I hereby declare that I have read through this report entitle "Design and Develop Pineapple Cutting Machine" and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering(Control, Instrumentation, and Automation) with Honors

Signature	:	……..
Supervisor's Name	:	En. Mohd Zamzuri Bin Ab Rashid
Date	:	8 June 2012

DESIGN AND DEVELOP OF PINEAPPLE CUTTING MACHINE

ZULFIKA BIN ARSAD

A progress report submitted in partial fulfillment of the requirement for the Bachelor of Electrical Engineering (Control, Instrumentation and Automation)

Faculty of Electrical Engineering

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2011/2012

I declare that this report entitle “Design and Develop Pineapple Cutting Machine” is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree

Signature	:	……..
Student’s Name	:	Zulfika Bin Arsad
Date	:	8 June 2012

To my beloved mother and father

ACKNOWLEDGEMENT

Alhamdulillah, thanks to Allah S.W.T for His blessed at last I finish this FYP II. I would like to take this opportunity to express my gratitude to all the parties that have been assisting me throughout the duration of my final year project report.

First and foremost, I would like to shower a million thanks to my supervisor, Encik Mohd Zamzuri bin AB Rashid who has been of outmost help and patience. From the first I started my project design until the end of my PSM II, he has been my source of motivation, inspiration, and my guiding light. All the input towards the practical has tremendously benefited me in various aspects.

I would also like to take this opportunity to show my appreciation to Engr. Anuar bin Mohamed Kassim and Puan Fadilah Binti Abdul Azis, the assessor. Thanks for always being receptive towards any new ideas and suggestion that was brought forward during our meeting on 4th June 2012. All your comments during Presentation PSM II was taken seriously and kept in a corner of my mind at all times while developing this report successfully.

Special thanks are also directed to some of UTeM lecturer for freeing up their busy schedule and spend time with me in order to help me figure out my project. Last but not least I would like to thank all my family members and friends who have been extremely supportive throughout the duration of the entire practical and helping me to complete my final year project report.

ABSTRACT

Pineapple cutting machine is a machine used to cut and peel the pineapple to form the cylindrical shape pulp. Various pineapples cutting machines available in the market, but most of the machine cannot accomplish all the process automatically. The main aim of this research is to develop a pineapple cutting machine to solve the problems faced by Small Medium Enterprise (SME) industries, where the machine developed can reduce the time taken for pineapple preparation. In this research, the design of the pineapple cutting machine has a twin cylindrical blade to remove the skin and mid core of the pineapple. The advantages of this pineapple cutting machine developed in this project are; it can cut the head and tail of the pineapple and at the same time, it can peel off outer skin of the pineapple. Besides, it also can remove the core of the pineapple. In order to operate the machine, a pineapple is initially located at the machine holder and the gripper will grip the pineapple. Then, the first cutter will cut the head and tail of the pineapple. After that, the skin and the core of the pineapple will be removed by using twin cylindrical blade.

ABSTRAK

Mesin pemotong nenas adalah mesin yang digunakan memotong dan mengupas nenas menjadi isi yang berbentuk silinder. Terdapat pelbagai mesin pemotong nenas yang berada di pasaran, tetapi kebanyakkan mesin ini tidak dapat menyempurnakan semua proses secara automatik. Tujuan utama kajian ini adalah untuk membangunkan sebuah mesin pemotong nenas untuk menyelesaikan masalah yang dihadapi dalam Industri Kecil dan Sederhana (IKS) , dimana mesin ini mampu mengurangkan masa yang diambil dalam penyediaan buah nenas. Dalam kajian ini, Mesin pemotong nenas yang direka mempunyai dua belah pisau berbentuk silinder untuk membuang kulit dan teras tengah buah nenas. Kelebihan mesin pemotong nenas yang dibangunkan dalam penyelidikan ini adalah ia mampu memotong bahagian atas dan bawah buah nenas dan pada masa yang sama ia boleh membuang kulit luar buah nenas. Selain itu ia juga boleh membuang teras tengah buah nenas itu. Untuk mengendalikan mesin ini, nenas pada mulanya diletakkan di pemegang buah nenas dan pencengkam akan mencengkam nenas. Kemudian pemotong pertama akan memotong bahagian atas dan bawah nenas. Selepas itu, kulit dan teras nenas akan dibuang menggunakan bilah berbentuk silinder.

