrical Engineering, Department of Electrical, Politeknik Sultan Salahuddin Abdul Aziz Shah**, which is located at **Persiaran Usahawan, 40150 Shah Alam, Selangor**. (Hereinafter referred to as 'the Polytechnic').

2. I acknowledge that 'The Project above' and the intellectual property therein are the result of our original creation /creations without taking or impersonating any intellectual property from the other parties.

3. I agree to release the 'Project' intellectual property to 'The Polytechnics' to meet the requirements for awarding the **Diploma in Electrical Engineering** to me.

Made and in truth that is recognized by;
a) MUHAMMAD AIMAN NURDDIN BIN ABDUL JALIL
(Identification card No: - 08DEU20F2012 MUHAMMAD AIMAN NURUDDIN BIN ABDUL JALIL

In front of me, KHAIRUL NAPISHAM BIN ABD RAZAK)……
)KHAIRUL NAPISHAM
As a project supervisor, on the date:)……

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I would like to express my gratitude towards my parents & member of Politkeknik Sultan Salahuddin Abdul Aziz Shah for their kind cooperation and encouragement which help me in completion of this Project. I would like to express my special gratitude and thanks to industry people for giving me such attention and time.

My thanks and appreciations also go to my colleague in developing the Project and the people who have willingly helped me out with their abilities.

LIST OF FIGURES

LIST OF ABBREVIATIONS:

ABSTRACT

Water sprinkler on the roof automatically by using the application. This tool aims to cool the roof from heat automatically by using a heat detector. When the heat detector detects a temperature that exceeds 35C. This device automatically sprays water to cool the roof of the house. The water from the rainwater will be collected and filtered and then stored in the storage tank for the purpose of activating the sprinklers. More water will be shot towards the growth that is around the house.

ABSTRAK

Pemercik air di bumbung secara automatik dengan menggunakan aplikasi. Alat ini bertujuan untuk menyejukkan bumbung daripada panas secara automatik dengan menggunakan alat penditek haba. Apabila alat penditek haba mengesan suhu yang melebihi 35C. Alat ini memancutkan air secara automatik untuk menyejukkan bumbung rumah. Air dari air hujan jugak akan di tadah dan ditapis kemudian di simpan di tangki simpanan bertujuan untuk mengaktifkan pemercik air. Air yang lebih pula akan di tembak ke arah tumbuh yang berada disekeliling rumah.

CHAPTER 1

1 INTRODUCTION

1.1 Introduction

Today, there is a lot of waste that happens in the world, one of which is the waste of water and electricity. This causes a country to experience an economic downturn. With this, I want to make a tool so that the waste can be avoided. The tool that will be made is a water sprinkler on the roof. automatically by using the application. This tool aims to cool the roof from heat automatically by using a heat detector. When the heat detector detects a temperature that exceeds 35C. This device automatically sprays water to cool the roof of the house. The water from the rainwater will be collected and filtered and then stored in the storage tank for the purpose of activating the sprinklers. More water will be shot towards the growth that is around the house.

1.2 Background research

In this project, I found a lot of water wastage. When a problem occurs, it affects the country's economy. Based on my observation, this tool can help in solving the problem. This tool is called automatic recycle water sprinkler roof via app 2022. This tool works to automatically cool the roof of the shop in hot weather, this can save water use because this tool will use water from rainwater and recycle the water to become clean and safe to use.

1.3 Problem statements

there is a lot of waste that happens in the world, one of which is the waste of water, electricity. This, causes a country to experience an economic decline. With this, I want to make a tool so that the waste can be avoided. This tool can also help in cooling the temperature of a place and save on usage water because this device uses rainwater that will be recycled to be used to cool the roof of the house.

1.4 Research Objectives

The main use of this tool is to be used in restaurants, which is to automatically cool the roof of the shop in hot weather, this can save water use because this tool will use water from rainwater and recycle the water to become clean and safe to use.

-Use water wisely

-Created a device to cool the roof using water from the rainwater catchment.

1.5 Scope of Research

1) This project focuses on working users.

2) The main focus of this project is to cool the roof from heat automatically by using a heat detector

3) The main controller uses an Arduino Uno.

4) This project will be designed as a prototype and the estimated budget for the implementation of this project will not exceed RM500.

1.6 Project Significance

Based on the research that has been done. The public does not attach much importance to saving water because they feel that our country has a regular water supply for the country. With this tool, it will be able to help them save water. Water sprinklers on the roof automatically by using the application. This tool aims to cool the roof from heat automatically by using a heat detector. When the heat detector detects a temperature that exceeds 35C. This device automatically sprays water to cool the roof of the house. The water from the rainwater will be collected and filtered and then stored in the storage tank for the purpose of activating the sprinklers. More water will be shot towards the growth that is around the house.

