POLITEKNIK
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LEMANG BURNING MACHINE

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The project report titled "Lemang Burning Machine" has been submitted, reviewed and verified as a fulfills the conditions and requirements of the Project Writing as stipulated

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SESSION: SESI 1 : 2022/2023

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In front of me, Click here to enter text. (Click here to enter text.) As a project supervisor, on the date:) .....)

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ACKNOWLEDGMENT

First of all, we would like to express our gratitude to the Almighty GOD for providing us with all of his miraculous resources, courage, and endurance to carry out this study successfully. I would like to express sincere gratitude to everyone who gave me the opportunity to finish the comprehensive report for my project, "Lemang Burning Machine" Too many demands and obstacles i encountered while preparing this report, but they were all part of the learning process, and overcame them by making the experience worthwhile by recognizing that our exhaustion was time well spent once the report was finally finished and successful.

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ABSTRACT

Lemang is one of Malaysia's famous heritage foods and a traditional dish for the Malays when celebrating festivals such as Hari Raya. Usually, lemang is served with rendang or serunding. The basic ingredients to produce lemang are glutinous rice, coconut milk and a little salt as a flavor and it has a unique aroma. Lemang that has been cooked cylindrical in shape with a size measurement of approximately 1 foot long and 2 inches in diameter will cut into slices before serving. Each lemang stem is estimated to be appropriate to be served to five to six guests. Lemang is cylindrical as it is cooked in a cylindrical tube container of bamboo. Lemang bamboo is a type of bamboo that has long segment structure and thin walls. A bamboo tree should be cut accordingly each segment with an open top and a closed bottom to serve as a container cooking. The process of cooking lemang is done by placing the lemang bamboo at an angle on the edge of fire or embers and this process is done in the open. Ingredients needed for the preparation of lemang are glutinous rice, coconut milk, salt, banana leaves and bamboo.

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CHAPTER 1
INTRODUCTION

1.0 INTRODUCTION

Lemang is one of the typical Malay foods made from white glutinous rice and is cooked inside a bamboo stalk cavity using a direct open fire method. An existing cooking technique is still using manual methods especially for turning the bamboo, so it becomes harmful for hand. This research aims to design, fabricate, and evaluate a lemang rice cooking device integrated with a continuous rotating system. This project intends to create a prototype of a lemang burning machine that uses an heating rod and does not require a huge labour to run. The control of the mechanical movements connected by the moto and the chain is part of the prototype revenue with a system that uses an Arduino Uno to control a revolving motor. The target for our project is for lemang seller but we also ask the lemang buyers for improvement for our projects. Analysis of the design had been carried out based on considerations of design alternatives, then the static load simulation was carried out using finite element analysis to obtain a robust device design that is ready for manufacture. By using a continuous rotating system, the risk of hand burning and the overcook bottom-part of lemang can be reduced.

1.1 PROJECT BACKGROUND

There are some production issues with the conventional lemang cooking procedure. Lemang being cooked unevenly, a lot of labour is needed, and fuels like charcoal are not consumed thoroughly. This project's goal is to create a semi-automatic lemang machine utilising an infrared burner without using a lot of labour. Controlling mechanical motions is necessary for the creation of this prototype. This prototype can take the place of the conventional way of burning lemang and operates with little labour. This idea also creates a system that uses an Arduino Uno to control a revolving motor. After entering the coding into the Arduino Uno, we used the L293D to control the motor's rotation in both clockwise and anticlockwise directions. Rotational movements are created via sprocket, motor dc and chains. Sprocket and chain are used to connect these mechanical parts. The trials' findings demonstrate that baking the lemang takes less than three and a half hours and doesn't involve a lot of labour.

1.2 PROBLEM STATEMENT

There are some production issues with the conventional lemang cooking procedure. Lemang being cooked unevenly, a lot of labour is needed, and fuels like charcoal are not consumed thoroughly. This project's goal is to create a semi-automatic lemang machine utilising an heating rod without using a lot of labour. Controlling mechanical motions is necessary for the creation of this prototype. This prototype can take the place of the conventional way of burning lemang and operates with little labour. This idea also creates a system that uses an Arduino Uno to control a revolving motor. After entering the coding into the Arduino Uno, we used the L293D to control the motor's rotation in both clockwise and anticlockwise directions. Rotational movements are created via sprocket, motor dc and chains. Sprocket and chain are used to connect these mechanical parts. The trials' findings demonstrate that baking the lemang takes less than three and a half hours and doesn't involve a lot of labour.

1.3 OBJECTIVE

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

I) To produce a prototype of a burning machine using heating rod

II) To develop a system that can control rotating motor by using Arduino uno

1.4 SCOPE OF PROJECT

This project intends to create a prototype of a lemang burning machine that uses an heating rod and does not require a huge labour to run. The control of the mechanical movements connected by the moto and the chain is part of the prototype revenue. The target for our project is for lemang seller but we also ask the lemang buyers for improvement for our projects.

1.5 IMPORTANT OF PROJECT

The traditional process of burning lemang is still used by the majority of lemang merchants today. There are various issues with using such methods, including cooking for too long, uneven cooking that results in some raw lemang, and traditional burning creates smoke, air pollution, and greenhouse gas emissions.The significance of our project is to develop the hardware of a semi-automated lemang machine employing an infrared burner for the hardware element.We also want to help the lemang seller to facilitate their work and at the same time the buyer will be satisfied. After that, we used an Arduino uno in the project and discovered some tools to help us with programming and coding.

1.6 SUMMARY

This first chapter describes the project's introduction. Lemang is a traditional Malay dish made from white glutinous rice and cooked over an open fire inside a bamboo stalk cavity. Then, conduct background research on various production issues associated with the traditional lemang cooking technique. Following that, a problem statement about Lemang is the cuisine of choice to

commemorate the festival season, especially during Aidilifitri. Finally, the scope of research on The goal of this project is to create a prototype of a lemang burning machine that uses a heating rod and does not require a lot of labour to operate.

CHAPTER 2
LITERATURE REVIEW

2.0 Introduction

Based on research paper we have studied We discovered a lot of fresh information regarding this project as a result of our study. We explore several types of heating and different types of methods to develop the hardware of a semi-automated lemang machine employing an infrared burner for the hardware element. After that, we used an Arduino uno in the project and discovered some tools to help us with programming and coding for develop the rotating system that can rotate the lemang mould for get the good result of cooking it.

2.1 Literature Review Topic 1-3

1. REKA BENTUK DAN PENILAIAN PRESTASI MESIN LEMANG MINI MARDI

Wan Mohd Fariz (2018) in this paper, a technological revolution of lemang production has been developed under the name of Machine Lemang Mini MARDI. The basic form of this machine innovation consists of a steel casing cylindrical in shape that serves as a cooking container. The cylindrical shape is chosen for retains the traditional physical characteristics of lemang cooked in bamboo. Technology these are capable of operating in two conditions i.e. singly or in combinationtechnology. The single concept means the lemang cooking container has been equipped with special electric heating system in one unit and while the concept of a combination of technologiesmeans the lemang cooking container is adapted to the cooking utensils in the kitchen i.e.rice cooker. The main focus of this technology developed is to produce a technology suitable for household or domestic use. Cooking period the length required if using a single concept is for 70 minutes with a cooking heat efficiency rate of 54% while the period for the combined concept the technology is for 120 minutes with a cooking heat efficiency rate of 8.83% [1].

2. MESIN PEMBAKAR LEMANG

Amir fitri bin samsuddin (2016), the traditional lemang cooking method has some drawbacks in terms of work productivity. It requires a lot of manpower, the consumption of fuels such as charcoal is not thorough and lemang is cooked unevenly. The objective of this project is to produce a prototype of a lemang burning machine using the principle of an oven that operates without the need for a lot of manpower. The production of this prototype involves the control of mechanical movements. This prototype is able to replace the traditional method of burning lemang and does not require a lot of manpower to operate. The project started by producing technical sketches using INVENTOR software. Then based on the sketch, this prototype was produced. Couplings and chains are used to produce rotational movements. These mechanical components are connected to sprocket and chain. Through the experiments conducted, the results show that the lemang is ready to be baked in less than three and a half hours without requiring much labor[2].

3. 2-DIMENSIONAL CFD SIMULATION OF THE AIR FLOW INSIDE A LEMANG

Suhaila Hussain (2015) , the normal way of cooking lemang is by putting it in open fire for more or less 2 hours. By using the lemang oven, the cooking time was reduced to about 1 hour and 20 minutes. A 2-dimesional CFD simulation was done to look at the hot air distribution inside the oven and how it affects the conditions inside the oven and the lemang during cooking. Results for velocity profile, as well as turbulence kinetic energy were obtained. It was found that the turbulence which carries with it energy was highest at the bottom of the lemang which would mean that that part of lemang would cook the fastest as it receives greater amount of energy compared to other parts of the lemang. This was why the lemang was overcooked at that part as evident from the experimental results. These results would be used to further improve on the existing lemang oven [3].

