UNIVERSITI TEKNIKAL MALAYSIA MELAKA

AUTOMATED PAPER CUTTER

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Industrial Automation and Robotics) with Honours.

by

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Sesi Pengajian: 2019

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I hereby, declared this report entitled Automated Paper Cutter is the results of my own research except as cited in references.

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APPROVAL

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

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ABSTRAK

Penyelidikan ini memberi tumpuan kepada masalah asas terutamanya yang timbul dalam industri proses pemotongan. Biasanya, untuk memotong kertas perlu menanda dan memasukkan ukuran yang sama dalam setiap proses. Mesin pemotong kertas automatik ini direka bentuk untuk kegunaan pejabat atau individu untuk memotong kertas mengikut panjang dan bilangan potongan yang diperlukan dengan dimensi yang sama. Peranti yang didorong oleh Arduino ini memotong kertas mengikut panjang yang telah ditetapkan secara automatik. Kaedah yang digunakan dalam projek ini adalah dengan menarik kertas ke dalam mesin dengan selang masa yang tepat menggunakan motor stepper dan penggelek. Seterusnya, motor stepper kedua menggerakkan pisau cukur kepada kertas, memotongnya menjadi jalur. Bilah cukur disokong oleh gelangsar yang menggabungkan dengan motor stepper. Perkembangan mesin ini akan mengurangkan kerja manual potong kertas disamping juga akan menghapuskan masa yang diambil dalam proses penandaan dan pemotongan kertas. Oleh itu, penciptaan mesin ini akan membantu untuk menetapkan kuantiti kertas yang dipotong dengan dimensi yang sama.

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ABSTRACT

The focus of this research was on standard problems in the first place which arise in industrial cutting processes. Normally, to cut the paper, we need to mark and feed equal dimension paper in each process. These automatic paper cutting machines were design to be useful for office or individual, this cutting was also design to be possible where is small and light uses to cut papers into the length and number of strips needed with equal dimensions. This Arduino-driven device cuts paper to the length that has been set automatically. The method that is used in this project by pulling paper inserted into the machine body at precise intervals using a stepper motor and rollers. Next, the second stepper motor moves a razor blade over the paper cutting it into strips. The razor blade supported by slider that combines with stepper motor. The development of this machine will reduce the manual work of cutting paper besides it also will eliminates the most time taking process of paper marking and cutting. So, the creation of this machine will help to set the quantity of the cutting paper with equal dimensions.

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DEDICATION

To my beloved parents Mr. Ab. Hadi Bin Yusoff and Mrs. Wan Faridah Binti Wan Yusof for their support and pray. A full appreciation to my supervisor Muhammad Fareq Bin Ibrahim for advising and helping through this project.

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LIST OF SYMBOLS

D, d	Diameter
F	Force
1	Length
P	Pressure
r	Radius
T	Torque
x	Displacement
q	Angle

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LIST OF ABBREVIATIONS

ARM7	Advanced RISC Machine 7
IDE	Integrated Development Environment
I/O	Input/Output
PCB	Printed Circuit Board
PWM	Pulse Width Modulation
USB	Universal Serial Bus
PC	Personal Computer
AC	Alternating Current
DC	Direct Current
CNC	Computer Numerical Control
IR	Infrared
RFID	Radio-Frequency Identification
OLED	Organic Light Emitting Diode
LCD	Liquid Crystal Display
SCL	Serial Clock
SDA	Serial Data

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter will describe the project background, objectives, problem statement, and scope of the project in order to give an overall view of the project.

1.2 Background

Designing and developing a process for the paper cutter is the main term in this project. The paper cutter needs to be tested and checked whether the mechanism is working or not. This project title is Design and Analyze Automated Paper Cutter using Arduino. The project involves small analysis of the paper cutter and developing of the paper cutter itself with concerns regarding strength, portability, durability, and convenience. This new design is required to improve its durability and features. The test needs to be done to find out the strength of the paper cutter before the developing process started. It is requiring more knowledge and skill of analysis. Accomplishment on how to solve the problem is the most important and need to be improved when this project launched.

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Apparently, traditional hand lever paper cutting machine not satisfactory as every time operator has to do accustom the paper to desired cut position and hold the paper before taking the cut so the Advanced Paper Cutting Machine using ARM7 by (S.S. Lavhate, 2014) was created in order to conquered above problems intelligent paper

cutting machine controller can be used. It is a semi-automatic programmable unit equipped with a very uncomplicated and user-friendly control panel. It has got a wide application area in books or notebook manufacturing industry, corrugated box manufacturing industry, visiting cards or labels manufacturing industry and so on. The advance that this machine has is an interface of 5 "inch colour graphics display, memory for 64000 cut positions, automatic push-out and air table control that makes it possible to cut and withstand bulky jobs. Figure 1.1 shows the paper cutting machine using ARM7 system.

