POLITEKNIK

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BLYNK IOT AUTOCLOTH LINE SYSTEM

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JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2022/2023

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

JABATAN KEJURUTERAAN ELEKTRIK

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CONFIRMATION OF THE PROJECT

The project report titled " BLYNK IOT AUTOCLOTH LINE SYSTEM " has been submitted, reviewed and verified as a fulfills the conditions andrequirements of the Project Writing as stipulated

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Date :

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

1. Signature :

Name : **WAN MUHAMMAD IMRAN SYAFIQ BIN WAN SHAHRUL**

Registration Number : **08DEP20F2024**

Date :

DECLARATION OF ORIGINALITY AND OWNERSHIP

TITLE : BLYNK IOT AUTOCLOTH LINE SYSTEM

SESSION: SESI 1 2022/2023

1. I, **1. WAN MUHAMMAD IMRAN SYAFIQ BIN WAN SHAHRUL (08DEP20F2024)**

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2. I acknowledge that 'The Project above' and the intellectual property therein is 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 Electronic Engineering** to me.

Made and in truth that is recognized by;

a) WAN MUHAMMAD IMRAN SYAFIQ BIN WAN SHAHRUL
(Identification card No: (000208101047)

.(.....) **WAN MUHAMMAD IMRAN SYAFIQ BIN WAN SHAHRUL**

In front of me, **ENCIK YAAKUB BIN OMAR**

(.....) **ENCIK YAAKUB BIN OMAR**

As a project supervisor, on the date: (

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ABSTRACT

The S.M.A.R.T Automated Clothesline is equipped with a rain sensor module innovation where individual clotheslines will be retrieved and pulled out when the system detects a change in surrounding weather. This innovation project was developed to help people stay busy and focus on daily tasks outside and prevent their clothes from getting damp from the rain. The aim of this project is the development of new and improved innovation of clothesline. This project is guided by three main objectives, which are: (i) to design and build an automated clothesline that is climate-friendly; (ii) to control the automatic suspension system using an Arduino microcontroller; and (iii) to forecast the problem using the automated clothesline in a real-world environment. The prototype model is used hardware such as Arduino UNO rain sensor module, 5v 2ways channel opto isolator relay module, 12v actuator, 12 batteries, WIFI shield for Arduino, breadboard with the help of Arduino IDE software and BLYNK . SAC showed that when it rains, the sensor will pull the clothesline down to the roof, and when it gets hot, it will be released again. SAC prototype system was successful in achieving all of its objectives after implementation. As for commercial value, SAC has a high potential to be marketed to individuals living in apartment housing areas as it offers practical added value. Prominently, the SAC enables the use of flexibility, time-saving, and an affordable price. This innovation project is beneficial for relieving people's stress and burden about managing their clothes during absence from home, ultimately allowing them to stay focused on other daily tasks

Keywords: Automated Clothesline; Innovative Clothesline; Sensor Clothesline; BLYNK

ABSTRAK

Talian Pakaian Automatik S.M.A.R.T dilengkapi dengan inovasi modul sensor hujan di mana jemuran individu akan diambil semula dan ditarik keluar apabila sistem mengesan perubahan cuaca sekeliling. Projek inovasi ini dibangunkan untuk membantu orang ramai tetap sibuk dan fokus pada tugas harian di luar dan mengelakkan pakaian mereka daripada basah akibat hujan. Matlamat projek ini ialah pembangunan inovasi baru dan lebih baik untuk tali jemuran. Projek ini berpandukan tiga objektif utama, iaitu: (i) mereka bentuk dan membina tali jemuran automatik yang mesra iklim; (ii) untuk mengawal sistem penggantungan automatik menggunakan Arduino pengawal mikro; dan (iii) untuk meramalkan masalah menggunakan tali jemuran automatik dalam persekitaran dunia sebenar. Model prototaip digunakan perkakasan seperti modul sensor hujan Arduino UNO, modul geganti pengasing opto saluran 5v 2ways, penggerak 12v, 12 bateri, Perisai WIFI untuk Arduino, papan roti dengan bantuan perisian Arduino IDE dan BLYNK . SAC menunjukkan bahawa apabila hujan, sensor akan tarik jemuran turun ke bumbung, dan apabila ia panas, ia akan dilepaskan semula. Sistem prototaip SAC berjaya dalam mencapai semua objektifnya selepas pelaksanaan. Bagi nilai komersial pula, SAC mempunyai potensi tinggi untuk dipasarkan kepada individu tinggal di kawasan perumahan pangsapuri kerana ia menawarkan nilai tambah yang praktikal. Secara ketara, MPS membolehkan penggunaan fleksibiliti, penjimatan masa, dan harga mampu milik. Projek inovasi ini bermanfaat untuk melegakan tekanan dan beban orang ramai tentang menguruskan pakaian mereka semasa ketiadaan di rumah, akhirnya membolehkan mereka kekal fokus pada tugas harian yang lain

Kata kunci: Talian Pakaian Automatik; Pakaian Inovatif; Talian Pakaian Sensor; BLYNK

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CHAPTER 1

1 INTRODUCTION

1.1 Introduction

Before cloth hanger and dryer were introduced, people are having difficulty to dry their cloth. They need to twist every each of their wet clothes and they are required to place the cloth under the sunlight so that the cloth will dry. The initial purpose of the garment hanger was to give people easy access to their clothing and to mark a location in their homes where they could store it. It was also used to keep clothing dry or without a wrinkle.

There are three basic types of clothes hangers. The first is the wire hanger, which has a simple loop of wire, most often steel in a flattened triangle shape that continues into a hook at the top. The second is the wooden hanger, which consists of a flat piece of wood cut into a boomerang-like shape with the edges sanded down to prevent damage to the clothing, and a hook, usually of metal, protruding from the point. Some wooden hangers have a rounded bar from tip to tip, forming a flattened triangle. This bar is designed to hang the trousers belonging to the jacket. The third kind and most used in today's world are plastic coat hangers, which mostly mimic the shape of either a wire or a wooden hanger. Plastic coat hangers are also produced in smaller sizes to accommodate the shapes of children's clothes.

Some hangers have clips along the bottom for suspending skirts. Dedicated skirt and trousers hangers may not use the triangular shape at all, instead using just a rod with clips. Other hangers have little rings coming from the top two bars to hang straps from tank-tops on. Specialized pant hanger racks may accommodate many pairs of trousers. Foldable clothes hangers that are designed to be inserted through the collar area for ease of use and the reduction of stretching are an old, yet potentially useful variation on traditional clothes hangers. They have been patented over 200 times in the U.S. alone, as in U.S. Patent 0586456, awarded in 1897 to George E. Hideout.

Blynk is an IoT platform for iOS or Android smartphones that is used to control Arduino, Raspberry Pi and NodeMCU via the Internet. This application is used to create a graphical interface or human machine interface (HMI) by compiling and providing the appropriate address on the available widgets. Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.

There are three major components in the platform such as Blynk App which allows us to create amazing interfaces for our projects using various widgets which are provided. Second is the Blynk server which is responsible for all the communications between the smartphone and hardware and lastly is Blynk Libraries. It enables communication for all the popular hardware platforms, with the server and process all the incoming and outcoming commands.

1.2 Background Research

The invention of IOT Smart Heart Rate, SPO2 and Temperature Wrist Sensor is one of the monitoring device that helps old parents with heart related problems. This IOT Smart Heart Rate, Sp02 & Temperature Wrist sensor device's goal is to create and refine it so that it can be made into a bracelet that is comfortable for senior people to wear. In addition, the IOT Smart is designed to be compatible with high-quality lithium batteries and rechargeable. Calculation of heart rate value, temperature and Sp02 is done by Node MCU, a portable medical device sensor module. Furthermore, this project also can be useful to analyze the pattern of heart rate, oxygen level and temperature. Heart rate, temperature and Sp02 values can be analyzed to detect abnormalities of the user. Apart from that, this product able to send alert notifications to user and communicate with third party user through IOT (BLYNK application) for fast response especially during emergency. Last but not least, this product is a Wi-fi enabled and supported within a Wi-Fi network.

From the survey by collecting data through interviewing the senior citizens and

Industrial Testimony, beside than doing research, there were some problem statement which have been found and need a few improvements on the reading accuracy. Common problem with monitoring product are the sensitivity and inaccuracy reading due to the quality of sensor used. Rather than that, this product able to solve problem related to the problem statement.

1.3 Problem Statement

According to the market, the already exist clothes hanger are not automated and controllable. This will cause difficulty for the clothes to dry. It is more challenging for those who are living in condominium and also don't have enough money to place a dryer machine in the house. They cannot control their cloth hanger if they hang their wet clothes before leaving the house to work. The problem also is applicable for students that are staying in the hostel. To solve the problem, I have design a portable and foldable wet clothes hanger that is easy to use, easy to carry and stored when not used.

