Faculty of Electrical and Electronic Engineering Technology

Development of Solar Powered Automatic Retractable Cloth Hanger with Raining Sensor and IoT

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Bachelor of Electrical Engineering Technology with Honours

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Development of Solar Powered Automatic Retractable Cloth Hanger with Raining Sensor and IoT

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A project report submitted
in partial fulfillment of the requirements for the degree of
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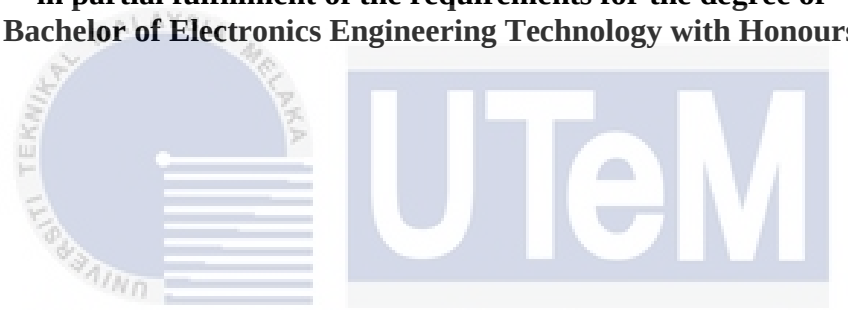

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DEDICATION

To my beloved mother, Zubaidah Binti Abdul Halim and father, Abu Bakar whose does not stop giving me full support and motivation throughout my whole journey in life and especially in studying at UTeM. Also thank you to my classmate and also to everyone who involve in brainstorming and contributing towards any ideas during execution of progress in my Final Year Project. Special thank you to all my siblings who always help me in advising, guiding, giving idea, and solving problems. Besides, giving inspiration by showing their hardworking in pursues studying and end up with a good career in life.

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ABSTRACT

Because of the variable weather conditions, such as rainy days, it might be difficult for people to dry their garments outside these days. During rainy days, individuals often forget to bring in their clothing. Working people will be affected by this, since they will be unable to handle their daily activities and routines due to a shortage of time. As a result of this occurrence, a concept has been devised to protect clothing that have been dried outside from being exposed to rain and becoming wet. The primary control mechanism for this device is a microcontroller, which allows it to operate autonomously. The primary goal is to create a compartment and an electrical system that will automatically retrieve garments on sunny days and retrieve clothes on wet days. A linear actuator as the mechanical mechanism, LDR Light sensor, Rain sensor module, and ESP32 module as an IoT module were all required to make this system work correctly. All of the sensor's programming will be installed using an ESP32 module, which will supply the system with instructions on how to work effectively. This device has the advantages of being energy and time efficient, as well as making it simpler for employed individuals to conduct duties at home indirectly.

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ABSTRAK

Oleh kerana keadaan cuaca yang berubah-ubah, seperti hari hujan, mungkin sukar bagi orang ramai untuk mengeringkan pakaian mereka di luar hari ini. Semasa hari hujan, individu sering terlupa untuk membawa masuk pakaian mereka. Orang yang bekerja akan terjejas oleh perkara ini, kerana mereka tidak dapat mengendalikan aktiviti dan rutin harian mereka kerana kesuntukan masa. Akibat daripada kejadian ini, satu konsep telah dirangka untuk melindungi pakaian yang telah dijemur di luar daripada terkena hujan dan menjadi basah. Mekanisme kawalan utama untuk peranti ini ialah mikropengawal, yang membolehkannya beroperasi secara autonomi. Matlamat utama adalah untuk mencipta petak dan sistem elektrik yang akan mengambil pakaian secara automatik pada hari yang cerah dan mengambil pakaian pada hari basah. Motor tingkap kuasa dan gear pengawal selia sebagai mekanisme mekanikal, penderia Cahaya LDR, modul penderia hujan dan ESP32 sebagai modul IoT semuanya diperlukan untuk menjadikan sistem ini berfungsi dengan betul. Semua pengaturcaraan sensor akan dipasang menggunakan ESP32, yang akan membekalkan sistem dengan arahan tentang cara untuk berfungsi dengan berkesan. Peranti ini mempunyai kelebihan iaitu cekap tenaga dan masa, serta memudahkan individu yang bekerja untuk menjalankan tugas di rumah secara tidak langsung.

