UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN OF ELECTRONIC HOUSEHOLD ONION PEELER

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Computer Engineering Technology (Computer System) with Honours.

by

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This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Mechanical Engineering Technology (Automotive) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Bawang merupakan suatu bahan atau produk utama yang penting kepada masyarakat untuk digunakan dalam masakan dan sebagainya. Hal ini kerana, bawang merupakan salah satu bahan asas yang sering digunakan di dalam masakan tidak kira di rumah atau di kilang-kilang pemprosesan makanan. Dalam pada itu, boleh dikatakan semua makanan mengandungi bawang. Terdapat banyak jenis mesin pengupas bawang yang besar dan hanya sesuai digunakan di kilang-kilang atau perusahaan makanan yang besar sahaja tetapi masih tiada lagi produk pengupas bawang yang sesuai digunakan di rumah dilancarkan di pasaran. Oleh itu, projek ini bertujuan untuk mencipta dan menghasilkan suatu produk pengupas kulit bawang iaitu "Electronic Household Onion Peeler" yang sesuai digunakan di rumah dengan dilengkapi oleh penderia yang sesuai yang membolehkan produk ini berfungsi secara automatik. Selain itu, objektif projek ini adalah untuk mereka bentuk dan membina prototaip yang sesuai untuk "Electronic Household Onion Peeler" dan juga untuk menjalankan analisis terhadap pencapaian proses pengupasan kulit bawang berdasarkan prototaip yang telah dibina. Umumnya, projek ini telah berjaya dibina selari dengan objektifnya. Oleh itu, "Electronic Household Onion Peeler" ini sangat berguna kepada masyarakat kerana ia merupakan produk yang mesra pengguna dan menjimatkan masa.

ABSTRACT

Onion is one of the important ingredients to the community for use in cooking and so on. This is because it can be said that all foods contain onions which are one of the basic ingredients in cooking no matter at home or in food industries. There are many types of onion peeler machine but they are only suitable for large food industries and the professional skill to control and handle those larger onion peeler machines is needed. Besides, there are also not have a portable type of the onion peeler launching in the market for the home user. Therefore, the aim of this project is to design an Electronic Household Onion Peeler. This product is built for the easier to the community to use it at home plus it is also will saving their time as it is built with the appropriate sensors and microcontroller which make the product will automatically run. The objectives for this project are to design the Electronic Household Onion Peeler and produce a suitable prototype and to analyse of the performance of the peeling process based on the development of the prototype. Generally, this project is built successfully which act in accordance with the objectives for this project. Therefore, this Electronic Onion Peeler is very useful for communities in which it is a user-friendly product and also time saving.

DEDICATION

To my beloved parents; Md Zawi Bin Ab Rahman and Zaiton Binti Hussain, and for my beloved family who encourages me, also do not forget to whom may involve in order helping me to complete my Finally, this dedication is also dedicated to my beloved friend that have provided me with a strong love shield and always surround me and never lets any sadness enter inside.

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LIST OF SYMBOLS

g	-	Gram
Kg	-	Kilogram
mm	-	Millimetre
kW	-	kilowatt
kPa	-	kilopascal
V	-	Volt
mA	-	mill ampere
MHz	-	Megahertz
KB	-	Kilobytes
mV	-	Millivolts
T	-	Torque
cm	-	centimetre
s	-	Second

LIST OF ABBREVIATIONS

IDE	-	Arduino Integrated Development Environment
LED	-	Light Emitting Diode
LCD	-	Liquid Crystal Display
USB	-	Universal Serial Bus
DC	-	Direct Current
AC	-	Alternating Current
PWM	-	Pulse Width Modulation
SRAM	-	Static Random Access Memory
EEPROM	-	Electrically Erasable Programmable Read-Only Memory
MDF	-	Medium Density Fiber

CHAPTER 1

INTRODUCTION

1.0 Introduction

In this chapter, the author will describe the project background, the problem statement, the objectives and aim of the project and scope to guide the author in a development of an electronic household onion peeler project.