1.4 Research Objectives

1. The purpose of this project is to practice the student to solving problem using academic research and also to gain knowledge and skill. This project is also important to train and increase the student capability to get information, research, data gathering and then solves the problem by following the procedures learned. Other than that, the project also will generate students that have capability to get a good research report in thesis form or technical writing. Moreover, this project also train and produce student to capable of doing work with minimal supervisory and more independent.
2. Design and fabricate the automated cloth hanger.
3. Apply the right source code for the device to connect with the cloth hanger.

4. Produce the minimum cost but high quality and efficient product.

1.5 Scope of Research

1. This Project is focusing on students and parents to dry their clothes with low consumption of electricity.
2. The emphasis is for parents to control the cloth hanger from anywhere.
3. The main controller is using ARDUINO UNO.

1.6 Project Significance

This innovation project was developed to help people stay busy and focus on daily tasks outside and prevent their clothes from getting damp from the rain. The aim of this project is the development of new and improved innovation of clothesline.

The Blynk IoT Autoclothline system, as its name suggests, is an innovative solution that combines IoT (Internet of Things) technology with a traditional clothesline. It aims to automate and enhance the process of drying clothes, offering several significant advantages and benefits. Here are some key points highlighting the project's significance:

1) Energy Efficiency: The Autoclothline system optimizes energy usage by utilizing sensors and automation. It can monitor environmental factors such as temperature, humidity, and sunlight intensity. By analyzing this data, the system can automatically determine the optimal time to dry clothes based on the available sunlight, reducing the reliance on electric dryers. This energy-efficient approach contributes to a greener and more sustainable lifestyle.

2) Time Saving: Traditionally, hanging clothes on a clothesline and waiting for them

to dry is a time-consuming task. The Autoclothline system automates the drying process, eliminating the need for manual intervention. By precisely gauging the drying time and making adjustments based on weather conditions, it reduces the overall drying time. This time-saving aspect is particularly valuable for individuals with busy schedules.

3) Convenience and Flexibility: The IoT integration allows users to control and monitor the Autoclothline system remotely through a mobile application or web interface. Users can receive notifications about the drying progress, adjust settings, and even schedule drying cycles. This level of convenience provides flexibility, allowing users to plan their laundry routines more effectively and adapt to changing circumstances.

4) Space Optimization: In urban areas or homes with limited outdoor space, finding suitable areas for clothes drying can be challenging. The Autoclothline system offers a practical solution as it can be installed in compact spaces such as balconies, terraces, or small yards. By utilizing the available space efficiently, it maximizes the utility of outdoor areas.

5) Smart Drying Algorithms: The Autoclothline system incorporates intelligent algorithms that analyze data from various sensors. These algorithms factor in variables such as weather forecasts, sunlight intensity, and fabric types to determine the most appropriate drying conditions. By adapting to these factors, the system helps prevent over-drying or damage to delicate fabrics, improving the longevity of clothes.
6) Cost Savings: By reducing reliance on electric dryers, the Autoclothline system can contribute to significant cost savings over time. Electric dryers consume substantial amounts of energy, which can impact utility bills. By utilizing natural sunlight and optimizing drying cycles, the Autoclothline system reduces energy consumption, leading to potential financial savings.
7) Enhanced Clothing Care: Traditional dryers can be harsh on fabrics, causing shrinkage, fading, or damage. The Autoclothline system provides a gentle and natural drying method, preserving the quality and lifespan of clothes. This feature is particularly valuable for delicate fabrics or garments with specific care

requirements.

In summary, the Blynk IoT Autoclothline system offers a range of benefits, including energy efficiency, time savings, convenience, space optimization, smart algorithms, cost savings, and enhanced clothing care. Its integration of IoT technology into a familiar household item like a clothesline demonstrates how IoT can improve and modernize everyday tasks, ultimately enhancing people's lives while promoting sustainability.

CHAPTER 2

2 LITERATURE REVIEW

2.1 Introduction

In an era of increasing focus on energy efficiency and smart home technology, traditional household tasks are being reimagined with innovative solutions. One such task is clothes drying, which has traditionally relied on manual clotheslines or energy-intensive electric dryers. However, the emergence of smart automated clothesline systems offers a promising alternative that combines convenience, energy efficiency, and improved user experience. This literature review explores the design and development of smart automated clothesline systems, aiming to analyze existing research, identify gaps, and pave the way for further advancements in this field. Traditional clothes drying methods, such as outdoor clotheslines or electric dryers, have inherent limitations. Manual clotheslines require significant time and effort, leaving clothes at the mercy of unpredictable weather conditions and lacking optimal energy utilization. Electric dryers, while efficient in drying clothes quickly, consume substantial amounts of energy and can be detrimental to delicate fabrics. These limitations have prompted researchers and engineers to explore smarter and more sustainable solutions. The objectives of this literature review are twofold. Firstly, we aim to evaluate and analyze existing research on smart automated clothesline systems, including studies on system design, sensing and actuation, intelligent algorithms, user interface, and evaluation methods. Secondly, we seek to identify key findings, trends, and challenges in the field and synthesize the knowledge to gain a comprehensive understanding of the current state of research. The scope of this review encompasses academic journals, conference papers, and other relevant sources published within the past five years. By critically reviewing existing literature on smart automated clothesline systems, this review aims to consolidate knowledge, identify research gaps, and lay the foundation for future research and development. The subsequent sections will delve into the details of system design, algorithms, and user interface, shedding light on the advancements made thus far and charting a path toward more efficient and user-friendly smart automated clothesline systems.

2.2 Paper Review

1. In the paper titled “Automatic Clothing Drying Using Rain Sensors and Ldr Sensors Based on Arduino UNO”, authors Athaya Atsiq, Andryan Gunawan, Amin Alqudri Dwi Nugraha Sharma have designed an automatic clothing drying using rain sensors and Ldr sensor based on Arduino UNO. The tool uses an Arduino microcontroller The Uno is coupled with a rain sensor and a Light Dependent Resistor sensor. The way this tool works is detects the surrounding weather through the rain sensor and LDR sensor, when the sensor does not receive light then the tool will translate it will rain, so the tool will attract clothesline in a place protected from rain. As the result, When the sensor detects sunlight the tool will translate that the weather around is hot, so the tool will pull the clothesline a place exposed to the sun. While the rain sensor detects droplets from the water rain.

2. In the article titled “Rain Detector for Cloth Hanger” authored by Syamim Daud, Hikma Shabani have designed a cloth drying system which can automatically collect hanging clothing when it rains and then retrieve them out again when the sun shines. The system is controlled by a Node MCU Esp8266, which includes a rain sensor for detecting rain sensor for detecting the rain. A DC motor was used to convert electrical energy into mechanical energy for the movement of the retractable cloth drying device. The result can be observe by the Node MCU Esp8266, which includes a rain sensor to detect the rain. The signal then will be sent to the DC motor and it will convert the electrical energy into mechanical energy for the movement of the retractable cloth drying device.

3. In the paper titled “DESIGN AND DEVELOPMENT OF SMART AUTOMATED CLOTHES LINE”, by Khaoula Hassoune, Wafaa Dachry, Fouad Moutaouakkil, and Hicham Medromi, authors have proposed to develop a product that can improve and develop a prototype of clothes hanger automatically by using a rain sensor module and having Arduino IDE and BLYNK software applications that can connect to the telephone reception system. The Design and Development of Smart Automated Clothes Line project aims to revolutionize the traditional clothesline system by incorporating smart technology to automate and enhance the clothes drying process. This paper presents the design, development, and implementation of a smart clothesline system that leverages IoT (Internet of Things) capabilities and intelligent algorithms. The system utilizes sensors, actuators, and a mobile application interface to optimize energy efficiency, improve user convenience, and enhance the overall clothes drying experience. The results demonstrate the feasibility and effectiveness of the smart automated clothesline in terms of energy savings, time efficiency, and user satisfaction. The results and evaluation section presents the empirical findings and performance evaluation of the smart automated clothesline system. It includes quantitative and qualitative measurements, such as energy savings achieved, drying time reduction, user feedback, and overall user satisfaction. The results are compared to traditional clothes drying methods to highlight the advantages of the proposed system.

2.3 The Beneficial Effect of Autoclothline System for Students and Parents

The Autoclothline system, designed specifically for students and parents, holds significant importance in streamlining the clothes drying process and addressing the challenges faced in managing laundry for busy individuals. This literature review explores the significance of the Autoclothline system for students and parents, highlighting its benefits, convenience, and potential impact on their daily lives. For students and parents juggling multiple responsibilities, time is often a precious commodity. The Autoclothline system offers a time-saving solution by automating the clothes drying process. With its intelligent algorithms and automated functionality, users can simply load the clothes onto the system, set the preferences, and let it handle the drying process. This eliminates the need for manual labor and constant monitoring, allowing students and parents to focus on other important tasks.

Electric dryers are notorious for their high energy consumption, resulting in increased utility bills. The Autoclothline system, on the other hand, emphasizes energy efficiency by leveraging intelligent algorithms and sensors to optimize the drying process. By utilizing natural sunlight, wind, and ambient conditions, the system minimizes reliance on electricity, thus reducing energy consumption and offering cost savings for students and parents. Living spaces, particularly in student accommodations or smaller homes, often lack adequate space for traditional clothes drying methods. The Autoclothline system addresses this issue by utilizing vertical or compact designs, allowing it to fit seamlessly in limited spaces. Its efficient use of vertical or wall-mounted areas maximizes the available space, freeing up room for other essential items.