4. LEMANG COOKER OPTIMIZATION

S B Daulay (2021) in this paper ,tell about the weaknesses of Lemang cooking process can only be overcame by the use of machinery which replaces the need to turn Lemang every intervals of time and also diminish the exposure to smoke, hence, a need to design such machinery rises. We designed the Lemang cooker using heater element and steel cylinders to replace bamboo stems. In the operation of this Lemang cooker, we also need to measure the mechanical performance, the quality of the product and also economic analysis of the cooker's operation. The cooker hence would also be optimized in the terms of cooking time and temperature so that the optimum settings can be determined[4].

5. DESIGN, FABRICATION AND THERMAL EVALUATION OF LEMANG (RICE BAMBOO) COOKING DEVICE INTEGRATED WITH CONTINUOUS ROTATING SYSTEM

Diang Sagita (2021) in this paper research aims to design, fabricate, and evaluate a lemang rice cooking device integrated with a continuous rotating system. Analysis of the design had been carried out based on considerations of design alternatives, then the static load simulation was carried out using finite element analysis to obtain a robust device design that is ready for manufacture. The overall dimension of the device is 2140 mm× 920 mm × 980 mm with a cooking capacity of 36 lemang per batch and has a bamboolemang speed of 15 rpm which is powered by a 0.5 hp electric motor. The new design of lemang cooking device has been manufactured by considering important parameters based on the requirement of the lemang producer i.e., still using bamboo due to the typical characteristic of lemang cooking and still using open fire cooking method due to the availability of biomass fuel. Performance test and evaluation of the cooking device has been carried out for observing heat distribution in bamboo using Analysis of Variance (ANOVA).[5]

Topic	Author	Method	Solution
Reka bentuk dan Penilaian prestasi mesin lemang mini MARDI	W.A. Wan Mohd Fariz, A. Mohd Shahrir, S. Asnawi, A. Saiful Azwan, J. Muhammad Aliq, A. Sha'fie, Z.A. Mohd Zaimi , S. Amir Redzuan, S. Mohd Azmirredzuan, M. A. T. Mohd Hafiz	Cooking using heating rod	a) Lemang Mini MARDI machine is connected to the electricity source and set the thermostat to 180 °C (Samsudin 1997). Lemang will be ready to cook in 1 hour or so 1 hour 30 minutes depending on the user if they want a soft textured lemang or that crispy b) The lemang holder rod is clamped slowly and pull out the lemang holder
Mesin pembakar lemang	Amir fitri bin Samsuddin, Mohamad muhaimeen Bin mohd hazman , Nurul asyiqin binti Zamri	Cooking using charcoal	Glutinous rice, coconut milk, banana leaves, bamboo and charcoal. After that, the bamboo is placed on the machine and the ingredients are poured into the bamboo that has been placed in the machine. The material is put into the bamboo before being placed on the burning place. Next, the process continues by turning on the charcoal. The burning process begins.
2-DIMENSIONAL CFD SIMULATION OF THE AIR FLOW INSIDE A LEMANG	Suhaila Hussain, Roshaliza Hamidon	Cooking using oven method	the velocity of the hot air is higher near the bottom of the lemang. The velocity is higher there as it has the contribution of both forced convection from the fan on one side and natural convection from the heating element on the other side. Both

			opposing the paths of one and the other.
Lemang Cooker Optimization	S B Daulay*, A P Munir and L A Harahap	Cooking using oven method	Grains, rice in particular, is affected by several factors on its qualitative parameters, especially flavour, where the taste itself is a result of interaction between chemical reaction, cooking temperature, concentration, where the rise and decline of cooking temperature will affect mostly in sweet and salty taste.
Design, fabrication and thermal evaluation of *lemang* (rice bamboo) cooking device integrated with continuous rotating system	Diang Sagita*, Ari Rahayuningtyas, Yose Rizal Kurniawan, Novrinaldi	Cooking use charcoal	Parts of the cooking device are made from sturdy and heat-resistance materials The Cooking method uses direct fuel-burning system using available local biomass fuel (coconut shells, corn cob, firewood) The expected *lemang* capacity is 36 *lemang* per batch The Cooking device is designed to have a tilt adjuster mechanism

2.2 SUMMARY

This section focusing on two different section, the This chapter extend the literature reviews that cater the information in accordance with the method of this project. The relevant information and other extra features were gathered as shown. The second section is discovered about the design was completed based on design choices, and the static load simulation was completed using finite element analysis to provide a robust device design that is suitable for manufacture.

CHAPTER 3
METHODOLOGY

3.0 Introduction

This section consists of six subsections which are the project design where the technologies required for the development of the system are presented, the project hardware showing the devices that were used for the implementation, the project software which consists of a description of the functionality, prototype development where the product develop and finally summary of this methodology.

3.1 PROJECT DESIGN AND OVERVIEW

My project concept starts with an empty barrel and evolves into a complex shape with four main hardware components: Arduino uno, motor driver, wiper link motor, heating rod, and power source. This project is also powered by an Arduino Uno and a motor driver. To create the schematic circuit, we utilise the proteus software.

3.1.1 BLOCK DIAGRAM OF THE PROJECT

3.2.1 Block Diagram of the Project

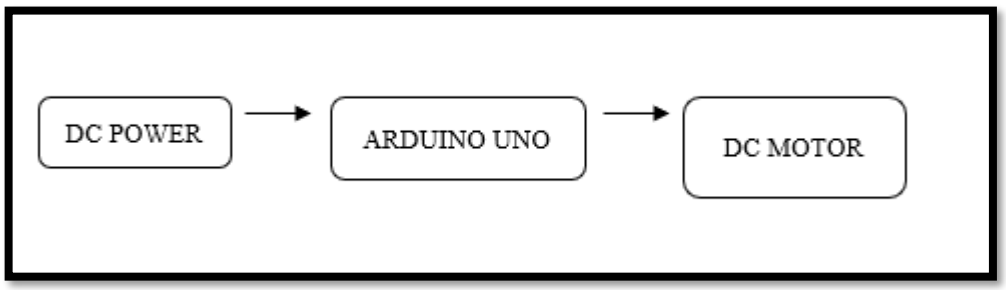


Fig 1. Dc Motor Rotation Block Diagram

Fig 2. Heating Rod Block Diagram

3.1.2 FLOWCHART OF THE PROJECT 2

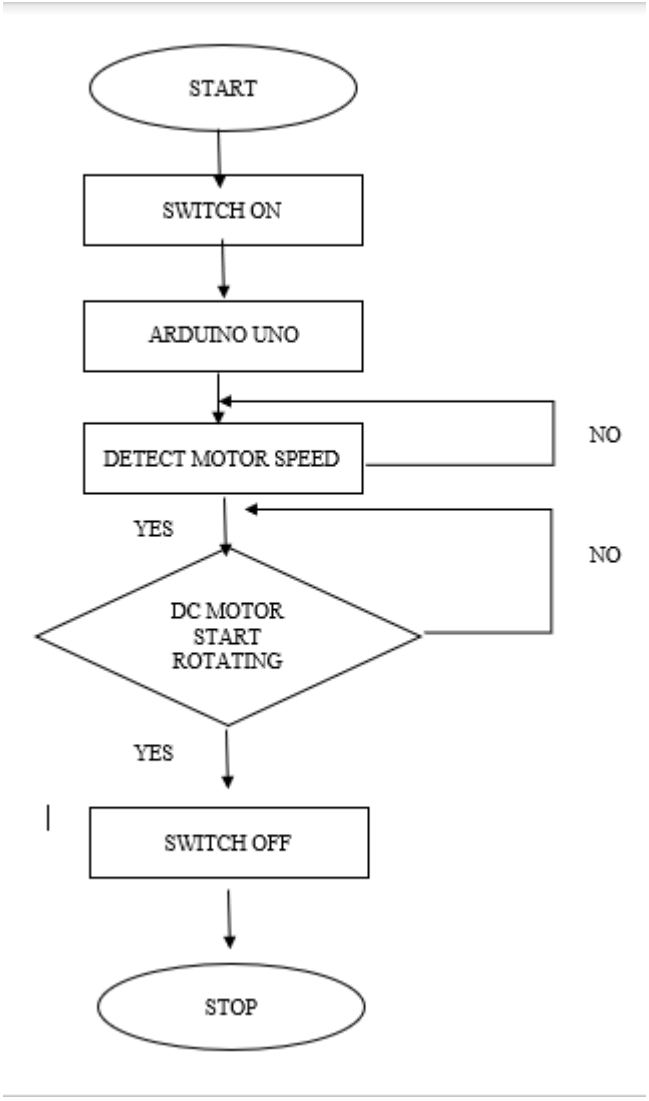
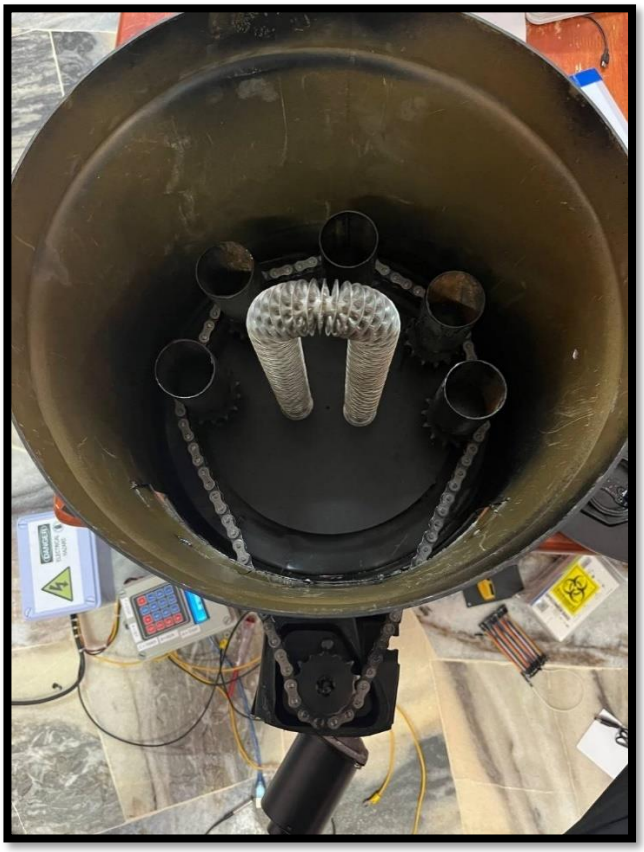


