Faculty of Electrical and Electronic Engineering Technology

THE DEVELOPMENT OF AN IOT BASED CHARITY BOX AUTOMATION AND SECURITY SYSTEM

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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Bachelor of Electronics Engineering Technology with Honours

2023

THE DEVELOPMENT OF AN IOT BASED CHARITY BOX AUTOMATION AND SECURITY SYSTEM

AZIMAH BINTI ZAINAL ABIDIN

A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Electronics Engineering Technology with Honours

Faculty of Electrical and Electronic Engineering Technology

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I hereby, declared this report entitled The Development of An IoT Based Charity Box Automation and Security System is the results of my own research except as cited in references.

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Date : 13th January 2023

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DEDICATION

To my beloved mother, Kidah Binti Musa and father, Zainal Abidin Bin Che Mok,

and to my supervisor Amar Faiz Bin Zainal Abidin.

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ABSTRACT

This paper or report presents the Internet of Things system for security system as well as automation. With the availability of the Internet of Things, it helps consumers in their daily lives to some extent, In addition to the increasing number of cases of theft or intrusion in Malaysia in recent years, which has various negative effects on society has shifted their focus towards the effectiveness of the security system. This has indirectly sparked the idea of implementing a mosque fund with the concept of security features that are targeted by criminals. It is therefore a responsibility for consumers to take precautionary action in order to prevent charity boxes from being stolen. One of the safety applications that are applied is several components and sensors in or around the charity box. Therefore, if a theft activity is detected this system will sound the alarm siren, by using this system it can reduce the risk of theft mosque funds and this system is also equipped by sensors as secure ways in the mosque when the charity box was break in by someone. Another advantages of this system is that the key can only be accessed by the mosque committee in order to open it.

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ABSTRAK

Kertas kerja atau laporan ini membentangkan tentang sistem Internet of Things untuk sistem keselamatan dan juga automasi. Dengan adanya Internet of Things ia sedikit sebanyak membantu pengguna dalam kehidupan seharian, tambahan pula bilangan kes kecurian atau pencerobohan yang semakin meningkat di Malaysia sejak kebelakangan ini yang memberi pelbagai kesan negatif terhadap masyarakat secara tidak langsung telah memberi kesedaran yang tinggi terhadap sistem keselamatan, ini secara tidak langsung telah tercetusnya idea untuk saya melaksanakan sistem pada tabung masjid berkonsepkan ciri keselamatan yang menjadi target penjenayah. Oleh itu, ia menjadi satu tanggungjawab untuk pengguna mengambil tindakan yang berwaspada supaya dapat mengelakkan tabung masjid dicuri. Salah satu keselamatan yang digunapakai ialah dengan menggunakan beberapa komponen dan sensor di dalam tabung atau di kawasan tabung tersebut. Oleh itu, jika terdapat kecurian sistem ini akan mengeluarkan bunyi penggera. Kajian ini memfokuskan kepada pernyataan masalah, dengan menggunakan sistem ia dapat mengurangkan risiko kes kecurian tabung masjid dansistem ini juga dilengkapi dengan beberapa sensor untuk sebagai langkah keselamatan di dalam masjid apabila tabung masjid dipecah oleh seseorang dengan kelebihan sistem ini kunci hanya boleh dibuka oleh ahli jawatankuasa masjid untuk membukanya.

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ACKNOWLEDGMENT

First and foremost, I would like to express my gratitude to my supervisor, Amar Faiz Bin Zainal Abidin for their precious guidance, words of wisdom and patient throughout this project.

I am also indebted to Universiti Teknikal Malaysia Melaka (UTeM) and my parents for the financial support through PSM 1 and 2 which enables me to accomplish the project. Not forgetting my fellow colleague and my senior Muhammad Fadhil Bin Amiruddin for the willingness of sharing his thoughts and ideas regarding the project.

My highest appreciation goes to my parents, and family members for their love and prayer during the period of my study. An honourable mention also goes to Muhammad Shahrul Bin Kadid and Nik Muhammad Arif Fahmi Bin Nik Ab Aziz for all the motivation and for all play role in completing this project.

Finally, I would like to thank all the staffs at the UTeM, fellow colleagues and classmates, the Faculty members, as well as other individuals who are not listed here for being co-operative and helpful.

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LIST OF SYMBOLS

cm	-	Centimeter
v	-	Voltage
m	-	Meter

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LIST OF ABBREVIATIONS

BOM	-	Bill of Materials
$CCTV$	-	Closed Circuit Television
dB	-	decibel
DC	-	Direct Current
GSM	-	Global System Mobile
IoT	-	Internet of Things
KBps	-	KiloBytes Per Second
LCD	-	Liquid Crystal Display
NO	-	Normally Open
RAM	-	Random Access Memory
RFID	-	Radio Frequency Identification
SCL	-	Serial Data
SDA	-	Serial Clock

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter aims to set up a framework and present simple ideas for project. It focusing on the project overview, elaborated on the purpose of the project, a brief description of the problem, scope and results.