The Autoclothline system offers valuable benefits and convenience for students and parents in managing their laundry needs. Its time-saving capabilities, energy efficiency, space optimization, ease of use, clothing care features, and environmental sustainability contribute to an improved quality of life. By integrating this innovative system into their daily routines, students and parents can achieve greater efficiency and convenience in the clothes drying process, allowing them to focus on their academic pursuits and family responsibilities.

2.4 Internet of Things

The application of Internet of Things (IoT) technology in the context of autoclothline systems has the potential to revolutionize the way we approach clothes drying. By integrating IoT capabilities into autoclothline systems, we can enhance their functionality, optimize energy usage, and provide users with greater control and convenience. This literature review explores the significance and benefits of IoT for autoclothline systems, highlighting its impact on energy efficiency, user experience, and overall effectiveness. IoT technology enables real-time monitoring and control of autoclothline systems. By incorporating sensors and connectivity features, users can remotely monitor the drying progress, receive notifications when the cycle is complete, and adjust settings as needed. This level of control ensures that clothes are dried to the desired level and provides a seamless user experience. One of the key advantages of incorporating IoT into autoclothline systems is the ability to optimize energy usage. IoT-enabled sensors can gather data on environmental conditions such as temperature, humidity, and sunlight intensity. This data, combined with intelligent algorithms, can dynamically adjust the drying process to minimize energy consumption while still achieving efficient and effective drying results. By leveraging IoT, autoclothline systems can significantly reduce energy waste and contribute to a more sustainable approach to clothes drying.

The Internet of Things is seen as now as one of the achievable responses for any distant regard following especially in the field of prosperity noticing. It supports that the individual flourishing limit data is gotten insidethe cloud, stays in the center are diminished for conventional routine evaluations and most critical that the prosperity can be checked and disorder dissected by any expert at any distance. IoT-enabled autoclothline systems can be programmed to automatically schedule drying cycles based on user preferences and real-time data. By analyzing factors such as weather forecasts, electricity tariffs, and user routines, the system can intelligently determine the optimal time to initiate the drying process. This automation eliminates the need for manual intervention, simplifies the user's tasks, and ensures that clothes are dried efficiently, even when users are busy or away from home.

The integration of IoT technology into autoclothline systems holds immense potential for transforming the clothes drying process. By leveraging IoT capabilities, such as enhanced monitoring and control, energy optimization, smart scheduling, data-driven insights, and integration with smart home ecosystems, autoclothline systems become more efficient, user-friendly, and sustainable. The application of IoT in autoclothline systems not only improves the user experience but also contributes to energy savings, reduced environmental impact, and a more connected and intelligent approach to household chores.

2.5 Automated Clothesline

The concept of an automated clothesline system offers a modern and innovative approach to clothes drying, replacing traditional manual methods with a technologically advanced solution. This literature review explores the significance and benefits of automated clothesline systems, highlighting their impact on convenience, energy efficiency, and user experience. An automated clothesline system eliminates the manual labor and time-consuming tasks associated with traditional clothes drying methods. With automated mechanisms for hanging and retracting clothes, users can effortlessly load and unload garments onto the clothesline. This convenience saves valuable time, particularly for individuals with busy schedules, allowing them to focus on other tasks or activities.

In urban environments or homes with limited outdoor space, an automated clothesline system offers an efficient solution by utilizing vertical or retractable designs. These space-saving configurations allow the clothesline to be installed in areas where traditional clotheslines would be impractical. By maximizing available space, individuals can still enjoy the benefits of line drying without sacrificing living or outdoor space. Automated clothesline systems contribute to energy efficiency and environmental sustainability by utilizing natural resources for clothes drying. By harnessing solar energy and utilizing outdoor air circulation, these systems reduce reliance on electric dryers, which consume significant amounts of energy. By adopting an automated clothesline system, individuals can reduce their carbon footprint and contribute to a more sustainable lifestyle.

Some advanced automated clothesline systems are equipped with weather monitoring features. These systems can detect unfavorable weather conditions, such as rain or high winds, and automatically retract the clothesline to protect the garments from damage. This added level of protection ensures that clothes remain safe and unaffected by unpredictable weather patterns, providing peace of mind for users. As automated clothesline systems continue to evolve and integrate with smart home technologies, they provide an efficient and modern solution for clothes drying, enhancing the overall user experience and contributing to a more sustainable lifestyle.

2.6 Innovative Clothesline

Innovation in clothesline systems has led to the development of advanced and efficient solutions that revolutionize the traditional concept of drying clothes. Innovative clothesline systems are designed to maximize space utilization, especially in areas with limited outdoor or indoor drying space. These systems employ creative and versatile configurations, such as retractable lines, folding racks, or multi-tiered designs, allowing users to adapt the clothesline to their specific needs. By efficiently utilizing available space, individuals can effectively dry clothes even in small living environments.

Energy efficiency is a key focus of innovative clothesline systems. By harnessing renewable energy sources, such as solar power, these systems minimize reliance on electricity and contribute to a more sustainable lifestyle. Additionally, some innovative systems utilize intelligent sensors and algorithms to optimize drying times based on factors such as ambient temperature, humidity, and sunlight intensity. This optimization reduces energy consumption and helps conserve valuable resources. Innovative clothesline systems prioritize clothing care by offering gentle and effective drying methods. Some systems incorporate features such as adjustable tension lines, fabric-friendly clips, or drying racks designed to prevent fabric stretching or distortion. By providing a gentle drying environment, these systems help maintain the quality, shape, and longevity of garments, reducing the need for frequent replacements.

Innovative clothesline systems often incorporate weather-resistant materials and protective features to withstand outdoor elements. These systems can withstand exposure to rain, UV rays, and extreme temperatures without compromising their functionality or durability. The ability to withstand different weather conditions ensures that clothes can be dried effectively, regardless of external factors. In addition to functionality, innovative clothesline systems focus

on aesthetics, offering visually appealing designs that complement the overall aesthetics of living spaces. These systems come in a variety of styles, materials, and colors, allowing users to choose options that match their personal preferences and blend seamlessly with their surroundings. The incorporation of attractive designs enhances the overall appeal and integration of clotheslines into modern homes.

As the conclusion, innovative clothesline systems bring significant advancements to the traditional concept of clothes drying. Through space optimization, energy efficiency, clothing care, smart features, weather resistance, and appealing designs, these systems offer enhanced functionality and improved user experiences. By adopting innovative clothesline solutions, individuals can enjoy efficient and sustainable clothes drying practices while maximizing space utilization and preserving the quality of their garments.

2.7 Rain Sensor

Rain sensors play a crucial role in various applications, including irrigation systems, automotive technologies, and building automation. In this literature review, we will explore the significance and benefits of rain sensors, focusing on their impact on water conservation, automation, and the overall efficiency of systems. Water scarcity is a growing concern in many parts of the world, making efficient water usage essential. Rain sensors contribute to water conservation by detecting rainfall and preventing unnecessary watering or irrigation. By automatically sensing precipitation, the sensors can interrupt or adjust irrigation systems, ensuring that plants and landscapes receive only the necessary amount of water. This proactive approach minimizes water waste and promotes sustainable water management practices.

Rain sensors provide automation capabilities to irrigation systems. They eliminate the need for manual intervention by detecting rain and triggering the suspension or adjustment of irrigation schedules. This automation ensures that landscapes are not overwatered during or after rainfall, reducing the risk of waterlogging, plant diseases, and unnecessary water consumption. By integrating rain sensors into irrigation systems, users can achieve precise and efficient control over watering cycles without constant monitoring or manual adjustments. It offers potential cost savings by optimizing water usage and reducing utility bills. By preventing irrigation during rainy periods, users can significantly reduce their water consumption, resulting in lower water bills. Moreover, efficient water management practices promoted by rain sensors contribute to the longevity and health of landscapes, reducing the need for costly repairs or replacement of plants affected by overwatering or improper irrigation.

By promoting water conservation, rain sensors contribute to environmental sustainability. Efficient water usage reduces the strain on natural water sources, conserves energy associated with water treatment and distribution, and minimizes the carbon footprint associated with water management. By incorporating rain sensors into various systems, such as irrigation, landscaping, or building

automation, individuals and organizations can actively participate in environmental stewardship and contribute to a greener future. Rain sensors are designed to be user-friendly and easy to integrate into various systems. They can be connected to irrigation controllers, smart home automation systems, or building management systems. The sensors typically require minimal setup and calibration, making them accessible to a wide range of users. The integration of rain sensors into existing systems enhances their functionality and ensures a seamless user experience, enabling users to enjoy the benefits of efficient water management without complex installations or extensive technical knowledge.