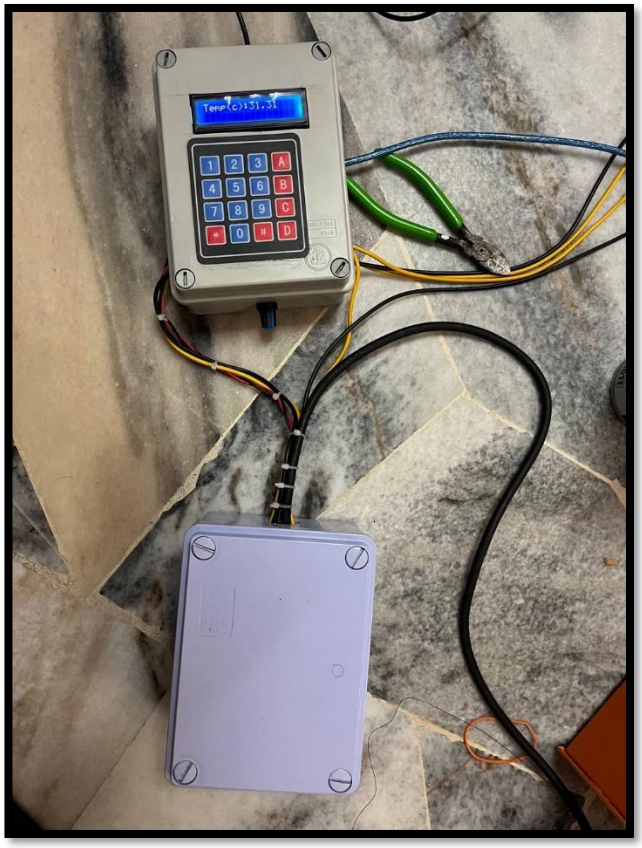
Figure 3.2 : Flowchart of the project

3.1.3 PROJECT DESCRIPTION

According to the flow chart, the power supply ac to dc is the project's input. a power supply is a device that converts the output from an ac power line to a continuous dc output or many outputs. The alternating current voltage is rectified to produce pulsing direct current, which is subsequently filtered to produce a smooth voltage. The power supply powers components such as the arduino uno, heating rod, motor driver, and wiper link motor.

3.2 PROJECT HARDWARE





3.2.1 SCHEMATIC CIRCUIT

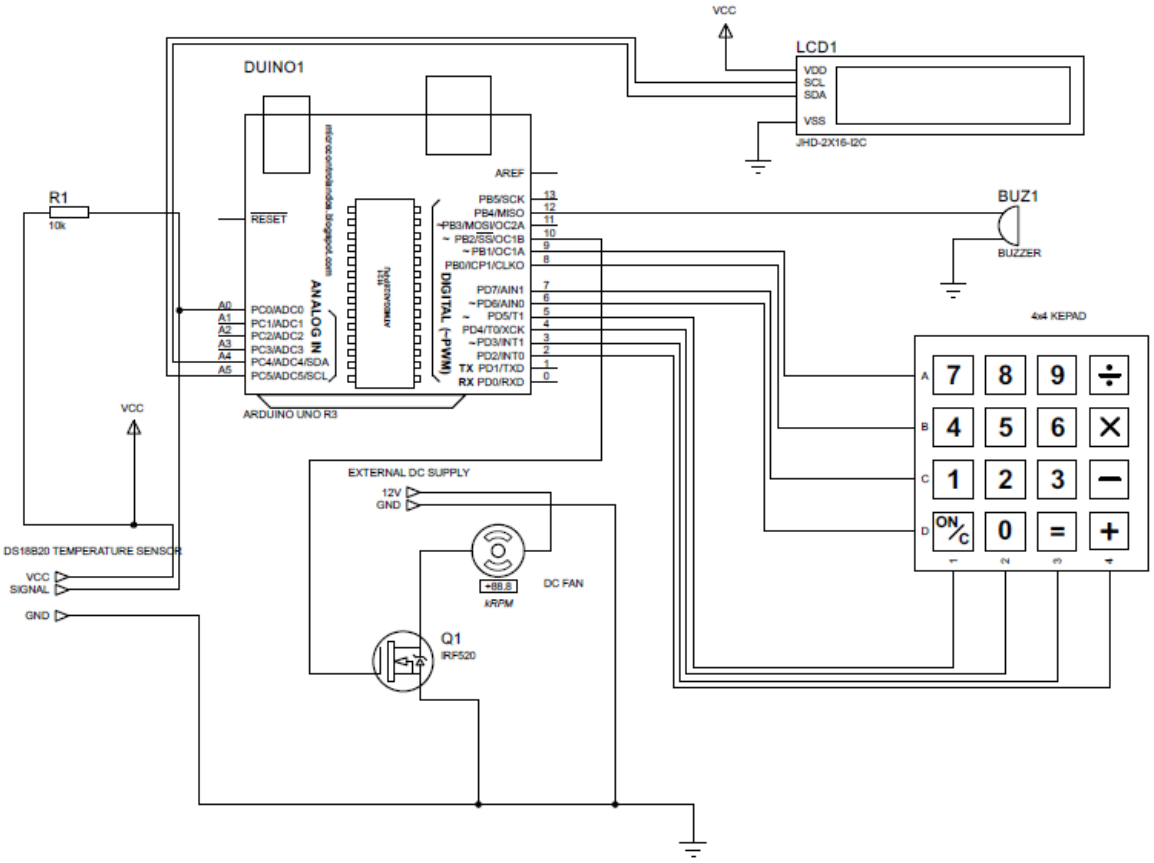


Figure 3.2.1 : Schematic Circuit

3.2.2 DESCRIPTION OF MAIN COMPONENT

In our proposed method, Arduino Uno is used to control rotation,direction and speed of motor . It alse used to read the temperature on heating rod. Arduino Idle program is used.

3.2.2.1 ARDUINO UNO(MICROCONTROLLER)

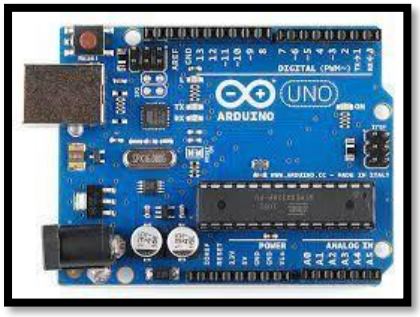


Figure 3.4

A microcontroller board called the Arduino Uno is based on the ATmega328 (datasheet). It has a 16 MHz ceramic resonator, 6 analogue inputs, 14 digital input/output pins (of which 6 can be used as PWM outputs), a USB port, a power jack, an ICSP header, and a reset button. It comes with everything needed to support the microcontroller; to get started, just plug in a USB cable, an AC-to-DC adapter, or a battery. The FTDI USB-to-serial driver chip is not used by the Uno, which is how it differs from all earlier boards. In its place, a USB-to-serial converter built using the Atmega16U2 (or Atmega8U2 up to version R2) is featured.

A microcontroller board called the Uno is based on the ATmega328P. It has a 16 MHz quartz crystal, 6 analogue inputs, 14 digital input/output pins, a USB port, a power jack, an ICSP header, and a reset button. It comes with everything required to support the microcontroller; to get started, just use a USB cable to connect it to a computer, or an AC-to-DC adapter or battery to power it.

The Italian word "uno," which denotes one, was chosen to signify the Arduino Software (IDE) 1.0 release. The Uno board and the Arduino Software (IDE) version 1.0 served as the foundation for later releases of Arduino. The first in a line of USB Arduino boards is the Uno board.

