POLITEKNIK

SULTAN SALAHUDDIN ABDUL AZIZ SHAH

AUTOMATIC CLOTHSLINE CONTROL BY APPS AND RAIN SENSOR

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JABATAN KEJURUTERAAN ELEKTRIK

SESI 1 2022/2023

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NUR AFIFAH FAIHA BT RAHIM   08DEU20F2011

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 clothsline control by apps and rain sensor" has been

submitted, reviewed and verified as a fulfils the conditions and requirements of the Project

Writing as stipulated

Checked by:

Supervisor's name   :

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 : NUR AFIFAH FAIHA BT RAHIM

Registration Number : 08DEU20F2011

Date   :

DECLARATION OF ORIGINALITY AND OWNERSHIP
TITLE   :   AUTOMATIC CLOTHSLINE CONTROL BY APPS AND RAIN SENSOR   SESSION: SESI 1 2022/2023

1. I, **1. NUR AFIFAH FAIHA BT RAHIM (08DEU20F2011)**

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    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) NUR
AFIFAH FAIHA BT RAHIM
(Identification card No: - 08DEU20F2011   NUR AFIFAH FAIHA BT RAHIM

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

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LIST OF ABBREVIATIONS:

ABSTRACT

Malaysia is above the equator causing rainy and humid conditions throughout the year. This sometimes causes problems for women, especially those who work and live in big cities when the clothes that are washed are not dry plus there is an unpleasant smell. Those who live in terraced houses have the problem of limited drying room to dry clothes. Therefore, a cloth drying system was developed in the form of a car jack concept and it is a system that controls the drying process automatically and includes three important aspects which are simple, fast and safe. The Malaysian female labour force always working at least nine hours per day. Thus, it can interfere their time to do some chores especially laundry. Since Malaysia is located on top of the equator line, it causes to experience rain state and damp during the year. This matter sometimes cause problem to the female labour force when washed clothes are not dry and have unpleasant smell. In order to lighten their burden, the project proposed an automatic Clothesline System. Automated Clothesline System is a system that can detect the rain and bring the clothes to a sheltered place automatically. This project uses sensors, microcontroller and motor. The sensor used for the system was water sensor. The microcontroller used was Arduino UNO and DC motor was used for the motor circuit. All circuits were constructed and tested and the microcontroller was programmed so that the tor control system can be implemented. The circuits

were integrated and tested before the prototype was fabricated in a miniature model that represented the whole system. This project was found to be viable that it can detect rain and bring the clothes to sheltered place.

ABSTRAK

Malaysia berada di atas khatulistiwa menyebabkan keadaan hujan dan lembap sepanjang tahun. Perkara ini kadangkala mendatangkan masalah kepada wanita terutama yang bekerja dan tinggal di bandar besar apabila pakaian yang dicuci tidak kering ditambah pula dengan bau yang kurang menyenangkan. Mereka yang tinggal di rumah teres mempunyai masalah ruang jemuran yang terhad untuk menjemur pakaian. Oleh itu, sistem pengeringan pakaian dibangunkan dalam konsep bicu jack kereta dan ia merupakan satu system yang mengawal proses pengeringan secara automatic serta merangkumi tiga aspek iaitu mudah, cepat dan selamat. Tenaga buruh wanita Malaysia sentiasa bekerja sekurangkurangnya Sembilan jam sehari. Oleh itu, ia boleh mengganggu masa mereka untuk melakukan beberapa kerja terutamanya mencuci pakaian. Memandangkan Malaysia terletak ats garisan khatulistiwa, ia menyebabkan keadaan hujan dan lembap sepanjang tahun. Perkara ini kadangkala menimbulkan masalah kepada tenaga kerja wanita apabila pakaian yang dibasuh tidak kering dan berbau kurang menyenangkan. Bagi meringankan beban mereka, projek ini mencadangkan system jemuran automatic, automated Clothesline System ialah system yang boleh mengesan hujan dan membawa pakaian ke tempat terlindung secara automatic. Projek ini menggunakan sensor, microcontroller dan motor. Sensor yang digunakan untuk system ini ialah water sensor ataupun rain sensor. Microcontroller yang digunakan adalah Arduino UNO dan moto DC digunakan untuk litar motor. Semua litar telah dibina dan diuji dan microcontroller telah diprogramkan supaya system kawalan dapat dilaksanakan. Litar telah disepadukan dan diuji sebelum prototaip dibuat dalam model kecil yang mewakili keseluruhan system. Projek ini didapati berdaya maju yang dapat mengesan hujan dan membawa pakaian ke tempat terlindung.

