



**Faculty of Electrical and Electronic Engineering Technology**



**DEVELOPMENT OF MICROCONTROLLER BASED CLOTHES  
FOLDING SYSTEM**

**NUR ALIAH AIMAN BINTI ALIAS**

**Bachelor of Electronics Engineering Technology (Industrial Electronics) with  
Honours**

**2021**

**DEVELOPMENT OF MICROCONTROLLER BASED CLOTHES FOLDING  
SYSTEM**

**NUR ALIAH AIMAN BINTI ALIAS**

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



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**Faculty of Electrical and Electronic Engineering Technology**  
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## 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 Electronics Engineering Technology (Industrial Electronics) with Honours.

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## DEDICATION

*These studies are dedicated to my dear parents, Alias bin Sa'ad and Ruhizah binti Saad, who were a source of inspiration for me and of strength when I felt like giving up and still give moral and spiritual support.*

*I would like to express my heartfelt appreciation and gratitude to Ir. Ts. Mohd Syahrin Amri Bin Mohd Noh, my main project, for the project's encouraging, inspiring, critical, and advice-giving, and motivating nature throughout its implementation.*

*I'd also want to thank my course mates and those who helped me with the research for this project by offering advice, ideas, and support.*



## ABSTRACT

Electronics has become one of the sectors where technological advances have seen significant expansion in our environment, such as in daily activities and business industries. Electronics technology is one element of assisting in the facilitation of human activity, creating a variety of practical and efficient electronic equipment to assist humans in meeting their demands. Folding clothes is one of the most common jobs. However, folding a lot of clothes takes a lot of time and energy. Working women who are unable to manage time at home often face this problem. These problems have resulted in solutions that make activities easier and save time. Some of the tasks that people normally perform today may be performed by automated machines with faster working procedures to help improve the results of laundry operations. Folding clothes can be done semi-automatically with a machine that can be operated using an android-based mobile phone. The purpose of this project is to demonstrate basic clothes folding machine as well as a semi-automatic system that combines mechanical and electrical design. The project also includes a description of electromechanical devices that can fold shirts, pants, towels, and other clothing. The machine can also calculate how many items are folded automatically. The project requires an Arduino Uno as a microcontroller, a Servo Motor as an actuator, a Wi-Fi Module, an IR Sensor, and software components. The data communication procedure in this system is controlled by an Arduino Uno microcontroller. With the use of infrared sensors and servo motors, this machine can also work semi-automatically. The servo motor movement that drives the folding board is the output system of the machine. The clothes-folding device uses a microcontroller with a servo motor as a practical means for folding clothes. The results show that by using this technology, people can save a lot of time folding clothes when compared to the traditional way. This project's outcomes may also be used to test and determine how many items of clothes have been folded using different measures depending on the kind of clothes.



## ***ABSTRAK***

Elektronik telah menjadi salah satu sektor di mana kemajuan teknologi telah menyaksikan pengembangan yang signifikan di persekitaran kita, seperti aktiviti harian dan industri perniagaan. Teknologi dalam bidang elektronik adalah salah satu bahagian dalam membantu memudahkan kerja manusia, mencipta pelbagai peralatan elektronik yang praktikal dan cekap untuk membantu manusia memenuhi keperluan mereka. Melipat pakaian adalah salah satu pekerjaan biasa. Namun, melipat banyak pakaian memerlukan banyak masa dan tenaga. Wanita yang bekerja yang tidak dapat menguruskan masa di rumah sering menghadapi masalah ini. Masalah-masalah ini telah menghasilkan penyelesaian yang menjadikan aktiviti lebih mudah dan menjimatkan masa. Beberapa tugas yang biasanya dilakukan oleh orang sekarang mungkin dilakukan oleh mesin automatik dengan prosedur kerja yang lebih cepat untuk membantu meningkatkan hasil operasi cucian. Lipat pakaian boleh dilakukan secara semi-automatik dengan mesin yang dapat dikendalikan menggunakan telefon bimbit berasaskan android. Tujuan projek ini adalah untuk memperlihatkan mesin lipat baju asas serta sistem semi-automatik yang menggabungkan reka bentuk mekanikal dan elektrik. Projek ini juga merangkumi penerangan mengenai alat elektromekanik yang dapat melipat baju, seluar, tuala, dan pakaian lain. Mesin ini juga dapat mengira berapa item yang dilipat secara automatik. Projek ini memerlukan Arduino Uno sebagai mikrokontroler, Servo Motor sebagai penggerak, Modul Wi-Fi, IR Sensor, dan komponen perisian. Prosedur komunikasi data dalam sistem ini dikendalikan oleh mikrokontroler Arduino Uno. Dengan penggunaan sensor inframerah dan motor servo, mesin ini juga dapat berfungsi secara semi-automatik. Pergerakan motor servo yang menggerakkan papan lipat adalah sistem output mesin. Peranti lipat pakaian menggunakan mikrokontroler dengan motor servo sebagai medium praktikal untuk melipat pakaian. Hasilnya menunjukkan bahawa dengan menggunakan teknologi ini, orang dapat menjimatkan banyak masa melipat pakaian jika dibandingkan dengan cara tradisional. Hasil projek ini juga dapat digunakan untuk menguji dan menentukan berapa banyak pakaian yang telah dilipat menggunakan ukuran yang berbeza bergantung pada jenis pakaian.