3.2.2.2 MOTOR DRIVER L293D

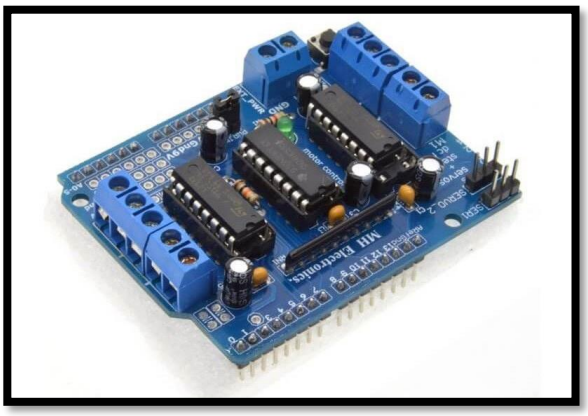


Figure 3.5: MOTOR DRIVER L293D

The L293D is a 16-pin Motor Driver IC which can control a set of two DC motors simultaneously in any direction. The L293D is designed to provide bidirectional drive currents of up to 600 mA (per channel) at voltages from 4.5 V to 36 V (at pin 8!). You can use it to control small dc motors - toy motors

3.2.2.3 I2C LCD 2004

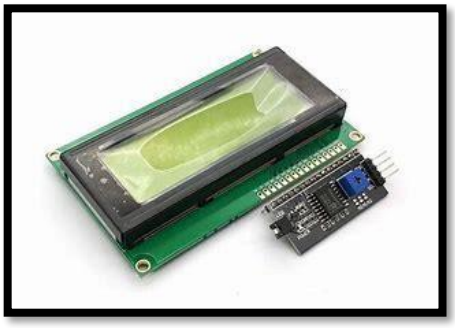


Figure 3.6 : I2C LCD2004

I2C Serial Interface 20x4 LCD Module This is I2C interface 20x4 LCD display module, a new high-quality 4 line 20 character LCD module with on-board contrast control adjustment, backlight and I2C communication interface. LCD2004, or 2004 character-type liquid crystal display, is a kind of dot matrix module to show letters, numbers, and characters and so

on. It's composed of 5x8 dot matrix positions; each position can display one character. There's a dot pitch between two characters and a space between lines, thus separating characters and lines. The model 2004 means it displays 4 rows of 20 characters.

3.2.2.4 DS18B20 TEMPERATURE SENSOR

Figure 3.7 :Temperature Sensor

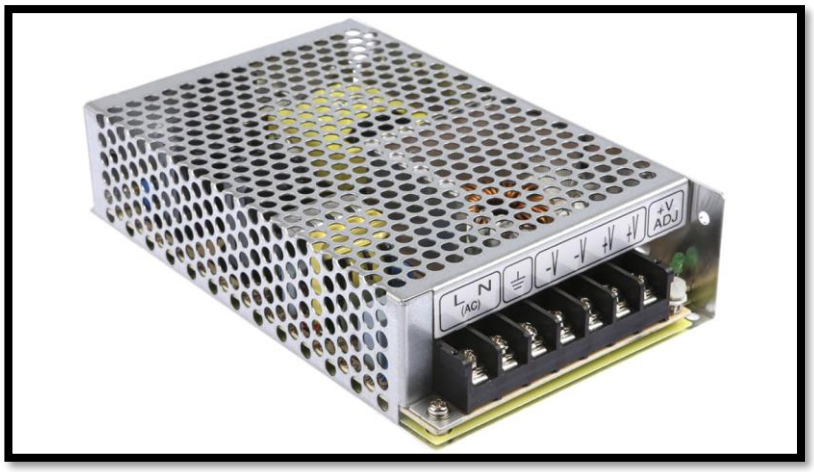
The digital temperature sensor like DS18B20 follows single wire protocol and it can be used to measure temperature in the range of -67oF to +257oF or -55oC to +125oC with +-5% accuracy. The range of received data from the 1-wire can range from 9-bit to 12-bit.

3.2.2.5 HEATING ROD

A heating element converts electrical energy into heat through the process of resistance, otherwise known as Joule heating. The electric current passing through the element encounters resistance, which produces heat.

Typically, heating elements are made from a coil, ribbon or strip of wire that provides heat like a lamp filament. Heating elements contain an electric current, which flows through the coil or ribbon or wire and becomes very hot. The heating element converts the electrical energy passing through it into heat, which is distributed outward in every direction.

3.2.2.6 POWER SUPPLY



A power supply is an electrical device that supplies electric power to an electrical load. The main purpose of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load. As a result, power supplies are sometimes referred to as electric power converters. Some power supplies are separate standalone pieces of equipment, while others are built into the load appliances that they power. Examples of the latter include power supplies found in desktop computers and consumer electronics devices. Other functions that power supplies may perform include limiting the current drawn by the load to safe levels, shutting off the current in the event of an electrical fault, power conditioning to prevent electronic noise or voltage surges on the input from reaching the load, power-factor correction, and storing energy so it can continue to power the load in the event of a temporary interruption in the source power (uninterruptible power supply).

3.2.2.7 WIPER LINK MOTOR

Windshield wipers are powered by a small electric motor, usually mounted on the firewall or under the cowl (the area under the windshield's base). The motor activates linkage that moves the wiper arms back and forth. On vehicles with a rear window wiper, a separate motor powers the one in the rear. Signs that a wiper motor is about to fail include slow or intermittent operation, wipers that will operate at only one speed, or arms that stop in the middle of the windshield when turned off. If your wipers don't work, the fault could also lie with other parts of the wiper system. In the winter, for example, trying to use the wipers when the blades are stuck to the windshield because of ice or snow can blow the fuse for the motor or trip a circuit breaker. Other possible causes are the interior switch that controls the wipers failing, wires in the system being damaged, or the linkage that pushes and pulls the wiper arms breaking. Moving parts in the linkage may also be stuck from corrosion and/or gunk and need lubrication.v

3.2.3 CIRCUIT OPERATION

This circuit works when an Arduino uno. The EN A pin of IC is connected to the PWM pin 2 of Arduino. Motor driver will control the speed of the motor. we were able to provide explanation of each circuits/components/I/O parts that use to develop the project very clearly and accurately using functional diagram and achieve the result. Lastly, I use I2C_LCD. I2c LCD is an easy-to-use display module, It can make display easier. Using it can reduce the difficulty of make, so that makers can focus on the core of the work. We developed the Arduino library for I2C_LCD, user just need a few lines of the code can achieve complex graphics and text display features.

CHAPTER 4
4.0 EXPECTED RESULT

4.1 INTRODUCTION

This project's expected result is the ability to design a system that can obtain well-cooked lemang without the need for constant maintenance is the predicted outcome of this project. The movement and speed of the motor in this product are controlled by an Arduino Uno and an L293D driver motor. The L293D will deliver power to the motors based on the voltage applied to the enable pins. The voltage provided to the enable pin increases as the motor is given more power and spins more quickly. A common Motor Driver IC that enables a DC motor to rotate in any direction is the L293D IC. After entering the coding into the Arduino Uno, we used the L293D to control the motor's rotation in both clockwise and anticlockwise directions. The purpose of this project is to develop a lemang machine that uses an infrared burner and is semi-automatic while requiring little manual labour. For the production of this prototype, mechanical motion control is required. This prototype can replace the traditional method of burning lemang and requires less labour to run.

4.2 RESULT AND ANALYSIS

COOKING TIME (MINUTE)	TEXTURE	CONDITION
60	Not good(semi-liquid)	Raw
70	Not good(semi-liquid)	Raw
80	Not good (semi-soft)	Raw
90	Almost good(semi-soft)	Half cook
100	Almost good(semi-soft)	Half cook
110	Good	Cook
120	Good	Cook well
130	Good	Cook well
140	Not good(half hard)	Overcook
150	Not good(half hard)	Overcook

Table 1. Cooking result

4.3SUMMARY

This chapter is divided into two sections. The first section discusses the kind of Arduino and motor that was used to test the project. The second section covers testing and running the project's entire process as well as observing what happens to the hardware and software components .

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

2 Conclusion

It is clear from this project's work that lemang burning machine can take the place of the conventional way of burning lemang and operates with little labour. This idea also creates a system that uses an Arduino Uno to control a revolving motor The designed lemang burning machine has undergone numerous tests and certifications that allow it to work for cook the lemang

As a result, this system is adaptable and scalable.

3 Suggestion for Future Work

My improvement suggestion for this project for the future is to replace the lemang mold material with steel that is suitable for cooking which is food grade.This is because the disadvantage we face is the steel is not suitable for cooking.

In addition, I recommend replacing the heating rod burning element with an infrared burner because it is more efficient and the burning process is faster. Because heating rod it take more time to heat. Then, use a motor driver whose power is compatible with the motor used so that the motor is not easily damaged. I Use the motor driver that support 5 volt but the wiper link motor I use is above 5 volt.

5 SUMMARY CHAPTER

I recommend using an infrared burner instead of the heating rod burning element because it is more efficient and burns faster. Also, use a motor driver whose power is compatible with the used motor so that it is not easily damaged. I use a 5 volt motor driver, but the wiper link motor I use is more than 5 volts.

