



Faculty of Electrical and Electronic Engineering Technology



**DEVELOPMENT OF A SOLAR POWERED AUTOMATIC
CLOTHESLINE SYSTEM**

MUHAMAD ZULHAIRIE BIN AZMI

Bachelor of Electronics Engineering Technology with Honours

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**DEVELOPMENT OF A SOLAR POWERED AUTOMATIC CLOTHESLINE
SYSTEM**

MUHAMAD ZULHAIRIE BIN AZMI

**A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Electronics Engineering Technology with Honours**



Faculty of Electrical and Electronic Engineering Technology

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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TIDAK TERHAD

Disahkan oleh:

zulhairie



DR. KHAIRUL ANWAR BIN IBRAHIM
PENSYARAH KANAN

FAKULTI KEJURUTERAAN ELEKTRIK DAN ELEKTRONIK
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

(COP DAN TANDATANGAN PENYELIA)

(TANDATANGAN PENULIS)

Alamat Tetap: No.1 Jalan Kiara SD11/1,
Bandar Sri Damansara,
52200 Kuala Lumpur,
W.P. Kuala Lumpur.

Tarikh: 27 Januari 2023

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I declare that this project report entitled “DEVELOPMENT OF A SOLAR POWERED AUTOMATIC CLOTHESLINE SYSTEM” is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature

:

zulhairis

Student Name

:

MUHAMAD ZULHAIRIE BIN AZMI

Date

:

27 JANUARI 2023



APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electrical Engineering Technology (Industrial Power) with Honours.

Signature :



Supervisor Name :

DR. KHAIRUL ANWAR BIN IBRAHIM
PENSYARAH KANAN
FAKULTI KEJURUTERAAN ELEKTRIK DAN ELEKTRONIK
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Date :

27 JAN 2023

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DEDICATION

To my beloved mother, Nozita Binti Mohd Arifin, and father, Azmi Bin Omar.



ABSTRACT

Malaysia is a country located on the equator line. Therefore, the weather conditions in Malaysia are uncertain. Because of this, the clothes that consumers wash become difficult to dry when it rains. Besides that, they also lack the time to hang and lift the clothes because they are busy with outdoor affairs. This project uses the solar system as a source of electricity to generate this automatic clothesline system and PLC CPM1A is as Microcontroller to include all the programs that will give instructions to run the system so that it can work automatically. This project has two modes which are manual and automatic mode. Manual mode is controlled by a push button switch to turn the clothesline in and out while the automatic mode is controlled by all the inputs signal. This project needs a DC motor as an output to convert electrical energy into mechanical energy to be able to pull in and out of the clothesline. Automatically, the clothesline will pull in if the rain sensor detected water or the temperature sensor detected a temperature below 24.5 degrees celcius and LED will turn on. If the light sensor detected light above 150 lux the motor will push out the clothesline.

ABSTRAK

Malaysia ialah sebuah negara yang terletak di garisan khatulistiwa. Oleh itu, keadaan cuaca di Malaysia tidak menentu. Disebabkan ini, pakaian yang dicuci pengguna sukar dijemur apabila hujan. Selain itu, mereka juga kekurangan masa untuk menyidai dan mengangkat pakaian kerana sibuk dengan urusan luar. Projek ini menggunakan sistem suria sebagai sumber tenaga elektrik untuk menjana sistem jemuran automatik ini dan PLC CPM1A adalah sebagai Microcontroller untuk memasukkan semua program yang akan memberi arahan untuk menjalankan sistem supaya ia dapat berfungsi secara automatik. Projek ini mempunyai dua mod iaitu mod manual dan automatik. Mod manual dikawal oleh suis butang tekan untuk memutarakan jemuran masuk dan keluar manakala dalam mod automatik dikawal oleh semua isyarat input. Projek ini memerlukan motor DC sebagai output untuk menukar tenaga elektrik kepada tenaga mekanikal untuk dapat menarik masuk dan keluar tali jemuran. Secara automatik, ampaiian akan ditarik masuk jika sensor hujan mengesan air atau sensor suhu mengesan suhu di bawah 24.5 darjah celsius dan LED akan dihidupkan. Jika sensor cahaya mengesan cahaya melebihi 150 lux motor akan menolak keluar ampaiian