1.1 Background

Allium cepa or mostly known as onion is one of the vegetable species that are found all over the world. The onion is basically popular as food everywhere for many centuries as they are valued for their flavor, aroma and taste that is prepared domestically or forming raw materials for a variety food process. Most of the onions that available today are products of cultivation and breeding to develop specific characteristics like size, shape, color and sweetness. The onion plant has a bulb at the base which consists of a fan of hollow, bluish-green leaves. Besides, onions are an integral part of cuisines in most parts of the world. They are eaten raw, pickled, roasted and many more in a wide range of dish. Onions are divided into three types based on the color such as yellow, red and white. Yellow onions are the dominant onion found in the markets and have strong-flavored.

Then, the red onion is milder and more perishable while the white onions are mild and often called sweet. The level of most essential nutrients in onions are fairly low but they bring about four percent sugar and number of the phytochemical compound on a table and all the varieties are good sources of vitamin C, calcium and iron. The red onions are little higher in fiber rather than other types of onions. In addition, the red onion has higher flavonoid contents linked to anti-inflammatory and health-promoting properties. While peeling or chopped the onions, the sulphenic acid is released which causes our eyes to sting and bringing on the tears while doing those processes. (Jones, 2015)

Figure 1.1: Red Onion (Jockers, 2017)

There are three types of peeling method that had been used such as a lye treatment, flame peeling and mechanical peeling. Usually, one of the suggestive methods that are used on onion is mechanical peeling. This is because, by using the mechanical method, the onions product will be in a good quality product as there is no objectionable chemical, thermal or cause damage to the onions compared to lye and

flame methods. Besides, this method gave significance to those onions that used for the canned product. Furthermore, research and investigation are made on the previous development of the onion peeler machine. Mostly the project development on the previous is required a large system as the machine is big and suitable just for large and big industries only and very costly. As the instances, there have big sizes of the onion peeling machine had been built in the previous developments which are used for the farm operation and big industries and required a lot of professional skill to conduct the machine. Besides, there are a lot of type of the onion peeler machine have been developed but the portable types of the onion peeling product have never been launched for home use.

Therefore, after discussions with project supervisor, a selection of onion skin peeler projects is selected. It is created a product that aims to facilitate the communities or housewives in easier to prepare food at home which has portable sized onion peeler, easy to used and saving time. Besides, this product also able to isolate the onion with the onion skin. Then, this product was named as the 'Electronic Household Onion Peeler'.

The Electronic Household Onion Peeler was created to facilitate stripping work for communities of the outer layer of the onion or onion skin. This product was built in suitable sizes and able to peel 100 g to 400g of the mini onions. This product will be built with two sensors which is the vibration sensor to sense the existing onions that are placed and load sensor to detect the weight of the onions. Then, the signal will be sent to the microcontroller to rotate the DC Motor to move the peeler blade in the peeler container. This machine will operate automatically the microcontroller detects the onions. This product is portable, safe and easier for home use.

However, the use of operating and testing the product will be discussed on other related topics. This product also was created for the housewives or communities who really need this kind of product to facilitate the process of stripping onion skin without consuming more time and can be protected the eyes from tearing due to the sulphenic acid that releases from onion while doing the peeling works. This product also able to peel the mini onion based on the estimated time that has been provided.

1.2 Problem Statement

The electronic household onion peeler is the project that is implemented to act as a medium to assisting of the onion peeling processing with more effective work. This product will give many benefits to all communities to use it at home or it also can be used in small product industries. Based on the research studied that had been made in the previous project development, this product is produced to solve a few problems so that onion peeling processing can be work properly.

Based on the investigations that have been done, mostly the communities especially the housewives and small food industries still used the traditional method in onion peeling process which is the outer skin of the onions is peeling manually using the knives and cutting board. These techniques are consuming time and can lead to injury when peeling the onions. Besides, for the housewives or mothers that have small kids or baby usually having a problem to cook for their family because they need nurturing their children. If the traditional method is used to peel the onions skins, the sulphenic acid that released by the onions while peeling will be affected to their children too. Therefore, the product Electronic Household Onion Peeler is produced to solve this problem as it has been generated with the friction concepts between onion and