UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF RICE CLEANER BY USING ARDUINO CONTROL

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 Robotic) with Honours.

by

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DECLARATION

I hereby, declared this report entitled “Development of Rice Cleaner by using Arduino Control” is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Automation and Robotic) with Honours. The member of the supervisory is as follow:

……

(Project Supervisor)

ABSTRAK

Tujuan utama projek ini adalah untuk membangunkan sistem automatik yang boleh membantu pengguna dalam pembersihan nasi. Proses biasa mengambil banyak masa, dengan ciptaan ini, ia akan membantu untuk mengurangkan jumlah masa yang diperlukan untuk membersihkan beras. Dari segi ukuran kebersihan, LDR yang akan digunakan dalam projek ini akan membantu pengguna untuk mengesan kebersihan beras sebelum ia dimasak. Ketika datang ke bahagian akhir proses, pengukuran kejernihan air akan mengukur kejernihan air beras, jika ia melebihi nilai tertentu yang ditetapkan, nasi perlu dibersihkan lagi. Proses pembersihan berulang yang dilakukan oleh sistem akan memastikan bahawa, akan kurang kekotoran bandingkan dengan teknik yang sedia ada. Dan mengakibatkan tahap jaminan lebih untuk pengguna kerana ia lebih canggih dan mudah untuk digunakan. Menggunakan analisis data yang digambil dari sistem, keberkesanan dan prestasi produk akan dinilai dan akan dipelihara untuk penambahbaikan.

ABSTRACT

The main purpose for this project are to develop an automated system which can help user in cleaning the rice. The normal process takes a lot of time, with this invention, it will help to reduce the amount of time needed to clean the rice. In terms of cleanliness, water clarity measurement, LDR that will applied in this project will help user to detect the cleanliness of the rice before it being cooked. When it comes to the final part of the process, water clarity measurement will measure the rice water clarity, if it exceeds the certain value that is set, the rice need to be clean again. Repeated cleaning process that was overdone by system will ensure that, there will be less impurities compare to the existing technique. And resulting in more assurance level for the user as it is more sophisticated and convenient to be used. Using the analyze data retrieve from the system, the effectiveness and the performance of the product will then evaluate and kept for further improvement.

DEDICATION

Allah, our creator.

Muhammad, our prophet.

Mohd Sahet Bin Parman, my father.

Wan Munah Binti Wan Samat, my mother.

My sister and my brother.

The rest of my family.

My Supervisor, Mr. Arman Hadi Bin Azahar.

My friends.

To all Muslimin and Muslimat.

Without all of your support, advice and encouragement, I will not finishing my project. Thank you for always supporting me and believing in me. I will never truly be able to express my sincere appreciation to all of you. Thank you.

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INTRODUCTION

1.1 Introduction

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

1.2 Background of the Project

As one of the most popular grains worldwide, rice is part of almost every great culinary tradition. Rice is the seed of the grass from the species of Oryza sativa, or known as Asian rice and Oryza glaberrima or known as African rice. Rice grain is being consumed by nearly 7 billion of human population. At Asia, this grain is consumed by a 90% of people every day. It is their main food including others food like meat, vegetable, bread, fruit and etc.

Before the rice is being cooked , the rice should be clean first, but there are a few confusing opinion that suggest user should not clean the rice because the cleaning process will remove the nutrients and the most important one is to keep extra starch. Whatever it is, it's worth trying a through wash at least once, to bring a simple bowl of rice to the height it deserve. Figure 1.1 below show the example of user cleaning the rice manually.

Figure 1.1: User clean the rice manually

To have a clean rice, most of the user need to clean the rice manually. There will be a few process that need to be done. This process is important to do because user do not know what is mixed with the rice when the rice is being packaging. There will be a small stone, dust, dirt, insects or pesticides. All this things, maybe can be a harmful things for our body if it is not cleaned with the right process.

Nowadays, the technology is become more sophisticated. It has helped develop more advance things. With technology, there will be a company that develop a machine to easy the human job. In this rice market, they are offering a larger machine for a bigger scale of rice cleaning. But this machine is not suitable for the household. They are widely used for industrial purpose only.

There is a lot of rice machine washer available in the market right now, but as mentioned many of the machine is in a larger scale. For example, rice machine washer from tradeindia. The product name, PILOT. This machine will be used to clean the rice by removing all the sand, rock, insect, dirt or other impurities from raw rice. After finished the main process, washed material can be collected through bottom center door. Additional info is, this machine is fitted with the reduction of gear and motor which will be rotating the stirrers positioned in double walled stainless steel conical vessel. Figure 1.2 shows the PILOT rice washing machine.

Figure 1.2: PILOT Rice Washing Machine

For this project, it is purposely focus on development of a rice cleaner by using Arduino control. This project will operated automatically to clean the rice to help user to get rid the surface starches, bugs, prevent clumping, and yields a clean and fresh taste. The user just need to know how this project function by learning how to operate it.