As we can conclude, the rain sensors play a vital role in water conservation, automation, and cost savings. By detecting rainfall and triggering appropriate responses in irrigation systems or other applications, rain sensors optimize water usage, reduce water waste, and promote environmental sustainability. The integration of rain sensors not only enhances the efficiency of systems but also simplifies user interactions and contributes to overall resource conservation efforts. By embracing rain sensor technology, individuals, businesses, and communities can actively contribute to water conservation and promote responsible water management practices.

2.8 BLYNK

Blynk is a popular Internet of Things (IoT) platform that provides a user-friendly interface and tools for building IoT applications and projects. It allows users to easily connect and control a wide range of devices, sensors, and actuators using a mobile app or web interface. Blynk simplifies the process of creating IoT projects by providing drag-and-drop widgets and a visual interface for designing custom user interfaces.

The key features and benefits of Blynk include:

1) Device Connectivity: Blynk supports connectivity with a wide range of popular hardware platforms, such as Arduino, Raspberry Pi, ESP8266, and many more. It provides libraries and code examples that make it easy to connect devices to the Blynk cloud server and exchange data.

2) Mobile App Interface: Blynk offers a mobile app for iOS and Android devices that allows users to monitor and control their IoT devices from anywhere. The app provides a customizable user interface with various widgets, such as buttons, sliders, graphs, and notifications, enabling users to interact with their IoT projects effortlessly.

3) Cloud-based Infrastructure: Blynk operates on a cloud-based infrastructure, which means that users do not need to set up and maintain their own servers. The cloud platform securely handles the communication between devices and the app, ensuring reliable and secure data transfer.

4) Widget Library: Blynk offers a rich library of pre-built widgets that can be easily added to the app's user interface. These widgets include buttons, sliders, gauges, graphs, and displays, allowing users to create interactive control panels for their IoT projects without the need for complex coding.

5) Data Logging and Visualization: Blynk provides built-in data logging and visualization capabilities. Users can store and analyze data from their IoT devices over time, allowing them to monitor trends, identify patterns, and make informed decisions based on the collected data.

6) Energy Efficiency: Blynk is designed to be energy-efficient, making it suitable for low-power IoT devices. It offers options for optimizing battery usage, such as deep sleep modes and efficient data transfer protocols, ensuring prolonged battery life for battery-powered projects.

7) Community and Integration: Blynk has a vibrant community of developers and enthusiasts who actively contribute to the platform. Users can share their projects, code snippets, and ideas with the community, fostering collaboration and knowledge sharing. Blynk also integrates with popular IoT platforms, cloud services, and APIs, allowing for seamless integration with other services and systems.

In summary, Blynk is a versatile and user-friendly IoT platform that simplifies the development of IoT projects. With its drag-and-drop interface, mobile app support, and extensive library of widgets, Blynk empowers users to create customized IoT applications and control their connected devices with ease. Whether for hobbyist projects, home automation, or industrial applications, Blynk offers a powerful platform for building and managing IoT solutions.

CHAPTER 3

3 RESEARCH METHODOLOGY

3.1 Introduction

The methodology and particular procedures employed in the project research are described in this section. Both qualitative and experimental methodologies are used in the methodology. In order to gain a better knowledge of the project, this part also describes the project's design and the methods that were taken to present an informative view. This research study is carried out in accordance with methodology and following analysis of an appropriate method for a successful advancement.

3.2 Project Design and Overview.

The aim of this project is to design and develop an automated clothesline system using the Blynk IoT platform. The autoclothline system will leverage IoT capabilities to provide users with enhanced control, convenience, and energy efficiency in their clothes drying process. This overview outlines the key components and features of the project. An Arduino or ESP8266 board will serve as the main microcontroller, responsible for gathering sensor data and controlling the system. Sensors such as rain sensors, humidity sensors, and light sensors will be utilized to detect environmental conditions and make intelligent decisions regarding clothes drying. Motorized mechanisms or servo motors will be employed to automate the hanging and retracting of the clothesline.

The Blynk mobile app will be used to provide users with a user-friendly interface for monitoring and controlling the autoclothline system. Users can interact with various widgets to initiate or adjust the drying process, receive notifications, and access system settings. Meanwhile, the Blynk cloud server will handle the communication between the mobile app and the autoclothline system, ensuring seamless data exchange and remote control capabilities.

The autoclothline system will offer the following functionalities:

1) Automated Drying Process:

- Environmental Sensing: The system will continuously monitor environmental conditions using sensors, such as rain sensors to detect precipitation, humidity sensors to measure moisture levels, and light sensors to assess sunlight intensity.
- Intelligent Drying Decisions: Based on the sensor data, the system will make intelligent decisions regarding clothes drying. It will automatically retract the clothesline when rain is detected or adjust the drying time and intensity based on humidity and sunlight conditions.
- User Control: Users can manually initiate or adjust the drying process using the Blynk mobile app. They can select specific drying modes, set timers, or override the automated system based on their preferences.

3.2.1 Block Diagram of the Project

The diagram below shows each component block use to perform Blynk IOT Autoclothesline System.

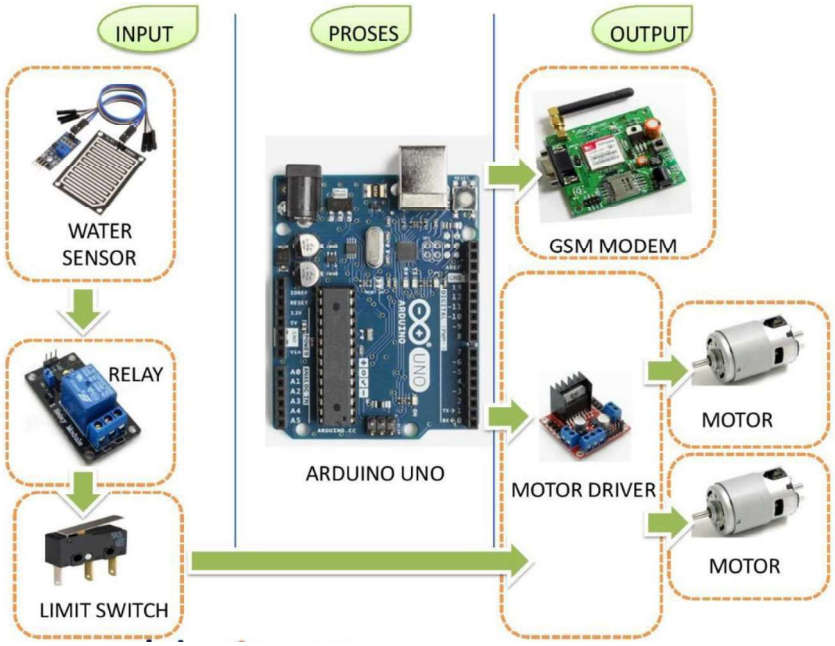


Figure 1.1: Block Diagram of Project

*Images may be subject to copyright

3.2.2 Flowchart of the Project 2

Figure 2.2 shows the diagram of flowchart of the whole system. It is shown the process of operation system starts with initializing the hardware setting for Input or Output then proceeding rain sensor initializing process which then the data is transmitted to BLYNK for results.