1.7 Summary

In this chapter we are have to make introduction about our project. In this chapter, we have to make introduction about hospital smart card. Also we make a problem statement, project scope and project objective

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Nowadays there are many scientists, engineers and students doing research on how to save water. This is because, they realize that there is a lot of water wastage. For them this project is very important for the future where provide facilities to the public to save water

2.2 Pre-action sprinkler head

Pre-action fire sprinkler systems employ the basic concept of a dry pipe system in that water is not normally contained within the pipes. The difference, however, is that water is held from piping by an electrically operated valve, known as a pre-action valve. Valve operation is controlled by independent flame, heat, or smoke detection. Two separate events must happen to initiate sprinkler discharge. First, the detection system must identify a developing fire and then open the pre-action valve. This allows water to flow into system piping, which effectively creates a wet pipe sprinkler system. Second, individual sprinkler heads must release to permit water flow onto the fire. In some instances, the pre-action fire sprinkler system may be set up with a double interlock in which pressurized air or nitrogen is added to system piping. The purpose of this feature is two-fold: first to monitor piping for leaks and second to hold water from system piping in the event of inadvertent detector operation. The most common application for this system type is in freezer warehouses

Advantages of using pre-action fire sprinkler systems include:

-The dual action required for water release - The pre-action valve must operate and sprinkler heads must fuse. This feature provides an added level of protection against inadvertent discharge. For this reason, pre-action systems are frequently employed in water sensitive environments such as archival vaults, fine art storage rooms, rare book libraries and computer centres.

Disadvantages of using pre-action fire sprinkler systems include:

-Higher installation and maintenance costs - Pre-action systems are more complex with several additional components, notably a fire detection system. This adds to the overall system cost.

-Modification difficulties - As with dry-pipe systems, pre-action sprinkler systems have specific size limitations which may impact future system modifications. In addition, system modifications must incorporate changes to the fire detection and control system to ensure proper operation.

-Potential decreased reliability - The higher level of complexity associated with pre-action systems creates an increased chance that something may not work when needed. Regular maintenance is essential to ensure reliability.

2.3 Live sprinkler system modifications

Newly installed sprinkler systems must be hydrostatically tested to check for leaks at a pressure of at least 200 psi (14 bar) for a period of at least 2 hours. When existing systems are modified such that the work affects less than 20 sprinklers, the system only requires testing at the system working pressure. Where the modification affects more than 20 sprinklers, that portion of the system must be isolated and tested at 200 psi (14 bar) for 2 hours. If the new work cannot be isolated, the testing can be done at system working pressure even if the modifications involved more than 20 sprinklers. In general, existing portions of the system do not need to be subjected to a new hydrostatic test.

2.4 water pump method:

Water pumps are commonly used on construction sites for dewatering or removing excess water accumulation. Water can build up due to heavy rains or from a high water table, and pumps allow you to move the water quickly to minimize downtime. Water pumps suitable for this application come in two main types and can be electric, gas-powered, hydraulic, or manual.

Water Pump Types
There are two basic types of water pumps: centrifugal and positive displacement. Both types are designed to move water from one place to another continuously.
A centrifugal water pump uses a rotating impeller to move water into the pump and pressurize the discharge flow. Centrifugal water pumps come in several different types, including standard, trash, and submersible models. All liquids can be pumped using centrifugal water pumps, even those with low viscosity. These pumps work well with thin liquids and offer high flow rates.
Positive displacement water pumps deliver a fixed amount of flow through the mechanical contraction and expansion of a flexible diaphragm. Positive displacement pumps are used in many industries that manage high-viscosity liquids and where sensitive solids may be present. They are recommended for applications requiring a combination of low flow and high pressure.
Considerations for Centrifugal Water Pumps
Centrifugal pumps are used in many construction and water system applications, in addition to dewatering. They are employed to pump water supplies in buildings and are compatible with pneumatic systems and where no suction lift is required. They are also used to pump water from domestic wells and to boost pressure in water intake lines. Centrifugal pumps can provide a continuous pressure source for fire protection systems, and they can serve as sump pumps in either vertical or horizontal configurations.

Centrifugal pumps are prone to several common problems. Some pumps may need recirculating liquid to prevent overheating caused by low flows. Centrifugal pumps must be primed, or filled with the pumped fluid, to operate properly. When the positive suction head of a system is too low for the selected pump, it can result in cavitation, a condition where air bubbles form near the impeller, leading to shockwaves inside the pump. Finally, wear of the pump impeller can be worsened by suspended solids in the liquid.

Considerations for Positive Displacement Water Pumps
Positive displacement water pumps, sometimes called rotary pumps, are very efficient due to the fact that they remove air from the lines and thus eliminate the need to bleed the air. These pumps are also effective for dealing with high-viscosity liquids.