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Completing any sort of project successfully necessitates the assistance of a lot of individuals. I also got assistance in the development of this study from a variety of sources. There is now a little effort to express my heartfelt thanks to that wonderful individual.

I'd like to express my heartfelt thanks to my supervisor at Universiti Teknikal Malaysia Melaka, Ir. Ts. Mohd Syahrin Amri Bin Mohd Noh (UTeM). This research would have been less effective if it hadn't been for his kind supervision and excellent instruction. His supervision and direction were vital in ensuring that this report was produced flawlessly at every stage of the project.

Then, I'd want to express my gratitude to my parents and friends for their invaluable advice and ideas. They've been quite helpful at different phases of the project's completion.

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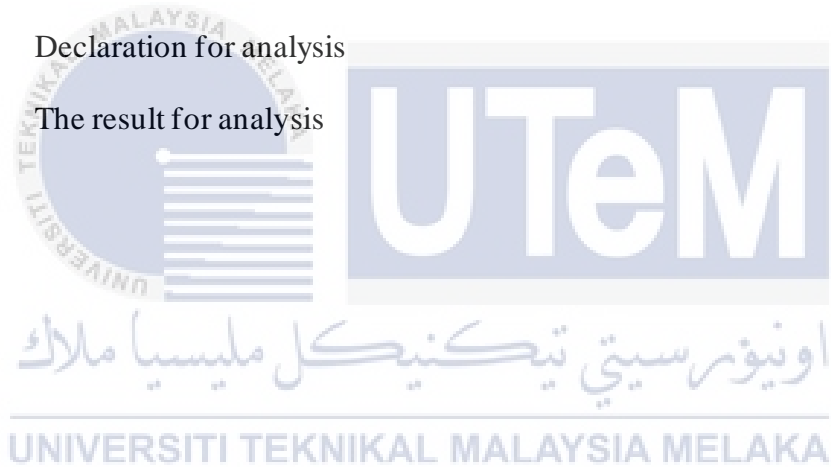
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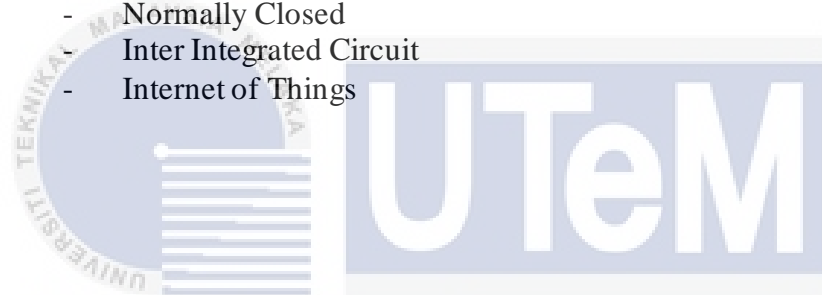
## LIST OF SYMBOLS

$\delta$	-	Voltage angle
<i>Hertz</i>	-	Frequency
<i>Mbps</i>	-	Megabytes



## LIST OF ABBREVIATIONS

<i>V</i>	-	Voltage
<i>AC</i>	-	Alternating Circuit
<i>DC</i>	-	Direct Current
<i>RPM</i>	-	Rotation Per Minute
<i>NO</i>	-	Normally Open
<i>NC</i>	-	Normally Closed
<i>I2C</i>	-	Inter Integrated Circuit
<i>TWI</i>	-	Two Wire Interface
<i>CPU</i>	-	Central Processing Unit
<i>ADC</i>	-	Analog to Digital Converter
<i>DIP</i>	-	Dual-inline package
<i>PLC</i>	-	Programmable Logic Controller
<i>GM</i>	-	General Motors
<i>NC</i>	-	Normally Closed
<i>I2C</i>	-	Inter Integrated Circuit
<i>IoT</i>	-	Internet of Things



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# CHAPTER 1

## INTRODUCTION

### 1.1 Background

Initially, we were thinking of something we could make to help people in their daily lives. Today, people live their normal lives on a close schedule. All of this complex electrical and electronic technology is used on a daily basis in modern times. Furthermore, with today's technology, I may learn how to perform things in a more indirect manner by utilizing existing technologies. Thus, I learned a single creation with many uses when we agreed to come up with a project called the Microcontroller Based Clothes Folding System. The Microcontroller Based Clothes Folding System is an automatic, motor-controlled, clothes folding machine powered by an Arduino system. The aim of this project is to fold the clothes when they are detected on the IR sensor. The clothes folding system is semi-automatic where one has to place the t-shirt on the folding board and it automatically folds when detected with an IR sensor. Usually, a person uses a conventional method to fold the clothes by hand. People nowadays have to live with a tight schedule in their daily life. The household chores, despite the gender discrepancy, have been a burden for many. This work is a burden for many and can sometimes be tiring depending on the amount of clothing and the number of people in a house.