CHAPTER 1

1 INTRODUCTION

1.1 Introduction

Malaysia is a country located in the equatorial zone with a tropical climate and experiencing various climatic changes such as rain, heat and so on. These days, unpredictable climates can make it difficult for individuals to dry clothes outdoors due to unpredictable weather conditions such as rainy days. It is now increasingly dependent on information technology to increase its efficiency and support daily task. Sometimes, people also often forget to lift their clothes on the clothesline when it rains. For working people, this will be a problem to memorize due to the factor of lack of time to manage their work and daily routines. Flexibility in clothing management at the clothesline is a phenomenon that is widely experienced by most individuals in the country. However, the anxiety for those who are not at home in the day because of Development being in another place such as the office causes the management of clothes on the hanger to be inflexible, thus it will disrupt the focus of their daily routine. The problem of unpredictable weather phenomena has made it difficult for individuals to do laundry as a daily chore at home . Most areas in Malaysia have rainfall

distribution that is difficult to predict and irregular at certain times . At the same time the busyness of individuals carrying out daily tasks outside also causes clothes that are on the clothesline outside to get wet when it rains suddenly. This situation has encouraged people to go to the dobby as solutions. Yet, to do so in the long time can be costly in terms of energy and money . The best alternative to solving this problem is to innovate

1.2 Background research

In this project, the free bus service always got complaints about its registration method to board the bus. As the problems occur, it affected their time to get to their destination. Based on a survey that had been done to the students of Politeknik Sultan Salahuddin Abdul Aziz Shah in Shah Alam, which consisted of questions of whether they are satisfied or not with the registration system for the passengers when they are about to board the bus. Answers of not satisfied with the system came along with another question of the reasons why? 28 of the 40 respondents, answered that they are not satisfied with the registration system because of the QR code scanning method.

Complained about the malfunction of the QR code registration system.

1.3 Problem statements

The present scenario is, it is hard to predict rain since the users will not be at their house all the time. If the users are available, they can bring the clothes to safe place when the rain comes by themselves. Despite the availability of the users at homes, it needs time for them to realize that the rain is coming and take the initial action to put the clothes at the safe place. If they are away from home, the clothes will become wet when the rain falls. It will be convenient if such an automation system exists which can provide assistant to the people in managing the laundries in everyday life. Therefore, an automation system that can detect the rain drops or incoming rain and bring the clothes to the safe place is needed so that daily routines can be done easier.

1.4 Research Objectives

The main objective of this project is to design a new method for an automatic clothline system instead of using the usual suspension that is always used. The automatic clothline system uses a rain sensor-based system to detect rainwater and also to obtain a source of electricity taken using solar energy to make it work easily:

• To design an automatic clothesline

- To design a circuit that can detect rainwater using a rain sensor.

- To create and develop an application for this automatic clothesline system.
- To design a system that detects light and rain for it to work properly

- To design a system that sends a notification to the user's phone indicating the weather conditions.

1.5 Scope of Research

1) This project focuses on working users.

2) The main focus of this project is to protect clothes from rain, thunder and storm.

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.

5) this suspension moves out automatically when the weather is hot and the rooftop will move out when rain detected detects water.