The primary drawback of positive displacement pumps is that they require a very small clearance between the rotating pump and the outer edge of the unit. As a result, the rotation must occur at very slow speeds. If the pump is operated at higher speeds, the liquids can erode and eventually reduce the efficiency of the water pump.

Water Pump Features and Specs
There are several important factors to consider when choosing a water pump for construction:

-Power—including the flow rate and horsepower
-Material—weather-resistant materials required for exposed applications
-Motor type/fuel type: electric, gas, diesel, hydraulic, or manual
-Head—total head discharge, or maximum pump power, suitable for the intended application

2.5 Summary

This chapter focusing about literature review. In this chapter we have to listing a several journal about our project. Then, we have to find and investigate the method, objective , literature review and their project into the journal

CHAPTER 3

RESEARCH METHODOLOGY

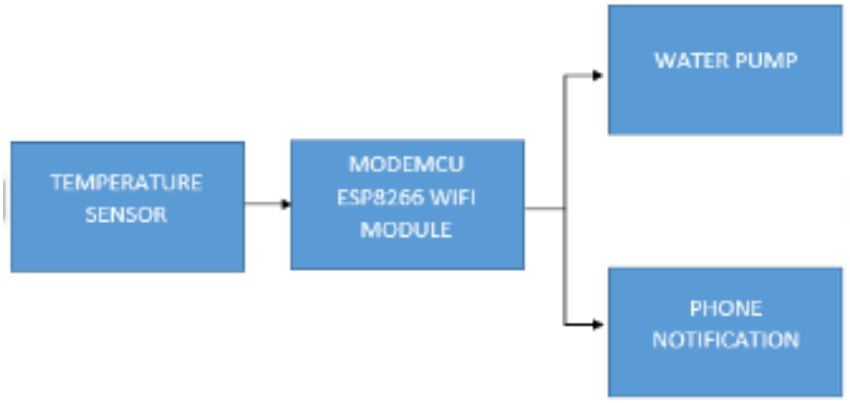
3.1 Introduction

Title selection is the earliest step taken before starting work related to the project. The title of the chosen project must be compatible with the diploma level because it is a final project throughout the studies in this Diploma in Mechanical Engineering (Automotive) course. In addition, the selection of appropriate projects helps creative and innovative thinking in addition to symbolizing the level of thinking of an individual and how high the level of knowledge of the individual is in aspects involving general mechanics. Next, a framework or flow chart is needed to carry out more organized and systematic work. This can help in the production of work without any problems and can save expenses and time**.**

