



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**AUTOMATIC COFFEE MAKER WITH VOICE  
CONTROL USING ARDUINO**

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

اونيورسي تيكنيكل مليسيا ملاك By

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**MUHAMAD LUQMAN BIN YUSSUF**

**B071710454**

**960524146667**

FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING  
TECHNOLOGY

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**BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA**

Tajuk: AUTOMATIC COFFEE MAKER WITH VOICE CONTROL USING ARDUINO

Sesi Pengajian: 2020

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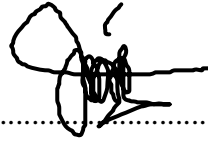


MUHAMAD LUQMAN BIN YUSSUF  
Alamat Tetap:

NO.52 JALAN 4/3,  
TAMAN SELAYANG MUTIARA,  
68100 BATU CAVES,  
SELANGOR.

Tarikh: 17 February 2021

Disahkan oleh penyelia:



PN KAMILAH BINTI JAFFAR  
Cop Rasmi Penyelia

KAMILAH BINTI JAFFAR  
Jurutera Pengajar  
Jabatan Teknologi Kejuruteraan Elektrik  
Fakulti Teknologi Kejuruteraan  
Universiti Teknikal Malaysia Melaka

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## DECLARATION

I hereby, declared this report entitled AUTOMATIC COFFEE MAKER WITH VOICE CONTROL USING ARDUINO is the results of my own research except as cited in references.

  
Signature: .....  
Author: Muhamad Luqman Bin Yussuf  
Date: 17 February 2021

  
  
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## 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 (Power Industry) with Honours. The member of the supervisory is as follow:



## DEDICATION

To my beloved parents, family, lecturers, and friends, I acknowledge my sincere thankful and gratitude to them for their love, support and sacrifice throughout my life. The sacrifice has inspired me from the day I learn to read and write to the point of what I have progressed to be at this point. I cannot find the suitable words that could properly describe my appreciation for their dedication, support, faith in my ability to accomplish my dream.



## **ABSTRACT**

*Nowadays, people are more interested in drinking coffee than other type of drinks. The most popular shop that people can buy coffee is at Starbucks. In the other way, they also can brew a coffee from their own coffee maker which they can be put in their resting room of companies or homes. The products of coffee maker have been introduced and sold all over the world. The coffee maker depends on the price of it. The higher price it be, the powerful the function of the coffee maker will be and the taste also more delicious. While the cheap and simple coffee maker will lose the enjoyment of drinking coffee and people need to keep an eye on status of the coffee maker. In our day now, people prefer to choose cheap coffee maker but more functions will take more convenience. In nowadays technology, people actually can have both feature that is cheap in price and powerful in function as well. In this thesis, I already design some function of the coffee maker based on the feature that have been requested by people which will make the moment of drinking coffee more convenient and enjoyable. In this project, I will be using Arduino Uno as my control system, combining with a few sensors and special circuits. My level measurement of coffee maker is by using many types of measurement such as temperature of coffee, floats measurement, water level and laser sensor. Users can control the coffee maker to make a cup of coffee by using their cell phone and doing remote control. Meanwhile considering about prices, I choose the most suitable sensors for measurement. I also do some jobs for saving energy and safe.*

