UNIVERSITI TEKNIKAL MALAYSIA MELAKA

INEXPENSIVE ELECTRONIC SAFETY CABINET WITH DIGITAL KEYPAD LOCK FOR STUDENT USE

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Electronic Engineering Technology (Industrial Electronic) Hons.

by

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Tajuk: **Inexpensive Electronic Safety Cabinet With Digital Keypad Lock For Student Use**

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ABTRAK

Sistem peringatan semasa dalam produk kabinet keselamatan adalah mahal dan tidak fleksibel bagi pengguna. Kabinet keselamatan menganggap sebuah aspek yang penting dalam kehidup seharian pada masa kini dalam menjaga keselamatan barang kita. Di samping itu, pengunaan sistem amaran dengan situasi masa nyata sangat penting bagi pengguna. Projek yang dicadangkan ini, adalah sebuah kabinet keselamatan elektronik yang murah dengan kunci papan kekunci digital khusus untuk kegunaan pelajar. Jadi, hasilnya hanya pengguna yang dapat membuka kabinet dan semua akses semasa akan memberitahu pemilik kabinet. Tanpa keraguan, pelajar boleh menyimpan barang berharga dalam kabinet ini, ianya sangat sesuai dan lebih selamat. Arduino uno digunakan sebagai pengawal utama (pelayan) projek ini. Papan kekunci 4x3 digunakan untuk memasukkan kata laluan oleh pengguna bagi tujuan membuka kunci dan mengunci kabinet ini. Akses masa nyata dapat menjejaki dan SMS sebagai isyarat amaran akan dihantar ke telefon pintar pengguna melalui sambungan GSM. Operasi semasa kabinet akan dipaparkan pada skrin LCD. Bagi akses yang menggunakan kata laluan yang betul akan mengaktifkan servo motor untuk membuka pintu kabinet. Jika mengenal pasti entri kata laluan yang salah, pengguna akan mendapat SMS amaran oleh sistem pintar dari GSM ke telefon pintar dan pintu kabinet tidak akan buka.

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ABSTRACT

Current safety cabinet product became costly and inflexible alert system for the user. Safety cabinet assumes an essential part in this present day living style to keep our things safely. In addition to the expanding familiarity with productive safety cabinet system, the access of real-time alert system is vital for users. In this project, an inexpensive electronic safety cabinet with digital keypad lock develop specially for student use. So the results gave a view that only user can open the cabinet and all the real-time access will notify that cabinet user. This cabinet more safe for student to keep their valuable things without any doubt. Arduino uno is used as the main controller (server) of this project. A 4x3 matrix keypad used to enter password by user to unlock and lock the safety cabinet. Real-time access was track and alert message send to the user smart phone through GSM connection (mobile internet connection). The operation displayed on LCD screen. The access using correct password activated servo motor to open the cabinet door. If identify wrong password entry, the GSM system alert user by sending message to user smart phone and the door will not open.

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DEDICATION

Dedicated to my beloved parents, LETCHUMANAN DANAM, my dear family members and my best friends.

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LIST OF SYMBOLS & ABBREVIATIONS

IT - Information Technology

IOT - Internet of things

IDE - Integrated Drive Electronic

GSM - Global System for Mobile

LCD - Liquid crystal display

ATM - Automated Teller Machine

RC - Resistor Capacitor

RFID - Radio Frequency Identification

PROM - Programmable Read Only Memory

CDMA - Code Division Multiple Access

RF - Radio Frequency

DTMP - Dual Tone Multi Frequency

IC - Integrated Circuit

UART - Universal Asynchronous Receive/Transmitter

MCU - Multipoint Control Unit

ADC - Analog to Digital Converter

MUX - Multiplexer

VSK - Virtual Shuffling Keypad

USA - United Sates of America

RISC - Reduced Instruction Set Computer

SMS - Short Message Service

TX - Transmitter

RX - Receiver

Wi-Fi - Wireless Fidelity

TCP/IP - Transmission control protocol/ Internet protocal

XML - Extensible Markup Language

PCB - Printed Circuit Board

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PC - Personal computer

MQTT - Message Queuing Telemetry Transport

FTP - File Transfer Protocol

HTTP - Hyper Text Transfer Protocol

MMS - Multimedia Messaging Service

ISDN - Integrated Service Digital Network

LED - Light Emitting Diode

FOSS - Free and Open Source Software

ASCII - American Standard Code for Information Interchange

AC - Alternative Current

DC - Direct Curren

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CHAPTER 1
INTRODUCTION

1.0 Introduction

This chapter contain project background, problem statements, objective and the work scope of the project which title 'Inexpensive Electronic Safety Cabinet with Digital keypad Lock for Student Use'.

1.1 Project Background

At the present time, having a safety cabinet is a must for everyone. Initially cabinets are used in schools and changing rooms, but now it being use in all places. People use cabinet in all type of applications. The digital and keyless lockers became excellent storage solution for all type of application. Almost, all cabinets manufacture using a normal cam lock, which hooks into locate on the inside of the cabinet door. Those regular cam locks only function with small keys, and consist the simplest of lock fastenings. These varieties of locks are used because they secondarily increase the overall cabinet price.