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My deepest gratitude goes out to my mother and father, as well as my other relatives and friends, for all of the support and prayers they offered to me while I was pursuing my education. In addition, I would want to thank my siblings and my friends for all of the effort, collaboration, and memories that they provided throughout our time together in UTeM. They deserve this honourable mention.

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LIST OF SYMBOLS

$°C$	-	Temperature

UTeM
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LIST OF ABBREVIATIONS

V	-	Voltage
PSH	-	Peak Sun Hours
IoT	-	Internet of Things
SCC	-	Solar Charge Controller
IioT	-	Industrial Internet of Things
W	-	Watt

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CHAPTER 1

INTRODUCTION

1.1 Background

Every day, the world has been compelled to conduct more innovation. Every day, there is a new innovation that has been made. As a result, many problems, including personal issues, have been handled by technology. The use of tools or machinery is essential, particularly when precision or speed are required. Everything was done manually back then, such as monitoring the garden, going to the library to locate a reference, purchasing goods at the supermarket, and asking people on the street for directions to places we wanted to go. Everything is now available at your fingertips. Surveillance cameras may be used to monitor the garden from afar. Aside from that, we don't need to travel to the library to get a book or source; we can just google anything and discover anything utilising the internet.

In today's world, the Internet of Things (IoT) or simply the internet has grown into a large platform that can be utilised not only for research but also for enjoyment. This trend benefits not only ordinary users, but also business owners and the manufacturing sector. Manufacturing processes, according to IDC (International Data Corporation), are the most common use of IoT in manufacturing. In 2016, this accounted for $102.5 billion of the total $178 billion spent on IoT use. Aside from that, companies have been paying close attention to IoT as a key technology for the future.Figure 1.1 below shows how widely the technology of Internet of Things(IoT) had been used.

Figure 1.1 Internet of Things(IoT) Technology

The fourth Industrial Revolution is now underway on our globe (4IR). The fourth industrial revolution includes artificial intelligence (AI), robotics, the Internet of Things (IoT), 3D printing, genetic engineering, quantum computing, and other technologies. According to Klaus Schwab, during the First Industrial Revolution, water and steam power were used to mechanise industries. During the Second Industrial Revolution, electric power was used to mass-produce things. During the Third Industrial Revolution, electronic and computer technologies were used to automate production. This exemplifies how swiftly the industrial revolution is moving forward. Figure 1.2 show revolution of industry.

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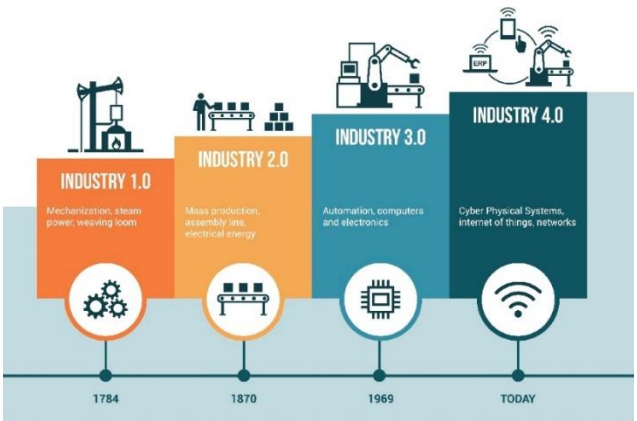

Figure 1.2 The revolution of industry

This fourth industrial revolution leads to a smarter approach, often known as the Industrial Internet of Things (IIoT). To put it another way, today's industry wants to maximise the use of technology in their production processes as shown in figure 1.3.

