# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

## SMART OUTDOOR CLOTHING RACK AND CURTAIN BLADE CONTROL SYSTEM

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronics Engineering Technology
(Industrial Electronic) with honours

by

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FACULTY OF ENGINEERING TECHNOLOGY
2015

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TAJUK: Smart Outdoor Clothing Rack and Curtain Blade Control System

SESI PENGAJIAN: 2015/2016 semester 1

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# APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Electronic Industrial). The member of the supervisory is as follow:

…….

(MR. MOHD FAUZI BIN AB RAHMAN)



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# ABSTRACT

Smart outdoor clothes rack is a new idea to prevent clothes from getting wet by the rain drops and its main purpose is to make the housewife easier to hang their clothes and give them more time in their daily life. Nowadays, many housewife have part time or full time, so with this system they can ensure their clothes get dried and go to work with rest assured. In this project, water sensor is used to sense the rain drops and a special protection layer that driven by two motors to protect the clothes from getting wet. All movements of this smart clothes rack will be controlled by a microcontroller. Furthermore, this system is also equipped with the house intensity control which able to compare the brightness of inner-house or an outer-house, so that the right angle of the window plates can be adjusted automatically. This condition occurs only if there is no cloth being hanged.



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# ABSTRAK

Penyidai baju pintar merupakan idea baru dalam mengawal keadaan pakaian daripada menjadi lembap disebabkan oleh titisan hujan, dan tujuan utamanya adalah untuk memudahkan suri rumah menggantung pakaian mereka dan memberikan mereka lebih banyak masa dalam kehidupan seharian daripada menjaga baju yang bergantung. Sebahagian daripada suri rumah mempunyai kerja sambilan atau kerja sepenuh masa, jadi dengan sistem ini, mereka boleh memastikan pakaian mereka sentiasa kering dan pergi ke tempat kerja dengan lebih yakin. Dalam projek ini penderia air digunakan untuk mengesan titik hujan dan satu lapisan perlindungan khas yang dipacu oleh dua motor bagi melindungi pakaian daripada basah akan dipasang. Semua pergerakan penyidai baju pintar ini akan dikawal oleh satu mikropengawal. Tambahan pula sistem ini juga dilengkapi dengan kawalan intensiti rumah yang berupaya membandingkan kecerahan dalaman dalaman atau luar rumah, supaya sudut bersesuian plat tetingkap boleh dilaraskan secara automatik. Keadaan ini hanya akan berlaku sekiranya tiada pakaian yang digantung.



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# DEDICATIONS

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# LIST OF SYMBOLS AND ABBREVIATIONS

| | | |
|---|---|---|
| LED | = | Light Emitted Diode |
| PWM | = | Pulse, width and modulation |
| ADC | = | Analog to digital converter |
| PCB | = | Printed Circuit board |
| PIC | = | Programmer Integrated chip |
| RPM | = | Revolution Per Mint |
| RISC | = | Reduced Instruction Set Computer |


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# CHAPTER 1
# INTRODUCTION

## 1.0 Introduction

A smart outdoor clothing rack and curtain blade control system is a product that used a sensor to detect the weather and automatically pull or release a shield to cover the clothes based on the real time weather condition. When the rain starts to fall, the clothes hanged on the clothing rack will protect by the clothing rack. On the other hands, after the rain, the cover of the clothing rack will back to his main position and the clothes will continue to dry.

## 1.1 Background

A smart clothes rack is a clothes rack that can protect the clothes from the raining drop. The clothes rack is divided into two parts which is drying line part and protection part. The drying line part is the part of the user to hang their clothes. By pressing the up button, the drying line will pull up the clothes to the higher part, so the user no need to use a push or pull dressing stick to hang their clothes. For the cover layer, it made by the curtain blade to block the rain drop.