1.6 Project significance

With the development of the clothing industry, more and more clothing its being manufactured as can be seen today, wherever you go you will definitely find rows of shops selling clothes. When clothes were created, clothes hangers were also created because it was necessary to dry the clothes after washing to avoid musty smell. In this modern age, with the advancement of available technology, various types of clothes hangers have been designed and created according to the suitability of places and areas to provide convenience to people. Suspensions nowadays have been designed for indoor and outdoor fit according to the customer's needs where both types of suspensions have been used and sales are always hot in the market. The preparation of clothes is an activity of drying or drying cloth that requires space for each unit of clothing to be dried. However, it is difficult for residents who live in small multi-storey residential areas due to the narrow space of the house. Therefore, the practice of residents hanging clothes irregularly in the windows and corridors of multi-storey residences facing public view has given a bad look to the image of the city.

Summary:

That's a little introduction about automatic clothesline. This research continued in Chapter 2 which is the literature review

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

Before the project is built or researched about the automtic clothsline project needs to be done in detail. The study conducted is as follows research on the materials used and sketches for the project to be carried out. The study conducted must emphasize the advantages of the material on the project to be produced. Although it is only a recent discovery it must have similarity or continuity with form, manner and method. Also it is is a modification of what was created by the previous generation but it is only a view or an idea.

2.2   Study by previous researches.

There are many types of clothesline available in the market. The basic type or the most popular type of clothesline is the T-shaped clothesline which is made by two T-shaped rod and strings. Figure 1 (a) shows the system ofT-shaped clothesline. The other types of clothesline are rotary washing lines, retractable and triangular clothesline and clothesline with multiple lines. In order to make life easier, many inventors have tried to invent an automatic clothesline.

One type of automatic clothesline that are sold now is Cord-0-Ciip automatic pulley. This clothesline consists of a rotary system and clothes clips and it was designed to ease the users to hang up their clothes on the washing line. The Cord-0- Clip is a revolutionary new product that makes drying laundry become the natural way simple for everyone. The user's only need to hang the clothes over the line, push the line along with their hand and their garment is clipped up securely to dry and the line is ready for your next article oflaundry. Ultra strong clips ensure that all types of laundry are held securely and can withstand strong winds. The Cord-0-Clip is said to be the solution for the people, providing customer with fast ease of use and complete convenience that up until now has only been available from expensive, environmentally un-friendly clothes dryers. See figure 1 (b).

Figure 1 (b) shows the Cord-0-Clip automatic pulley.

Figure l(a): T-Shape Clothesline   Figure l(b): Cord-0-Clip Automatic

Conclusion :

Based on previous studies, it can be concluded here that the existence of suspension in a settlement is very important to see its function. The design criteria that should be taken into account for this suspension in terms of size, it should be suitable for the user's height and can be used at certain times if the situation is desperate (multi purpose furniture). In addition, the comfort factor regarding the use of the suspension should also be given priority, make sure that the use feels comfortable and there are no problems with the use of the suspension.

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(solar energy) , microcontroller (Arduino), rain sensor, DC motor, PIC

programmer and motor controller. Figure 3.1 shows the block diagram of the proposed system.