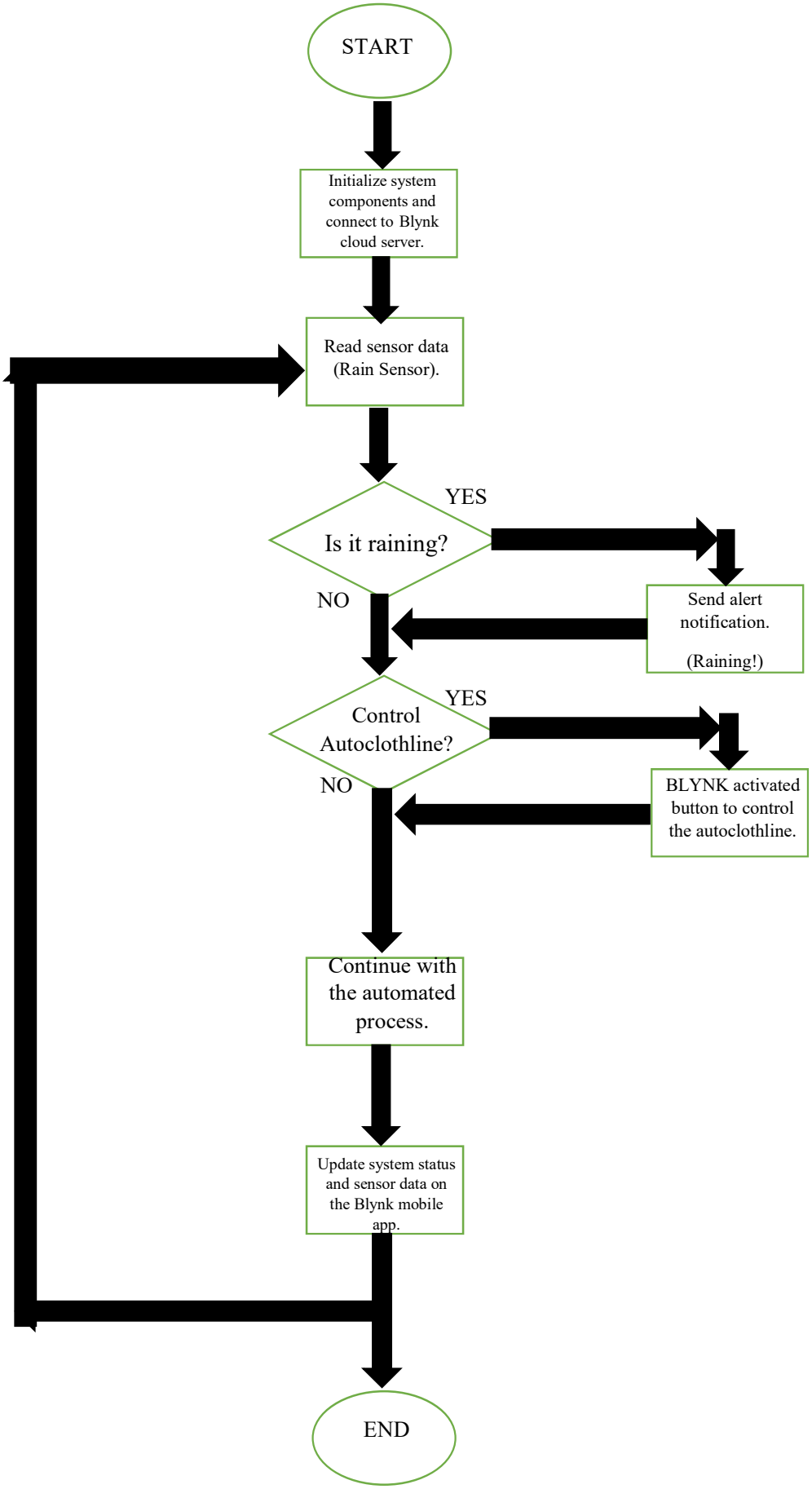


Figure 2.1 : Flow chart of operation of the system

3.3 Project Description

The Blynk IoT Autoclothline System is a project aimed at automating the clothes drying process using the Blynk IoT platform. The system utilizes sensors to monitor environmental conditions, such as rain, humidity, and light, and makes intelligent decisions to optimize the drying process. By integrating with the Blynk mobile app, users can conveniently control and monitor the system from anywhere, ensuring efficient and hassle-free clothes drying.

The Autoclothline system comprises the following main components:

i) Microcontroller: An Arduino or ESP8266 board serves as the central control unit of the system. It connects to the Blynk cloud server, reads sensor data, and controls the operation of the autoclothline.

ii) Sensors: Rain sensors, humidity sensors, and light sensors are employed to gather environmental data. These sensors provide input to the microcontroller, enabling it to make informed decisions about the drying process.

iii) Actuators: Motorized mechanisms or servo motors are used to automate the hanging and retracting of the clothesline. The microcontroller controls these actuators based on the sensor data and user inputs.

The system continuously monitors environmental conditions using the sensors. If rain is detected, it automatically retracts the clothesline to protect the clothes. When rain subsides, the system resumes the drying process. Additionally, it adjusts drying time and intensity based on humidity levels and optimizes drying cycles according to available sunlight. Users can interact with the system through the Blynk mobile app. The app provides a user-friendly interface that allows users to manually initiate the drying process, adjust drying settings, and override automation decisions as desired. Users receive real-time updates and notifications regarding the system status and drying progress.

The Autoclothline system incorporates energy-saving measures. It optimizes drying time based on environmental conditions to reduce energy consumption. By utilizing sunlight when available and avoiding unnecessary drying during rainy periods, the system minimizes energy waste. The Blynk IoT Autoclothline System provides a convenient and efficient solution for automating the clothes drying process. By leveraging the Blynk IoT platform and integrating with sensors and actuators, the system offers automated drying control, user-friendly mobile app interaction, energy efficiency, and optimization. This project enhances the overall convenience and effectiveness of clothes drying while reducing user effort and energy consumption.

3.4 Project Hardware

The proposed system consists of three electronic components which are cost-efficient and all are open sourced.

3.4.1 Schematic Circuit

Figure below**Error! Reference source not found.** shows the overall circuit diagram of this Project which is created using Proteus Software.

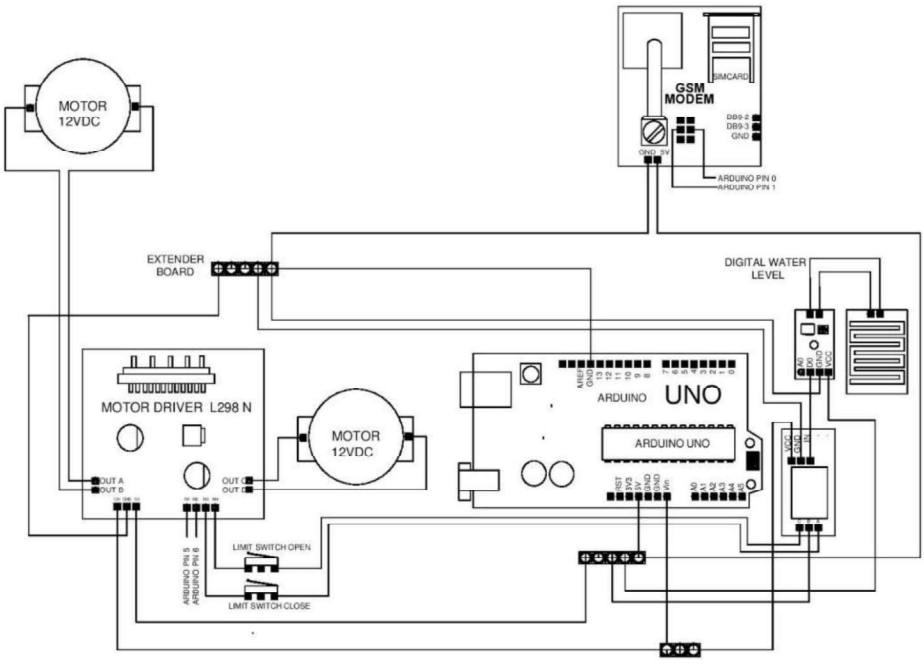


Figure 3.1: Circuit Diagram
*Images may be subject to copyright

3.4.2 Description for Main Components

In this project, the Arduino Uno is based on the ATmega328P microcontroller, which is an 8-bit AVR architecture chip. It operates at a clock speed of 16 MHz and has 32KB of flash memory for storing the program. The Arduino Uno can be powered in two ways. It can either be powered through a USB connection from a computer or using an external power supply connected to the DC power jack. The board supports a voltage range of 6V to 20V.

It can be programmed using the Arduino programming language, which is based on Wiring, a simplified version of C/C++. The Arduino software environment provides a user-friendly integrated development environment (IDE) for writing and uploading code to the board.

The wifi device use will be integrate with the user phone in order to get the locationand internet connectivity to access the cloud server.

3.5 Project Software

This project used 2 development software which are :

Proteus 8

The Proteus Design Suite is a proprietary software tool suite used primarily forelectronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

The Proteus Design Suite is a Windows application for schematic capture, simulation, and PCB layout design. It can be purchased in many configurations, depending on the size of designs being produced and the requirements for microcontroller simulation. All PCB Design products include an autorouter and basicmixed mode SPICE simulation capabilities.

Schematic Capture

Schematic capture in the Proteus Design Suite is used for both the simulation of designs and as the design phase of a PCB layout project. It is therefore a core component and is included with all product configurations.

Microcontroller Simulation

The micro-controller simulation in Proteus works by applying either a hex file or a debug file to the microcontroller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it. This enables its use in a broad spectrum of project prototyping in areas such as motor control, temperature control and user interface design. It also finds use in the general hobbyist community and, since no hardware is required, is convenient to use as a training or teaching tool.Support is available for co-simulation of:

- Microchip Technologies PIC10, PIC12, PIC16,PIC18,PIC24,dsPIC33 Microcontrollers.
- Atmel AVR (and Arduino), 8051 and ARM Cortex-M3 Microcontrollers
- NXP 8051, ARM7, ARM Cortex-M0 and ARM Cortex-M3 Microcontrollers.
- Texas Instruments MSP430, PICCOLO DSP and ARM Cortex-M3 Microcontrollers.
- Parallax Basic Stamp, Freescale HC11, 8086 Microcontrollers.

PCB Design

The schematic capture module automatically transfers connectivity data in the form of a netlist to the PCB Layout module. This knowledge is put to use, together with user-specified design guidelines and several design automation tools, to help in error-free board design. The size of the design is constrained by the product configuration, and PCBs with up to 16 copper layers can be created.

3D Verification

The board being developed can be viewed in 3D along with a partially transparent height plane that simulates the board enclosure using the 3D Viewer module. The board can then be mounted and positioned precisely using mechanical CAD tools like Solidworks or Autodesk using STEP output.

Arduino IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) – is a software tools that can be use to develop structure code for the Arduino controller. It contains a text editor for writing code, a message area, a text console, atoolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

a) Text Editor

Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The consoledisplays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom righthand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verifyand upload programs, create, open, and save sketches, and open the serial monitor.