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m	-	Meter
cm	-	Centimeter
s	-	Second
ms	-	Meter per Seconds
N	-	Newton
E	-	Summation
μ	-	Mean

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CHAPTER 1

INTRODUCTION

1.0 Overview

The pineapple cutting machine is a machine that automatically can cut and peel the pineapple to form a cylindrical shape pulp of pineapple. Pineapple pulp is the inner content of the pineapple between outer skin and core. The outer skin of pineapple is naturally hard and thick to cut. Pineapple core is the innermost portion or the central part of the pineapple. The core of pineapple is the part that cannot be eaten because it is kind of hard structure and tough. The automatic pineapple cutting machine will peel the whole outer skin of pineapple and at the same time the core of the pineapple also will be removed. Pineapple pulp is commercially used to produce juice, flavor, pineapple cocktail, pineapple jam and canned pineapple pulp. The main advantage of the automatic pineapple cutting machine is the machine can process the pineapple with automatic operation. Automatic pineapple cutting machine can done all the process required to produce the pineapple pulp, that's mean outer skin and core of the pineapple can be removed by the machine. By using the automatic pineapple cutting machine the production time, human workforce and the labor cost can be reduced. The automatic pineapple cutting machine has potential to be develop and applied in the small and medium entrepreneurs (SME) aligned with target of Ministry of agriculture and Agro-Based Industry Malaysia for pineapple industry. The targets of the ministry are every pineapple farmer in Malaysia has their own mini factory to process pineapple and increase entrepreneurs' people in pineapple industry. Similarly, Malaysia Pineapple Industry Board has targeted to increase the production from 5% of world pineapple production into 20%, improve the quality of Malaysia pineapple and diversify multiproduct from pineapple. This chapter will discuss about the problem statement, objectives and scopes of the project.