To maintain the cleanliness of the rice, this project will use PH measurement. Based on the article, a good rice should have a PH of less than 4.6. Once the machine finish clean the rice, it will check the rice to ensure it is below 4.6, if the PH of the water is greater than 4.6 the rice need to be clean again until it fulfill the requirement that we set.(How 2016)

The second method to determine the cleanliness of the rice is by using an LDR. This method is use to determine the water clarity or turbidity in the rice water since the water from washed rice is cloudy. Once the rice already in its final cleaning process, LDR will determine the water turbidity, and if the water already pass certain requirement that we set in LDR, the cleaning process is done.

1.3 Problem Statement

Nowadays, to cook the rice, user need to know how to clean the rice first. Basically, user needs to put the rice in the bowl. After that, submerge the rice in water by adding the water until the rice is covered. Then, need to stir the rice around by hand to remove the surfaces starches, bugs, dirt or maybe a dust. Poor out the cloudy water, or anything that has floated through the surface. And repeat this process until getting a clear water. All this process, require a lot of times. And if the user did not clean the rice with the right process, they will end up eating something that is not healthy for them. For a user that maybe did not have time, this process will burden them. They cannot estimate time for cleaning the rice. It will be hard for the user to predict or planning what is the next process or activity need to be done.

1.4 Objective of Project

The project focusses on the following 3 objectives:

1) To determine value of water clarity that represent the cleanliness of the rice.
2) To design an automatic rice cleaner that using water clarity measurement.
3) To evaluate the effectiveness or the performance of the rice cleaner.

1.5 Scope of Project

The scope of this project is divided into 3 main point:

1) To design a system that can automatically cleans the rice.
2) To design a system that can measure clarity of the water by using LDR.
3) Determine the rice quality and hygiene by using water clarity measurement.

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 the first progress of the project, chapter 1 will discusses about the introduction, objective, problem statement and the scope of the project. Moving on the next chapter, it contained more on the theoretical things such as literature review, software and the hardware specification. This chapter also discuss more about the same product that already being used in the market. For the chapter 3, it will discuss on the methodology and the project development. Here it will show more detail about the project flow. Last but not least, chapter 4 will discuss the result that we obtained during the project progress. It will show project improvement and failure result that we get during this period. The last chapter is about the conclusion of the project and what can improve for the next future project.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will discuss more about the researches to the project. Each main topics of the tittle will describe the case study related to the topic. It is written based on the study related to the article that is being published, blog, book, magazine or any other information at any webpage. Literature review is important because of, it have overview or can be called as conclusion of knowledge from both theoretical and practical perspective. It also can be a guide for a researcher to avoid the same mistakes by past researchers. This study can help a lot during the progress of the project beside can help to gain more ideas, information, expected result, solution or maybe a problem that can occurs during this period.

2.2 Rice

Rice is the main source for over half the words population. By far this grain already become one of the most important commercial food crops. It being consume every day and the production of rice is almost 535 million ton. In earth, there are 50 countries that produce rice, with China and India is conquering almost half of the production. The Southeast Asian countries support almost 9 to 23 million metric of the rice production.

Over 300 million acres of Asian land is used for growing the rice. Rice is important to many of Asian people because of, it is already act as main trade mark for them. Figure 2.1 below show the rice. (JacquelineL.Longe 1996)

Figure 2.1: Rice

Rice is a unique cops because it can grow in wet environments that other crops cannot survive in. In Asia, there is a lot of wet environment abundant across it. The domestication of rice has become the most important development in history and now there is a thousand type of rice that are cultivated on every continent except Antarctica. Rice have a lot of the nutrients such as carbohydrates, proteins, minerals and fats respectively. Because of high phytonutrient level, processors are currently using the rice oil and bran in foods. The unique properties and broad application that have in the rice flour and starch become a popular ingredients across multiple product categories. Figure 2.2 shows the rice cultivation. (Partnership n.d.)

Figure 2.2: Rice Cultivation

After rice reaches its maturity around 105 to 150 days, usually farmers will harvest the rice manually or using the harvester machine. For the manually rice harvesting, farmer need to use their both hands to harvest the crop. This activities is including the cutting, stacking, handling, threshing, hauling and cleaning. Manual harvesting as shown in Figure 2.3 is the most methods that being used in Asia. Farmer just need a knife or sickles to cut the rice crop. This methods is effective when a crop has been lodged or fallen. With its effectiveness, these methods also have a few disadvantage, where it's take additional labors to manually collect and the harvested crop. The right process will give a good result whereas harvesting will maximize grain yields, grain damage and the deterioration. Using the harvester machine as shown in Figure 2.4 is the second option in this rice cultivation industries, but due to its availability and cost of the machine it is not widely uses by a farmer. (Partnership n.d.)