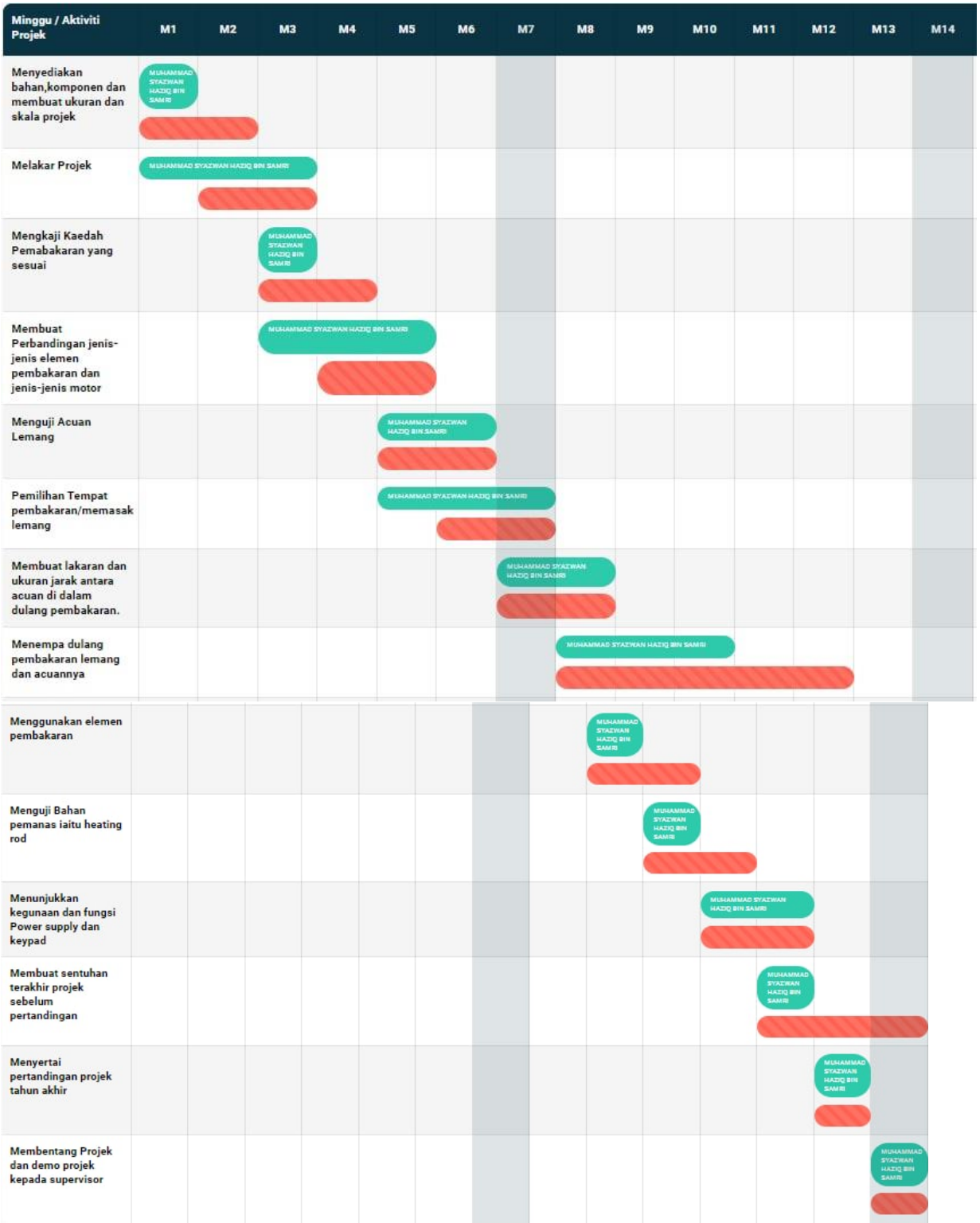
CHAPTER 6

PROJECT MANAGEMENT AND COSTING

6.1 Introduction

The section will explain the entire project progress activities in the form of a gantt chart, the cost and budget used and the questionnaire distributed to lemang traders and lemang buyers

6.2 Gant Chart and Activities of the Project



6.3 Cost and Budgeting

COMPONENT	QUANTITY	PRICE
ARDUINO UNO	1	RM35.00
TEMPERATURE SENSOR	1	RM 5.00
LCD DISPLAY	1	RM 8.50
WIPER LINK MOTOR	1	RM72.00
MOTOR DRIVER	1	RM 6.00
RELAY	1	RM 4.00
POWER SUPPLY	1	RM25.00
WELDING	[redacted]	RM1300.00
OTHER		RM300.00
FINAL TOTAL		RM1755.50

6.4 Chapter Summary

This chapter demonstrated that there will be a cost to determining whether a manufacturing process is worthwhile. This project's element contains some used and rather expensive components. Because skilled and experienced workers are required, the welding section has the highest cost, which is Rm1300. The project's pricing also corresponds to one of the primary criteria of an experienced project developer: a low-cost, high-quality project. This project's element contains some used and rather expensive components, but in the event of an incident, money cannot be purchased with life. Although welding is an expensive hobby, I have applied for a grant to help cover some of the costs.

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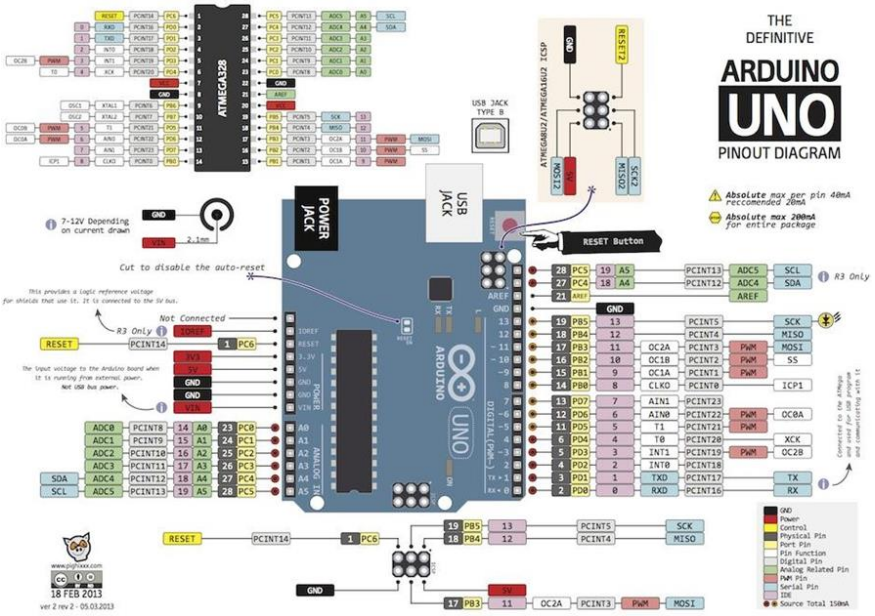
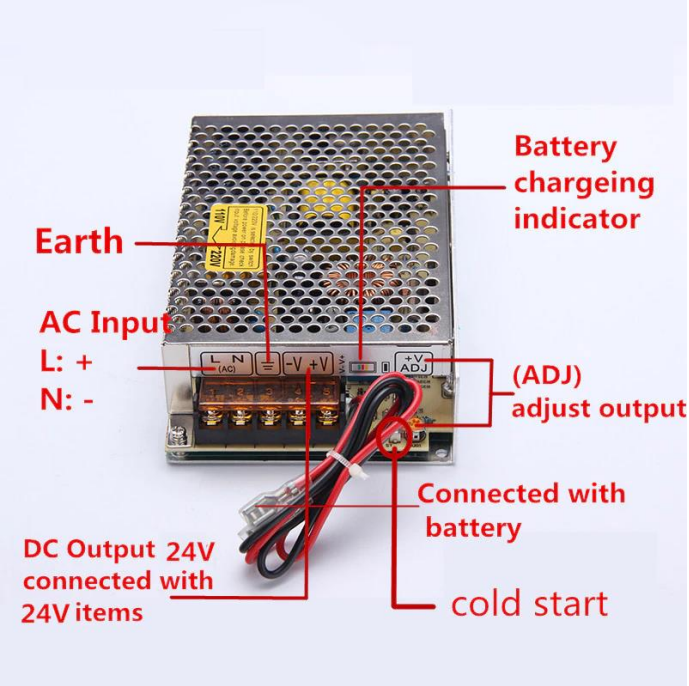
APPENDICES