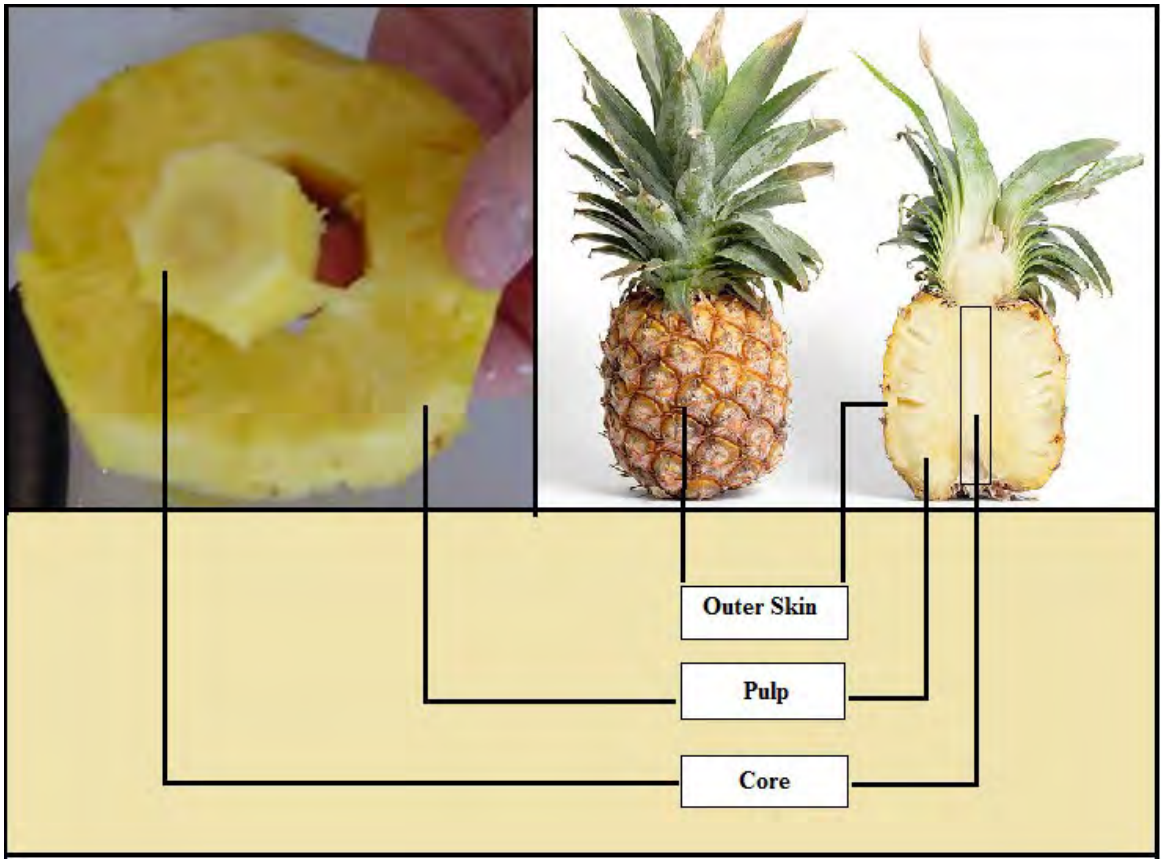

Figure 1.1: Cross sectional area of pineapple

1.1 Problems statement

Recently, demand of the pineapple in global market had increased. Before the pineapple can be proceed to produce another product the pineapple need to be processed first to remove the outer skin and core of the pineapple. A lot of processes to produce a pulp of pineapple because the increases in processing time, number of labor also increase and will bring the major problem that is production cost will increase. In order to solve the problem, there are lots of pineapple cutting machine have been designed in the market.

In the existing design, most of the pineapple cutting machines only can peel the pineapple skin while their head and tail already have been chopped off earlier. Besides proposing a new design and mechanism for the pineapple cutting machine that can cut the head and tail of the pineapple and at same time, this machine can peel of the skin and core of

the pineapple. It is hoped that the time taken to accomplish the whole process can be reduced by using this machine.

1.2 Objective

The objectives for this project are:

(a) To design the pineapple cutting machine.

(b) To develop hardware for pineapple cutting machine.

(c) To control the pineapple cutting machine.

1.3 Scope of the project

In order to achieve the project's objectives, the scope of the project is limited to a few assumptions. The assumptions made in this project are:

(a) The pineapples that can be cut by this machine have the same size.

(b) The cutter at the machine is fixed to cut the same size of pineapple

1.4 Summary

In this chapter, the problem statement, objective, scopes of the project are developed discussed. It also describes the main goal and limitations will for the project. In the next chapter, an intensive literature review of the project will be explored. The literature review covers the other people's project and research which include design, mechanism used, controller and etc.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction.

This chapter discusses about the articles, journals, conference papers and any information that related to this project. It consists of the research products that have been previously developed by several institutions and companies. Furthermore, this chapter also will mention about the projects available in markets nowadays.

2.1 Comparison on existing design.

In the paper done by [1], the author presents the automatic pineapple peeling machine. The machine has adjustable holder on the one side of pineapple to hold the pineapple. The machine has two cylindrical blades to peel the skin of pineapple and a pair of magnetic switch to control up and down the peeler blade. The author uses power window motor to drive the cylindrical peeler blade and the system is fully controlled by using microcontroller.