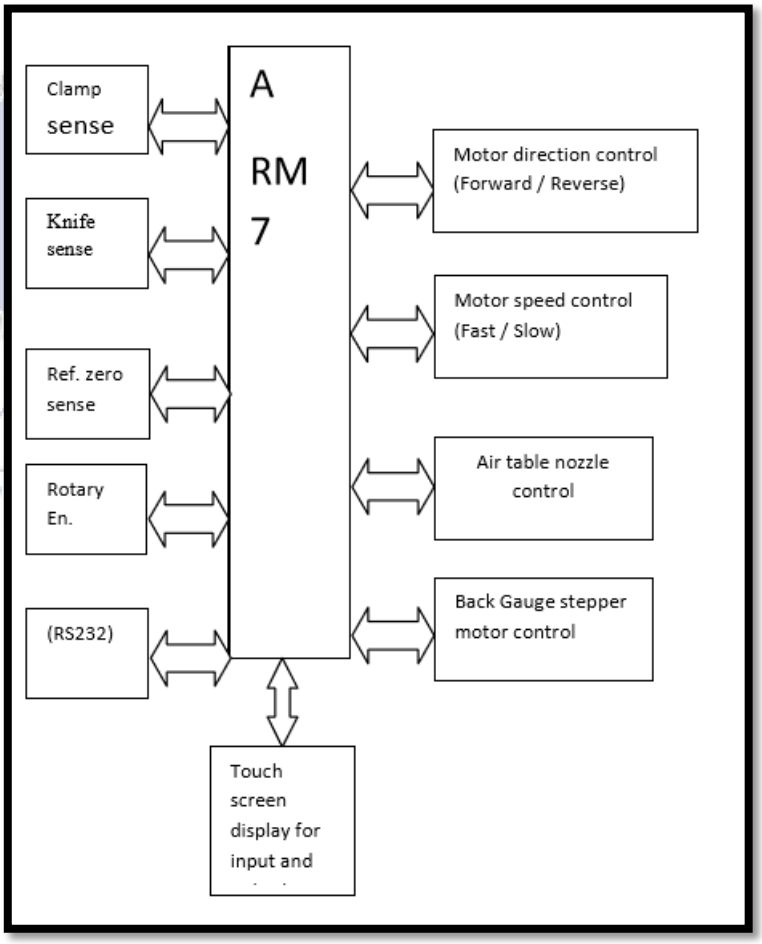

Figure 1.1: Paper cutting machine using ARM7 system

Besides that, Paper Shearing Machine has been developed by (A.K.Murthy, 2016) in order to coordinate a number of inanimate pieces of steel and iron and operating the machine at high speed with precision, requires a superior skill. From the first cutting machine, the old hand-operated wooden plow and press to the present power-driven steel mechanism is like the advanced evolution from the old wooden sailing vessel to the modern steel ship. Therefore, the Paper Shearing Machine extracts the unused or empty papers of blue books by pure mechanical energy application. The approximate number of papers that can be cut counts at around 100 sheets, at about 4-5 bluebooks at one stroke of cut. From the research of study, during the cutting of different kinds of paper material, the effects of blade angle on blade stresses have been analysed.

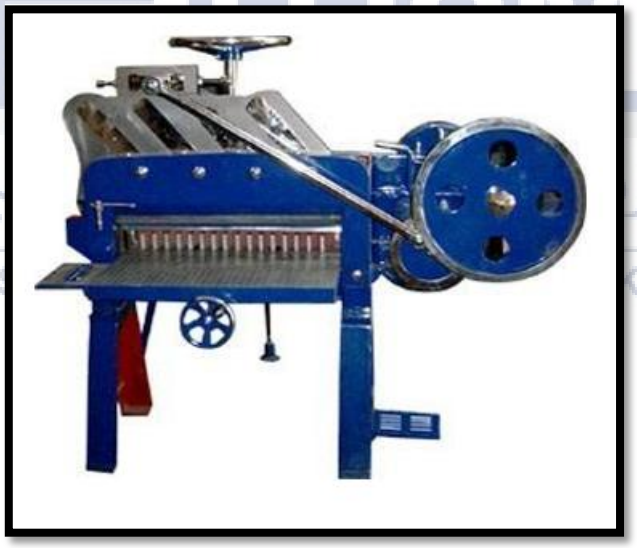

Figure 1.2: Paper Shearing Machine

Apart from that, based on Geneva paper cutting machine, the design and analysis were analysed by (Vijay Kumar U, 2016), perform a comparison of the position,

velocity, and acceleration between the conventional Geneva wheel mechanism and the proposed mechanism. As designated from a Geneva wheel and a gear train presents a kinematics study of an indexing mechanism to achieve intermittent motion.

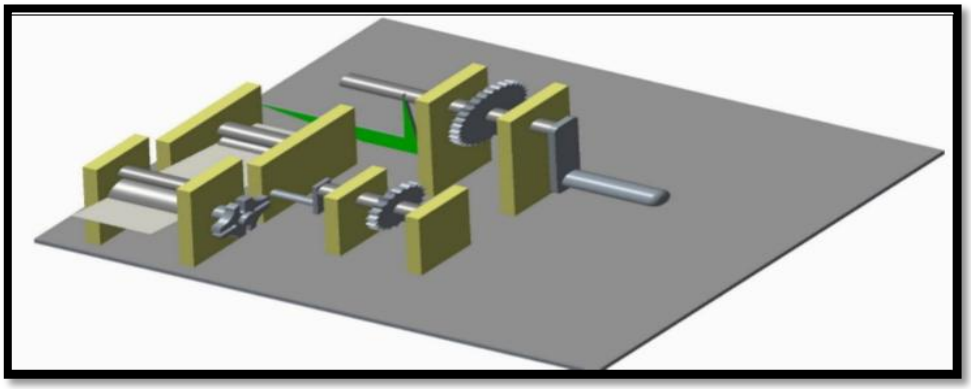

Figure 1.3: Geneva Paper Cutting Machine

There are some various type of paper cutting machine has been designs. Depending on their functional condition, each form has its own advantages and disadvantages. Therefore, in order for users to comfortably using the paper cutting machine, the design of the body is very crucial.

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1.3 Problem statement

This paper cutter will primarily help people to cut paper or to remove unneeded parts of paper safely. The manual work of cutting paper before only take the most time to process the paper marking and cuts the paper. This project is to ease the people to cuts paper automatically with the setting of length and number of strips. Besides proposing new design and mechanism for the paper cutting machine that can cut the paper two sides at the same time, this machine also could use in cutting sticker industry.