Microcontroller is a controller very common in electronic field because it can use to control many devices, such as robot, remove control and other electronic devices. Microcontroller is a programmable component and it can operate similarly to a small simple computer. Other than that, a microcontroller also can receive signal from another device and generate an output signal to control other devices.

Water sensor is an electronic sensor to sense water and generate a signal to control the device. Nowadays, water sensors are very commonly used to detect rain,


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liquid leakage, tank overflow detector and water level, eider at industry or housing. For example, when there is no any water drop on the surface of water sensor, the output voltage is about 5V (the power supply is 3.3V to 5V DC to active the sensor) but when the water drops on the surface of the water sensor the voltage drops until 1.8V. This is because water is an electrically conductive liquid.

Use some electronic device and mechanical component, a smart clothes rack can be build up and it can install easily on the balcony or any place that is suitable for clothes drying. Smart clothes can be divided into two types either indoor clothes rack or outdoor clothes rack. For many householders, they prefer indoor because they no need to hang their clothes under the sun. Other than that, this product will help many housewives to overcome some weather changing problem, so they can collect their clothes when they are free.

The other added function on the clothing rack is control the light intensity inside the house. By controlling the curtain blade flip in few angles, it may prevent the living room or bedroom shine directly by sunlight.

## 1.2 Problem Statement

Nowadays, many apartments is built in Malaysia and the balcony is having a limited space. So many housewife will prefer a smaller size clothes rack to hang their clothes after washing, with the smaller size of clothes rack that is not enough for a family. Other than that, nowadays many parents are busy to working so they do not have much time at home to take care their clothes when drying.

- There have many apartment builds in Malaysia, but all of them have a difference size and shape of the balcony.
- Type of design of the shield to fully protect the clothes.
- Motor use to pull drying line and shield.


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## 1.3 Objective

The main objectives for this project can be described as follow:

- To design a clothes rack which able to control brightness of inner house.
- To develop a smart clothes rack which have an automatic cover system to cover the clothes when rain.

## 1.4 Scope

In this project, a water sensor is needed to detect the weather whether is raining or sunny day. If the sensor is detected the raining water, then to motor will activated and pull the cover to protect the clothes. Other than that, it also needed to construct a circuit which is able to detect the weather and control the motor. After the circuit part and the sensor are completed, the hardware design will start in the same time. In this project a smaller scale prototype of smart clothes rack system will develop that represents the actual system and performance of the smart clothes rack.

The cost for this project is estimated around RM400. This project must be completed before the end of the year 2015.

## 1.5 Thesis Outline

The structure and layout of the thesis is described as follows:

Chapter 1 – introduction: this chapter gives a short introduction on the project and covers the problem statement, objectives and scope of the project

Chapter 2 – literature review: this chapter explains the type of smart clothes which exist today and reviews the component and material that are needed in order to complete this project.

Chapter 3 – methodology: this chapter discusses the methods to complete the project and also the test settings required for the product performance verification.



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Chapter 4 – result and discussion: This chapter will summarize the results based on the fabricated prototype and discuss overall performance associated with the project.

Chapter 5 – conclusion and recommendation: This chapter will conclude the achievement of the overall project objectives and suggest some recommendations towards improving the product better.


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# CHAPTER 2
# LITERATURE REVIEW

## 2.0 Introduction

The data analysis from the previous source collected and discuss on this chapter. In this literature review section, the past projects which have some similarity with this project of component, method and design are discussed. First of all, there have many importance components such as rain sensor, motor use, and design on the protection layer. From those many types on component a feel component is selected to make a comparison and selection. Next, a few software used are introduced and give some explanation on the part of the software used.

## 2.1 Type of Clothe Rack

Nowadays many types clothe rack exists and they can be divided in to two main type indoor or outdoor. Other than that some clothes rack is adding an extra function such as fan, actuator or ultraviolet light to improve clothes rack.