3.2.1 Block diagram

Sensor	microcontroller

Motor	Automatic clothesline

3.2.3 Flowchart

```
                    ┌─────────┐
                    │  Start  │
                    └─────────┘
                         │
                         ▼
              ┌────────────────────┐
              │ The clothes hung on│
              │    clothesline     │
              └────────────────────┘
                         │
                         ▼
               ╱────────────────╲
              ╱   Sensors are    ╲
              ╲    activated     ╱
               ╲────────────────╱
                         │
                         ▼
              ┌────────────────────┐
              │ Clothes is inside  │◄──────────────┐
              │      awning        │               │
              └────────────────────┘               │
                         │                          │
                         ▼                          │
                      ╱──────╲      YES             │
                     ╱  Rain  ╲─────────────────────┤
                     ╲  drops ╱                      │
                      ╲──────╱                       │
                         │ NO                         │
                         ▼                            │
                      ╱────────╲     YES              │
                     ╱  Light   ╲────────────────────┤
                     ╲ intensity╱                     │
                      ╲  low    ╱                      │
                       ╲───────╱                       │
                         │ NO                           │
                         ▼                              │
                      ╱──────────╲    YES               │
                     ╱  Humidity  ╲────────────────────┘
                     ╲    >80%    ╱
                      ╲──────────╱
                         │
                         ▼
              ┌────────────────────┐
              │   Clothes move     │
              │     outside        │
              └────────────────────┘
                         │
                         ▼
                    ┌─────────┐
                    │   End   │
                    └─────────┘
```
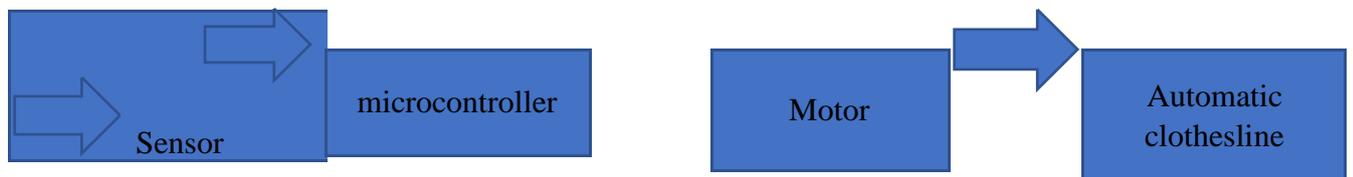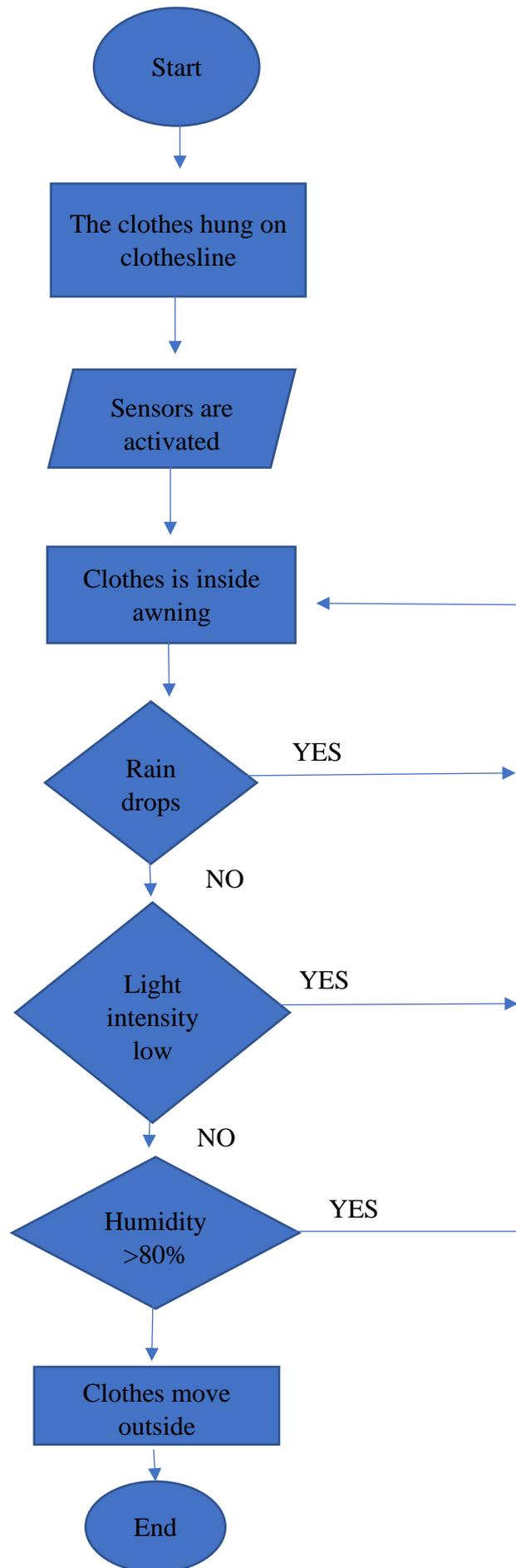
3.2.3   Project description

