UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF MOTORIZED CAKE DECORATOR USING ARDUINO SYSTEM

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

By

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I hereby, declared this report entitled DEVELOPMENT OF MOTORIZED CAKE DECORATOR USING ARDUINO SYSTEM 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 Technology Electronics Engineering (Electronic Industry) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Pada masa ini, penggunaan beg kertas pastri yang tradisional adalah salah satu kaedah yang selalunya ramai pembuat atau pembekal kek untuk menghias permukaan kek dan pastri. Pengguna mestilah memerah beg pastri secara manual untuk mengeluarkan krim aising ke atas kek. Dengan menggunakan beg pastri yang ada di pasaran sekarang memerlukan tenaga yang berterusan untuk memerah beg pastri dan akan mengundang keradangan tendon.

Berdasarkan beberapa penyelidikan, ciptaan baru berkaitan dengan peranti yang digunakan untuk menghias kek dan pastri telah dibuat. Pertama, bekalan kuasa DC sebagai sumber yang membekalkan arus elektrik dari bateri LiPo yang boleh dicas semula pada mesin produk. Selain itu, produk ini boleh dibasuh dan juga direka khas sebagai produk mesra alam. Pengguna boleh membeli apa-apa reka bentuk tip di pasaran untuk menyambung di muncung produk. Apa yang menjadikannya berbeza dan lebih baik daripada inovasi yang ada sekarang adalah produk reka bentuk produk yang boleh digunakan untuk pelbagai tugas. Ia mempunyai kelajuan yang boleh dikawal oleh pengguna. Kelajuan produk menawarkan satu cara yang efektif selain kehebatan pemhias kek itu sendiri. Ini disebabkan kelajuan perlahan boleh mencipta perincian sementara kelajuan pantas dapat mengurangkan masa untuk menghias kek

ABSTRACT

Currently, the use of flexible, traditional pastry bags to apply the frosting is one of the most common methods for decorating baked goods. The user must manually squeeze the frosting out of the decorating bag through the decorative tip onto the baked goods. The repetitive movements and the force required for proper use of such decorating bags frequently cause the users to have an inflammation of the tendons.

Based on multiple research, a new invention relates to devices used to apply frosting on cakes and other baked goods is created. Firstly, DC power supply is used as the source that supply the electric current from a source to the rechargeable battery on product machine. If the battery is full, the led will turn green. Next, this product is washable and it is environmental technology. Other than that, user can buy any sort of tips design in the market to connect at the nozzle of this product. What makes it different and better than other innovation or development that has been made nowadays is this product are design is multitasking. It have controlled speed for the user to choose. This preference speed offers a good way to the user to be more effective in terms the bakers have already a good skill of decorating a cake. This is due to the slow speed can create a detail while fast speed can reduce time to decorate.

DEDICATION

Alhamdulillah, praise to the Almighty Allah S.W.T This thesis is dedicated to:

My beloved family,
My Parents,
My Supervisor,
My lecturers
And all my friends

Thanks for their encouragement and support.

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Alhamdulillah, thank you Allah because of His blessing, my final year project is finally successfully completed.

During the process to complete my project objective, a lot of research is done either by using internet, reading past year thesis, reference books and journal. With the guidance and support from peoples around me, the project is completed due to the time given. Here, credit is for those who helped me to achieve what I had achieved in my final year project.

I would like to express my sincere and gratitude and respect towards my project's supervisor, En. Ir Mohd Syahrin Amri bin Mohd Noh for his kind, encouragement and suggestions. Without his continued support and interest, the project would not be like what it likes today. May Allah bless and reward him for his sincere, endeavour and contribution in the way of knowledge.

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Thank you to all lecturers, staffs, friends and all who has directly and indirectly involved on this project. Your helps and cooperation will never be forgotten. May Allah bless and reward them for their sincere, endeavour and contribution in the way of knowledge.

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LIST OF SYMBOLS

D, d	-	Diameter
F	-	Force
g	-	Gravity = 9.81 m/s
I	-	Moment of inertia
1	-	Length
m	-	Mass
N	-	Rotational velocity
P	-	Pressure
Q	-	Volumetric flow-rate
r	-	Radius
T	-	Torque
Re	-	Reynold number
V	-	Velocity
w	-	Angular velocity
x	-	Displacement
z	-	Height
q	-	Angle

LIST OF ABBREVIATIONS

PCA	Principal Component Analysis

LIST OF PUBLICATIONS

CHAPTER 1

INTRODUCTION

1.1 Background

Nowadays, the Open-source software (OSS) has sort of applications in human facilities, from fix malware, improve task, or adapt the software to suit their own necessity. It can make robots, electronic gadgets and automatic machines. The open source software is software with source code everybody can modify, examine and enhance. Moreover, programmers that have the compassion and access to the computer program's source code can improve the function of that program by adding features to it or fixing parts which incorrect. Development of Motorized Cake Decorator using Arduino System a system where the stepper motor is used to run motorized cake decorator. Nowadays, pastry chef or patisserie face problem to squeeze icing from pastry bag to a cake due to a large number of order. Sometimes they easily exhausted and lead to a tennis elbow. This project will provide a new way to decorate a cake which are pressing push button, continuous choice, speed control and set timer. Electric appliances can also be switched on and off portable way. The overall innovation inspired from pastry bag using air compressor as in pneumatic and mechanical mechanism.

