# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

# DEVELOPMENT OF RICE COOKER INTEGRATED WITH ARDUINO CONTROLLER

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

by

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# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

## BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

Tajuk: DEVELOPMENT OF RICE COOKER INTEGRATED WITH ARDUINO CONTROLLER

Sesi Pengajian: 2019

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# DECLARATION

I hereby, declared this report entitled DEVELOPMENT OF RICE COOKER
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Signature:       ………………………………

Author :       Muhammad Faridzwan Bin Azman Shah

Date:       23 December 2019

# 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 Mechanical Engineering Technology (Automotive) with Honours. The member of the supervisory is as follow:

Signature: ………………………………………….

Supervisor:    MR. ARMAN HADI BIN AZAHAR

## ABSTRAK

Objektif utama inisiatif ini adalah pembangunan skim automatik dimana bertujuan untuk membantu membersihkan dan juga untuk memasak beras. Ciptaan ini membantu mengurangkan penggunaan masa untuk membersih dan memasak beras dalam proses yang biasanya mengambil masa yang lama untuk disediakan. Seterusnya, pengukuran kejernihan air akan diukur dan jika nilai yang dibaca melebihi yang ditetapkan, beras perlu dibersihkan sekali lagi sehingga nilai yang diingini tercapai. Sistem pembersihan beras dibuat berulang kali untuk menjamin kebersihan beras. Proses menanak nasi akan dijalankan pada proses yang terakhir selepas semua proses pembersihan dilaksanakan. Kecekapan dan kualiti perkakas ini akan dinilai dan dipantau untuk peningkatan selanjutnya menggunakan maklumat analisis yang diperoleh daripada system.

# ABSTRACT

The primary objective of this initiative is the development of an automated scheme which is to assist clean and cook rice. This invention helps to reduce the time taken to clean and cook the rice in the standard process which taking a lot of time to prepare it. Next, the water clarity measurement will measure the clarity of the rice water. If the reading exceeds that set value, the rice needs to be re-cleaned again, until the desired value is achieved. The system will repeat the cleaning method to guarantees the lower impurities. The rice cooker will be responsible for the final portion of the rice-cooking operation to ensure that this process is carried out. The efficiency and quality of the appliance will be evaluated and maintained for further enhancement using the analysis information obtained from the system.

# DEDICATION

Allah, our Creator.

Muhammad, our Prophet.

Faezah Binti Hassan, my mother.

Azman Shah Bin Md Isa, my father.

All of my family.

My Supervisor, Mr Arman Hadi Bin Azahar.

My friends.

To all Muslimin and Muslimat.

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| | | |
|---|---|---|
| **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 flowrate |
| **r** | - | Radius |
| **T** | - | Torque |
| **Re** | - | Reynold number |
| **V** | - | Velocity |
| **w** | - | Angular velocity |
| **x** | - | Displacement |
| **z** | - | Height |
| **q** | - | Angle |

# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

This chapter will clarify about the background, problem statement, objective, scope and outline of the project.

### 1.2 Background of the project

Rice has fed more people over a longer period than any other crop. As far back as 2500 b.c. rice has been documented in the history books as a source of food and for tradition as well. Beginning in china and the surrounding areas, its cultivation spread throughout Sri Lanka, and India. It was then passed onto Greece and areas of the Mediterranean. Rice spread throughout southern Europe and to some of north Africa. From Europe rice was brought to the new world. From Portugal it was brought into brazil and from Spain to central and south America. Rice could be taken to many parts of the world due to its versatility. It can grow in the desert conditions of Saudi Arabia, in the wetland deltas of southeast Asia in the flooded rice plains which we are most familiar with.

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Figure 1.1 Clean Rice Manually (https://bakedbree.com)

White rice generally needs a good rinse before cooking, to remove its starchy coating – not washing it leads to smellier rice that spoils faster. You put the rice in a bowl, cover with cold water and swirl around with your hand, repeating this several times until the water runs clear. To get clean rice from dirt, most users wash rice manually. This is very important because we do not know what happened during the rice packing process. When the packaging process occurs, potentially small stones or insects enter the rice during this process, and this can cause illness to the user's body due to eating unsanitary rice.

In today's era, technology is growing rapidly and developing. With the existing technology, the industry will develop a machine that facilitates humanity and in addition it ensures that the resulting product is more of a quality and good.

