Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF SMART REWARD DISPENSER USING ARDUINO

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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DEVELOPMENT OF SMART REWARD DISPENSER USING ARDUINO

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in partial fulfillment of the requirements for the degree of
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Faculty of Electrical and Electronic Engineering Technology

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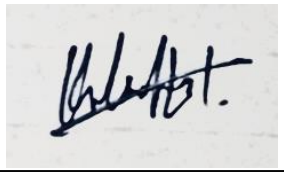

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APPROVAL

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

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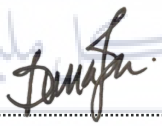
Signature : 

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DEDICATION

To my beloved father, Mr Ho Kai Seng, and mother, Mrs Lee Ah Geok,

my supervisor, Dr. Haslinah Binti Mohd Nasir,

and

my beloved friends,

Thank you.

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ABSTRACT

Kids don’t really understand the reason why they need to study and learn all the subjects in school. Besides, it is a difficult task for the kids and even students to participate in their learning process as they are difficult to focus their attention throughout the lesson. Kids really love rewards and it is one of the initiatives to increase their motivation to learn. Hence, this project aims to develop a smart reward dispenser using a thumbprint sensor for login authentication which integrates with the cloud database. To create this project, Arduino Mega 2560 is chosen as the main controller of the system, followed by Cytron ESP8266 Wi-Fi shield, ILI 9486 TFT LCD act as the touch screen display, DY50 optical fingerprint reader sensor module, and a servo motor. By integrating the system with the cloud database, each student can redeem rewards based on their performance during classes. Three selections can be chosen from the first menu on the touch screen display; register new user, log in for existing users and delete to remove the existing user. All these can be done by using thumbprints detection. The ThingSpeak cloud database is used for storing the students' performance data by day. The authentication login system using thumbprint successfully recognized the registered student and was able to redeem the rewards as requested. In conclusion, this project is successfully developed and fully functional where it might help to motivate the students during their learning process.

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ABSTRAK

Kanak-kanak tidak faham sebab mereka kena bersekolah dan belajar semua subjek di sekolah. Selain itu, ia merupakan suatu tugasan yang sukar bagi kanak-kanak dan pelajar untuk mengambil bahagian dalam proses pembelajaran mereka kerana mereka sukar untuk fokus sepanjang waktu kelas. Kanak-kanak gemar diberi ganjaran dan ia merupakan salah satu inisiatif untuk meningkatkan motivasi mereka untuk belajar. Oleh itu, projek ini bertujuan untuk membina sebuah sistem agihan ganjaran pintar yang disepadukan dengan pangkalan data dengan menggunakan cap jari sebagai pengesahan untuk log masuk. Untuk membina sistem ini, Arduino Mega 2560 telah dipilih sebagai pengawal utama sistem, diikuti dengan Cytron ESP8266 Wi-Fi shield, ILI 9486 TFT LCD sebagai paparan skrin sentuh, cap jari sensor optik DY50 dan motor servo. Dengan menyepadukan sistem tersebut dengan pangkalan data, setiap pelajar boleh menebus ganjaran berdasarkan pretasinya semasa waktu kelas. Terdapat tiga pilihan yang boleh dipilih dari menu pertama di paparan skrin sentuh, iaitu mendaftar pengguna baharu, log masuk ke pengguna sedia ada dan memadam untuk mengeluarkan pengguna sedia ada. Tindakan tersebut boleh disiapkan dengan megesan cap jari. Pangkalan data ThingSpeak digunakan untuk menyimpan data prestasi pelajar setiap hari. Pengesahan untuk log masuk sistem dengan menggunakan cap jari dapat mengesan pelajar yang didaftar dan berjaya menebus ganjaran seperti yang diminta. Sebagai konklusi, projek ini telah berjaya dibina dan berfungsi dalam keadaan yang baik di mana ia dipercayai untuk memotivasikan pelajar-pelajar semasa waktu kelas.

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LIST OF ABBREVIATIONS

IoT	-	Internet of Things
V	-	Voltage
LCD	-	Liquid-crystal display
TFT LCD	-	Thin-film-transistor liquid-crystal display
uC	-	Microcontroller
RFID	-	Radio frequency identification

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CHAPTER 1

INTRODUCTION

1.1 Background

Kids can be considered as ‘builders’ of every country as they play an important role in the process of development of every country. They will shoulder all types of duties such as engineers, doctors or even a prime minister to build the future and prosperity of every country. Hence, they need to be educated well in a healthy and happy environment since kindergarten to make sure both of their physical and mental can grow up normally which can develop and manage a country well. People feel happy during receiving rewards after their hard work, especially in a company. As an example, employees will feel happy after receiving rewards from their employers for completing some complex, or difficult tasks which required a lot of research and planning.

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The same theory goes to the kids, they really like rewards for whatever they have done either in school or daily life. To tell the truth, kids especially at the age of six or below don’t know what they really want [1]. They don’t really understand the reason why they need to study and learn all the subjects in the school even though they don’t really like that subject. In their mind, they will wonder when their parents bring them for a vacation, shopping or playing at a playground. Besides, it is not an easy task for kids to focus their attention throughout the lesson. Most of them will prefer to watch a short YouTube video instead of listening to the class [2]. The situation may have become worse when the kids are

being hungry or something happened such as a fight, the probability of the kids getting distracted is higher and thus, they are likely to do something wrong.

A rewards system may encourage the kids to have a learning habit as they will always look for the rewards. Besides, it will also train the kids to stay focused indirectly as the teacher may ask questions during classes. Kids who always stay focused during classes have a higher probability to answer questions compared to others who are not focused. Hence, a smart reward dispenser system is proposed as it becomes a must to increase the motivation of the students in school especially in the kindergarten during their learning process. Thus, this project will integrate with the cloud database to attract students to participate more in the learning activity. The reward dispenser will read the data from the cloud storage through the IoT platform, which the data is collected based on student performance. The student will need to login into their account so that they can get the rewards based on their achievement.

1.2 Problem Statement

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The method of rewarding students in the education system has been introduced a long time ago, and until now there are many teachers who wonder if they really need this kind of system to handle their classroom. It may be difficult for the students especially kids to participate in their own learning process, and to add insult to injury, some situations may be even worse such as failing grades, poor attention and focus of students, incomplete assignments or homework and low student motivation and interest. Hence, the answer to this problem statement is yes to encourage and motivate students in their learning process although it is not compulsory [3]. Besides, this type of rewarding system also prevents teachers from consuming too much time on calculating students marks. In the era of Industry 4.0, the rewarding system should be digitalised so that teachers can focus completely on

educating students and at the same time increase the motivation of students to study well. Furthermore, this system can be said fair and square as it will dispense the rewards based on the performance of every student which has been saved in the cloud database. To conclude, this smart reward dispenser system can cure some of the negative situations as stated above and produce a better student either academic or personal behaviour.

1.3 Project Objective

Specifically, the objectives are as follows:

a) To develop smart reward dispenser system using thumbprint sensor for login authentication.

b) To integrate the system with the cloud database for redeeming rewards.

1.4 Scope of Project

To complete this project, there are three scopes of this project need to be completed as follows:

a) Designing circuit for reward dispenser.

b) Adding authentication system for log in by using fingerprint.

c) Create a dummy cloud database to store students' data.

1.5 Thesis Organisation

Organisation is the significant part to overview the whole process of this project. In detail, the thesis organisation are as follows:

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- Chapter 1: Introduction

  This chapter briefly describe the background of this project. Then, it is followed by the problem statement and the project objective. This chapter concludes with the scope of project and the thesis organisation.

- Chapter 2: Literature review

  This chapter shows the research of other projects which have done by previous researcher. Besides, a clearer information of the previous projects can be obtained by creating a comparison table between all of them such as the components used, method, advantages and disadvantages.

- Chapter 3: Methodology

  This chapter shows the list of equipment and components specification. Then, it is followed by the block diagram and the experimental setup of this project. This chapter concludes with a schematic of this prototype which is sketched based on the block diagram and experimental setup of this project.

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- Chapter 4: Results and Discussions

  This chapter shows the result and discussion of this project based on the prototype. Based on the data obtained, chapter concludes with discussion about the expected result of this project.

- Chapter 5: Conclusion and Recommendations

  This chapter will discuss the conclusion of this project. It is followed by the recommendations which can enhance the function of this project.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, the deeper understanding of the project Development of Smart Reward Dispenser Using Arduino can be done by discussion and determination from previous research and projects which related to the title. All information and knowledge from the previous research and projects which obtained from Internet are clearly cited. This project proposes smart reward dispenser using Arduino which can be used to distribute the rewards based on students' performance which obtained from the dummy cloud. By using this system, it can help teacher to display the data of students' performance through dummy cloud and perform marks deduction after the students redeemed their rewards.

2.2 Previous Research and Projects

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There are several previous research and projects can be found on the Internet and they are stated below with their circuit diagram, block diagram and their prototype image. Besides, a comparison of previous research and projects based on method, component used, advantages and disadvantages are shown after the summary. Hence, a clearer concept to create this system can be seen before proceeding to the next chapter as it will determine the equipment which required for the system.

Figure 2.1 shows the circuit diagram of password enabled door locking system using Arduino and IoT. The purpose of this research is to develop a door locking system which can be used for residential areas and offices. This system consists of two units, which are entry for the user and exit for the user. It will determine the correctness of the password entered by user and each user has a maximum 4 wrong attempts. Once the user entered a wrong password for more than 4 times, the system will automatically block any input and it can only back to its function after reset. Since the system is connected with Wi-Fi module ESP8266P, hence it will send a data to the cloud, which is the password entered by the user to compare with the preset password. Once the password entered match with the preset password, the door lock will open for 2 minutes [4].

