



UNIVERSITI TEKNIKAL MALAYSIA MELAKA
AUTOMATED CLOTHES DRYING SYSTEM

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Robotic and Automation) with Honours.

by

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BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

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APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Robotic and Automation). The member of the supervisory committee is as follow:



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ABSTRAK

Automasi adalah teknologi yang berkembang pesat di seluruh dunia. Hal ini tidak hanya fokus pada peningkatan prestasi industri saja tetapi ianya juga memfokuskan gaya hidup seharian. Perkembangan sistem pengeringan pakaian automatik dengan menggunakan teknologi automasi dalam peralatan untuk menghasilkn sistem ini. Pembangunan ini menggunakan software seperti CATIA untuk merancang model projek dan penggunaan alat automasi akan memberikan kelebihan yang besar dalam meningkatkan keselesaan. Projek ini membantu pengguna untuk mengambil pakaian mereka ketika ada hujan . Mikro kawalan akan digunakan sebagai otak untuk mengesan hujan atau air dan mengawal pergerakan tali jemuran pakaian. Perisian program juga akan digunakan untuk memprogram mikropemproses ini dan pembolehubah yang ditetapkan. Pergerakan tali jumuran pakaian dalam mod automatik dan manual akan diuji. Tali jemuran pakaian harus dapat bergerak selepas hujan dan dalam manual mod tali jemuran pakaian akan bergerak selepas suis ditekan,dalam mode ini sistem dapat bergerak masuk atau keluar dari kawasan bumbung mengikut suis yang ditekan.

ABSTRACT

Automation is a fast growing technology around the world. It is not only focus on improving industries performance but also daily lifestyle. Development of an automated clothes drying system applies the automation technology on building equipment. Development of this project using software likes CATIA to design the model of the project and uses of automation equipment will give large advantage in increasing comfortability. This project helps the user to pick up their clothes when there is raining. Microcontroller will be used as a brain to sense the rain drop or water and control the movement of the clothes line. Programming software also will be used to program this microprocessor and all the variables were defined. Movement of the clothes line in automatic and manual mode will be tested. The clothes line should be able to close after the rain and in manual mode the clothes line will be moved following the switch pressed either to move inside or outside from the roofing area.

DEDICATION

Specially dedicated to my beloved mother Iesau A/P Echu and my sister Chong Ena are very concern, understanding, patient, and supporting. Thanks for everything to my supervisor Mr. Hisham bin for his constructive guidance, encouragement and patient in fulfilling our aspiration in completing this project, to my family and all my friends. I also would like to say thanks for everything. The work and success will never be achieved without all of you.

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CHAPTER 1

INTRODUCTION

1.1 Background

This chapter will describe and brief simply about the automated clothes drying system definition. This chapter also include the problem statement of the current clothes drying system, objective of this project, research scopes, and Gantt chart of the project automated clothes drying system.

1.2 Clothes Drying Rack

The clothes dryer rack is a place for drying clothes after washing. Normally this clothes dryer rack in place in the sun for drying clothes. In ancient clothes dryer rack is just using rope and wood only. At the present time we can see these tools are made from all sorts of materials such as wood, aluminum, steel and plastic. A clothes drying rack, sometimes called a clothes horse rack, drying horse, clothes maiden, drying rack, refers to a frame upon which clothes are hung after washing to enable them to dry (ecofx, January 10, 2008).

There are many types of drying racks, including large, stationary outdoor racks, smaller, folding portable racks, and wall-mounted drying racks. A drying rack

is similar in usage and function to a clothes line, and used in replace of clothes dryer. The name clothes horse was in use by 1800(Marie, September 18, 2007).

A clothes line or washing line is any type of rope, cord, or twine that has been stretched between two points, outside or indoors, above the level of the ground. Clothing that has recently been washed is hung along the line to dry, using clothes pegs or clothes pins. Washing lines are attached either from a post or a wall, and are frequently located in back gardens. Longer washing lines often have props holding up sections in the middle due to the weight of the clothing.

More elaborate rotary washing lines save space and are typically retractable and square or triangular in shape, with multiple lines being used such as the Hills Hoist from Australia (Hill, 1945). Some can be folded up when not in use although there is a hazard of getting fingers caught, so there is usually a safety button.