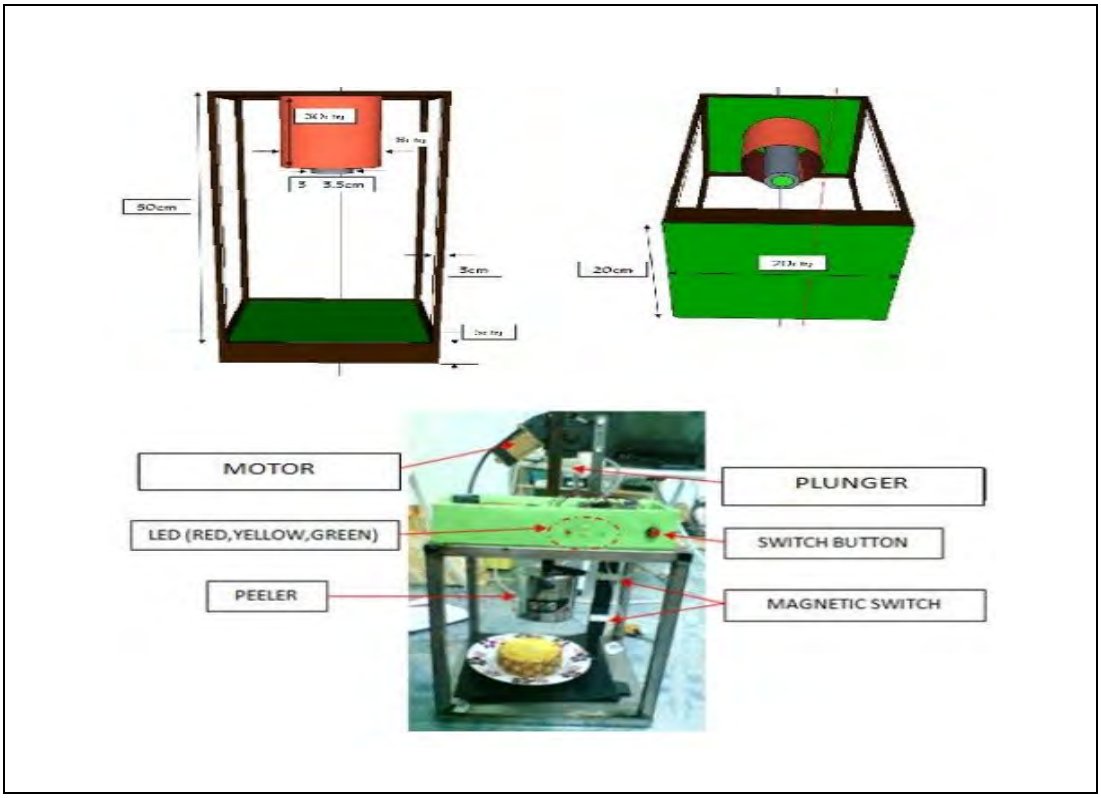

Figure 2.1: Development of Hardware for Automated Pineapple Peeling Machine using Microcontroller by [1]

In the paper done by [2], the authors present the machine that is used for peeling fruits and vegetables as show in Figure 2.2. The machine has pushrod, trident, grater, peeling blade, end cutting blade, switch and safety cover. The function of pushrod is to hold the fruit and to push the fruit toward the trident. Trident is used to support the fruit and it will spin the fruit when the cutting process is carried out. Grater is a kind of blade us to grate fruit to make it looking good. The peeling blade is used for peeling the skin of the fruit while a pair of end cutter is used for cutting head and tail. The switch function is to control the process and the safety cover is used for protect the user while the machine operates.