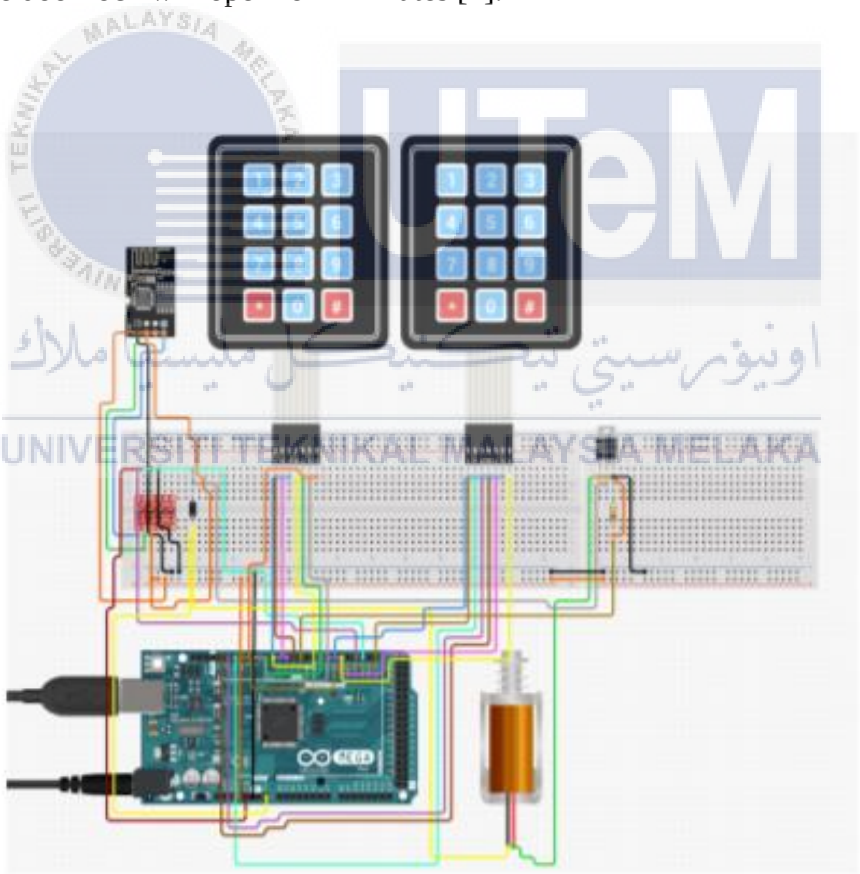

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Figure 2.1 : Circuit diagram for password enabled door locking system using Arduino and IoT

Figure 2.2 shows a data acquisition system with TFT graphic interface using Arduino Uno. The purpose of this research is to develop a simple and cheap data acquisition system which able to run some function such as analog to digital conversion, digital signal processing and displaying data. After configuration of the coding such as libraries, setup of TFT LCD and declaration of variables, the TFT LCD should be able to display output if the coding are successful compiled and uploaded to Arduino Uno [5].

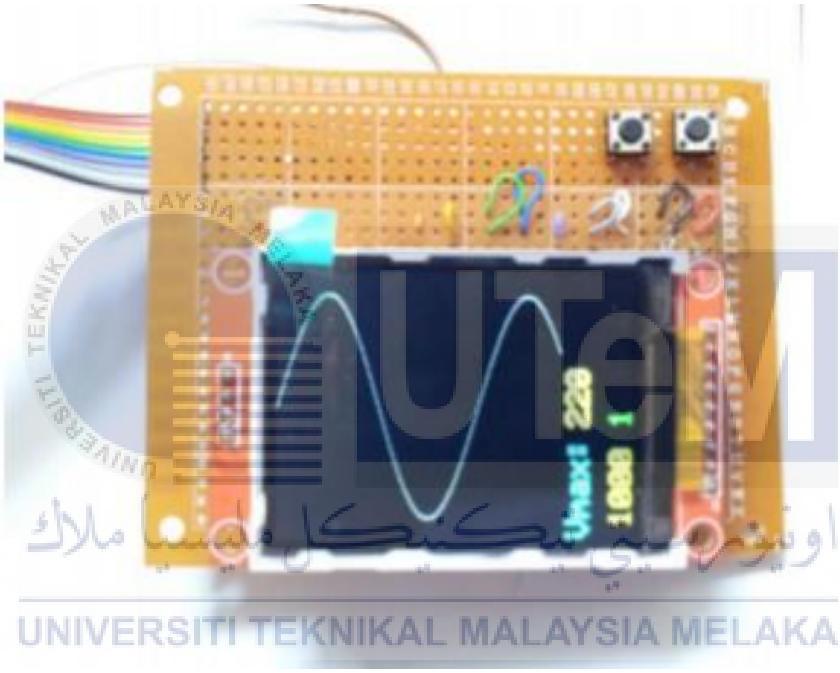

Figure 2.2: Data acquisition system with TFT graphic interface

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Figure 2.3 shows a smart garbage separation and monitoring system using Microcontroller LPC2148. The purpose of this research is to develop smart garbage separation and monitoring system whereby it can solve the garbage problem as it can separate the garbage into two types, which are wet and dry. The microcontroller is connected to various type of sensor such as ultrasonic sensor and moisture sensor which aid in the process of separating the garbage. By connecting Wi-Fi module ESP8266 to the microcontroller, it will obtain data such as bin level and system status so that the owner can monitor the system and plan if any maintenance is needed [6].

Figure 2.3: Smart garbage separation and monitoring system

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