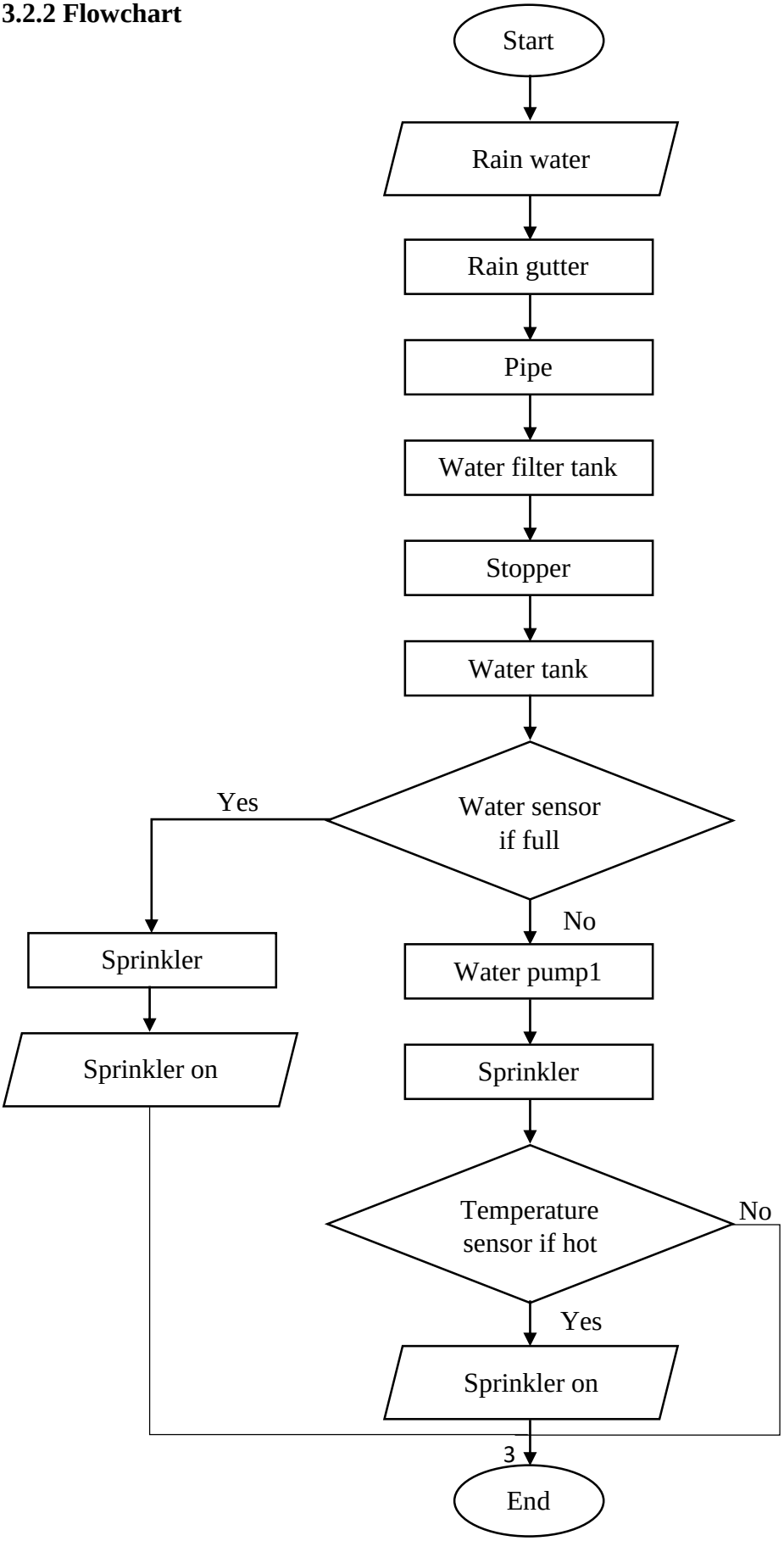
3.2 Project design and overview

Proposed device consists of two main parts which are hard ware and software. Hardware include power supply, microcontroller (Arduino), temperature sensor, water level sensor, water sprinkler, water pump motor, PIC programmer and motor controller. Figure 3.1 shows the block diagram of the proposed system**.**

