Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF KUIH BAHULU BATTER DISPENSER VIA ELECTRICAL MACHINE WITH LOW POWER CONSUMPTION

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Bachelor of Electrical Engineering Technology (Industrial Power) with Honours

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DEVELOPMENT OF KUIH BAHULU BATTER DISPENSER VIA ELECTRICAL MACHINE WITH LOW POWER CONSUMPTION

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DEDICATION

To my beloved parents Mr. Abdul Kasimin Bin Japin and Mrs. Ennun Binti Esit for their support and pray. A full appreciation to my supervisor Ir. Ts. Dr. Mohd Farriz Bin Hj Md Basar for advisng and helping me through this project.

ABSTRACT

This paper presents a new design and development of an autonomous traditional pastry batter ("Kuih Bahulu") dispenser. Kuih bahulu is a traditional cake or snack that is typically baked in brass moulds of varying sizes and shapes. Making "kuih bahulu" may seem simple, but the manual production system adds labour and time, making them expensive. Due to the manual manufacturing process, the shape, size, and aesthetic of the product are not always to the customer's liking. The development adheres to a standardized engineering design procedure. Then, software development and testing were conducted to determine which hardware components could be utilized for this project with the greatest efficiency. An Arduino UNO board was used to command the entire control system and perform the automatic functions of the machine. This project also investigates the performance of autonomous kuih bahu machine operations so that periodic enhancements can be made. Based on the analysis and result, this machine is able to produce minimum time taken of 45.50 seconds per mouldings filled. The machine power output is measured to be at 30.13W at its maximum output with 50% motor speed. This machine is certain to be a brilliant idea that will assist individuals in enhancing their lives and marketing strategies.

ABSTRAK

Kertas kerja ini membentangkan reka bentuk baru dan pembangunan dispenser adunan pastri tradisional autonomi ("Kuih Bahulu"). Kuih bahulu merupakan sejenis kuih tradisional atau makanan ringan yang biasanya dibakar dalam acuan tembaga dengan pelbagai saiz dan bentuk. Membuat "kuih bahulu" mungkin kelihatan mudah, tetapi sistem pengeluaran manual menambah buruh dan masa, menjadikannya mahal. Oleh kerana proses pembuatan manual, bentuk, saiz, dan estetik produk tidak selalu disukai pelanggan. Pembangunan ini mematuhi prosedur reka bentuk kejuruteraan standard. Kemudian, pembangunan dan pengujian perisian dijalankan untuk menentukan komponen perkakasan mana yang boleh digunakan untuk projek ini dengan kecekapan yang paling tinggi. Papan Arduino UNO digunakan untuk memerintahkan keseluruhan sistem kawalan dan melaksanakan fungsi automatik mesin. Projek ini juga menyiasat prestasi operasi mesin kuih jari autonomi supaya penambahbaikan berkala dapat dibuat. Berdasarkan analisis dan hasilnya, mesin ini mampu menghasilkan masa minimum yang diambil sebanyak 45.50 saat bagi setiap acuan yang diisi. Output kuasa mesin diukur pada 30.13W pada output maksimumnya dengan kelajuan motor 50%. Mesin ini pasti menjadi idea cemerlang yang akan membantu individu dalam meningkatkan kehidupan dan strategi pemasaran mereka.

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δ	-	Voltage angle

LIST OF ABBREVIATIONS

V	-	Voltage
I	-	Current
W	-	Watt
g	-	gram
kg	-	kilogram
kw/h	-	Kilowatt per hour
mm	-	Millimeter
s	-	Seconds

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CHAPTER 1

INTRODUCTION

1.1 Background

Kuih Bahulu is a traditional Malaysian snack that is frequently served at celebrations and festivals. It is a type of sponge cake that is typically made with a batter consisting of eggs, sugar, and flour. The batter is poured into small moulds before being steamed or baked until light and fluffy. Kuih bahulu typically takes the form of a small bun and has a delicate, spongy texture. Colors such as green, pink, and blue can be achieved by adding pandan juice or food coloring. Traditionally, it is light yellow or brown in color. They may be consumed plain or with a variety of sweet toppings, including coconut and gula melaka. It is a popular snack among Malaysians and is available in supermarkets, traditional kuih (snack) shops, and online. They are typically consumed as a snack or dessert, but they can also be consumed for breakfast.

Figure 1.1: Three Different Shapes of Kuih Bahulu

Manually making Kuih Bahulu requires a certain level of skill and experience in order to achieve the desired texture and form. Obtaining the correct consistency of the batter is one of the difficulties people may encounter when making kuih bahulu by hand. The batter for kuih bahulu must be light and fluffy and the ingredients must be thoroughly combined to achieve this consistency. If the batter is too thick, the kuih bahulu will be dense and heavy; if the batter is too thin, the kuih bahulu will not hold its shape. In another instance, the formation of kuih bahulu. Kuih bahulu are traditionally made in small moulds, making it difficult to achieve a uniform shape. People may have difficulty evenly filling the moulds with the batter or removing the kuih bahulu from the moulds after they have been baked or steamed.