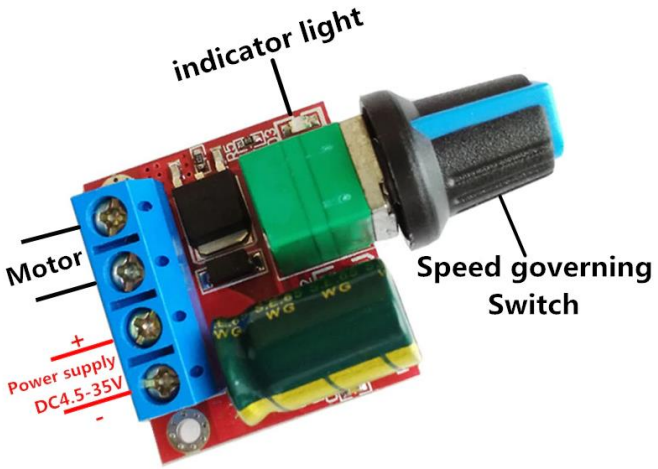
APPENDIX A- DATA SHEET



DATASHEET ARDUINO UNO



DATASHEET POWER SUPPLY



DATASHEET MOTOR DRIVER

APPENDIX B- PROGRAMMING

```
#include <Keypad.h>
#include <OneWire.h>
//#include <LiquidCrystal.h>
#include <Wire.h>  // Comes with Arduino IDE
#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x3F, 16, 2);
//LiquidCrystal_I2C  lcd(0x27,  2,  1,  0,  4,  5,  6,  7,  3,
POSITIVE);  // Set the LCD I2C address
//LiquidCrystal_I2C  lcd(0x3F,  2,  1,  0,  4,  5,  6,  7,  3,
POSITIVE);  //some address is different


#define Buzz 13
#define FAN 10
#define SW 12

OneWire  ds(A0);  // on pin 10 (a 4.7K resistor is necessary)

//Variable Declaration-------------------------------------
-------------
int WaitData=0;
String BTpassword="";
String dummy;
float SPEED=0;
int Ms1=0;
int Ms2=0;
int RQScount;
int WRONGCOUNT=0;
int countERROR;
int countPHONE;
int countOK;
int countKEY;
int commaPosition;
int index = 0;
int Pfull;
double PwordInx;
char check;
int  LOCK=0;
int Sec=0;
int minx=0;

String  PwordIn;
double  NowPword;
int mode=0;
int SMSX=0;
int StatusHIGHL;
float SetTemp=45;
float ActTemp=0;
String MESSAGE1="   WELCOME";
String MESSAGE2="  ";
int TSet=45;
int TimeSet=1;
int count;
int OP=0;
int FANSTATE=0;
```

```
int TXX=0;

const byte ROWS = 4;
const byte COLS = 4;
char keys[ROWS][COLS] = {
  {'D','#','0', '*'},
  {'C','9','8', '7'},
  {'B','6','5', '4'},
  {'A','3','2', '1'}
};
byte rowPins[ROWS] = {
  6,7,8,9}; //connect to row pinouts
byte colPins[COLS] = {
  2,3,4,5}; //connect to column pinouts

Keypad keypad = Keypad( makeKeymap(keys), rowPins, colPins,
ROWS, COLS );




void setup(){

  PwordIn = "";
  countKEY = 0;

 pinMode(Buzz,OUTPUT);
 pinMode(FAN,OUTPUT);
 pinMode(SW,INPUT);
 digitalWrite(SW,HIGH);
 digitalWrite(FAN,HIGH);
  Serial.begin(9600);

lcd.backlight(); // finish with backlight on
  lcd.begin();
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Initializing..");
  lcd.setCursor(0, 1);
  lcd.print("pls wait");
  delay(2500);


 lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print(MESSAGE1);
  lcd.setCursor(0, 1);
  lcd.print(MESSAGE2);




}

void loop(){
//------------------------------------------------------------
--
```

```
  byte i;
  byte present = 0;
  byte type_s;
  byte data[12];
  byte addr[8];
  float celsius, fahrenheit,celsius1, fahrenheit1;
  //------------------------------------------------------------
----------------------------
  if ( !ds.search(addr)) {
  //  Serial.println("No more addresses.");
  //  Serial.println();
    ds.reset_search();
    delay(250);
    return;
  }

 // Serial.print("ROM =");
  for( i = 0; i < 8; i++) {
  //  Serial.write(' ');
  //  Serial.print(addr[i], HEX);
  }

  if (OneWire::crc8(addr, 7) != addr[7]) {
   //   Serial.println("CRC is not valid!");
      return;
  }
 // Serial.println();

  // the first ROM byte indicates which chip
  switch (addr[0]) {
    case 0x10:
   //  Serial.println("  Chip = DS18S20");  // or old DS1820
      type_s = 1;
      break;
    case 0x28:
   //   Serial.println("  Chip = DS18B20");
      type_s = 0;
      break;
    case 0x22:
     // Serial.println("  Chip = DS1822");
      type_s = 0;
      break;
    default:
    //   Serial.println("Device  is  not  a  DS18x20  family
device.");
      return;
  }

  ds.reset();
  ds.select(addr);
  ds.write(0x44, 1);       // start conversion, with parasite
power on at the end
   digitalWrite(FAN,HIGH);
  delay(1000);     // maybe 750ms is enough, maybe not
  // we might do a ds.depower() here, but the reset will
take care of it.
```

```
  present = ds.reset();
  ds.select(addr);
  ds.write(0xBE);         // Read Scratchpad

//  Serial.print("  Data = ");
//  Serial.print(present, HEX);
//  Serial.print(" ");
  for ( i = 0; i < 9; i++) {           // we need 9 bytes
    data[i] = ds.read();
//    Serial.print(data[i], HEX);
//    Serial.print(" ");
  }
//  Serial.print(" CRC=");
//  Serial.print(OneWire::crc8(data, 8), HEX);
//  Serial.println();

  // Convert the data to actual temperature
  // because the result is a 16 bit signed integer, it should
  // be stored to an "int16_t" type, which is always 16 bits
  // even when compiled on a 32 bit processor.
  int16_t raw = (data[1] << 8) | data[0];
  if (type_s) {
    raw = raw << 3; // 9 bit resolution default
    if (data[7] == 0x10) {
      // "count remain" gives full 12 bit resolution
      raw = (raw & 0xFFF0) + 12 - data[6];
    }
  } else {
    byte cfg = (data[4] & 0x60);
    // at lower res, the low bits are undefined, so let's
zero them
    if (cfg == 0x00) raw = raw & ~7;  // 9 bit resolution,
93.75 ms
    else if (cfg == 0x20) raw = raw & ~3; // 10 bit res,
187.5 ms
    else if (cfg == 0x40) raw = raw & ~1; // 11 bit res, 375
ms
    //// default is 12 bit resolution, 750 ms conversion
time
  }
  celsius = (float)raw / 16.0;
  fahrenheit = celsius * 1.8 + 32.0;


  //Serial.print("  Temperature = ");
  if (celsius>0){
    ActTemp=celsius;
  }
  //-----------------------------------------------------------
--------------------------


//  Serial.print(" Celsius, ");
  //Serial.print(fahrenheit);
 // Serial.println(" Fahrenheit");
```

```
//*********************************************************
**************************************************
if (mode==0){
  lcd.clear();
   lcd.setCursor(0, 0);
  lcd.print("Temp(c):");
  lcd.print(ActTemp,2);




}
//*********************************************************
**************
if (mode==2){


  lcd.setCursor(0, 0);
  lcd.print("T(c):");
  lcd.print(ActTemp,1);
  lcd.print(" AUTO");
   lcd.setCursor(0, 1);
  lcd.print("ST(c):");
  lcd.print(TSet);
  lcd.print(" ");

if (minx>0 || Sec>0){
if (ActTemp<TSet){
  SPEED=0;
  FANSTATE=0;
   digitalWrite(FAN,LOW);
}
if (ActTemp>TSet){
 // analogWrite(FAN,SPEED);
  digitalWrite(FAN,HIGH);



}
}

Serial.print(celsius);
  Serial.print("\t");
  Serial.println(TSet);

//TXX++;
//if (TXX>=1){
  if (Sec>0){
    Sec--;
}
  if (Sec==0){
    if (minx>0){
      minx--;
      Sec=59;
    }

    if (minx==0 && Sec==0){
```

```
      minx=0;
      Sec=0;
      lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("COMPLETED...");
digitalWrite(FAN,HIGH);
    digitalWrite(Buzz,HIGH);
    delay(100);
  digitalWrite(Buzz,LOW);
  delay(100);
  digitalWrite(Buzz,HIGH);
    delay(100);
  digitalWrite(Buzz,LOW);
  delay(100);
  digitalWrite(Buzz,HIGH);
    delay(100);
  digitalWrite(Buzz,LOW);
  delay(100);
    }


  }

  TXX=0;
 // lcd.setCursor(0, 1);
  lcd.print(minx);
    lcd.print(":");
    lcd.print(Sec);
    lcd.print(" ");
//}

}
//*********************************************************
**************


  //--------------KEYPAD----------------


      char key = keypad.getKey();
    //  lcd.setCursor(0, 1);
    //  lcd.print(key);
      if (mode==2){
         if (key != NO_KEY && key =='D'){
          OP=0;  mode=0; FANSTATE=0;
          digitalWrite(FAN,LOW);
        }
      }

      if (mode==2){
         if (key != NO_KEY && key =='*'){
          mode=0;
        }
      }
      if (mode==0){
        if (key != NO_KEY && key =='*'){
          OP=1;
        }
```

```
           if (key != NO_KEY && key =='#'){
            OP=0;
          }
          if (key != NO_KEY && key =='A'){
            OP=0;  mode=1;
          }
           if (key != NO_KEY && key =='B'){
            OP=0;  mode=2;
            minx=TimeSet;
            lcd.clear();
            digitalWrite(Buzz,HIGH);
            delay(20);
            digitalWrite(Buzz,LOW);
            delay(20);
            digitalWrite(Buzz,HIGH);
            delay(20);
            digitalWrite(Buzz,LOW);
            delay(20);
            digitalWrite(FAN,LOW);
          }
                 if (key != NO_KEY && key =='C'){
            OP=0;  mode=3;
          }
          if (key != NO_KEY && key =='D'){
            OP=0;  mode=0; FANSTATE=0;
            digitalWrite(FAN,HIGH);
          }
        }
        //-------------------------------------------------
---------------------
      if (mode==1){
        lcd.clear();
        lcd.setCursor(0, 0);
        lcd.print("Set Temperature");
       lcd.setCursor(0, 1);
       lcd.print(PwordIn);
       //lcd.print(dummy);
      }
       if (key != NO_KEY && key =='*'){

       }
       /*
       if (key != NO_KEY && key !='*'){

         mode=1;

         PwordIn += key;
         dummy +="*";
         lcd.setCursor(0, 1);
         lcd.print(PwordIn);
         countKEY = countKEY + 1;
         Serial.println(countKEY);
         Serial.println(PwordIn);
         delay(500);
       }
       */
       while (mode==1){
```

```
          char key = keypad.getKey();
     if (mode==1){
       lcd.clear();
       lcd.setCursor(0, 0);
       lcd.print("Set Temperature    ");
      lcd.setCursor(0, 1);
      lcd.print(PwordIn);
     //lcd.print(dummy);
     }
      if (key != NO_KEY){
        mode=1;

        PwordIn += key;
        dummy +="*";
        lcd.setCursor(0, 1);
        lcd.print(PwordIn);
        countKEY = countKEY + 1;
     //   Serial.println(countKEY);
     //   Serial.println(PwordIn);
     //   Serial.println(PASSWORD.toInt());
        delay(500);
      }
      if (key == '*'){
        PwordIn = ""; PwordInx = 0;
          dummy="";
          countKEY = 0;
          SMSX=0; mode=0;
      }

       if (key == '#'){
        TSet=PwordIn.toInt();
         lcd.clear();
       lcd.setCursor(0, 0);
       lcd.print("Temp Set...");
       lcd.setCursor(0, 1);
       lcd.print(TSet);
       lcd.print("C");
       delay(2000);
        PwordIn = ""; PwordInx = 0;
          dummy="";
          countKEY = 0;
          SMSX=0; mode=0;
      }

//&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
&&&&&&&&&&&&&&&&&&&&
        if(countKEY > 5){
        //NowPword = PASSWORD.toInt();
       // PwordInx = PwordIn.toInt();
        int Check=1;
```