1.2 Background

The mosque is a place of worship for Muslims, not only that but the mosque is place where the activities of collecting zakat and payment of zakat as well as a place to gain knowledge. Sourced from alms and waqf donations from various parties, the mosque instituteis believed to be able carry out this responsibility and trust. According finding by Hidayah (2022) donation collection during Friday's prayers 50% increases since the mosque reopened [1].

From several news article burglars break charity box and steal money was increases. Since then, the purpose of this project to develop an IoT based mosque automation and security system that can be implement in our society and send the data through wireless device to microcontroller. Next, microcontroller processed and transmitted the data to sensor. These would help the society from crime. Usually the system with an IoT still not widespread. With the availability of this technology it can reduce the rate of criminal cases.

1.3 Problem Statement

As of late, there are some not really pleasing news to hear which is regarding the increasing the number of theft cases in our country. Namely the case of breaking into mosques.According to the article R. Meor (2022) cases of breaking the charity boxes in Melaka, Malaysia up to 163% [2]. Although there are several type of electronic devices or security system such as CCTV marketed but the cases still increases. Nowadays, theft cases are very common in the mosque. The mosque management can see the footage after the break in case occurs thisis indirectly makes the security system looks a little weak from an emergency response. Then the padlock that are using now in the mosque charity box easy to break in. Not only that, there no alarm system trigger during the charity box was break in. Moreover the less demand from consumers for security system is due to relatively expensive cost factors in the market and the complex installation methods.

1.4 Project Objectives

The main objectives to produce a prove of concept an electrical charity box equipment with alarm system and push notification. Based on the main objective, there are four elements the charity box

a) To design an electrical the charity box using Autocad to design 3D model and Arduino IDE as source code.

b) To build a low cost, portable electronic charity box for mosque management. A portable electronic charity box with size 30cm x 30cm x 34.5cm box. Estimated cost for this project less than RM 200.00.

c) To verify the functionality, security and performance of the electronic charity box by performing a set of system testing fully integrated applications.

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d) To validate the effectiveness of electronic charity box by performing a survey consist of 15 questions.

1.5 Scope of Work

Scopes are recorded to guarantee the venture will be inside its expected limit. This project will use Nodemcu which connect to application Blynk IoT, The NodeMcu development board can be easily programmed with Arduino IDE. Looking back in the old days, most people would give charity to mosque members manually or by shaking hands because at that time there were no more existing facilities, but the change of times has resulted in the mosque fund, which makes it very easy for the public or mosque members to give charity regardless of time. Not only that, in fact the mosque fund has also been innovated in line with IR 4.0. If in the past there was only a mosque fund, but nowadays, funds are implemented with the concept of safety and automatic features to reduce the rate of theft of mosque money.

In implementing the low cost prototype that can be used in Internet of Things based automation and security system with cost the system also less than RM200 including required component. With around 1.5kg weight and width 34.5cm x length 30cm x height 30cm of size, the project focusing in automation and security system. The prototype also made from wooden that has 1 cm thickness where it is a low cost than steel or plastic acrylic transparent. The electronic charity box more safer in high position which is can avoid from violations with animals such as cats.

For develop the application, Blynk IoT is used. This application required the mosque management to connect it using WiFi to open the solenoid key, As we know mostly the mosques throughout in Malaysia have already internet facilities. Blynk IoT is choose for develop the application as it can operate in Android Operating System, where most we can

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afford to buy android phone. It can control hardware remotely and also can display data or send notification. Not only that, Blynk apps also can create an amazing interface for projects IoT. Furthermore, the accelerometer has been used which is it can sense the vibration from scale that are program in Arduino IDE. A 3 axis digital accelerometer and 3 axis digital gyroscope. It helps to measure the angular velocity along the x axis, y axis and z axis. The accelerometer and linear velocity do not effect the measurement of the gyroscope. Hence the 6 axis acceleration is used for an accurate reading. Not only that, the charity box also have siren alarm that produce the sound loudly around 10 meter can be heard.

1.6 Contribution Project

The main motivation in doing this project to introduce IoT to user especially to the mosque management. This project may help user to monitor both analog and digital devices across the world either from a web interface (Blynk cloud server) of from local server without the need for human interaction over a wireless network. So, by introducing this project it can assist the charity box from home and cities via mobile phone. By automating activities, it saves us a lot time even we are far away from our actual location, and it is updated frequently in real time.

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The electronic charity box previously mostly used RFID cards to access the keys, but the project now utilizes WiFi or data to unlock it using a smartphone, as it is known that most mosques in Malaysia have stable and decent WiFi internet access to ease the management work. If the WiFi not stable the money in the charity box can be collect for tomorrow. Not only that, but this electronic charity box project also has an alarm system when there is a case such as an attempt to steal, it can be heard loudly inside the mosque and the mosque's committee will receive a notification thru on their respective smartphone.