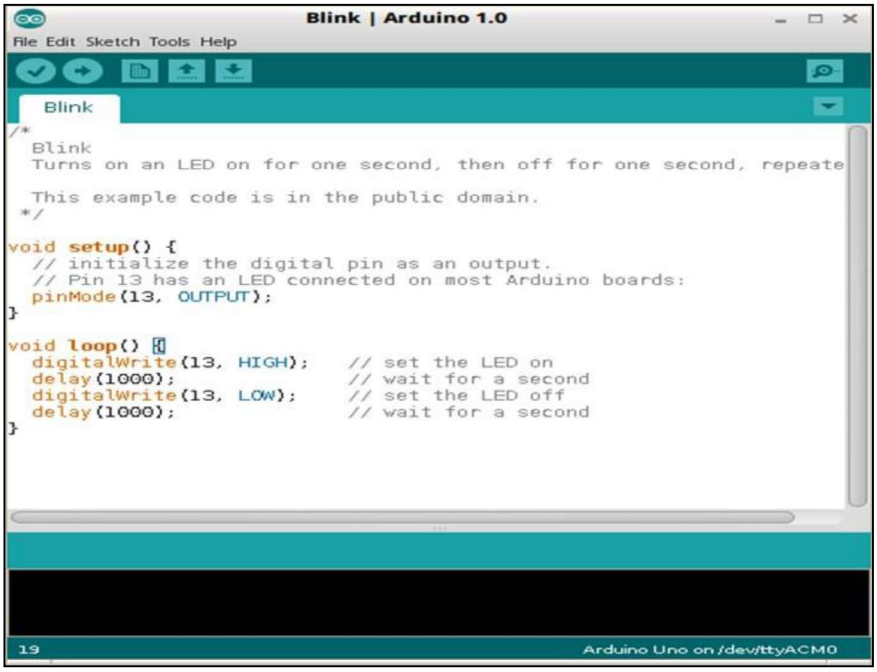
b) Compiler

Compiler is a module that can translate or converting C language programmingto the machine language either binary or hex files which will be use by the microcontroller devices.

c) Uploader

Module that is use to transfer the binary or hex files to the microcontroller devices.

Figure 3.1 : Example of the Arduino IDE terminal



Programming

The Arduino Nano can be programmed with the Arduino software (download). Select "Arduino Duemilanove or Nano w/ ATmega328" from the Tools > Board menu (according to the microcontroller on your board). The ATmega328 on the Arduino Nano comes preburned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header using Arduino ISP or similar.

Automatic (Software) Reset

Rather then requiring a physical press of the reset button before an upload, the Arduino Nano is designed in a way that allows it to be reset by software running on aconnected computer. One of the hardware flow control lines (DTR) of the FT232RL is connected to the reset line of the ATmega328 via a 100 Nano farad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset thechip. The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment.

This means that the bootloader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload. This setup has other implications. When the Nano is connected to either a computer running Mac OS X orLinux, it resets each time a connection is made to it from software (via USB). For thefollowing half-second or so, the bootloader is running on the Nano.

While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board aftera connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data.

3.4.1 Flowchart of the System

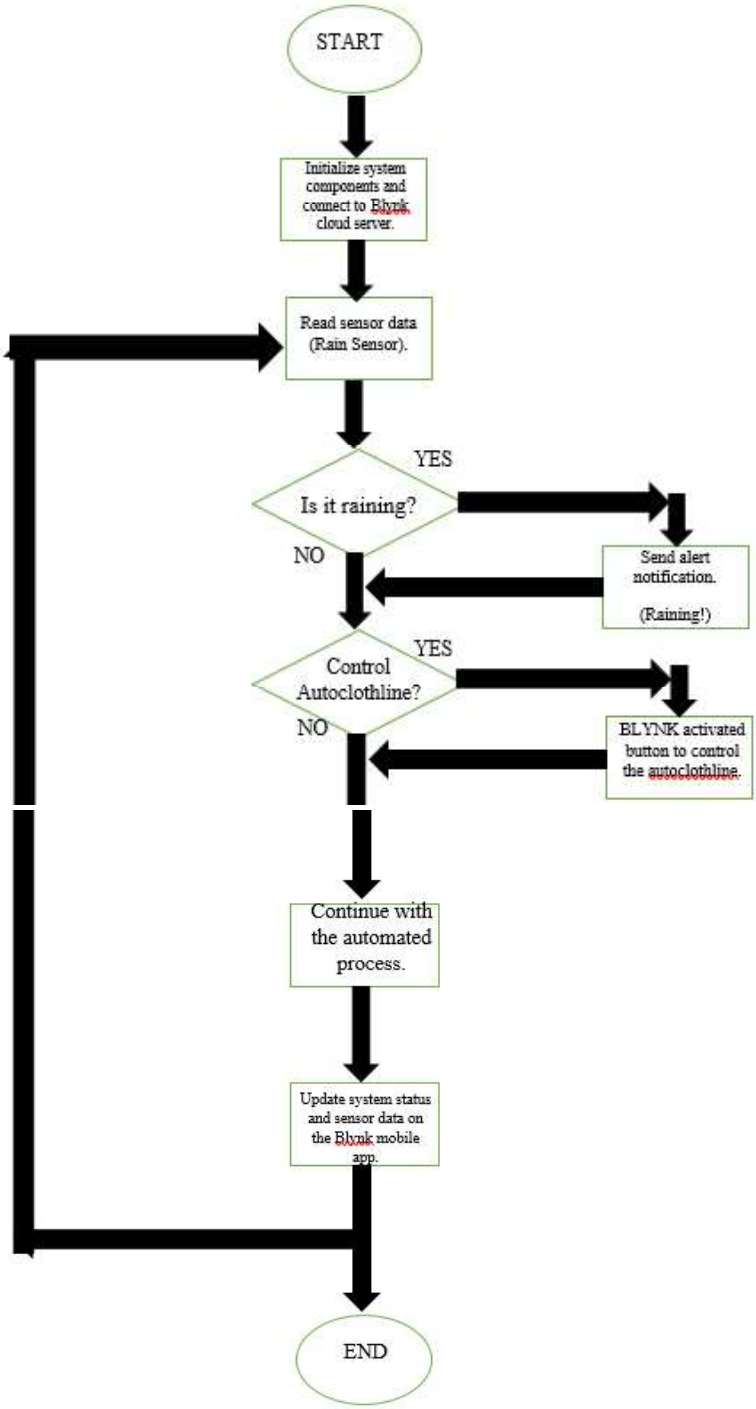


Figure 4.1 : System Flowchart

3.5.2 Description of Flowchart

Operation instructions

Firstly, the flowchart begins with the start symbol, indicating the beginning of the process. The system initializes, preparing the components and sensors for operation. The flowchart would include a decision symbol to check if any sensors, such as a rain sensor or wind sensor, are triggered. If no sensors are triggered, the process continues to the next step. If a sensor is triggered, the system moves to a different path, such as skipping the clothesline operation.

The motor that controls the clothesline movement is activated to start the clothesline rotation. A timer is used to determine the duration for which the clothesline should rotate. The flowchart includes a decision symbol to check if the timer has reached its set duration. If the timer is still running, the clothesline continues to rotate. If the timer has reached its set duration, the process moves to the next step. The motor controlling the clothesline rotation is deactivated, bringing it to a stop. The flowchart includes a decision symbol to check if the laundry is dry or if it needs further drying. If the laundry is dry, the process moves to the next step. If the laundry is not dry, the system may repeat the clothesline rotation process for a predetermined number of cycles or activate additional drying mechanisms. The flowchart ends with the stop symbol, indicating the end of the process.

3.6 Sustainability Element in The Design Concept

When considering sustainability in the design concept for an autoclothline system, several elements can be incorporated to minimize environmental impact and promote sustainable practices. Firstly, the design of the autoclothline system to be energy-efficient by incorporating features such as low-power motors, energy-efficient sensors, and optimized control algorithms. This ensures that the system consumes minimal electricity during operation, reducing its environmental footprint. Other than that, Implement sensor technologies to optimize the system's operation based on environmental conditions. For example, integrating a rain sensor can prevent the clothesline from operating during wet weather, avoiding unnecessary energy consumption and potential damage to clothes. Last but not least, Design the autoclothline system with end-of-life management in mind. Use recyclable materials and ensure that the system can be easily disassembled and recycled at the end of its life. Provide guidance to users on proper disposal options to encourage responsible waste management.

CHAPTER 4

4 PROJECT MANAGEMENT AND COSTING

4.1 Introduction

This chapter presents the project management and costing for overall project that were planned and is done after taking consideration of each values and aspects in order to fulfill all of the things needed for a successful project.