The production of traditional foods like kuih bahulu can be significantly increased by having a traditional food machine. Many of the processes involved in making the food, such as mixing the batter, filling the moulds, and baking or steaming the kuih bahulu, can be automated using traditional food machines, like a kuih bahulu machine. Because of the time and labor savings, manufacturers may be able to produce more kuih bahulu in a given period of time. Because it can be programmed to follow a specific recipe and ensure that the batter is mixed properly, the temperature is accurate, and the kuih bahulu are shaped consistently, a traditional food machine can also help to improve the consistency and quality of the finished product.

By minimizing human intervention and offering more precise monitoring of temperature, timing, and other production-related parameters, using machines also ensures the hygiene and food safety standards that are essential for the food industry. Overall, using a traditional food machine can greatly improve the consistency and quality of final product while also increasing output and efficiency of traditional food production. Additionally, it can improve the hygienic and customer safety of the production process.

1.2 Problem Statement

The production of kuih bahulu today faces several limitations that may affect the quantity, quality and safety of the final product. One of the limitations include limited production capacity: Some traditional kuih bahulu makers still use manual methods to produce the snack, which can limit the quantity that can be produced in a given amount of time. This can make it difficult for these producers to meet the demands of a larger market, and can make it difficult to compete with larger, industrial manufacturers.

Next, lack of standardization and consistency. Traditional kuih bahulu is often made by hand, which can lead to variations in taste, texture, and appearance from batch to batch. This can make it difficult to achieve consistency in the final product, which can affect customer satisfaction. Another factor to consider is difficulty in scaling up the production process: While traditional kuih bahulu manufacturers may be able to produce a small quantity of the snack, scaling up the production process to meet larger demands can be difficult, and may require a significant investment in equipment and labor. As the demand for kuih bahulu increased, it requires more labor and more raw ingredients to produce. This can make the cost of production go up which may not be feasible for small scale traditional kuih bahulu producers.

Based on the foregoing, the goal of this research is to improve the kuih bahulu production process in term of reducing the time taken to fill the moulds and reducing manual labors. The study investigated the adoption of the autonomous kuih bahulu machine in relation to the productivity of the production line by constructing an automated batter dispensing system.

1.3 Project Objective

The main aim of this project is to develop a systematic and effective development of kuih bahulu batter dispenser via electrical machine with low power consumption. Hence, the objectives of this research are set as follows:

a) To design a non-complex control system via integration of Arduino, sensors and motor driver.

b) To develop an automated electric kuih bahulu batter dispenser machine.

c) To test and investigate the performance of automated batter dispenser.

1.4 Scope of Project

The scope is this project is about the development of kuih bahulu batter dispenser with low power consumption. This task required the use of low powered device to actuate the machine process. This project also focusses on developing an appropriate dough/batter dispensing mechanism.

Based on low power consumption system, this project was constructed mainly using DC powered components rated from 5V-12V input supply. DC components were chosen due to the simplicity of assembly. The machine was also constructed to run on 12V DC supply. The decision to run the machine on 12V DC supply is mainly for the reason that both feedback and actuating device requires 5V-12V DC supply.

Dispensing mechanism are built using stainless steel material. Stainless steels material was used because of the ease of maintenance such as cleaning and hygiene control. Furthermore, most of industrialize food production use stainless steel equipment because it is durable, easy to clean, and resistant to corrosion. Stainless steel also does not react with most food products, making it a safe choice for food-grade equipment. Additionally, it is non-toxic and non-leaching, which helps to ensure that the food produced is safe for consumption.

1.5 Summary

Background, problem statement and objectives are important to determine the direction of the study and then be able to focus the priority of producing the study. Based on the problem statement and objective, the study will be done in the next chapter on previous studies, appropriate methods, related components, and methods to develop a prototype. The scope of the project ensures the boundaries of a project in order to achieve the objectives easily.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the ideas for the design, concept, specifications, and other project-related information. This is determined through research into previous similar projects and through research into automated pastries machines currently in development and on the market. Additionally, this chapter discusses the theory underlying the system that will be used to construct the machine.

2.2 Food Production

Foods and beverages are the primary necessities for humans and animals. The increase in global population increases the demand for food and drink. The food industry has a significant obligation to fulfil and satisfy the needs and desires of consumers by achieving nutrition properties, food security, and food safety[1]. Automated systems are required in the food industry to carry out food production with maximum precision and efficiency while maintaining the necessary level of product quality control. It is commonly associated with science and technology. In recent years, the use of automation systems in the contemporary food industry has increased. Many food industries have already automated their entire production process, from the selection of raw materials to the final serving. The primary objective of the industry's computerized system is to carry out the process with maximum precision and efficiency. Therefore, more benefits can be realized than with the use of manual techniques in the food industry. This paper discussed the significance of automation systems in the food processing industry, with an emphasis on automation tools