Keyless for cabinets are holding an important part. Cabinet with keyless lock provides personal good control and highly secure because they efficient the process of using the cabinets, and provide protection against theft. In a residential areas, the usage for keyless locks for cabinets include jewelry cabinets, home office overhead cabinets, garage cabinets, and living room medicine cabinets. At organizations, school, or business building or facility,

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the applications for keyless locks to be used on cabinets include medical cabinets, medical carts, personal lockers, office supply cupboards, IT enclosures, First Aid cabinets, key cabinets, tool carts, desk drawers, and hazardous material cupboards. The new code locks cabinet lock increase the possibilities for a lot of uses of electronic access control. This simple electronic battery operated lock is a very easy and fast retrofit for inexpensive cam locks supplied as standard on a huge range of lockers, cabinets and cupboards. Since there is no key way, it cannot be picked or bumped open making it secure. It will be simply be ideal to lockers or cabinets, which do not have a locking device already fit, giving the user fast and simple keypad access without the use of keys.

For access an electronic devices like digital keypad cabinet that may use cloud-based platform. This system provide special and quality information for mechanical design and produce to implement IoT level connectivity and intelligent in their system. Theses idea provides the level of physical security that is extremely adaptable and very secure than mechanical keys. So can track the real-time access and control of valuable devices. It also can resource for facility protection and safety.

To operate a project we need control system as brain. To build electronic projects we can use arduino. The arduino is a complete development board and it is a general source platform which consists of physical programmable circuit board and software. Arduino became popular for those starting out with electronic. Because it does not required a different part of hardware to compile new coding onto the board. IDE software used to program arduino. IDE use simple version of C++ language. It is very easy to learn and also to program. Arduino has standard form factor that breaks out the function of microcontroller into a more accessible package.

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1.2 Problem statement

Students lost their valuable things like smartphone, laptop, money and power bank when keep in their hostel or rental house cabinets. Theft always happens to higher education students in their living place. Students suffer when lost their money, laptop, and smartphone, because they cannot do their work or assignments according to time given by lectures. At the same time, every students are not effort to buy a safety cabinet with high price to keep their valuable things safely.

This problem statement identify in a survey made with UTeM students. In this survey, 68 student ware answer the questions. The responders from different faculty and different living area. Below are the evidences of the survey, which says that inexpensive electronic safety cabinet is important to students.

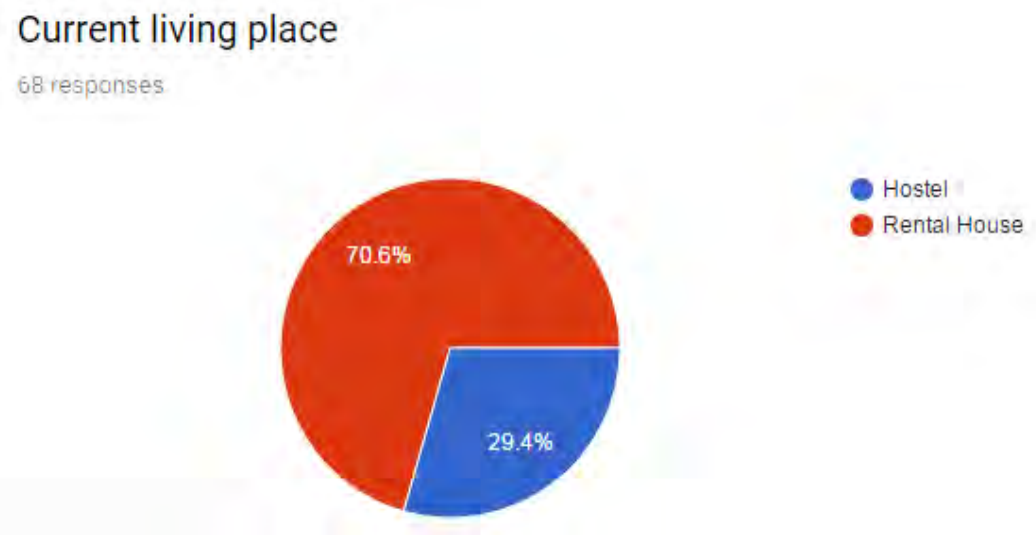

Figure 1.1 Responders (Students) from different living place

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Figure 1.2 The percentage of students lost their things.

From 68 responder, 29.4% students lost their valuable thing in their living place. As analyzer, it was a quit big range because more then quarter.