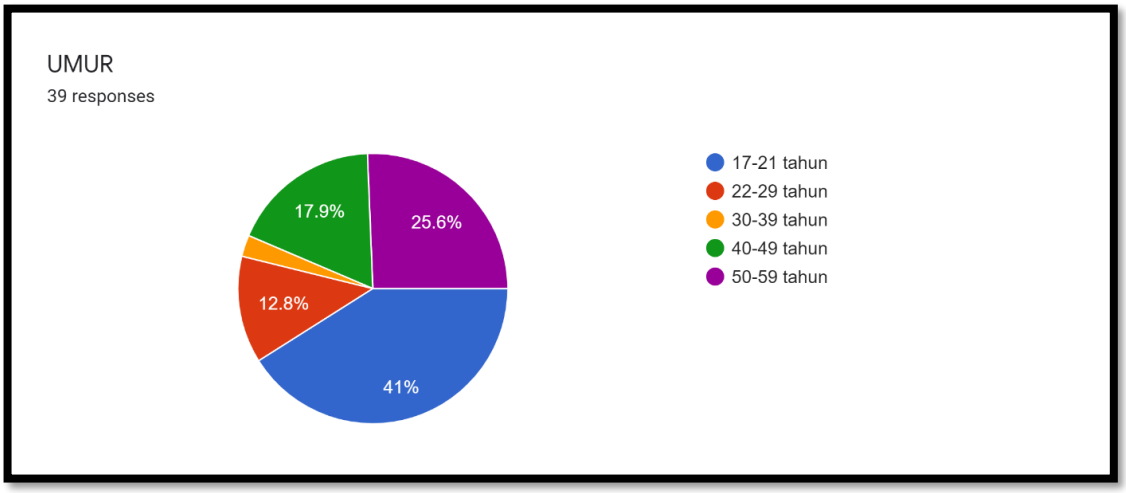
```
       if (Check==1){



       }



       }

//&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
&
         delay(10);

       }


//------------------------------------------------------------
----------------------------
     if (mode==3){
       lcd.clear();
       lcd.setCursor(0, 0);
       lcd.print("Set TIMER (min)");
      lcd.setCursor(0, 1);
      lcd.print(PwordIn);
      //lcd.print(dummy);
     }
      if (key != NO_KEY && key =='*'){

      }
      /*
      if (key != NO_KEY && key !='*'){

        mode=1;

        PwordIn += key;
        dummy +="*";
        lcd.setCursor(0, 1);
        lcd.print(PwordIn);
        countKEY = countKEY + 1;
        Serial.println(countKEY);
        Serial.println(PwordIn);
        delay(500);
      }
      */
      while (mode==3){
               char keyx = keypad.getKey();
     if (mode==3){
       lcd.clear();
       lcd.setCursor(0, 0);
       lcd.print("Set TIMER (min)  ");
      lcd.setCursor(0, 1);
      lcd.print(PwordIn);
     //lcd.print(dummy);
     }
```

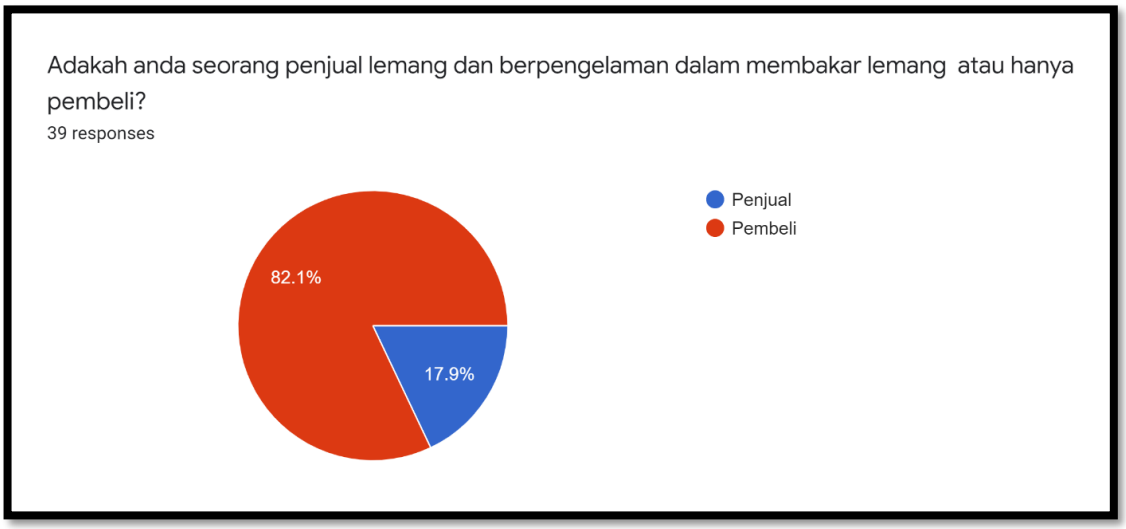
```
        if (keyx != NO_KEY){
          mode=3;

          PwordIn += keyx;
          dummy +="*";
          lcd.setCursor(0, 1);
          lcd.print(PwordIn);

          delay(500);
        }
        if (keyx == '*'){
          PwordIn = ""; PwordInx = 0;
            dummy="";
            countKEY = 0;
            SMSX=0; mode=0;
        }

         if (keyx == '#'){
          TimeSet=PwordIn.toInt();
           lcd.clear();
         lcd.setCursor(0, 0);
         lcd.print("Time Set...");
         lcd.setCursor(0, 1);
         lcd.print(TimeSet);
         lcd.print(" min");
         delay(2000);
          PwordIn = ""; PwordInx = 0;
            dummy="";
            countKEY = 0;
            SMSX=0; mode=0;
        }

//&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
&&&&&&&&&&&&&&&&&&&&&
          if(countKEY > 5){
          //NowPword = PASSWORD.toInt();
         // PwordInx = PwordIn.toInt();
          int Check=1;









        if (Check==1){



        }



        }
```

```
//&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
&

        delay(10);
      }

      //-----------------------------------------------------
--------




//-------------------------------------------------------------
------------------------


delay(100);



}

void Clear(){
          WRONGCOUNT=0;
          PwordIn = ""; PwordInx = 0;
          dummy="";
          countKEY = 0;  mode=0;
           digitalWrite(Buzz,LOW);

           delay(1000);
}
void DoorOpen(){




}
```

2.1 APPENDIX C :NEED ANALYSIS / MARKET ANALYSIS

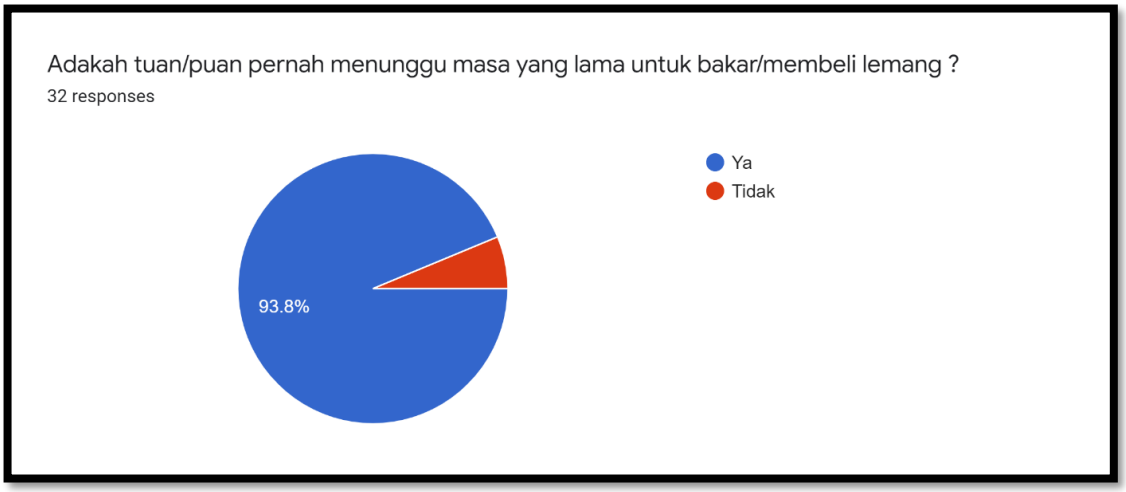
We have made an analysis of the survey we made using google form. our target respondent for this project is buyer and seller lemang. we have received 32 respondents from buyers and 7 sellers.



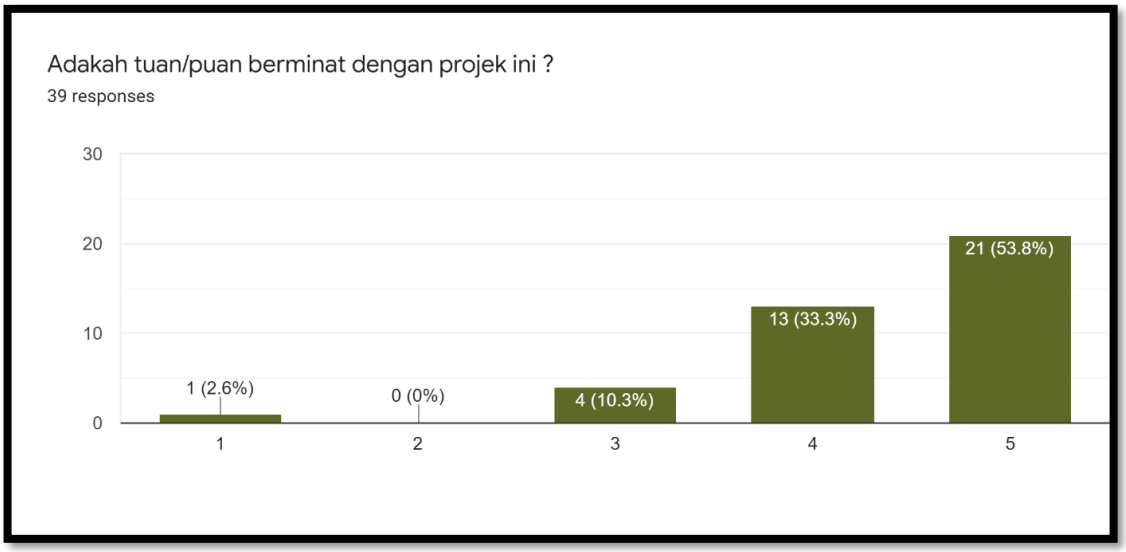


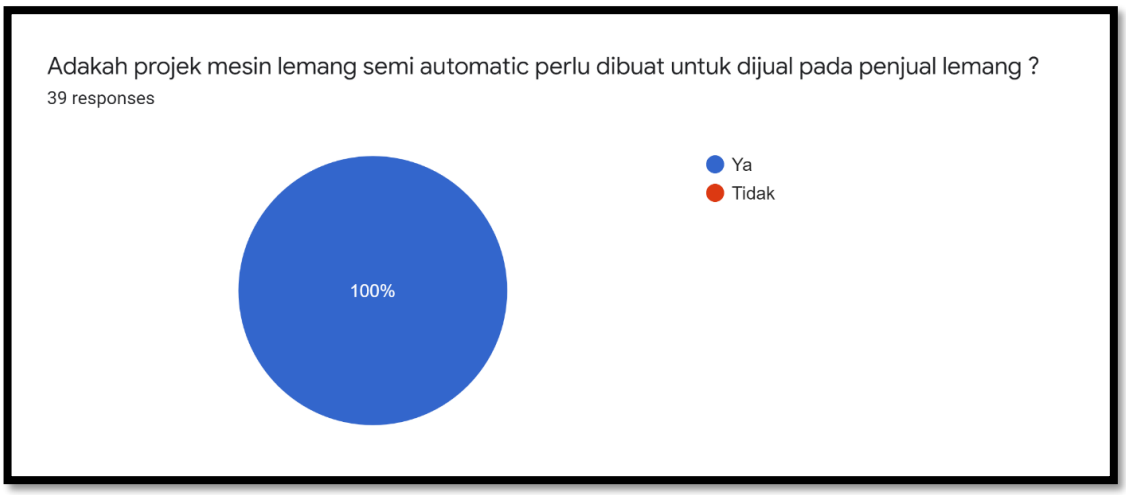
SELLER SECTION

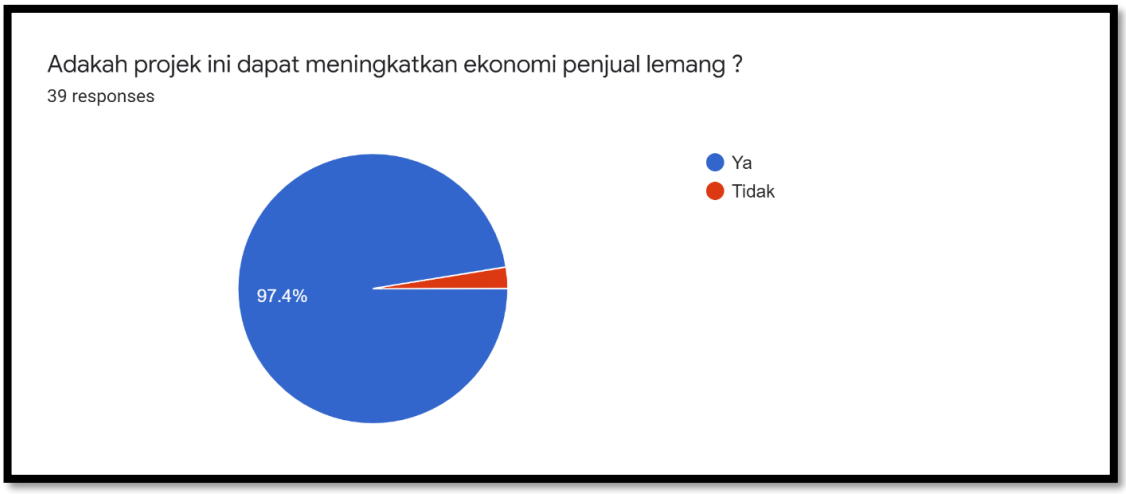
BUYER SECTION



GENERAL SECTION

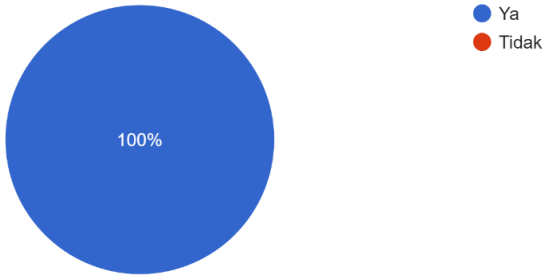



Adakah projek mesin lemang semi automatic perlu dibuat untuk dijual pada penjual lemang ?
39 responses
100%
Ya
Tidak


Adakah projek ini dapat meningkatkan ekonomi penjual lemang ?
39 responses
97.4%
Ya
Tidak

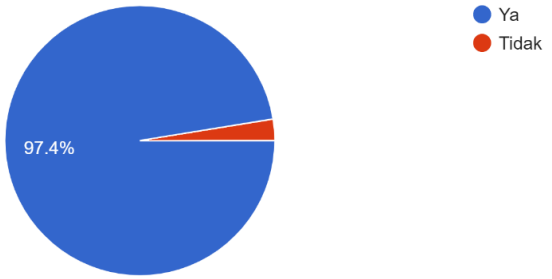
Adakah tuan/puan setuju projek ini dapat mengurangkan masa pembakaran lemang berbanding cara pembakaran yang tradisional ?

39 responses



Adakah projek ini dapat mengurangkan pembakaran terbuka dan kesan rumah hijau berbanding cara pembakaran yang tradisional ?

39 responses



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