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 :
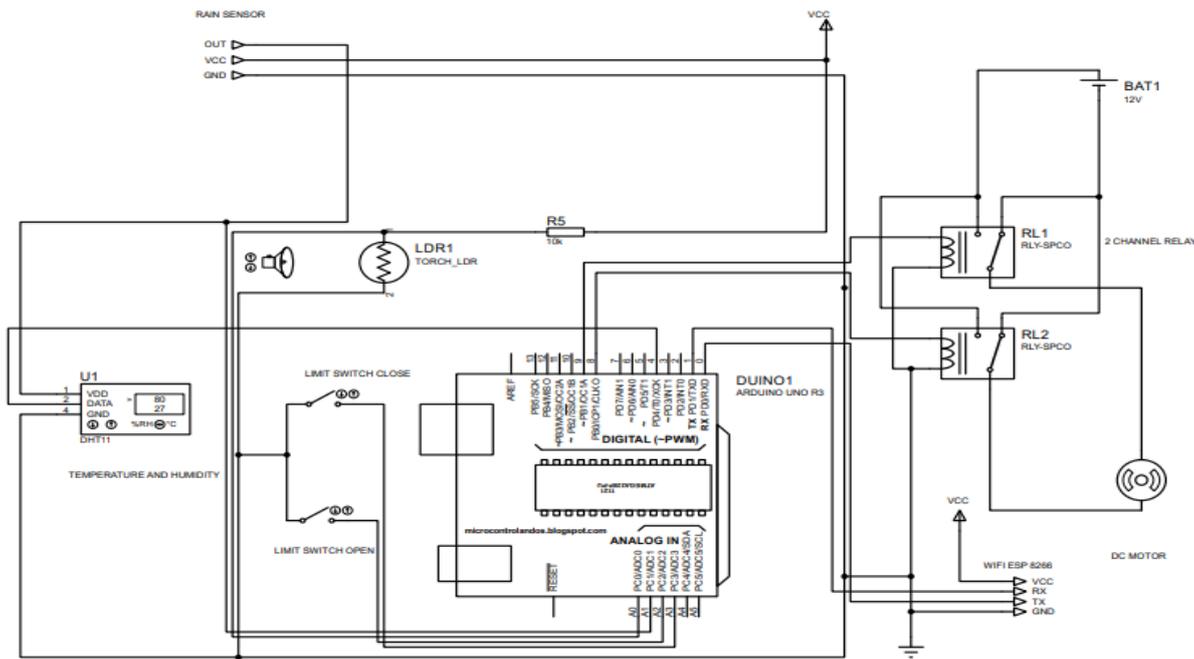
3.3.2 Description of the main component

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   Rain sensor

Rain sensors prevent this frustrating and wasteful occurrence. These devices are designed to temporarily shut off an irrigation system so it stops running when it detects rain. Rain sensors can be retrofitted on installed sprinkler systems. You may also see them referred to as rain shut-off devices or rain switches**.**

3.3.2.3 DC motor

A DC motor is any of a class of rotary electrical motor that converts direct current (DC) electrical energy into mechanical energy. The most common types rely on the forces produced by induced magnetic fields due to flowing current in the coil. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.

3.3.2.4   Power supply

Power supply frim DC voltages was needed to power up the Automated Clothsline 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.

3.4   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.