## **ABSTRAK**

*Pada masa kini, orang lebih berminat untuk minum kopi daripada jenis minuman lain. Kedai paling popular di mana orang boleh membeli kopi adalah di Starbucks. Dengan cara lain, mereka juga dapat membuat kopi dari pembuat kopi mereka sendiri yang terdapat di bilik rehat syarikat atau kediaman mereka. Produk pembuat kopi telah diperkenalkan dan dijual di seluruh dunia. Mesin pembuat kopi ini bergantung pada harganya. Semakin tinggi harganya, semakin canggih fungsi pembuat kopi dan rasanya juga lebih sedap. Manakala mesin pembuat kopi yang murah dan sederhana akan kehilangan nikmat keseronokan untuk minum kopi dan orang perlu memerhatikan status pembuat kopi tersebut. Pada zaman kita sekarang, orang lebih suka memilih mesin pembuat kopi murah tetapi lebih banyak fungsi memerlukan lebih banyak kemudahan. Dalam teknologi masa kini, orang sebenarnya dapat memiliki kedua-dua ciri ini iaitu harganya murah dan juga canggih fungsinya. Dalam tesis ini, saya sudah merancang beberapa fungsi pembuat kopi berdasarkan ciri yang telah diminta oleh orang-orang yang akan menjadikan saat minum kopi lebih senang dan menyenangkan. Dalam projek ini, saya akan menggunakan Arduino Uno sebagai sistem kawalan saya, menggabungkan dengan beberapa sensor dan litar khas. Pengukuran tahap saya pembuat kopi adalah dengan menggunakan banyak jenis pengukuran seperti suhu kopi, pengukuran terapung, permukaan air dan sensor laser. Pengguna boleh mengawal pembuat kopi untuk membuat secawan kopi dengan menggunakan telefon bimbit mereka dan melakukan kawalan jauh. Semasa mempertimbangkan tentang harga, saya memilih sensor yang paling sesuai untuk pengukuran. Saya juga melakukan beberapa pekerjaan untuk menjimatkan tenaga dan selamat.*



## ACKNOWLEDGEMENTS

Alhamdulillah, at last I am able to complete this project, that is about Automatic coffee maker with voice control using Arduino and submit it on time. First of all, I would like to start off by thanking to Allah SWT, the most gracious and the most merciful for blessing us to finish this project. Without His guidance I would never be able to accomplish anything in my whole life.

I would also like to thanks to my parents for always and never stop supporting my education for many years, and for encouraging, advising and guidance me in this life. I take this opportunity to express the deepest appreciation to my supervisor, Madam Kamilah Binti Jaffar, for her patience guidance, enthusiastic and encouragement of this project, her willingness to give her time so generously has been very much appreciated.

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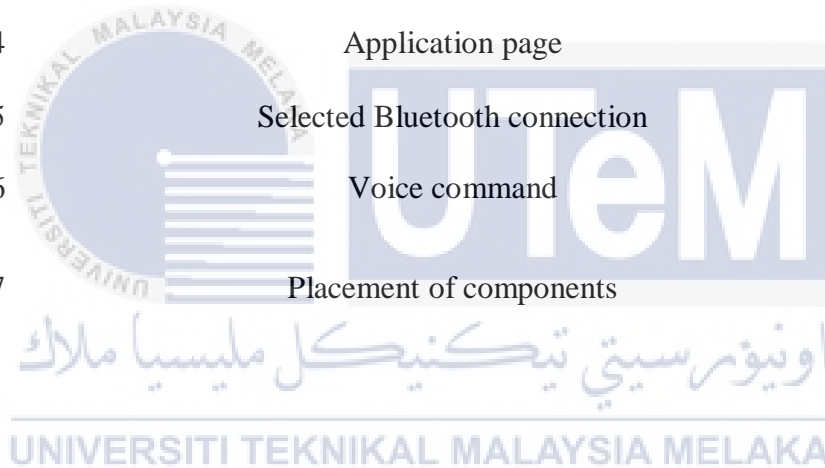
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## LIST OF SYMBOLS AND ABBREVIATIONS

C	=	Capacitance
E	=	Constant known as the absolute permittivity of free space
K	=	Relative dielectric constant of the insulating material
d	=	Distance between the conductors
A	=	Effective area of the conductors
$\rho$	=	Density of gas or fluid
p	=	Pressure
g	=	Acceleration due to gravity
h	=	The height of a column of gas or fluid
L	=	Distance from sensor to object
T	=	Time between the emission and reception
C	=	Sonic speed
V	=	Voltage
LCD	=	Liquid Crystal Display
GND	=	Ground
VCC	=	Power supply
kHz	=	Kilohertz
cm	=	Centimeter
DC	=	Direct current