1.3 Problem Statement

Today the weather in our country is uncertain. Rain season does not follow the cycle and it will go down regardless of the day or night. This will be the next problem to dry clothes outdoors. Therefore, those who are drying their clothes off, they are always worried to leave the house after the clothes have been dried in the clothes dryer rack outdoor. In additional, the wives of the work they are always busy with work. So, they have no time at all to keep their clothes before leaving work that they will dry clothes and then after returning from their work to preserve. For these people, they always accept the risks when it rains because usually the people working will work for eight hours or more. So during working hours eight hours or more they cannot be returned to their attire collect to their clothes when it rains. Consequently, they will re-wash and dry their clothes.

Today we can see all sorts of clothes dryer rack design on the market. Most designs have a large size and will take more space to put it. Not all homes have more space, particularly terraced houses and flats. In fact they have a lot of volume for

drying clothes. So they have a problem to buy racks of clothes dryer in accordance with the conditions of their home.

The current clothes drying rack are not used in autonomous robotic technologies. The clothes drying rack other problem is the design that used a lot of space and not flexible. On the other hand, on the day of uncertain weather will limit the time housewife to leave the house .Additional, wives who have carrier they were have limited time to be housewives.

1.4 Objective

There are objectives in the project are:

- a) To design and development an automated clothes drying
- b) To study a sensor application.

1.5 Scopes

The scopes in the project are:

- a) To design the automated clothes drying system
- b) Fabrication the automated clothes drying system
- c) Utilize the rain sensor and Peripheral interface controller (PIC) microcontroller.
- d) Programming the automated clothes drying system.

1.6 Gantt Chart of the Automated Clothes Drying System

AUTOMATED CLOTHES DRYING SYSTEM																			
No	TASK	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18
1	TITLE SELECTION																		
	Selection PSM title	■	■																
	Submit PSM title		■	■	■														
2	Research																		
	Clothes drying			■	■	■	■	■	■	■	■	■	■	■	■	■	■		
	Design			■	■	■	■	■	■	■	■	■	■	■	■	■	■		
	Software			■	■														
3	Report writing																		
	<i>Chapter 1</i>																		
	Introduction					■	■												
	<i>Chapter 2</i>																		
	Literature Review						■	■	■	■	■	■	■	■	■	■	■		
	<i>Chapter 3</i>																		
	Methodology												■	■	■	■			
	Submit PSM 1														■	■	■	■	
4	PSM Presentation																		
	Planning																		
	Presentation																	■	■

Table 1.1 : Gantt Chart of the Automated Clothes Drying System

PSM 2																			
Detail	Semester Break	Wk1	Wk2	Wk3	Wk4	Wk5	Wk6	Wk7	Wk8	Wk9	Wk10	Wk11	Wk12	Wk13	Wk14	Wk15	Wk16	Wk17	Wk18
1.0 Design																			
1.1 Planning and Design	■	■	■																
1.2 Design main Base	■	■	■	■															
1.3 Design Supporter	■	■	■	■															
1.4 Circuit Design and system application				■	■	■	■												
1.5 system application					■	■	■												
2.0 Study and Analysis																			
2.1 Application of the system and electrical part								■	■	■									
2.2 Problem Solving									■	■	■								
3.0 PSM2- Report																			
3.1 Chapter 4	■	■	■	■	■	■	■	■											
3.2 Chapter 5						■	■	■	■	■	■	■	■	■	■				
3.3 submit Draft report													■	■	■				
3.4 Submit Report																	■		
4.0 Presentation																			
4.1 Provide the presentation slide																			■

Table 1.2 : Gantt Chart of the Automated Clothes Drying System

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will focus on data collecting from various resources for this project. It is actually discussing about the past project that similar with this project, the parts of automated clothes drying rack system whether from mechanical system, electronic circuit and programming. There are several of hardware related issues will be discussed in this section with involved the development of an actual automated clothes drying rack system.

2.2 Introduction of Clothes Drying

Clothes drying are suspended lengths of rope, wire or metal rods that hold freshly laundered clothing, allowing it to dry. Clothing is hung from the line on plastic hangers, draped over the clothes drying rack or fastened to it using wooden or plastic

clips. Clothes dry by any combination of air, wind sunlight and gravity slowly drawing the moisture out.

Clothes drying rack dry clothing without using any gas or electricity. Clothes drying rack can be used for all types of fabric, especially delicate items that can shrink or sustain damage in a machine dryer. Large items like rugs or quilts that do not fit in a home dryer can easily be dried by air on a clothes drying rack. Set up clothes drying rack in the back yard, basement, laundry room or bath, or suspend them between buildings or porch posts. Indoor clothes drying rack are used year round, while outdoor clothes drying rack work best on fair and windy days in moderate temperatures.(Diamond.,1970)

According to Landor, (April 2009) the evolution of clothes drying has been around as long as people have been washing clothes. Early clothes drying were as simple as a length of rope tied between two trees. Clothes drying have evolved, particularly from the 1940s on, into a variety of styles ranging from simple metal brackets and umbrella styles to automated pulley systems. Solid carved wood pins were improved upon with hinge styles in wood and plastic. Around the 1980s, clothes drying rack fell out of fashion in the U.S., even being banned in many communities for being unsightly. In the new millennium, environmentally conscious ideals have caused resurgence in clothes drying rack use and the repealing of neighbourhood bans.