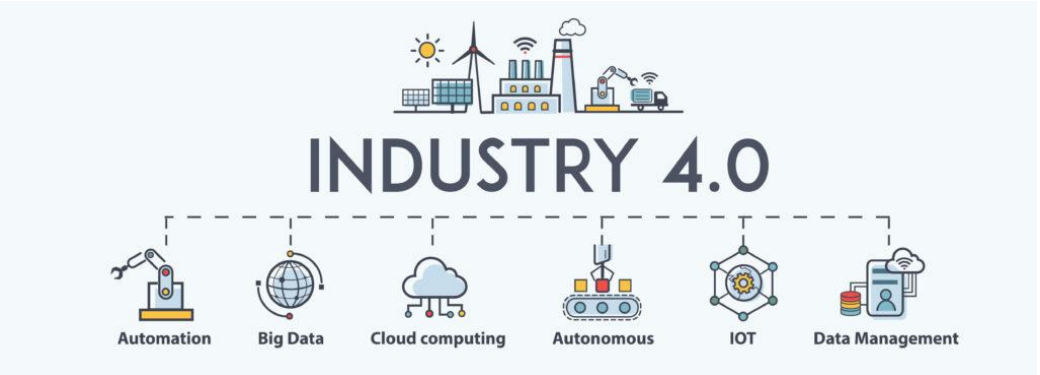

Figure 1.3 4th Industrial Revolution usage

1.2 Problem Statement

Weather is a natural phenomenon that is unpredictable and impossible to control. For those who depends on the sun light to dry up their cloth will face the problem of their hanged cloth getting wet and soak in rainwater.

Malaysia also suffers rain and damp throughout the year due to its proximity to the equator. When washed clothing are not dry and have a foul odour, it may cause issues with the workforce. It will be much more challenging for the family if they do not have assistance or a maid to help with chores. Most middle-class households, on the other hand, cannot afford a maid. Year after year, the maid's pay has increased.

To overcome the problem that been faced by many people, An Automatic retractable cloth hanger will be developed. It’s basically operates like a regular retractable cloth hanger but it is equipped with few extra beneficial feature such as rain sensor detector, Internet of Things(IoT) and also automatic mechanism that can pull out and pull in the cloth hanger. This invention can be controlled using phone application and it will help human to at least being in control of their things although they are not in the house. A regular dryer cost a lot and it

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cause more harm than good to environment. So, this invention aim to promote greener way to dry up your clothes.

Other than that, using a dryer can cost a lot of money because it use electricity as source power . This Development of Solar Powered Automatic Retractable Cloth Hanger with Raining Sensor and IoT is fully operate by solar energy. Thus it will save the electric bills.

1.3 Project Objective

a) To develop a design plan of a prototype of a Solar Powered Automatic Retractable Cloth Hanger.

b) To evaluate a prototype of a Solar Powered Automatic Retractable Cloth Hanger in terms of:

i. design features.

c) To implement Internet of Things (IoT) for Automatic Retractable Cloth Hanger.

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1.4 Scope of Project

The scope of project(Expected output) is to develop an automatic retractable clothesline with a basic machine system and sensory system that can detect rain and retract the clothing, as well as detect sunshine and return the clothes to their original position. When the clothes are retracted, the customer will receive a notice through IoT, and a timer may be set to retrieve the laundry at the desired moment. The user will be able to alter the timer by looking at the humidity and temperature. A solar panel will be used as a power source to supply the motor with power and make the system functional as intended.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

People today have a difficult time picking up their garments when it rains. Malaysia, on the other hand, has some of the most unpredictable weather. It might rain in the morning and be sunny in the afternoon, or vice versa. The purpose of this project is to keep their fabric from getting wet in the rain. It's also about energy conservation, like as not using the dryer. The human work will be made simpler by constructing a rack that is reliant on light intensity and water or moisture by delivering this idea, an automatic drying rack. This drying rack allows people to hang their clothes without worrying about them becoming wet, and they will remain dry.

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2.2 Past Studies

Froilan N. Jimeno II, Briely Jay A. Briz and Marvin Roy P. Artiaga have presented a design that is solar-powered with a 12V battery for backup power. Aside from that, the ESP32 Module was utilised as a Wi-Fi module to connect to a Wi-Fi network and as a notification sender to transmit information to the phone. Aside from that, the suggested design employed two sensors: a rain sensor and a LDR light sensor. To move the retractable clothline, this device also uses a linear actuator and a forward and backward mechanism movement.

Ooi Wei Lynn proposed a design that work like an umbrellas clothline but with an improvise version. The design use lego EV3 brick to enable communication between the sensors. The design also use both electricity and sunlight to dry up the clothes. So it is energy saving. Other than that, the design use water sensor to detect raindrop, color sensor to separate