3.2.1 Block diagram



3.2.2 Flowchart

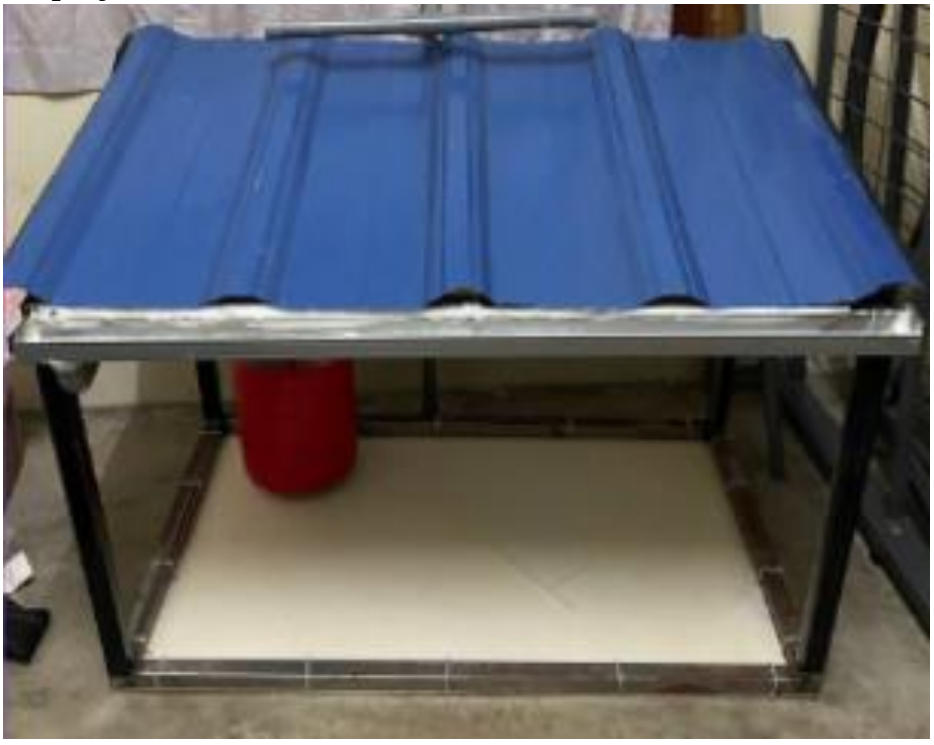


3.2.3 Project description

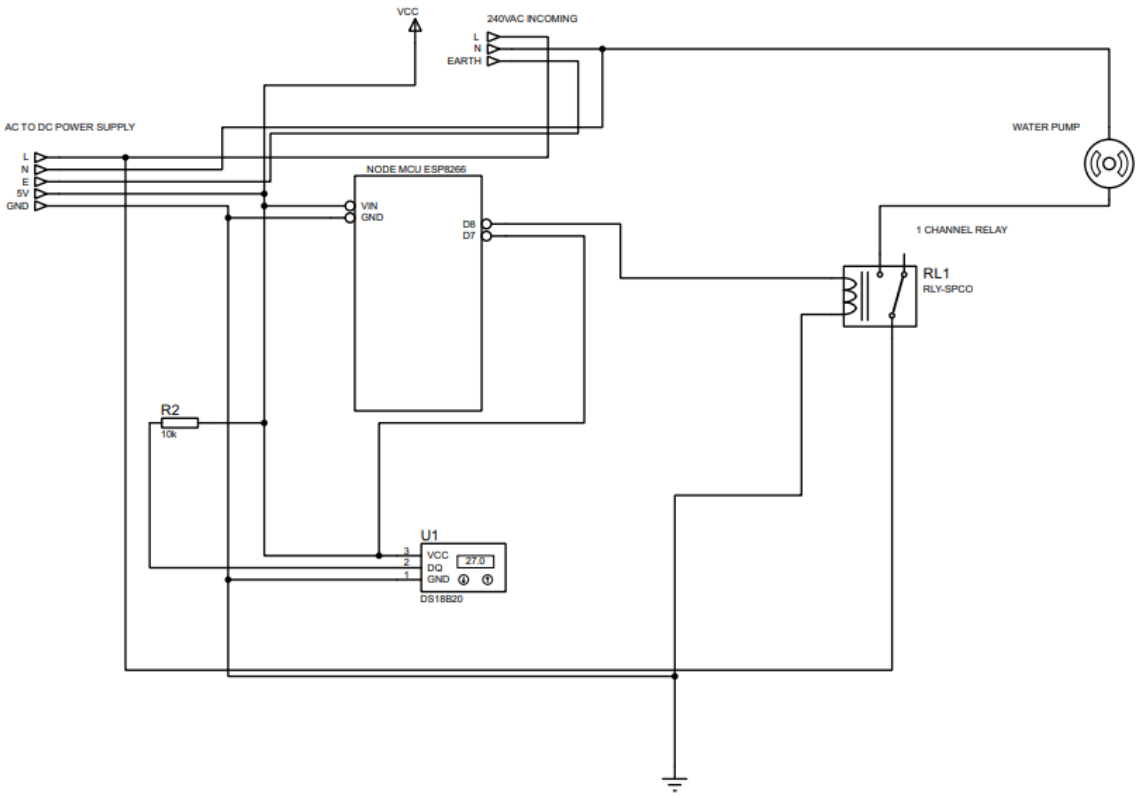
During Final Year Project I, the problem statement for the project was defmed thoroughly to get the problem solutions. Then, research and studies was carried out to ensure the best ways to conduct the project. Research and studies regarding materials were including what suitable hardware, software and the cost of materials for the project were done. During the conducted studies, the final design was determined.

As for Final Year Project II, the designed circuit was drawn and simulated in suitable software and constructed on the breadboard. The circuits were tested and modified until the outcomes fulfilled the project objective. After that, all the circuit were integrated, tested and modified to ensure the prototype was working properly.

3.3 project hardware



3.3.1 schematic circuit :



3.3.2 Description of the main component

3.3.2.1 Arduino Uno

The Arduino Uno is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

3.3.2.2 Temperature sensor

Temperature sensor A temperature sensor is a device that measures temperature and converts the temperature reading into an electrical signal that can be read by a computer or other electronic device. There are many types of temperature sensors, including thermocouples, RTDs, thermistors, and infrared sensors. They can be used in a wide variety of applications, such as HVAC systems, appliances, industrial processes, and medical equipment. Some temperature sensors are designed for specific environments or ranges of temperature.

3.3.2.3 Water sensor

A water sensor is a device that detects the presence of water and generates an electronic signal to indicate that it has been activated. Water sensors are commonly used in a variety of applications, such as flood warning systems, leak detection, and automatic shut-off valves for appliances. They can be made from various materials, such as plastic or metal, and can use different technologies to detect water, such as capacitive, resistive, optical, or ultrasonic. Some water sensors are also able to measure the level of water and send this data to a control system.

3.3.2.4 Power supply

Power supply frim DC voltages was needed to power up the Automated Sprinkler system. A power supply is an electrical device that supplies electric power to an electrical load . The main purpose of a power supply is to convert electric current from a source to the correct voltage, current and frequency to power the load. As a result, power supplies are sometimes referred to as electric power converters. Some power supplies are separate standalone pieces of equipment, while others are built into the load appliances that they power.

