STINGLESS BEE HONEY HARVESTING SYSTEM VIA BLUETOOTH APPLICATION

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STATEMENT OF AWARD FOR DEGREE

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SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of degree of Bachelor of Engineering Technology in Electrical.

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STUDENT'S DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries in which have been fully acknowledged. The thesis has not been accepted for any degree and is not concurrently submitted for award of other degree.

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Dedicated to my parents

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ABSTRACT

Stingless bees are by far the largest group of eusocial bees on Earth. They are small insects of dark bee and usually do not sting. Despite that, this type of bees also collecting nectar from flowers produce and convert it into honey. Honey is produced by a process of regurgitation by honey bees which is stored in the beehive. A beekeeper use a honey harvesting system that use a vacuum pump to extract honey from the beehive. The harvesting system in the market has its own weaknesses. For instance, beekeeper must watch the system do the extraction process in order to not get honey spilled from the bottle as it is a manual systems. Also, a dust particle might be mixing with honey during the extraction process. Honey is very beneficial for our body and regular honey is available to get rid of many diseases. Extracting honey is easier to do when honey is still warm from the beehive as it flows much more freely. New design for the stingless bee honey harvesting system has been made with the availability of Bluetooth technology. The aims of this study were to program a control system to adjust motor speed and stop the system automatically. Subsequent to this, peristaltic pump linkage with oscilloscope to evaluate, compare and validate the motor speed. In this study, the application were found connected with the honey harvesting system. This application can be used to harvest honey, the sensor can detect the presence of honey in the bottle and motor works well when changing the speed motor. This honey harvesting system has a good response.

ABSTRAK

Lebah kelulut adalah kumpulan terbesar lebah eusosial di bumi. Mereka adalah serangga kecil lebah gelap dan biasanya tidak menyengat. Walaupun demikian, jenis lebah ini juga mengumpul nektar dari bunga menghasilkan dan mengubahnya menjadi madu. Madu dihasilkan oleh proses regurgitation oleh lebah madu yang disimpan dalam sarang lebah. Seorang penjaga lebah menggunakan sistem penuaian madu yang menggunakan pam vakum untuk mengeluarkan madu dari sarang lebah. Sistem penuaian di pasaran mempunyai kelemahan tersendiri. Sebagai contoh, penjaga lebah mesti menonton sistem melakukan proses pengambilan untuk tidak mendapat tumpahan madu dari botol kerana ia adalah sistem manual. Juga, zarah debu mungkin bercampur dengan madu semasa proses pengekstrakan. Madu sangat bermanfaat untuk tubuh kita dan madu biasa tersedia untuk menyingkirkan banyak penyakit. Mengekstrak madu lebih mudah dilakukan apabila madu masih hangat dari sarang lebah kerana ia mengalir jauh lebih bebas. Reka bentuk baru untuk sistem penuaian madu lebah tanpa sengaja telah dibuat dengan adanya teknologi Bluetooth. Tujuan kajian ini adalah untuk program sistem kawalan untuk menyesuaikan kelajuan motor dan menghentikan sistem secara automatik. Selepas itu, hubungan pam peristaltik dengan osiloskop untuk menilai, membandingkan dan mengesahkan kelajuan motor. Dalam kajian ini, aplikasi itu didapati berkaitan dengan sistem penuaian madu. Aplikasi ini boleh digunakan untuk menuai madu, sensor dapat mengesan kehadiran madu dalam botol dan motor berfungsi dengan baik ketika mengubah motor kecepatan. Sistem penuaian madu ini mempunyai tindak balas yang baik.

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LIST OF SYMBOLS

A	Ampere
cm	Centimeters
mA	Milliampere
mAh	Milli Ampere Hour
mbps	Megabits Per Sec
ms	Milliseconds
Nm	Newton-metre
rpm	Revolutions Per Minute

ABBREVIATIONS

BESS	Battery Energy Storage System
GND	Ground
IDE	Integrated Development Environment
IR	Infrared
LCO	Lithium-Cobalt-Oxide
LED	Light Emitting Diodes
LIBs	Lithium-Ion Batteries
LFP	Lithium-Iron-Phosphate
LMO	Lithium-Manganese-Oxide
LTO	Lithium-Titanate-Oxide
MIT	Massachusets Institute of Technology
NCA	Nickel-Cobalt-Oxide
NMC	Nickel-Manganese-Cobalt
OS	Operating system
PWM	Pulse Width Modulation
USB	Universal Serial Bus

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

This chapter is discussed about the project background, the problem, objective and project scope. The purpose of improvising honey harvesting system to become semi-automated extraction process is to provide a comfort with controller of suction strength pump for the user during harvesting. The product is design to be environmentally friendly, stable operation, easy to use and install with an acceptable cost.