Development of Motorized Cake Decorator using Arduino System consists of Arduino UNO circuit and a stepper motor that can be attached to designated casing to control the movement by using a push button to push down the icing and potentiometer to select the multiple choice of speed.

1.2 Statement of the Purpose

The purpose of this whole project is to help the bakers or the user to learn frosting a cake easily or increase the productivity due to its good performance. The use of bag pastry has grown in its contribution to the economy and living standards of the country. It will also continue to grow internationally and in every corner of the country. This trend has a great potential in human life where in the present, various types of recipes and new discoveries on frosting art attract the hearts of all. In pastry bag perspective, to make it embedded with the concept of Arduino, the pastry bag innovation itself equipped with push button where later will be interpret by microcontroller. Then, the microcontroller will interact with the stepper motor to rotate clockwise or anti-clockwise based on the user input.

1.3 Problem Statement

The project is implemented in order to achieve the following objectives which are:

(a) To develop a system that reduce the possibilities of getting a tennis elbow.

(b) To design an innovation based on Arduino control interfaces.

(c) Able to decorate a cake faster and create a green technology devices.

1.4 Scope of project

The scope of this project is to study the basic of Arduino from several published papers and books as well as to study the code used to create an innovation of the Arduino-based cake decorator. This project focus mainly on how to apply what that have been learned about the Arduino application. The parameters for this project can be divided into several parts which are:

1.4.1 The basic concept of Arduino application

In this project, Arduino Uno application is used to design a device that can bring a lot of benefits to the user. Arduino Uno Rev3 is a microcontroller board based on the ATmega328P designed for simple projects. It has 14 digital I/O pins, 6 analog inputs and a 16 Mhz quartz crystal. Arduino applications can control two electronic system and DC motor.

1.4.2 The basic movement of pastry bag

The movement of the pastry bag is controlled manually by the user. A pastry bag is an often cone- or triangular-shaped, hand-held bag made from cloth, paper, or plastic that is used to pipe semi-solid foods by pressing them through a narrow opening at one end, for many purposes including cake decoration. The harder the user squeeze, the more the icing will come out from the bag.

1.5 Thesis Structure

Chapter 1:

The first chapter introduces brief idea of the project. It focused on the overview of the project, detailing the objectives, the problem statement, scope and outcome of the project.

Chapter 2:

Tasks foundation is talked about in this part. The technique idea, hypothesis and some normal for segment of equipment that are utilized in this venture is examined in this part.

Chapter 3:

Chapter 3 describes the methodology used in this project. The schedule or steps that need to be completed and the detailed reports of studies that were done to achieve the aim of the project are presented.

Chapter 4:

Chapter four shows the outcome and talk. Every one of the reenactments, information accumulation and examination acquired will be talked about in detail. The outcomes will be contrasted and the destinations sketched out with the end goal to arrive.

Chapter 5:

This chapter expresses the end and future work that can be embraced. A few proposals and recommendation on the best way to enhance the execution of the framework dependent on the coveted outcomes will be given.

CHAPTER 2

LITERATURE REVIEW

This chapter presents literature review on the innovation of the pastry bag into a motorized machine as well as Arduino system. The development of different tools used for cake frosting that aim to save time and to reduce elbow pain is discussed. The advantages and disadvantages of each frosting tools are also presented and compared. This chapter also presents the development of Arduino system will be utilized in this project.

2.1 Pastry Bag History

To improve variety of ideas for the baker's shop and culinarian, piping bag have been frequently deployed over centuries. In response to the demands of pastry bag users for ability access, syringe frosting tool, battery-powered frosting tool and air pen drive have been developed.

The innovation of pastry bag have begun over the past years and the designs of the pastry bag have been the same within recent decade. Until now, the use of pastry bag still is the most effective and be people favourite.

2.2 Previous Innovation of Pastry Bag

2.2.1 Kuhn Rikon Frosting Deco Pen

Kuhn Rikon Corporation founded in 1926 was developed Kuhn Rikon Frosting Deco Pen using 2 AA batteries. In general, an electrical tool includes the precise control, multifunction equipment and green technology which technology whose use is intended to mitigate or reverse the effects of human activity on the environment. This Deco Pen will support the user