3.3.2.5 Motor controller

Motor controller are devices that regulate the operation of an electric motor. In artificial lift applications, motor controllers generally refer to those devices used in conjunction with switchboard or variable frequency drives to control the operation of the prime mover.

3.3.2.6 Water pump motor

A water pump motor is a type of electric motor that is specifically designed to power a water pump. It is typically an AC motor, although DC motors can also be used. The motor converts electrical energy into mechanical energy, which is used to drive the pump and move water through a plumbing or irrigation system. Water pump motors are used in a wide range of applications, including residential and industrial settings.

3.3.2.6 Water pump motor

Relay is one kind of electro-mechanical component that functions as a switch. The relay coil is energized by DC so that contact switches can be opened or closed. A single channel 5V relay module generally includes a coil, and two contacts like normally open (NO) and normally closed (NC).

3.4 Project software

For this project, we're simulating this circuit using Proteus Arduino. The Arduino software is the next programme we use to programme the Arduino uno. The Proteus Arduino can build a circuit even before we start a prototype. Using this software, we can simulate the circuit and ensure that electricity flows into each of our components. Additionally, it ensures that every component can function as expected. Because it allows us to test in the programme before testing on a prototype, this software can also assist us in protecting our components from over voltage. After coding is complete, the code can be checked for errors using the Arduino software before being converted to the Proteus Arduino to run the programme. After the coding has been converted into the software, the component in question can be tested to see if it is functioning properly. This can reduce the amount of time needed to troubleshoot coding or circuit issues.

3.5 Summary

In this chapter we are doing research methodology. In this chapter we have to find the way or the method that we use to make a project become real. In this chapter, we make a listing and description about the components that we use to make a project. We also have a flowchart and circuit project.

CHAPTER 4

RESULT

4.1 Introduction

A water sprinkler on a rooftop, often referred to as a rooftop sprinkler system or rooftop fire protection system, is designed to provide fire suppression and protection for buildings, particularly those with flat or low-sloped roofs. The primary purpose of the system is to prevent or minimize the spread of fire and protect the building and its occupants.

Here are some key aspects of a typical rooftop sprinkler system:

1.Sprinkler Heads: The system consists of a network of sprinkler heads strategically placed across the rooftop. These sprinkler heads are connected to a water supply and are designed to release water when triggered by heat or fire.

2.Water Supply: The system requires a sufficient and reliable water supply to deliver water to the sprinkler heads. This can be provided by a dedicated water storage tank, a connection to a municipal water supply, or a combination of both.

3.Pumping System: In some cases, a pumping system may be necessary to ensure adequate water pressure for the sprinkler system. The pump helps maintain the required water flow and pressure to effectively suppress the fire.

4.Control Panel: A control panel is typically installed to monitor and control the sprinkler system. It may include alarms, valves, and sensors to detect fire or system faults. The control panel is responsible for activating the sprinkler heads when necessary.

5.Piping and Distribution: The water supply is distributed through a network of pipes that connect the sprinkler heads. The pipes are designed to withstand fire conditions and are often made of materials with fire-resistant properties.

4.2 RESULT AND ANALYSIS

Water sprinklers on rooftops are primarily designed for fire protection and suppression rather than temperature reduction. While the water released by the sprinklers may temporarily create a cooling effect in the immediate vicinity, it is not an effective method for significantly lowering temperatures or providing long-term cooling.

The cooling effect produced by water sprinklers is a result of the evaporative cooling process. When water is released into the air, it absorbs heat energy from the surrounding environment as it evaporates. This can create a localized cooling effect in the immediate area where the water is sprayed.

However, the cooling effect from a rooftop sprinkler system is limited and temporary. It may provide some relief in terms of reducing the immediate radiant heat from a fire or hot surface, but it would not be sufficient to cool down an entire building or significantly lower the ambient temperature.

For effective cooling of buildings or outdoor spaces, dedicated cooling systems such as air conditioning units, evaporative coolers, or misting systems are more appropriate. These systems are specifically designed to regulate and reduce temperatures, providing consistent and controlled cooling throughout the desired area.

It's important to note that the primary purpose of rooftop sprinkler systems is fire protection rather than temperature control. If you're looking to cool down a rooftop or building, considering other cooling options would be more appropriate and effective.

4.3 DISCUSSION

Rooftop sprinkler systems are an important component of fire safety measures for buildings, particularly those with rooftop equipment, flammable materials, or where fire spread can be challenging due to the roof configuration. They play a crucial role in protecting the building, reducing damage, and ensuring the safety of occupants in the event of a fire. It's important to consult with fire protection experts and comply with local regulations and standards when installing or maintaining rooftop sprinkler systems.