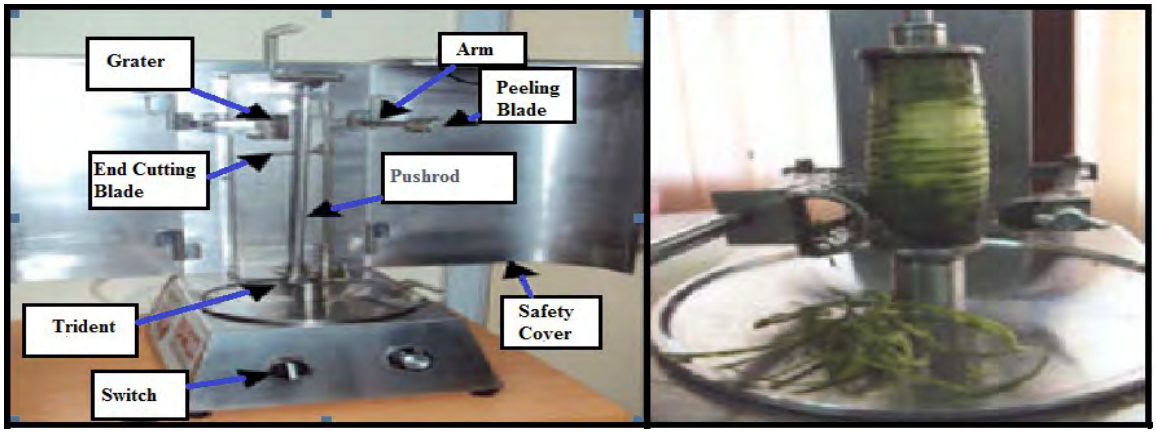

Figure 2.2: Design and Development of an Apparatus for Grating and peeling fruits and Vegetables by [2]

In the paper done by [3], the author presents the Pineapple Peeler which has adjustable cutting blades to cutoff the head and tail of the pineapple while another blades called as concentric cylindrical is used to remove the skin and core of the pineapple. The blades are driven by two D.C motors and electric linear ball screw actuators, microcontroller and arrangement of magnetic limit switch .There are fins mounted at the cylindrical blade to separate the pineapple waste and the waste can be collected after the process is accomplished. The pineapple cutting machine has the holder and adjustable gripper.

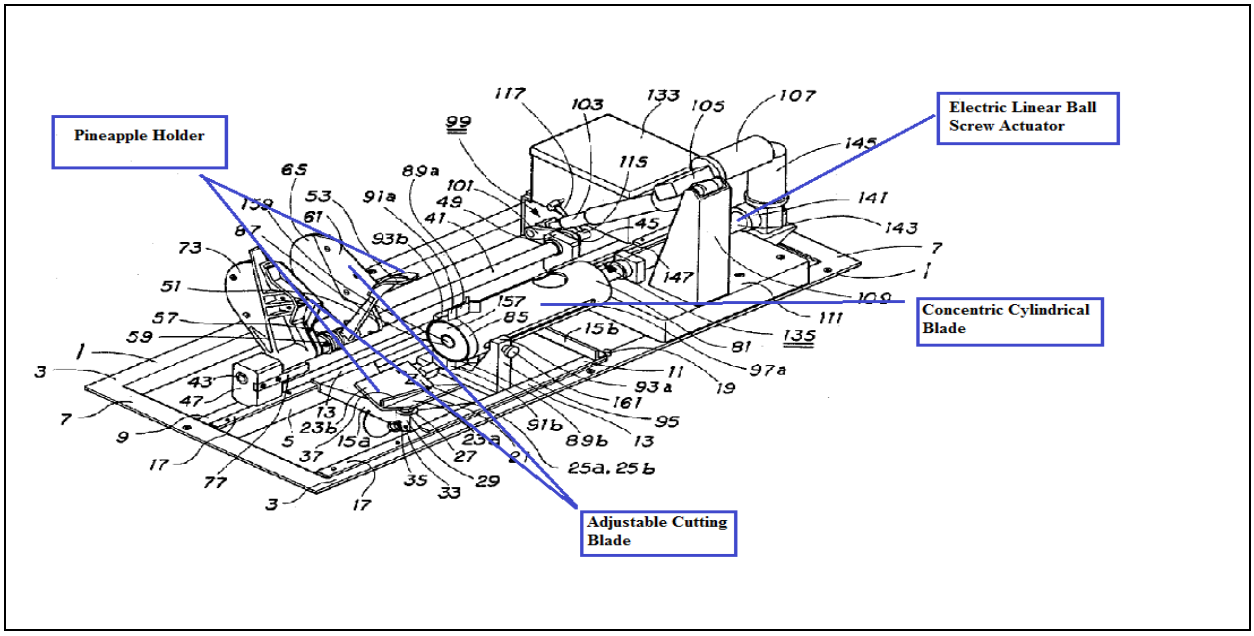

Figure 2.3: Pineapple peeler by [3]

In the paper done by [4], the company presents the Pineapple Peeler which is manually operated. The machine has a twin cylinder blade that is positioned statically at the middle of the machine. The machine also has a pusher that is connected to a lever to reduce the energy requires to doing the peeler process. There is pineapple holder at the end of the pusher to grip the pineapple.