4.2 Gantt Chart and Activities of the Project during Project 1

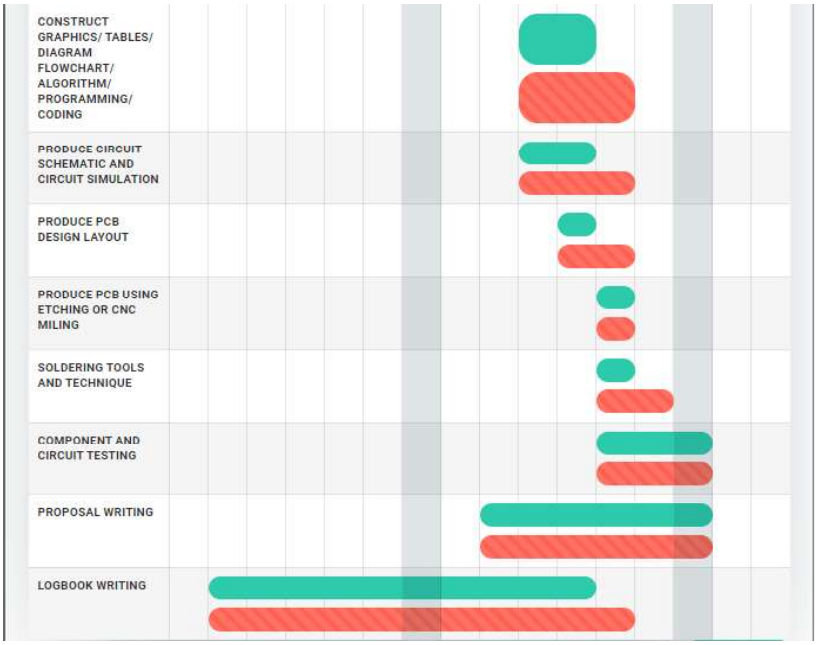


Figure 5.1 : Project 1 Gantt Chart

4.3 Gantt Chart and Activities of the Project during Project 2

Figure 6.1 : Project 2 Gantt Chart

4.4 Cost and Budgeting

Table 1: List of Components and Materials

No.	Component and materials	The unit price	Quantity	Total
1	20 Ways Male-Male Jumper Cable (20cm)	RM 5.00	1	RM 5.00
2	20 Ways Female-Female Jumper Cable (20cm)	RM 5.00	1	RM 5.00
3	Arduino Uno (CH340)	RM 46.00	1	RM 46.00
4	12V DC Rechargeable Battery Polymer Lithium-Ion Battery	RM 68.00	1	RM 68.00
5	Extender	RM 5.00	1	RM 5.00
6	Relay 1-Channel 12V	RM 10.00	1	RM 10.00
7	GSM Modem (SIM900A)	RM 90.00	1	RM 90.00
8	Limit Switch	RM 5.00	2	RM 10.00
9	Arduino Power Jack	RM 4.00	1	RM 4.00
10	Motor Driver Module	RM 14.00	1	RM 14.00
11	Raindrop Sensor Module	RM 10.00	1	RM 10.00
12	Motor 12VDC 12RPM High Torque Metal Gear DC Motor	RM 60.00	2	RM 120.00
13	Other materials	RM 50	-	RM 50
			Total :	**RM 437.00**
	List of other costing			
1	Transportation	RM 50.00	-	RM 50.00
2	Postage	RM 50.00	-	RM 50.00
3	Craft Work	-	-	-
5	Application	-	-	-
			Total :	**RM 100.00**
			Overall total	**RM 537.00**

CHAPTER 5

5 RESULTS, DISCUSSION & CONCLUSION

5.1 Introduction

This chapter presents the results obtained from the data analysis which has been made through several questionnaire where testimony is given to both users and Industrial. Apart from that, the whole process of collecting and analyzing data is discussed properly in order to fully understand the problem occurred and how it is solved for a successful project and lastly this chapter will conclude all parts of the project.

5.2 Results

The complete design of the system and obtained results

As a result, the autoclothline system is designed as an automated and energy-efficient solution for drying clothes. It incorporates sustainable practices throughout its lifecycle, from material selection to end-of-life considerations. Moreover, the autoclothline system consists of a sturdy frame made from sustainable and durable materials, such as responsibly sourced wood or recycled metal. The frame supports a rotating clothesline mechanism powered by an energy-efficient motor.

Other than that, the system incorporates a low-power motor and efficient control algorithms to minimize electricity consumption. It can be powered by renewable energy sources, such as solar panels or wind turbines, reducing reliance on conventional energy and promoting sustainability. The autoclothline system features sensors, including a rain sensor, to prevent operation during unfavorable weather conditions. This prevents energy waste and protects clothes from getting wet, ensuring efficient and safe operation.

In addition, the system includes an intuitive interface that allows users to easily control and monitor the drying process. It provides options for adjusting settings, such as rotation speed and drying duration, while displaying relevant information, such as energy consumption and drying progress. The autoclothline system also utilizes sustainable materials throughout its construction. The frame is made from responsibly sourced wood or recycled metal, and other components are selected based on their environmental impact, prioritizing materials with low carbon footprints and high recyclability.

The system undergoes a lifecycle assessment to identify areas for improvement and minimize environmental impacts. It is designed for disassembly, allowing easy repair, component replacement, and recycling at the end of its life, reducing waste and extending product lifespan. The system comes with comprehensive user manuals and educational materials that guide users on energy-efficient laundry practices. This includes tips on optimal load sizes, eco-friendly detergents, and air drying clothes whenever possible, promoting sustainable behavior.

Other than that, the system is also packaged using minimal, recyclable, and biodegradable materials to reduce waste. The design optimizes the size and weight of the system to minimize transportation-related emissions during distribution. The autoclothline system is designed to have a minimal environmental impact at the end of its life. It is easily disassembled, and components are clearly marked for recycling or responsible disposal. Users are provided with guidance on proper disposal options, encouraging responsible waste management.

Last but not least, the complete design of the autoclothline system prioritizes sustainability by incorporating energy efficiency, renewable energy integration, sustainable materials, user education, and end-of-life considerations. It aims to provide a reliable and eco-friendly solution for drying clothes while minimizing environmental impact and promoting sustainable laundry practices.

5.3 Discussion

5.3.1 Challenges and Trends

Challenges:

One of the key challenges is optimizing the energy efficiency of autoclothline systems. Designers face the task of minimizing energy consumption while ensuring effective and timely drying of clothes.

Autoclothline systems rely on sensors to detect environmental conditions such as rain or wind. Ensuring the accuracy and reliability of these sensors is crucial to prevent false triggers or missed detections, which can impact the system's efficiency and user experience.

Autoclothline systems need to withstand various weather conditions, including rain, wind, and sunlight. Designers must consider the durability and weather resistance of the system's components to ensure long-term reliability and minimize maintenance requirements.

Designing an intuitive and user-friendly interface is essential for seamless operation and control of the autoclothline system. Ensuring that users can easily understand and interact with the system's features and settings is crucial for a positive user experience.

Trends:

The trend towards smart homes and Internet of Things (IoT) technologies is influencing the design of autoclothline systems. Integration with smart home platforms, mobile apps, and voice assistants allows for remote monitoring, control, and automation of the system, providing convenience and enhanced functionality.

Sustainability remains a significant trend in design, including autoclothline systems. There is a growing emphasis on using eco-friendly materials, optimizing energy efficiency, integrating renewable energy sources, and promoting sustainable laundry practices to minimize environmental impact.

The utilization of data analytics and machine learning techniques can enable autoclothline systems to learn and adapt to user preferences and environmental conditions. This trend allows for intelligent optimization of drying cycles, energy usage, and predictive maintenance, enhancing efficiency and user satisfaction.

Designers are exploring modular and customizable approaches to autoclothline systems, allowing users to personalize the system's features, sizes, and configurations based on their specific needs and available space. This trend offers flexibility and ensures better integration into different environments.

Autoclothline systems can integrate with home energy management systems to optimize energy usage and coordinate with other energy-consuming devices. This trend enables load balancing, demand response, and peak time energy management, contributing to overall energy efficiency in the home.

The concept of a circular economy, which focuses on minimizing waste and maximizing resource efficiency, is gaining attention. Designers are exploring ways to design autoclothline systems with modular and easily recyclable components, promoting repairability, and encouraging the use of recycled materials.

These challenges and trends provide insights into the evolving landscape of autoclothline system design, addressing key considerations such as energy efficiency, user experience, sustainability, and technological advancements. Designers in this field need to navigate these challenges and leverage emerging trends to create innovative and eco-friendly solutions for efficient clothes drying.

5.3.2 Validation and characterization

In the context of an autoclothline system, the validation and characterization processes involve assessing and confirming the system's performance, functionality, and reliability. The first step is to validate the core functionalities of the autoclothline system. This involves testing the motor operation, rotation control, sensor accuracy, and other essential features. The system should be tested under different scenarios and conditions to ensure that it operates as intended. The autoclothline system should undergo environmental testing to validate its performance under various conditions. This includes testing its resilience against rain, wind, and sunlight to ensure that it can withstand different weather conditions without compromising its functionality or structural integrity. To validate the energy efficiency of the autoclothline system, measurements should be taken to assess its power consumption during operation. This helps determine its energy efficiency rating and ensures that it aligns with sustainability goals.