CHAPTER 5

CONCLUSION

5.1 Introduction

Water sprinklers, when activated, can have a temporary cooling effect on the immediate vicinity, including the roof surface. This is due to the process of evaporative cooling, where water absorbs heat energy from the surroundings as it evaporates into the air. As a result, the temperature in the immediate area can be lowered.

However, it's important to note that the cooling effect of water sprinklers on the roof is limited and temporary. The amount of water sprayed and the evaporation rate will determine the extent of cooling. The cooling effect may be more noticeable in hot and dry climates where evaporation is faster.

5.2 Conclusion

In conclusion, water sprinklers on rooftops, also known as rooftop sprinkler systems, are primarily designed for fire protection and suppression rather than temperature reduction or cooling purposes. Their main objective is to prevent or minimize the spread of fire and protect buildings and their occupants.

While the water released by rooftop sprinkler systems may create a temporary cooling effect in the immediate area due to evaporative cooling, it is not an effective method for significantly lowering temperatures or providing long-term cooling. Other dedicated cooling systems, such as air conditioning units or evaporative coolers, are more suitable for cooling buildings or outdoor spaces.

It's important to recognize that the primary function of rooftop sprinkler systems is fire safety, and they should be installed, maintained, and used in accordance with local regulations and standards. These systems play a crucial role in protecting buildings, minimizing fire damage, and ensuring the safety of occupants in the event of a fire.

5.3 Suggestion for future works

improvements related to water sprinklers on rooftops, here are a few suggestions for future endeavours:

1.Research on Efficiency: Conduct studies or experiments to evaluate the efficiency of rooftop sprinkler systems in fire suppression and protection. Investigate factors such as the optimal placement of sprinkler heads, water distribution patterns, and the effectiveness of different sprinkler designs in controlling fires on rooftops.

2.Advanced Detection Systems: Explore innovative fire detection technologies that can improve the responsiveness and accuracy of rooftop sprinkler systems. This could involve integrating advanced sensors, such as thermal imaging or smoke detection, to enhance early fire detection and activation of the sprinkler system.

3.Water Conservation: Investigate methods to optimize water usage in rooftop sprinkler systems without compromising their effectiveness. This could involve exploring water recycling or rainwater harvesting techniques, as well as developing smart control systems that adjust water flow based on fire intensity or specific areas at risk.

4.Integration with Building Automation Systems: Explore the integration of rooftop sprinkler systems with building automation systems for enhanced monitoring, control, and coordination. This integration could include features such as remote monitoring, automated maintenance alerts, and integration with other safety systems within the building.

5.Fire Safety Standards and Regulations: Contribute to the development and improvement of fire safety standards and regulations pertaining to rooftop sprinkler systems. Stay updated with local and international codes and standards and provide insights based on research and practical implementation.

6.Environmental Impact: Evaluate the environmental impact of rooftop sprinkler systems and identify ways to minimize their carbon footprint. This may involve exploring energy-efficient pump systems, eco-friendly fire suppression agents, or alternative fire protection technologies.

Remember to consult with experts in fire safety, building engineering, and relevant fields when pursuing these future works. Collaboration with industry professionals, academic institutions, or research organizations can help advance knowledge and contribute to the improvement of rooftop sprinkler systems.

CHAPTER 6

PROJECT MANAGEMENT AND COSTING

6.1 Introduction

A Gantt chart is a type of bar chart that illustrates a project schedule. It provides a visual representation of project tasks, their durations, and the dependencies between them. A Gantt chart is an effective tool for project managers to plan, schedule, and track progress. Gantt charts are widely used in various industries and are particularly helpful for visualizing complex projects with multiple tasks and dependencies. They offer a comprehensive overview of project timelines, aiding in planning, scheduling, and monitoring progress to ensure successful project completion.

6.2 Costing

No	Component and materials	Price(RM)	Quantity	Total
1	Node MCU ESP8266	23.40	1	23.40
2	Single Relay Module	5.50	1	5.50
3	Step Down DC	11.50	1	11.50
4	PVC Pipe	4.50	1	4.50
5	Zink	-	1	-
6	Wood	3.50	1	3.50
7	Play wood	5.50	1	5.50
8	Water Filter	3.60	1	3.60
9	Water Pump	18.88	2	37.76
10	Temperature Sensor	12.12	1	12.12
11	Glue PVC	3.20	1	3.20
12	Bottle 5liter	5.20	1	5.20
13	Silicone Tube	3.18	2	6.36
14	Acetusy Cure Silicone	6.18	1	6.18
15	Tape	3.40	1	3.40
16	Jumper	7.70	1	7.70
17	Casing	3.90	1	3.90
18	PVC Connecter	0.50	6	3.00
19	Metal Frame	250	1	250
Total				RM396.32