In addition, most of the clothes folding machines on the market are either for industrial use or too expensive. I am trying to build a portable semi-automatic clothes folding system with a low cost to serve most people. The operation of the machine requires less

manpower involvement, which is significantly useful for people who are not willing to organize their clothes.

## **1.2 Problem Statement**

For now, the process of folding clothes is deeply affecting women out there, especially housewives, college students, and anyone else involved in this problem. Women who don't have enough time are burdened as a result of this issue, and they don't have time to fold their clothes. This is due to the fact that most people work or have other commitments. After a day of work, most people feel tired and they will buy something to help make their day easier. So, this semi-automatic clothes folder is designed to help people fold their clothes easily and quickly.

The business industry, especially the laundry sector, is also facing the same problem. Service from the laundry sector will be slow when a lot of clothes are received from customers. It's because it takes quite a long time to fold a lot of customers' shirts. As a result, this project also implements this technology to help the laundry industry fold clothes in large quantities in a short period. The technology has also been upgraded to be automatic to determine how many clothes have been folded. It can also automatically display the number of folding clothes it on the mobile phone.

## **1.3 Project Objective**

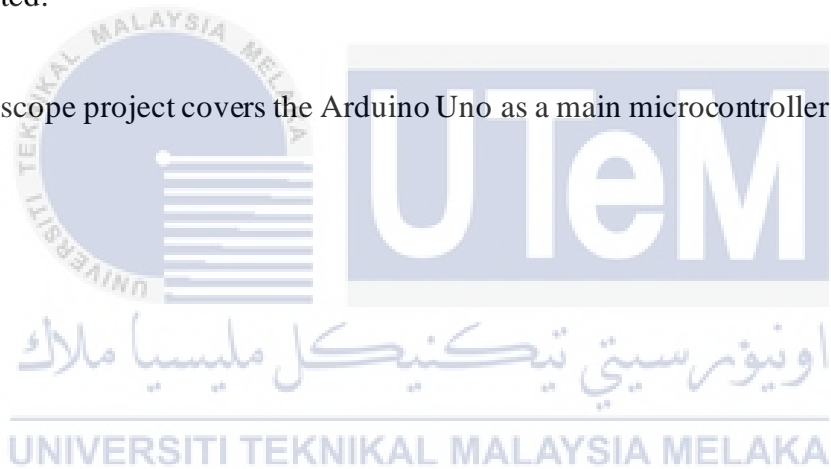
The primary goal of this project is to propose a systematic and effective methodology for estimating the automatic system of shirt folding machines that can assist people in simplifying and speeding up the shirt folding process. Specifically, the objectives are as follows:

- a) To develop semi-auto clothes folding system.
- b) To design new IoT based clothes folding system to replace the conventional folding method.

#### **1.4 Scope of Project**

The scope of this project is as follows:

- a) This scope project only includes clothing such as adult shirts and pants, and towels.
- b) This scope project process is performed on a semi-automatic machine; it is not fully automated.
- c) This scope project covers the Arduino Uno as a main microcontroller.



## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

The proposed work clarifies the T-shirt folding mechanism, which is simple and useful in this world. This project's goal is to fold a t-shirt with just a smartphone button. This folding machine is completely self-sufficient. Place the t-shirt on the board and hit the start button to have it folded in a second. Working women who have to do domestic tasks face a variety of issues. This concept would be beneficial to working women. With this automated t-shirt folding machine this energy and time can be saved and used in any other jobs. People usually get tired of folding their clothes after they have been washed, so they leave them in the cupboard as they are. It prepared an economical machine to detect the t-shirt and fold to solve the above-mentioned problem. This computer requires less human participation. [1]

#### 2.2 Components

##### 2.2.1 Power Supply

A power supply is a component of any electronic system that provides power. Batteries, solar panels, and adapters will also be used as a power source for the power supply. The voltage supplied by this part will be determined by the voltage required by the electronic circuit. The converter power supply is an electrical system that decreases and converts AC (Alternating Current) voltage to DC (Direct Current) voltage for use in electronic devices.[2] The components of a good power supply adapter are seen in Figure 2.1 as the block diagram of the power supply below: