UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF HENNA DRAWING MACHINE

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

NORHASLINA BINTI SUHAIMI
B071610008
950407-04-5032

FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING

TECHNOLOGY

2019

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

Tajuk: DEVELOPMENT OF HENNA DRAWING MACHINE

Sesi Pengajian: 2019/2020

Saya **NORHASLINA BINTI SUHAIMI** mengaku membenarkan Laporan PSM ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.

2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.

3. Perpustakaan dibenarkan membuat salinan laporan PSM ini sebagai bahan pertukaran antara institusi pengajian tinggi.

4. **Sila tandakan (X)

☐ SULIT*   Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia sebagaimana yang termaktub dalam AKTA RAHSIA RASMI 1972.

☐   **TERHAD***   Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan.

☒   **TIDAK TERHAD**

Yang benar,   Disahkan oleh penyelia:

....

NORHASLINA BINTI SUHAIMI   MOHAMAD HANIFF BIN HARUN

Alamat Tetap: Cop Rasmi Penyelia

No 18, Jalan RU 20,

Taman Rambai Utama, 75250,

Melaka

Tarikh: Tarikh:

---

*Jika Laporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan PSM ini

DECLARATION

I hereby, declared this report entitled DEVELOPMENT OF HENNA DRAWING MACHINE is the results of my own research except as cited in references.

Signature: …………………………………

Author :   NORHASLINA BINTI SUHAIMI

Date:

APPROVAL

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 Electrical Engineering Technology (Industrial Automation and Robotics) with Honours. The member of the supervisory is as follow:

Signature: ………………………………………….

Supervisor : MOHAMAD HANIFF BIN HARUN

ABSTRAK

Mesin lukis inai ini diperbuat daripada barangan yang mudah didapati dan rendah kos merujuk kepada contoh mesin mini CNC yang sedia ada. Mesin ini mempunyai tiga paksi iaitu X,Y dan Z dan mampu melakar gambar dengan kawalan Arduino sebagai pengawal mikro bertujuan untuk mengawal sudut dan anjakan motor dengan tepat. Mesin ini menggunakan motor stepper sebagai platform untuk ketiga- tiga paksi. Projek ini sesuai untuk pelajar atau mereka yang berminat untuk melakukan ujikaji terhadap mesin CNC. Akhir sekali, mesin ini diprogramkan untuk membaca g-code di mana ia akan ditafsirkan dalam bentuk koordinat sebelum diterjemahkan kepada lukisan yang dipilih. Mesin ini menjalani beberapa kali ujian dan percubaan untuk mengetahui prestasi keupayaan ketiga- tiga paksi mesin tersebut dalam melaksanakan tugasan.

ABSTRACT

Henna drawing machine is made up from low cost goods and easy to get and it is developed based on an example of mini CNC machine. This machine consists of three axes which are X, Y, and Z and is capable to draw design that is controlled by an Arduino as the micro controller in order to control the angle and displacement of the motor correctly. This machine uses stepper motor as a flatform for those three axes. This project is suitable for students and those who interested to learn more about CNC machine. Last but not least, this machine is programmed to read the g-code which is then interpreted in the coordinates before it is translated into a chosen drawing. This machine undergoes testing and trial for several times to determine the performance of the axial reliability of the machine

DEDICATION

To my beloved parents, I acknowledge my sincere indebtedness and gratitude to them for their love, dream and sacrifice throughout my life. Their sacrifice has inspired me from the day I learned how to read and write until what I have become now. Thanks for always be there during my journey in completing this final project. I cannot find the appropriate words that could properly describe my appreciation for their devotion, support and faith in my ability to achieve my dreams.

ACKNOWLEDGEMENTS

First and foremost, all praises to Allah the Almighty for giving me the strength, health, knowledge and patience to successfully complete this Finale Year Project report in the given time. I would like to address my deepest appreciation to the supervisor, Mr Mohd Haniff bin Harun for his encouragement, comments, guidance and enthusiasm through the time developing the report. This project might be impossible to complete without all of your help. Last but not least, a big thank to everyone that directly and indirectly involved in helping me finishing this Finale Year Project report. Thank you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.0   Introduction

This chapter provides an introduction about this project. It starts with the general information and background about the development of henna drawing machine, problem statement, scope and the thesis outline project.

1.1   Project Background

Art is a thing that human do through expression, songs, photo or even in a drawing. It showed the prettiness that attract people and one of satisfaction that is expressed through art. One of the popular art among woman which is Henna or Mehndi. Henna is known as a dye which is produced from plant which named as henna tree. In a short term, henna is can be classified as a temporary body art which is the result produced from the henna is stain on skin and can last up to three weeks before it fades. Henna has been used a long time before usually in Indian culture as arts and beauty as it can be applied on skin, nails, hair as well as on fabric. Nowadays, the application of henna is on demand especially among brides. It is manually applied or drawn by skillful henna artists which need them to sit for quite long hours to draw out the design and depends on the creativity and imagination of the henna artist to come up with desired designs.

1

A machine or also known as mechanical instrument is a mechanical construct that implements energy to apply pressures and regulate motion in order to execute an intended operation. As far as we know that machines not only can be guided by humans but as well as livestock, by natural forces such as water and wind, heat, chemical or electrical energy. Traditional method is truly could not be denied that the effort of human in acting like a machine to fulfill tasks. However current technologies is more helpful and satisfy. In this era, technology has become one of the main thing in replacing human task. For example an automated used machine that is guided by a computer program named CNC (Computer Numerical Control). This computer program is a common-based coordinate in order to gain form automatically. [(Kalpakjian 2006)]. CNC (Computer Numerical Control) machining is known as a high-precision computer controlled method where it is widely used in manufacturing sector in producing products as mills, lathes, and other metalworking without the assistance of humans as in a CNC machine, the slide movement and functions are fully controlled by motor by using the program. CNC machine involves in various types of machine to carry out variety function, size and design.This henna machine has an ability to draw basic henna sketches or design. It can use pen or henna cone to draw a design. In this paper we are designing a low cost three axes henna drawing machine based on CNC machine by using stepper motor. Arduino microcontroller and motor controller software. There are several operation involved with CNC machine but this project is based on CNC plotter machine. This project uses Arduino in order to control the movement of stepper motor. The result expected will be this machine is able to plot any sketch onto the parchment paper and precisely according to the image that we desire.

1.2 Problem Statement

The most important thing that we always concern about when we carry out any task, work, job or even activities in our daily life is health. Surveys have been carried out to gain some responses from few local henna artist in order to verify the fact that doing henna manually can cause slipped disc. This is due to the posture of a henna artist body while drawing the henna especially when it comes to feet drawing. Henna artist need to bend their body and it takes at least one and a half hours to get it done. For a full-time henna artist, this occupation will cause them healthy problem in the future as what had happened towards the veteran henna artist nowadays. To be clear, drawing henna is not an easy work and this requires someone who has talent in drawing at the mean time the person must be a patient person due to the prettiness of henna drawing is based on the technique of one's drawing. Henna artist could not sit in a good posture to draw, even how struggle she is, she will bend her back or head to draw and suffer in this condition every time doing henna.

Thus, this problem can be overcame by developing this henna drawing machine based on the CNC (Computer Numerical Control) machine method used. CNC is commonly known as a machine that is used in manufacturing sector which relates with computer to control machine tools for example turning, grinders, mills and lathes. In this case, studies on CNC machine is carried out and an idea of constructing a different function of CNC machine is created which is drawing or plotter method. This project is not only to overcome the problem as stated earlier but the advantages is benefit to both sides which is to henna artist and the user. This machine can be used in long term with less costing of maintenance and it reduces the drawing time and fasten the henna artist task instead of drawing by hand which causes the user to wait. This proves that CNC

3

machine is not only functions for producing raw materials into a product or part but it is able to draw a design.

1.3   Problem Objective

Arduino microcontroller is a better approach and easy as it could help in easing task with user friendly interface while preventing on site accident. In this project, there are three objectives that need to be achieved. The objectives of this project are:

- To develop CNC machine that is capable in operating as henna painter.

- To create CNC henna drawing machine by using Arduino microcontroller.

- To analyze the machine performance and functionality

1.4   Work Scope

The study is subjected to focus more on how to build the henna drawing machine where it can fully function, low maintenance, can maintain in long term and affordable. This machine design that has been chosen in the optional design created on a surface provided at the machine before pasted on hand. In addition, some parts of the CNC (Computer Numerical Control) machine will be assemble together to build the henna printer machine and after that some experiment such as accuracy test will be done and tested on this henna drawing machine as well as its running condition. Any modification on this henna drawing machine will be carried out if there are problem occur by referring

4

the result experiment whether it is running in a good condition or vice versa. These are the scopes covered in this project:

   i.   Mechanical Scope : Mechanism used is old wood, shaft and bearing of CNC mini machine, stepper motor, 3D printed plotter.

  ii.   Electronic Scope : A circuit will be design to connect between Arduino, driver and stepper motor.

iii.   Software Scope   : The programming software to used is Arduino IDE.

CHAPTER 2

LITERATURE REVIEW

2.0   Introduction

In this chapter, before expressing any venture, the project requires knowledge to develop as a prototype. Researches and studies have been carried out through many kind of sources such as journal, previous projects and articles. All information regarding the development of henna drawing machine and CNC machine in terms of both software and hardware are gathered as much as possible in order to make sure the development is as in right guidance as well as to explain in details to readers of what has been discovered for this project in this chapter.