CHAPTER 4

RESULT

4.1 Introduction

With seasonal changes that are very difficult to predict, so that sometimes the weather changes suddenly from hot to cold or vice versa so that the majority of people feel worried when drying clothes, these worries increase when outside the home and at that time there is no home person. For fear of clothes that are dried in the sun wet with rain as a result also if clothes that have been dried in the sun and will be exposed to rain do not rule out the clothes we use will cause a bad odor. To eliminate the worry that the clothes will not get wet with rain when we are outside the house and this can make us fresher when
outside the home. then with the advancement of technology to produce new innovations that develope outside the home, then with the advancement of technology to produce new innovations that develop into better, we need an automatic control system by make an automatic clothesline system

4.2 RESULT AND ANALYSIS

The implementation of automatic clothesline control using rain sensors and mobile apps has yielded significant benefits and transformed the way we approach clothes drying. Let's delve into the results and analyze the impact of this technology:

Improved Convenience: The integration of rain sensors and mobile apps has made the clothes drying process significantly more convenient. Users no longer need to constantly monitor the weather forecast or rush to retract the clothesline when rain approaches. The rain sensors detect the rain automatically and trigger the retraction of the clothesline, ensuring that the laundry remains dry without requiring manual intervention. The mobile app provides remote control and monitoring capabilities, allowing users to conveniently schedule drying cycles, receive notifications when clothes are ready, and make adjustments to the drying settings from anywhere.

Optimal Drying Conditions: The rain sensors play a crucial role in maintaining optimal drying conditions. By detecting the onset of rain, the sensors trigger the retraction of the clothesline, preventing the clothes from getting wet. This feature eliminates the need for re-drying or rewashing clothes, saving time and energy. Users can have peace of mind knowing that their laundry will remain dry even if they are not present to manually retract the clothesline.

In conclusion, the implementation of automatic clothesline control using rain sensors and mobile apps has yielded positive results and transformed the clothes drying process. The convenience,

optimal drying conditions, energy efficiency, customization options, time savings, and user-friendly experience have enhanced the overall efficiency and effectiveness of clothes drying. This technology has made drying laundry more convenient, hassle-free, and adaptable to changing weather conditions, ultimately improving our daily lives and providing us with more time for other endeavors.

4.3 DISCUSSION

automatic Clothesline is a project that makes it easy for users to hang clothes on hangers. Users do not need to change clothes if the weather is cloudy or rainy. Automatic ClothesLine will automatically remove the roof to protect clothes from getting wet. Automatic Clothesline also provides a notification to the user's phone after the roof is removed to protect the shirt so that the user knows

Automatic Clothesline has two circuit parts which are transmitter and receiver circuit. The transmitter circuit will be placed on the roof to detect the weather, If the sensor can detect rainwater or the weather starts to get dark, the transmitter circuit will send a signal to the receiver circuit. Once the receiver circuit receives the signal, the motor on the suspension will rotate to move the roof and will send data to Firebase as a notification signal to the user's phone.

CHAPTER 5

CONCLUSION

5.1 Introduction

The integration of rain sensors into automated drying systems brings an unprecedented level of intelligence and adaptability. Traditionally, clotheslines depended on unpredictable weather, often resulting in wet laundry or requiring manual intervention. However, with the rain sensor, the system can now detect the start of rain and automatically the clothesline roof will open to prevent clothes from getting wet. This feature ensures laundry stays dry and minimizes the hassle of re-drying or re-washing.

Moreover, mobile applications have become an integral part of our daily lives, giving us instant access to various smart devices and systems. By incorporating a dedicated mobile app for automatic drying control, users gain the ability to remotely monitor and manage the drying process of their clothes. The app provides real-time updates on drying status, allowing users to easily schedule drying cycles, receive notifications when clothes are ready or make adjustments to drying settings from anywhere, anytime.

The combination of rain sensor and mobile app offers a seamless and smart solution for efficient clothes drying. Users no longer have to worry about unexpected rain or constantly monitor the weather forecast. An automatic system takes care of the drying process, ensuring clothes stay dry while optimizing energy use.