Out there there's a lot of rice cleaners on the market right now, but most is rice cleansing on a large scale that's used in the industry. For example, this product name is a Pilot. Figure 1.2 PILOT Rice Washing Machine use in industry show the example of rice washing machine. This machine will be used to wash the rice by removing all the dirt, rocks, bugs and also rice that's broken. The machine removes floating impurities,

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sand particles below 800 microns, dust and other washable impurities. It is also used for soaking rice to the required level of moisture and rinsing the excess water. It consists of a perforated vessel with stirrers. The washed material can be kept in the same vessel for soaking. Then it is rinsed and discharged through bottom for further processing. This machine can wash from 50 kilograms to 250 kilos of rice with one single wash. So, it's just used in the industry instead of home.



Figure 1.2 PILOT Rice Washing Machine use in industry

(https://www.pilotsmithindia.com )

For the project this time, this rice washing is focused using the Arduino controller to make this project run smoothly. This project automatically functions to clean rice and indirectly ensures that rice is cleared safe and tasty to eat.

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Before the rice being cooked, cooking pan, lid, measuring cup need to be clean first by using clean water and soap. After cleaning it, rinse it and dry it by using clean

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cloth. Quantity rice are being measured by cup provided in the packaging. Next step put the rice inside the clean bowl, the place the measured water inside the bowl together with rice. After the quantity of water and rice are correct, plug into the 230-240-volt AC and turn ON the switch. After turning ON the switch, the KEEP WARM light will light up. Press the automatic control lever to COOK to begin the cooking process. After the rice completely cooked, the lever at rice cooker will automatically turn to KEEP WARM back. Figure 1.3 displays the rice that being cooked is in perfect condition. This process is to ensure the rice not overcooked and keep the rice warm and ready to eat condition.(Perfect et al. n.d.). Figure 1.3 illustrates the overcooked rice.



Figure 1.3: Rice Cooked Perfectly ( https://surfingruinedmylife.net/ )



Figure 1.4: Overcooked Rice ( https://www.pinterest.com )

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**1.3     Problem Statement**

Nowadays, to cook the rice perfectly the users need to know how the suitable amount of water need to be poured into the bowl. Effect from it, the rice that been cooked maybe chewy or hard in the middle after the allocated time. Even using an automated rice cooker, the user still needs to know the amount of water need to be measured in the bowl. Furthermore, the another problem that we can find is , the user didn't clean the rice perfectly and this will harm the user which eat the unclean rice .For the user which didn't have enough time, this process will be a burden to them. They didn't care the cleanliness of the rice which they will cook.

**1.4     Objective of Project**

The project focusses on the following three objectives:

1) To implement an automated rice cooker with IoT system.

2) To determine the value of water clarity that represent the cleanliness of the rice.

3) To evaluate the effectiveness of the performance of the rice cleaner.

**1.5     Scope of Project**

- Design system that can automatically clean and cook rice.

- Implemented the rice cooker with IoT system.

- Determine the rice quality by using water turbidity.

## 1.6    Outline of Project

This project consists of five main chapter:

1)  Chapter 1: Introduction of the project

2)  Chapter 2: Literature review

3)  Chapter 3: Methodology

4)  Chapter 4: Result

5)  Chapter 5: Conclusion

For this progress of the project, students will discuss about the introduction, objective, problem statement and scope of the project. On the next chapter, we focused on the theoretical things such literature review, software and the hardware specification. Furthermore, this chapter discussed about the product which is already in the market right now. In the chapter 3, methodology and project development will be discuss in this chapter. In the chapter 4, the result that we obtain from this project progress will be discuss. This will show the project improvement and unsuccessful result that we get during this period. At the end of the chapter 5, it will discuss about the conclusion of this project and what improvement that can be done in the next project.

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## CHAPTER 2

## LITERATURE REVIEW

## 2.1    Introduction

In this chapter, it will discuss about the project researches. Every topic in the title explained the case study which is related for this topic. This chapter will be written based on article, books, blog, magazine, information in the websites or the case study which is related and already published. It generally follows a discussion of paper thesis statement or the study's goals. This chapter is important because it have a conclusion of cognition from practical and theory perspective.

## 2.2    Rice

Rice is the main supply to almost all the world's population. At this moment, grain is the one of the vital commercial food crops. 535 million ton of rice are being produce and consume everyday by the users. In the world, there are 50 countries that yield rice, China and India manipulated half of the production. Almost 9 to 23 million metric of rice production are being support by Southeast Asian countries. In Asian lands, over 300 million acres are used to growing the rice. For them, it is already act as a main trade mark because rice is important for Asian people. Figure 2.1 depicts the rice cooked perfectly.

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