6.2 GANTT CHART AND ACTIVITIES OF THE PROJECT (SEMESTER4)

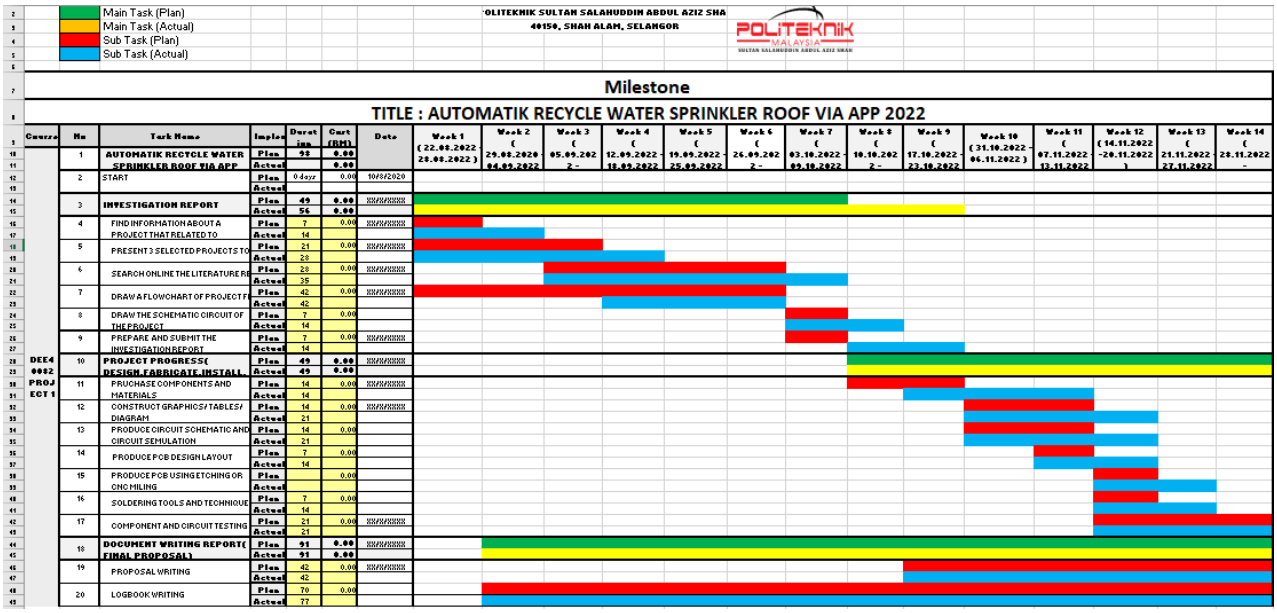


Figure 6.1 Gantt chart semester 4

6.2 GANTT CHART AND ACTIVITIES OF THE PROJECT (SEMESTER5)

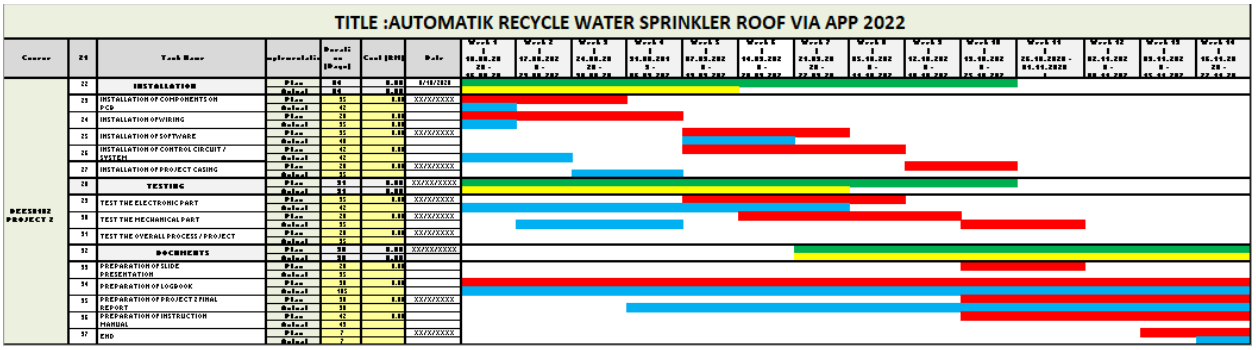


Figure 6.2 Gantt chart semester 5

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-*Fixed water fire extinguishing system* (2016) *YouTube*. Available at: https://youtu.be/vvzYK8PCmj0

-*How to make automatic plant watering system using Arduino Uno and soil sensor || techie lagan* (2021) *YouTube*. Available at: https://youtu.be/iwkE_HWU-6M (Accessed: January 17, 2023).