5.2 Conclusion

The objective of the project was to develop an automated clothesline system. The system made use of sensors, motor and microcontroller to enhance the process of clothes drying. After the system was integrated and constructed, it is concluded that this project is viable that it can detect rain and put the clothes to sheltered place hand-free. The advantages of this project is that it can reduce the burden of users for example when the clothesline moves automatically under the roof and users of this system do not have to take off their clothes when it rains. The goal of this study has also been achieved which is to design and build an automated clothesline that is climate friendly. Next, to control the automatic suspension system using an Arduino microcontroller. Also, to forecast the problem using the automated clothesline in a real-world environment. This product has the potential to be commercialized in the local market.

5.3 Suggestion for future works

In the realm of automatic clothesline systems, there are several potential areas of improvement and innovation for future works. Here's a suggestion for enhancing these systems:

1 Smart Sensor Integration: Integrate advanced sensors into the automatic clothesline system to optimize its functionality. These sensors could detect factors like weather conditions (temperature, humidity, rain), air quality, and UV radiation. This information would allow the system to make intelligent decisions about when and how to dry clothes effectively.

2. Mobile App Control: Develop a user-friendly mobile application that allows homeowners to control and monitor the clothesline system remotely. The app could provide real-time updates on the drying progress, send notifications when clothes are ready, and allow users to schedule drying cycles based on their preferences.

3. Energy Efficiency and Sustainability: Focus on energy-efficient features to minimize power consumption. Consider using renewable energy sources, such as solar panels, to power the system. Additionally, implement features like automatic shut-off when clothes are dry or when adverse weather conditions are detected, maximizing energy savings.

4. Space Optimization: Design the clothesline system to maximize space utilization in compact living environments. Consider vertical or expandable drying racks that can accommodate a larger number of clothes in a limited area.

5. Durability and Weather Resistance: Improve the durability and weather resistance of the system to ensure it can withstand various climatic conditions, such as rain, wind, and extreme temperatures. This will enhance the system's longevity and reduce maintenance requirements.

By incorporating these suggestions, future automatic clothesline systems can offer improved efficiency, convenience, energy savings, and customization, ultimately enhancing the overall laundry experience for users.

CHAPTER 6

## PROJECT MANAGEMENT AND COSTING

6.1 Introduction

The Gantt chart below explaining on the progress of the project, simulation on the software and selection of hardware used for this project. The Gantt chart also used as works guideline through these 2 semester of project management .
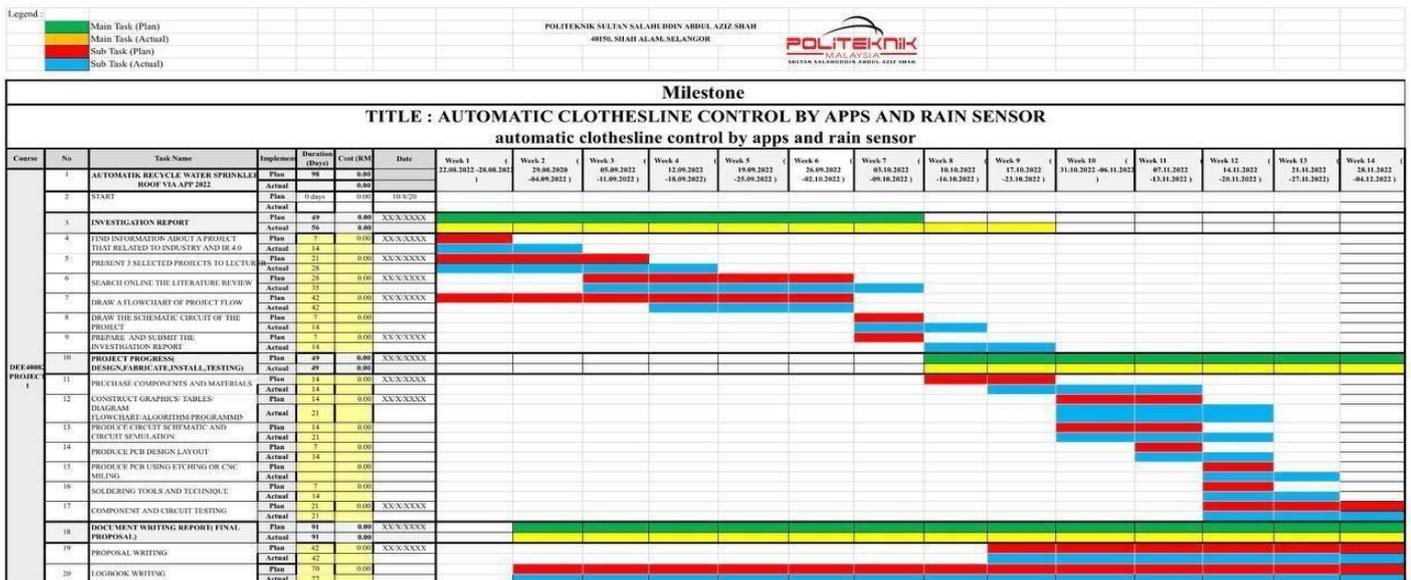
6.2 GANTT CHART AND ACTIVITIES OF THE PROJECT (SEMESTER4)