# CHAPTER 1

## INTRODUCTION

This chapter contains of a project background, problem statement, objective, project scope, organization. In general, this project is about using machines to make different types of coffee. The technology of making coffee that was previously used is simply by using the push of a button to operate the coffee production but this project wants to innovate and upgrade the system and the process of making coffee that will make it easier for consumers. Later, this chapter also describes some of the objectives and goals that will be achieved by this project, all the details of how to make coffee automatically will be included in the scope of the project and at the end of this chapter will explain in more detail about this coffee making project.

### 1.1 Project Background

Coffee is made from the roasted and ground seeds, or beans, of the coffee plant, a tropical evergreen shrub. Two of the 25 or more species, Arabica and Robusta, supply most of the world's coffee. Arabica is grown in Central and South America, the Caribbean, and Indonesia; Robusta mainly in Africa. The shrub bears small white flowers with a jasmine-like fragrance. The fruit, which is red when mature, is called a cherry. The seed is called a bean. Coffee contains large amounts of caffeine, whose effects have always been an important element in the drink's popularity. Coffee-drinking dates from the 15th century in Arabia. It reached Europe by the 17th century and immediately became popular. Coffee is consumed by about one-third of the world's population. Coffee, is a beverage brewed that came from the roasted and ground seeds of the tropical evergreen coffee plant of African origin. Coffee is one of the three most-popular beverages in the world and one of it is also most-profitable international commodities. Though coffee is the basis for an endless array of beverages, its popularity is mainly attributed to its invigorating effect, which is produced by

caffeine, an alkaloid present in coffee [1].

Coffee becomes an irreplaceable drinking in our daily life, especially for people who need to refresh themselves and improve working efficiency. According the data from ICO, the consumption of coffee in the world is increasing. When people want to drink a cup of coffee and they are staying at home or busying with theirs jobs, it is unreasonable to let them go to shops or Starbucks to buy. So, the better choice will be brewing coffee by home using coffee maker [2][3].