2.1   Component of Development of CNC Machine

To achieve the To achieve the project of development of small CNC machine several reading from past literature review has been made, where it will be discuss more details in this chapter. For this development of small CNC machine project, research has been made through the brain of this project where the suitable microcontroller, CNC machine control software, hardware design.

2.2   Henna History

Henna can be referred to a kind of dye that produced by mixing some ingredients with a plant which is commonly called as henna plant. This is also called as a temporary tattoo among Asian women due to the famous art and skin decorations drawn by a henna

6

artist. The paste is applied on the skin and once washed away, the stain will oxidize and darken over for couple days and can last up for at least two weeks which can act as pain-free alternative to traditional tattooing. The stain is in reddish-orange color. (Emma Taggart; 2018) In Malaysia, henna is widely used to adorn a woman's hands especially during wedding celebrations and this art is believed to bring luck to the person who is wearing it besides at the same time to pleasure the bride-to-be and the female family members. Meanwhile, it is also depends on the henna artist's creativity and imagination to come out with pretty designs.

In doing things that we love, as a human being, we have given one thing that is more important to concern about is our health. Due to the poor posture when sitting for a quite long hour as shown in below figure 2.1 to complete the henna drawing, this problem lead to slip disc.

Figure 2.1 Posture of Henna Artist While Drawing

Generally, not only physically demanding occupation put us at risk that lead to slip disc problem. As what can be seen inside the figure 2.2, person whose job that requires him

7

to sit for a long period of a whole day are highly susceptible to slip disc if they sit in poor posture. The degeneration in spine cartilage and spinal disc can occur if a person sit in a poor posture within many years and in a long period because of the pressure at the spinal disc.
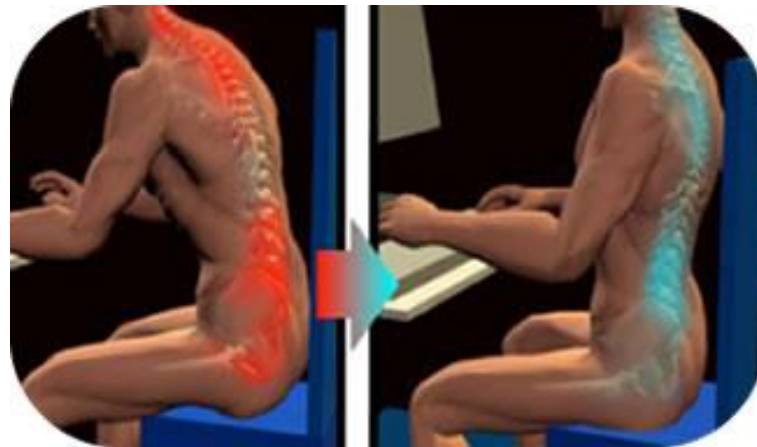

Figure 2.2 The Poor Posture View

Figure 2.3 Henna Leave and Henna Powder

A fact proven that henna has exist for thousand years ago and it has its own use and history. During ancient era, Muslim Moguls introduced henna in India which directly introduced it to Egypt and all around the world. And it started specially for Indian

8

woman and became favorite art among the woman. Powder henna that usually used as dye is basically be harvested in bush form. There are many kind of plant that produce henna leaves but they have been combined and used to call with one name like Mignonette for example. Henna is also use to produce essential oil. Furthermore, the henna plant can be medicines which produced by the leaves and roots, thus, it is also good for applying henna on body skin. Regarding its name, while henna name is originally called as "Hinna" that come form Arabic. But in some different places, it has its own different name such as "Henu". (Marie,2001)

2.3   CNC (Computer Numerical Control) Drawing Machine

CNC machine is also known as Computer Numerical Control. Computer Aided Design (CAD) is related to this machine. A design created in the Computer Aided Design (CAD) will generate the computer and send the information of design to the machine tools for production process. Some of the applications used, the information will be sent in a punched numerical control and the tape might be used as a duplicate for numerical control program.

Basically, the first step process of this CNC machine and almost of all types, a design of a product should be insert in the computer so that the machine knows how to plot or cut the product according to the specific measurements. To design a product, there have a few software that can be use such as INKSCAPE, Computer Aided Design (CAD) and others. But it depends on the product that want to be create. CAD is mostly prefer if the design should be in 3d and inkscape is the easier to use for the product that involve in sketching or plotting. To specify how the design how the design should be cut, the CAD file is insert into the Computer Aided Manufacturing (CAM), where the CAM file can

9