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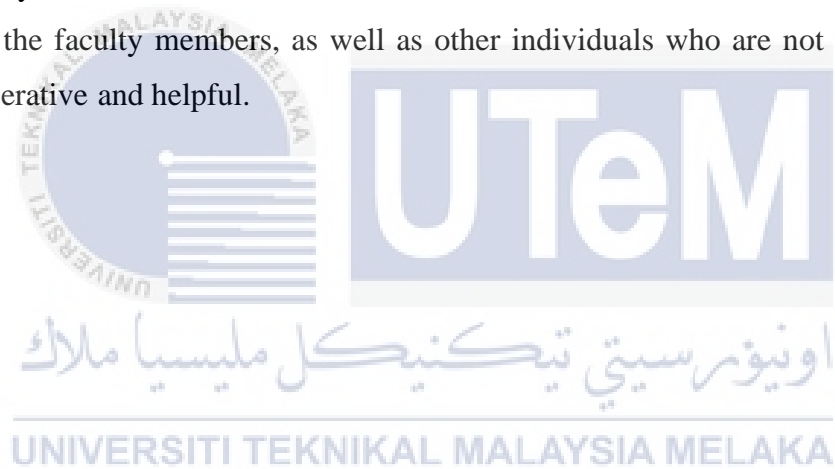


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LIST OF SYMBOLS

°C	-	Degree celsius
%	-	Percentage



LIST OF ABBREVIATIONS

<i>V</i>	-	Voltage
<i>s</i>	-	seconds
<i>ml</i>	-	Mili litre



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CHAPTER 1

INTRODUCTION

1.1 Background

The issues that now exist in the social circles of modern society are what inspired this effort. The concept of creating an automatic clothesline system is a useful and practical response to the desires of contemporary society. When compared to twenty years ago, modern society's way of life is drastically different now. The majority of women presently have to leave the house to support the family's financial needs. Without exaggeration, it can be said that this group is constantly on the lookout for new technological advancements that will make conducting their daily business easier.

Due to their busy schedules, this group of women only has time to gather at night and in the morning. They must take care of household duties when they arrive home from work after being exhausted on time. Now is the time for them to prepare meals, pack the house, wash clothes, etc. How about washing clothes at night and wanting them to dry in the sun? What if it frequently rains during the day because of the weather? The two questions mentioned above served as the inspiration for this project. designing an automatic clothesline system that can move the clothesline outside when it's sunny and move inside when it's raining.

1.2 Problem Statement

The majority of Malaysians wash their own clothes, so clothesline are a very important element at home. For residents of housing estates, space to build clothesline is very limited. Building a permanent clothesline is very space consuming and the process of moving the structure for drying and storage is complicated and harassing. In some areas such as multi -storey housing (flats), to obtain space, clotheslines from the windows facing the outside of the house and the situation this gives a less beautiful view. Hence, the design of the clothesline that save space without having to be moved during use are highly relevant to study.

1.3 Project Objective

The objectives of the study are aimed at ensuring important goals and decisions after the project is implemented. Here are the objectives in developing the project:

- a) To design an automatic clothesline system powered by solar.
- b) To develop automatic clothesline system programmed by PLC.
- c) To analyze the sensors using proper tools to meet the actual results as programmed.

1.4 Scope of Project

The scope or limit of project implementation should be made as a reference to ensure each project implementation does not fall out of the objectives to be achieved. Scope project implementation is set based on the objectives or goals of the project. Therefore, this

'AUTOMATIC CLOTHESLINE SYSTEM' project must not go beyond goals and their functions. Among them;

- a) The specially designed clothesline will move in and out for protect clothes from getting wet in the rain. The clothesline will be entered when the water detector will detect the rain falling, if the rain sensor detects no more rain falling, the clothesline will automatically move out.
- b) This clothesline system also uses a light sensor which will detect weather. When it is daytime the clothesline will moving outside. If the day is already overcast which is at night the clothesline will moving inside.



CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Malaysia is a country located on the equator line. Therefore, the weather conditions in Malaysia are uncertain. Because of this, the clothes that consumers wash become difficult to dry when it rains. Besides that, they also lack the time to hang and lift the clothes because they are busy with outdoor affairs. Therefore, this project have designed an automatic clothesline system to make it easier for users. This project have done research to ensure that the design is made to meet the engineering specifications and meet the needs of the users today. There are many advantages that can be found in this project.

Among the advantages of this project is that clothesline can be automatically moved inside when it rains. This happens with the help of rain sensors found on the clothesline. The sensitivity of this device to rain is able to turn on the motor switch in order to pull clothesline into inside position.

In addition, the low installation cost makes the tool affordable for every family whether low or middle income. In addition, consumers do not have to worry if there is a malfunction in the clothesline as the materials are very easily available in the market and consumers can afford to repair themselves as it only involves a simple circuit. In terms of space, the use of this automatic clothesline can save space as the position can be modified according to the suitability of the space. This model can be modified to save space. The prototype shown is only one model of choice. For the future it can be further developed in terms of its design.

2.2 Past studies

This problem has been solved in a number of earlier research. A study for a prototype automatic clothes drier using the ATmega8535 microprocessor was designed in 2012.[1] The design's functioning principle is briefly explained. When the rain sensor detects no rain, the motor rotates and pulls the mine out of the way, allowing the clothesline to hang outside. If the rain sensor senses rain, the engine will draw the clothesline mine inside, allowing the dried clothes to be stored inside.[2]

In addition, in 2013, a simulation of the drying roof cover system was created, which included light sensors (LDR) and rain sensors.[3] Simply said, the system operates when the light sensor senses the presence of light. If the raindrop sensor senses precipitation falling, the fin roof will open or shift, and the roof will move and close the area.[4]

In 2017, a similar concept was created utilising the ATmega328p microcontroller (on Arduino Nano) as a microcontroller and a remote control system.[5] This study incorporates ideas from earlier studies and makes some changes to develop more innovative and useful tools. The design concept used in this study comes from the first, second and third studies, namely, making the rope/mine clothesline a moving part, because this type of design is more cost-effective and simple.[6]

2.3 Design Overview

Through the review, there are several basic designs suitable for the condition of the multi-storey house that can be modified to an automatic and adjustable clothing store for domestic use. The designs are as follows:

1. Model 1



Figure 1 : Model 1

The design of this model 1 can be moved 180 degrees when it is to be used which will allow for a wider drying space. This model 1 will save space as it can be kept tidy by bridging back on the wall when it is no longer in use.

The features of these clothesline are:

- Each stem of the scribe rotates independently.
- Not bothering when it's not in use.
- Easy to install.

d. Able to withstand a maximum load weight of 9kg

e. Dimension

- width of the site = 60 mm
- site height = 100 mm
- bar length = 800 mm
- bar area = 2500 mm²

2. Model 2



Figure 2 : Model 2

The design of model 2 is to use the same concept as the antenna in terms of lengthening and shortening methods. This model can save space no matter where it is attached to the walls of the house. This model provides efficient drying with elongation and shortening abilities. Clothes can be dried without the need to hang irregular clothes in the home area. The design of this model 2 has seven steel-coated plastics that will not rust or cause clothes to tear. This Model 2 is pulled out when it is to be used to ensnare clothes and when not in use, it can be re-compressed with a distance of just 75 mm from the wall.

The features of these clothesline are:

- a. Extend up to 400mm from the wall.
- b. 7 rows of adjustable drying.
- c. Easy installation.
- d. Moderate stage of manufacturing
- e. Dimension
 - length = 400 mm
 - width = 1200 mm
 - height = 80 mm
- f. Able to withstand a maximum weight of 15 kg