### 2.1.1 Pulley Type Clothes Rack

The clothes drying rack which is using aluminium as their material, the size is 2×2.4m, stainless steel wire rope, and the height is adjustable. The design makes the user easier to hang their clothes on the rack and save space in the house. But this type of clothes rack only suitable build in indoor and it does not have any automatic system. The user still need to use roller to adjust the high of the rack. If the rack


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installed at outdoor then it has no any protect to their clothes. Their design is shown in figure 2.1.

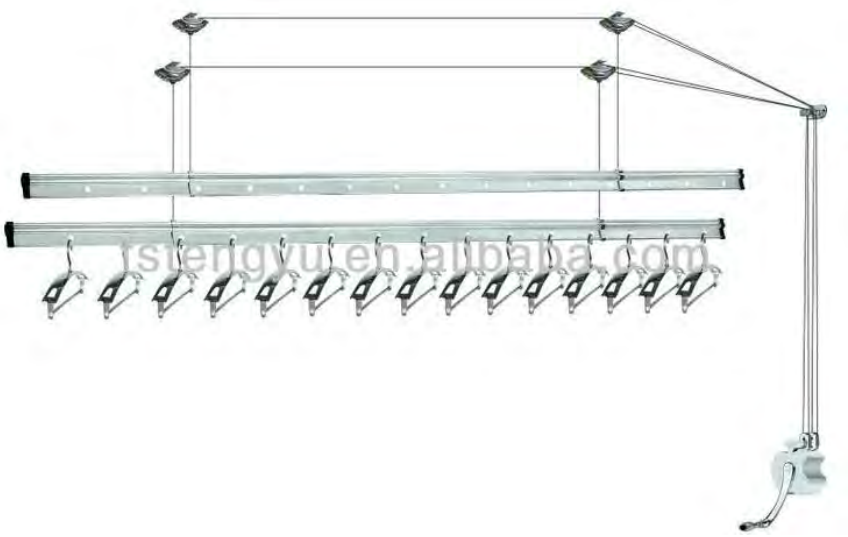


Figure 2.1: Pulley Type of Clothes Rack

### 2.1.2 Automatic Ceiling Cloth Hanger

Automatic ceiling cloth hanger is a clothes rack that added many additional functions and it have many advantages, but the design and some of the extra function are not necessary needed in the clothes. For this type of clothes rack it is very expansive, so most of the family is cannot afford it. The cost of this automatic ceiling cloth hanger is around RM 1900. The design and the additional function is show in figure 2.2.


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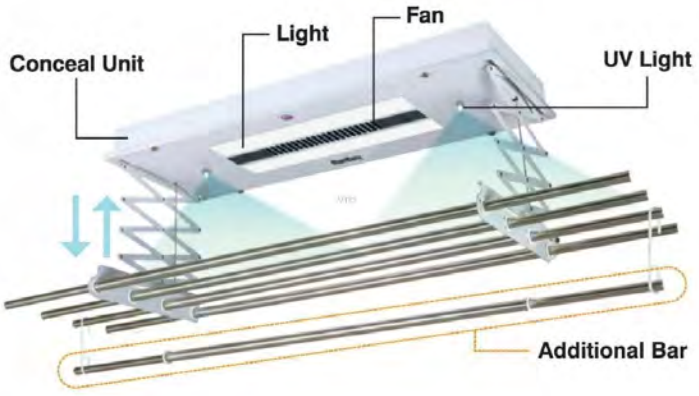


Figure 2.2: Design and The Function of Automatic Ceiling Cloth Hanger

### 2.1.3 Normal Type of Clothes Rack

A simple type of clothes racks there have no electric function, electronic function and other function. It just simple a rack and purposely to hanging the clothes. This type of clothes rack needs a large space to install, for some apartment, their balcony is no enough space for this type of clothes rack. Other than that, the clothes rack do not have any protection layer or cover to protect the user clothes form rain water. The design of the clothes rack is show in figure 2.3.

Figure 2.3: 3 Example of Simple Clothes Rack



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