1.2 PROJECT BACKGROUND

Stingless bee or "lebah kelulut" in the Malay language are a large group of bees belonging to the order Hymeneptera, the family Apidae and the tribe Melopinini. They can be found mostly in tropical and subtropical regions, particularly in Australia, Africa, Brazil and Southeast Asia. Lebah Kelulut and Trigona are bee species that do not sting, making the insect easier to handle than other honey bees. There are nearly 150 species of Trigona bees (Kelulut) such as Scapto Trigona, Trigona Laeviceps, Trigona Apicalis, Trigona Thorasica, Trigona Itama and many more (Tualang Admin, 2014).

They are reared by local beekeepers for their valued Meliponini honey which contains highly nutritional ingredients as compared to the honey produced by other honey bees (Abdul Jalil A H & Shuib I, 2012). Apart from the prized Meliponini honey, the notion on the absence of the stingers compared to a typical

honey bee make them less risky to be reared in the backyard. Now, there is a huge increase in the number of stingless bee farms, either for personal, commercial or research purposes.

The purpose of this project is to design a new device that used for honey harvesting system. The device will replace the vacuum pump that is mostly sold in the market or traditional methods using syringe. The purpose of this project is also to pair the bottle with an application that can control the strength of suction of the peristaltic pump.

In this research, we will program a new system to extract honey from the stingless bee. Extraction is the process by which the honey is remove out of the frames, either by draining in a warm place or by using a vacuum pump force with a honey extractor. The vacuum pump is by far the fastest method to extract the honey. However, the vacuum pump in the market nowadays do not sell in one set with the bottle and power supply. It is troublesome to beekeeper to buy a large variety of equipment. Therefore, we used Bluetooth technology as a medium control motor speed of the bottle. Beekeepers can extract the honey with minimal monetary investment. Thus, this research will focus on honey harvesting system via Bluetooth application.

1.3 PROBLEM STATEMENT

When it comes to usability, the first and foremost target is to get available supply of pure honey and convenience to the user. A product that accurately transfers the amount of a honey is required to achieve this objective. My project is based on solving this problem by analyzing the potential of equivalent electrical circuits to describe the amount of a honey that can be transfer from stingless bee to the bottle. Conceptualize and demonstrate solutions which help to connect and control various elements of the harvesting system to make it smart. There are two core problems in the existing system described as follow.

A manual system relies heavily on the actions of people which increases the possibility of human error. A beekeeper might forget to press stop button when collect the honey from stingless bee. This results in needless of damaging stuff of existing product and spilled the honey that has been collected into the

bottle. User negligence could also result in not collecting enough of a honey, meaning the business could run out of a crucial order at the wrong time.

Vacuum pumps and systems are one of the widely used equipment in process plants. It is very important to correctly size and select the vacuum pump as it is to lay down the right specifications (Scribner, 2007). Understanding the fundamentals of vacuum as well as the system and its integration would enable the operators to deal with the day to day problems, which are inevitable.

One of the problems faced in stingless bee honey storage is mixing the dust particles by the extraction process occurs in honey due to its strong suction pressure of pump. When the silicone tube dirty from dust it will eventually clog and create low vacuum pressure.

1.4 OBJECTIVE

To achieve success on Honey Harvesting System purposes, the following objectives are set:

i. To program a control system to adjust the motor speed and stop the system automatically.
ii. To evaluate, compare and validate the motor speed between the peristaltic pump and oscilloscope.

1.5 PROJECT SCOPE

In order to realize this type of harvesting honey system by considering time constraint and budget, there are several scopes that need to be outlined. This is to ensure the project objective can be achieved successfully. This project is proposed under certain defined scopes:

i. The radius of the coverage is bound by Bluetooth technology.
ii. The application is a native Android application that does not required browser or internet connection.
iii. Program coding for the Arduino to set the rotation speed of the peristaltic pump.

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