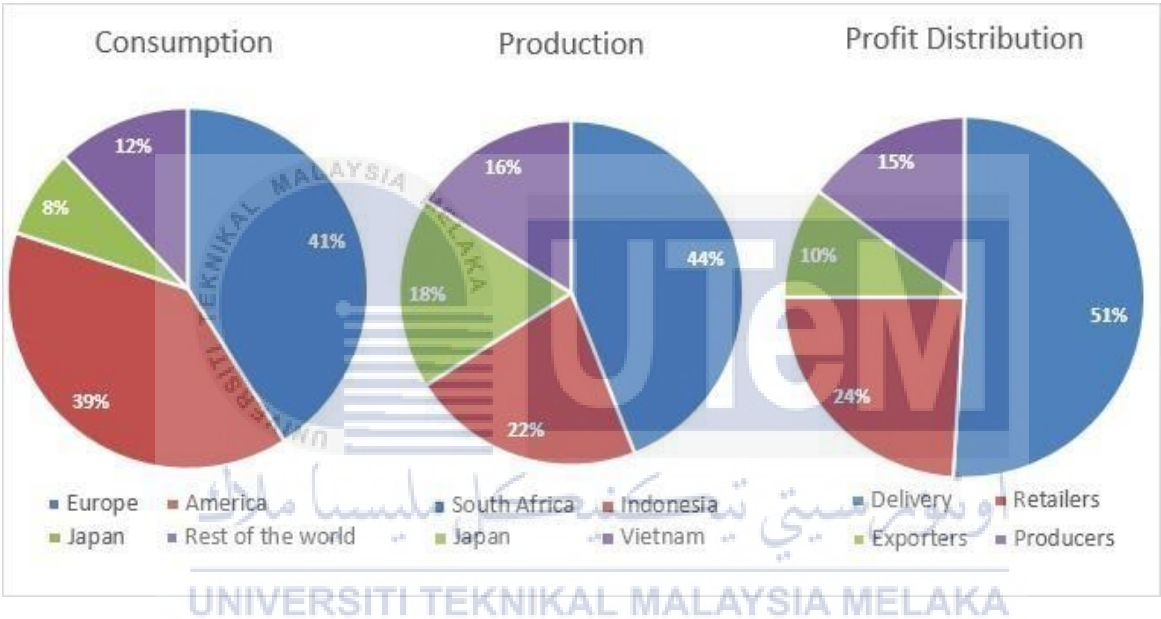


Figure 1.1 World coffee consumption

In the market, people can find different types of coffee maker different ways to brew coffee. The most normal types are drip coffee maker, single serve coffee maker and espresso machine. Also in this market, products have different prices with diverse functions. For example, T13001 from Tower and E6 from Jura.



Figure 1.2 Tower t13001



Figure 1.3 Jura E6

Table 1.1 Different of coffee maker

Coffee Maker	Jura E6	Tower T13001
Price	RM 6,950	RM 185
Coffee	Bean	Ground Coffee
Functions and features	Intelligent water system, thermo-block heating system, preheating, smart connect, the choice of different types of coffee, making milk foam and so on	Heating, anti-drip feature, Permanent washable nylon filter and so on

From the table 1, we can see that Jura E6 is more intelligent and more automatic compared to Tower T13001. The price for the Jura E6 is far more expensive than Tower T13001 and customer will think twice to buy this expensive coffee maker. We already know that the Jura E6 is the best choice and will make an excellent and delicious coffee but at the end customer will always select the cheapest one.

For the lower price coffee maker, it is inconvenient that user has to check whether there is water in the coffee tank by themselves and turn on or off directly by standing near the coffee maker. For the safe problem, if water level or temperature over the limitation, people cannot close coffee maker immediately and maker will still work, when it is laid down by kids or pets at home or coffee

pot is not in the coffee maker. And if coffee maker works too long time, it will waste lots of power.

## 1.2 Problem Statement

There are some problem statements that need to be considered in developing the automatic coffee maker. Some coffee makers are cheap but with less functions, it is inconvenient for people to drink coffee which they have to stand near the coffee maker to check whether there is water in the maker tank or liquid level in the coffee pot. And sometimes it will cause some safe problems and waste energy if no one keeps an eye on the status of coffee maker. It is also troubled users to get close to the coffee machine and press various buttons just to make a cup of coffee.

## 1.3 Project Objective

The objectives of this thesis aimed to add more functions to the coffee maker which let people drink or make coffee easier and save more their time.

- 1) To develop an automatic coffee maker.
- 2) To design touchless coffee maker using Arduino controller.
- 3) To implement the voice controller that can be control the machine by using MIT AI2 apps.

## 1.4 Project Scope

The scope of this project is to make an improvement to a coffee machine and can came up with an idea on how make things easier for people to produce a coffee. The suitable component and code play an important role to develop a successful process of making a coffee.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

In this chapter, the previous study or research and analysis based on automatic coffee maker will be do it and compile as a literature review for this project. This chapter review on some of the sources such as paper, previous journal, articles and websites as references in this project.

It will give us some information about the structure of the project and how it being develop based on the previous research. There is a few features and knowledges that can be found when doing this literature review. There is some main topic that can be discussed and investigate in this chapter such as the size of the blade that is use to grind the coffee beans, the technique that is use to make that coffee and the sensor that is use to detect a cup.

The main purpose of this coffee maker is to make it easy and convenient for users to make delicious coffee by simply using the mobile phone's voice-activated application to activate the coffee maker. The most important thing to do before handling the hardware part is to determine the most appropriate methods and steps for the project. In addition, the size of the blade also needs to be considered to produce a smoother coffee range and not too large chunks after the grinding process.