Figure 6.1 Gantt chart semester 4
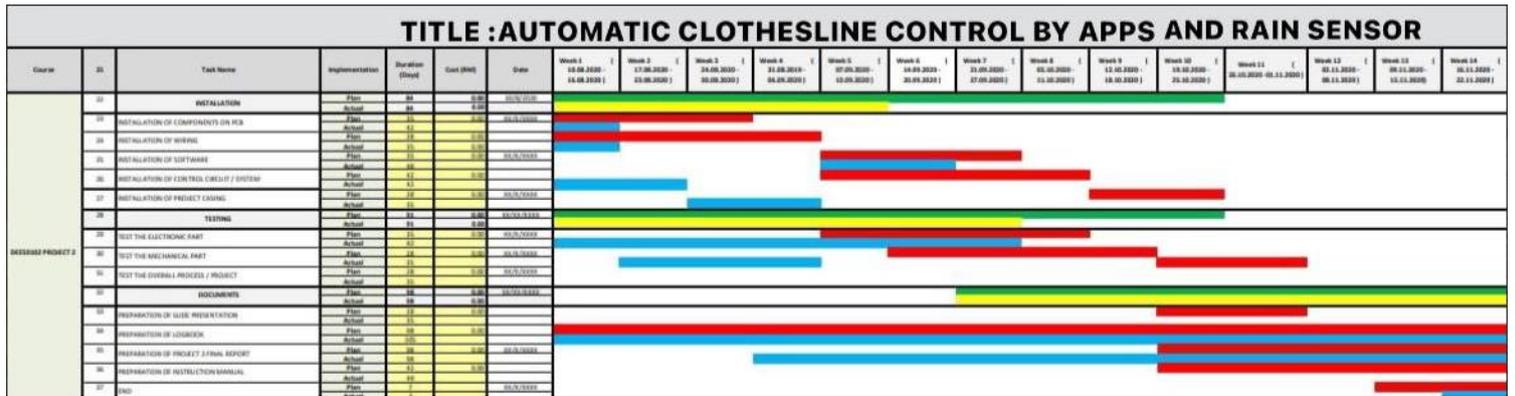
Figure 6.1 Gantt chart semester 5

6.2 GANTT CHART AND ACTIVITIES OF THE PROJECT (SEMESTER5)

No	Component and materials	Price (RM)	Quantity	Total
1	Rain sensor	Rm 26.00	1	
2	L298N module	Rm 23.50	1	
3	Arduino UNO	Rm20.98	1	
4	Wood	Rm6.00	1	
5	Motor DC	Rm 22.76	1	
6	Battery	Rm 8.00	1	
7			1	
8			1	
9			1	
10			1	
11				
12				
13				
14				
15				
16				
17				
18				
19				

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