The autoclothline system should undergo reliability and durability testing to assess its performance over an extended period. This involves subjecting the system to rigorous usage, including repeated cycles of operation, to identify any potential weaknesses or failures. The system's components and materials should be tested for their durability and resistance to wear and tear. User experience testing is crucial to validate the system's usability and user-friendliness. This involves gathering feedback from users through surveys, interviews, or observation, to assess their satisfaction with the system's operation, controls, and overall performance. User feedback helps identify areas for improvement and ensures that the autoclothline system meets users' needs and expectations. Once the system has been validated, it is important to characterize its performance parameters. This includes measuring factors such as rotation speed, load capacity, drying time, noise levels, and any other relevant performance indicators. Characterization data provides valuable information to users and helps in comparing the system's performance with other similar products in the market.

5.4 Conclusion

In conclusion, the design of an autoclothline system involves considering various factors such as functionality, energy efficiency, sustainability, and user experience. By incorporating sustainable practices and materials, optimizing energy consumption, and integrating renewable energy sources, the autoclothline system can minimize its environmental impact and promote eco-friendly laundry practices.

Validation and characterization are crucial processes to ensure that the autoclothline system meets its intended requirements and performs as expected. Through functional validation, environmental testing, energy efficiency testing, reliability and durability testing, user experience testing, safety testing, performance characterization, and endurance testing, the system's performance, reliability, and user satisfaction can be assessed and optimized.

Challenges in autoclothline system design include optimizing energy efficiency, ensuring sensor accuracy and reliability, addressing durability and weather resistance, and designing an intuitive user interface. On the other hand, trends in this field include the adoption of smart and connected systems, sustainability and eco-friendliness, data analytics and optimization, modular and customizable designs, integration with home energy management systems, and a focus on circular economy principles.

By addressing these challenges and embracing these trends, designers can create autoclothline systems that provide efficient clothes drying while minimizing environmental impact, promoting sustainability, and enhancing user satisfaction. The autoclothline system, when designed and validated with these considerations in mind, offers a reliable, energy-efficient, and eco-friendly solution for drying clothes in a convenient and sustainable manner.

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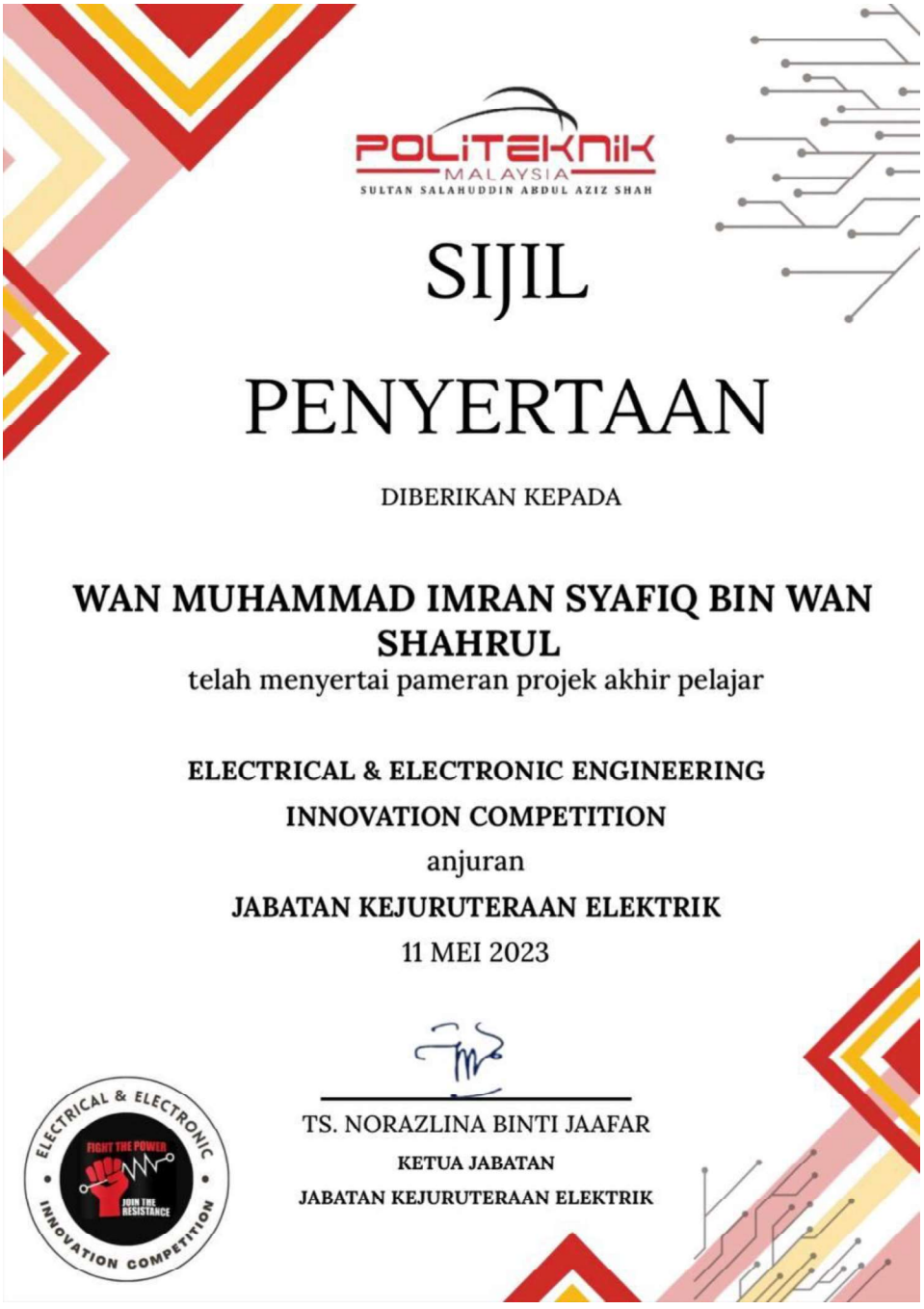
6 APPENDICES

APPENDIX A-DATA SHEET



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SULTAN SALAHUDDIN ABDUL AZIZ SHAH

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LETTER of ACCEPTANCE

Dear Wan Muhammad Imran Syafiq IMRAN,

"BLYNK IOT AUTOCLOTHLINE SYSTEM" was examined by the referee committee and accepted to be presented as an ORAL PRESENTATION at our congress.

We are pleased to invite you to the 7th International Congress of Eurasian Social Sciences, which will be held on 27-30 April 2023.

Prof. Dr. Kubilay YAZICI
Niğde Ömer Halisdemir University
Head of Organizing Committee

7th INTERNATIONAL CONGRESS OF EURASIAN SOCIAL SCIENCES
27-30 April 2023 Bodrum, Mugla, TURKEY (Online)

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PRESENTER CERTIFICATE

Dear WAN MUHAMMAD IMRAN SYAFİQ IMRAN

Hosted by International Vision University; with the contributions of the Korint Publishing, International Journal of Eurasia Social Sciences, International Journal of Education Technology and Scientific Researches and the International Journal of Eurasian Education and Culture, in the 7th International Congress of Eurasian Social Sciences which was held on 27-30 April 2023, participated with a paper titled "**BLYNK IOT AUTOCLOTHLINE SYSTEM**".

Prof. Dr. Kubilay YAZICI
Head of the Organizing Committee

APPENDIX B- PROGRAMMING

```
// Libraries
#include <Servo.h>
#include <BlynkSimpleEsp8266.h>

// Constants
const char* ssid = "your_wifi_ssid";          // Your WiFi SSID
const char* password = "your_wifi_password";  // Your WiFi password
const char* auth = "your_blynk_auth_token";   // Your Blynk authentication token

const int rainSensorPin = 2;       // Rain sensor pin
const int motorPin = 3;            // Motor control pin
const int rotationTime = 5000;     // Rotation time in milliseconds (adjust as needed)
const int dryingDelay = 30000;     // Delay between drying cycles in milliseconds (adjust
    as needed)

// Variables
Servo motor;                       // Motor object
bool isRaining = false;            // Rain sensor state

void setup() {
  Serial.begin(9600);
  Blynk.begin(auth, ssid, password);

  pinMode(rainSensorPin, INPUT);
  pinMode(motorPin, OUTPUT);
  motor.attach(motorPin);
}

void loop() {
  Blynk.run();

  // Check rain sensor state
  isRaining = digitalRead(rainSensorPin);

  if (!isRaining) {
```

```
    // Start rotating the clothesline
    motor.write(90); // Adjust the angle as needed for proper clothesline rotation

    // Wait for the specified rotation time
    delay(rotationTime);

    // Stop rotating the clothesline
    motor.write(0);

    // Delay before the next drying cycle
    delay(dryingDelay);
  }
}

BLYNK_WRITE(V0) {
  // Button widget on V0
  int value = param.asInt();
  if (value == 1) {
    // Perform any action when the button is pressed
    // For example, you can stop the rotation immediately by writing 0 to the motor
    motor.write(0);
  }
}
```

APPENDIX C- PRODUCT POSTER