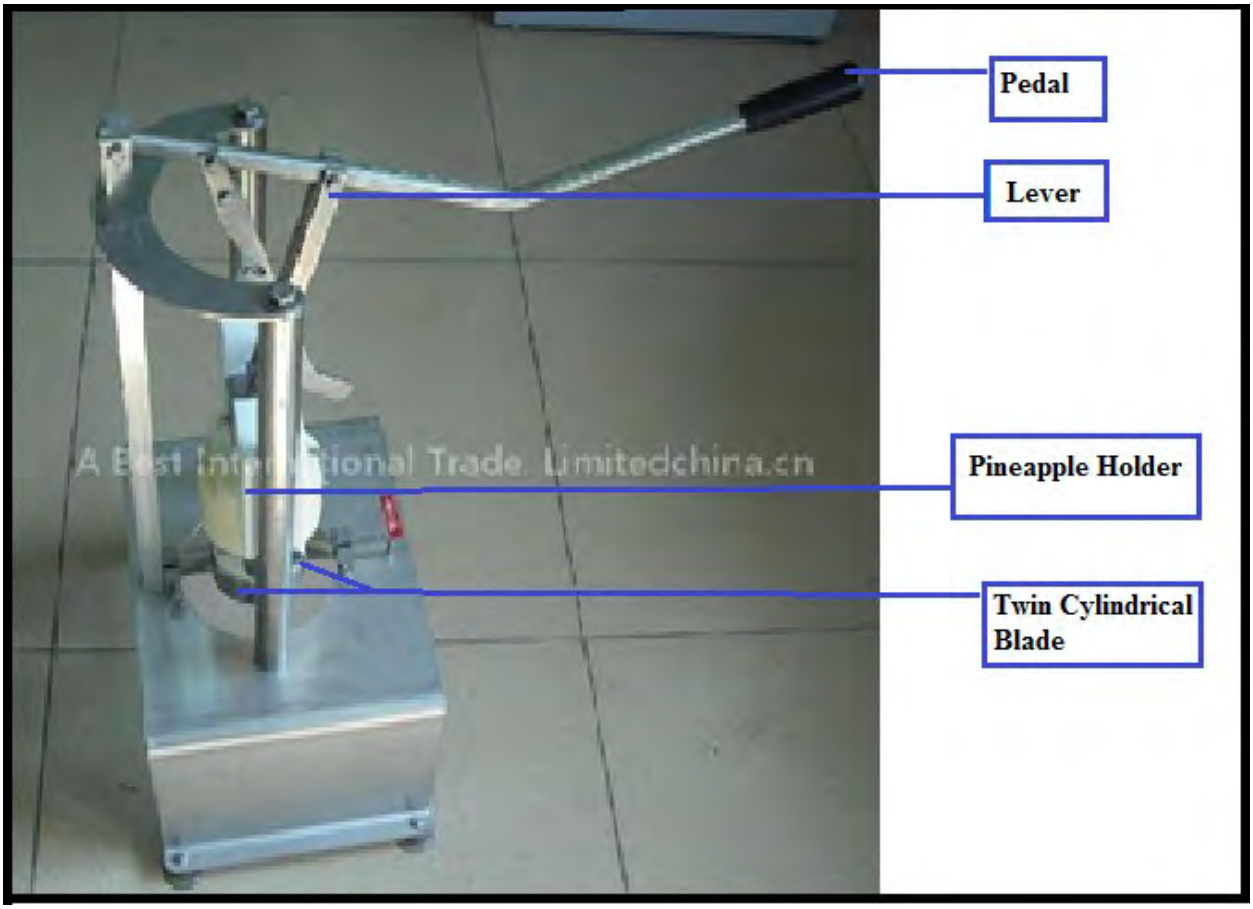

Figure 2.4: Pineapple Peeler by [4]