2.3 Mechanical Structure

Process in making automated clothes drying rack, mechanical structure is a very important element because it covers every aspect of the design structure of a clothes drying rack. Mechanical structure not only focus on ergonomics, but must take all factors such as tire design space, space electronic component and battery, the nature of the structure either mild or stainless steel and others. Typically, the material used

to make mechanical structure is stainless steel, acrylic, aluminium, carbon steel, fibre and Teflon. In design of clothes drying rack might be need light weight body to move quickly, need stabilizer, strength and so on to do the tasks. That because mechanical structure is included in the literature review for the research.

2.3.1 Stainless Steel

Refer to Garry (2003) Stainless steel is always made using chromium. The minimum amount of chromium used to make stainless steel is 10.5%; it is chromium that makes the steel stainless. Chromium also improves the corrosion resistance by forming a chromium oxide film on the steel. This very thin layer, when placed under the right conditions, can also be self-repairing. Stainless steel is a great surface that doesn't corrode or rust easily. Stainless steel is easy to sanitize and clean. It actually isn't stain-proof, it simply stains less than other steel. Chemical residues, dirty water, and even hard water can leave stains and spots on stainless steel. It can also be dented and scratched fairly easily. In addition to iron, carbon, and chromium, modern stainless steel may also contain other elements, such as nickel, niobium, molybdenum, and titanium. Nickel, molybdenum, niobium, and chromium enhance the corrosion resistance of stainless steel. Stainless steel common used as a support structure in robot design and it can be cut by portable cut-off.



Figure 2.1: Stainless Steel Products

<http://www.khodasteel.com/s s round bar forged rounds flats hexagonal bars.html>

2.3.2 Aluminium

Aluminium materials as examples shown in **Figure 2.2**, basically is soft, lightweight metal with appearance ranging from silvery to dull gray, depending on the surface roughness. Aluminium is nontoxic, nonmagnetic and non-sparking. The yield strength of pure aluminium is 7 to 11 MPa, while aluminium alloys have yield strengths ranging from 200 MPa to 600 MPa. Aluminium is easy to cut and bend using ordinary shop tools (McComb, 2001). The advantages of its properties usually used to get the robust and lightweight structure of application.

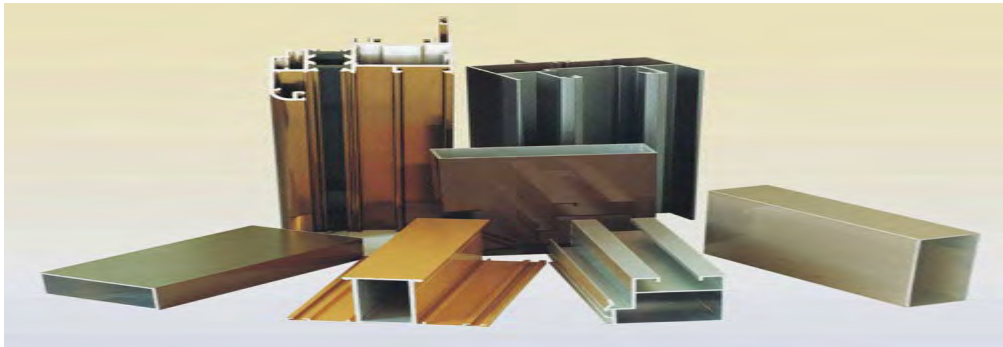


Figure 2.2: Aluminium structure (Focus Technology, 2010)

2.3.3 Teflon

Teflon is polytetrafluoroethylene, or PTFE. The molecular structure of Teflon is based on a chain of carbon atoms, the same as all polymers. Unlike some other fluoropolymers, in Teflon this chain is completely surrounded by fluorine atoms. The bond between carbon and fluorine is very strong, and the fluorine atoms shield the vulnerable carbon chain. This unusual structure gives Teflon its unique properties. In addition to its extreme slipperiness, it is inert to almost every known chemical. PTFE is a fluorocarbon solid, as it is a high molecular weight compound consisting wholly