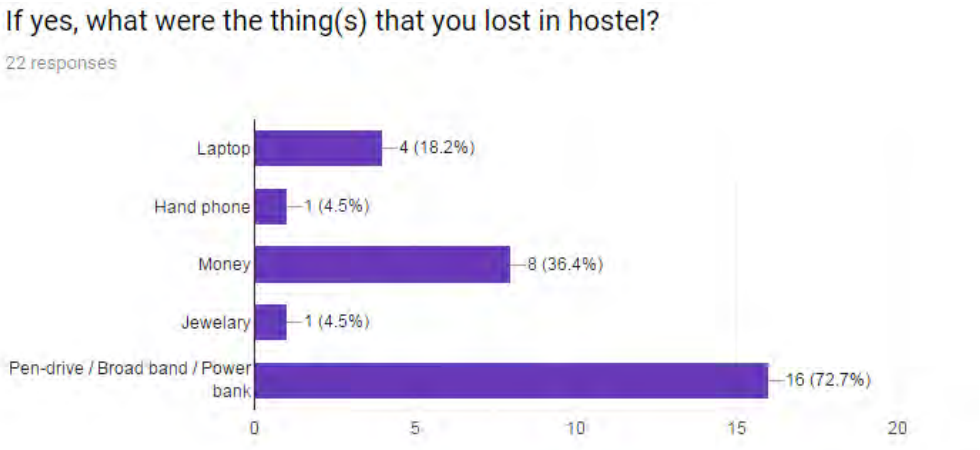

Figure 1.3 Type of things that they lost

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From the result, can conclude that 72.7% lost their pen-drive / broad band and power bank from overall 30% of losses. For student those things are important for their studies. The second highest lost happen on money 36.4% and followed by laptop 18.2%.

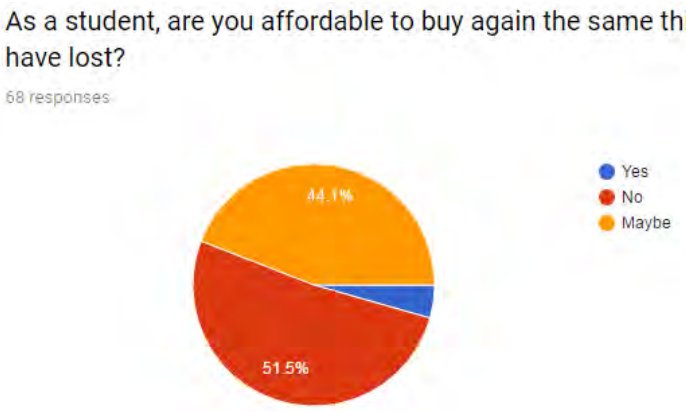

Figure 1.4 Students answer on buying the things that they lost

Based on above, pie chart, 51.5% student are not affordable to buy the things that they lost. So it show that student need a safety system to keep their things safely.

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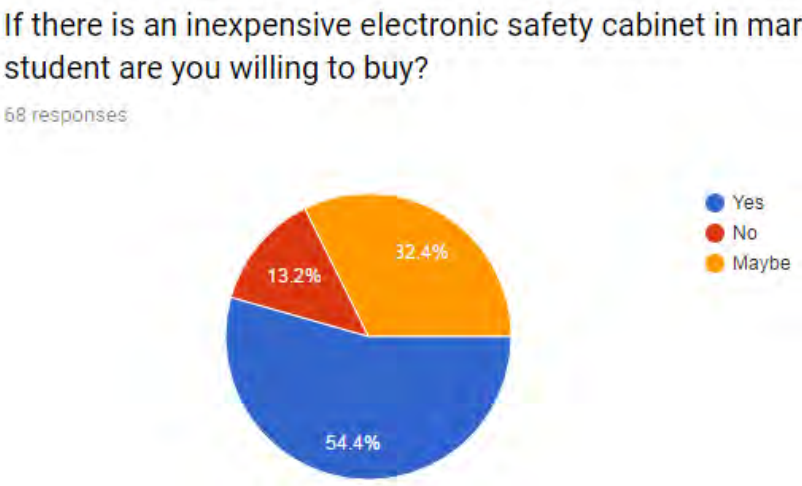

Figure 1.5 Proof that 54.4% of students from 68 agree to buy inexpensive electronic safety cabinet.

Finally, 54.45% student from 68 respondent need and agree to buy an inexpensive electronic safety cabinet to keep their valuable things safely. From thus, survey can conclude that student need this safety cabinet.

1.3 Objective

1.3.1 To study the cabinet safety system using keypad and GSM connection.

1.3.2 To design an inexpensive control system using keypad and GSM connection.

1.3.3 To analyze the efficiency of the message transfer from electronic safety cabinet to the user smart phone.

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1.4 Work scope

There are few steps need to complete in this project to achieve the project objective. This electronic safety cabinet base on combination of hardware and software. This project mainly focused on a cabinet safety system, which will track the access by the entry of password. This is the work scope of this project. The C language is used to program the arduino uno which acts as a server in this project. Other than that, a matrix 4x3 keypad, 16x2 LCD display screen, GSM module and servo motor will program using C language by IDE software to perform it desired function, since this equipment all attached to arduino uno. The software and hardware parts developed and integrated together. Finally, the analysis and verification are carried out at the cabinet system performances.

1.5 Thesis outline

In this thesis, there are five sections, which are chapter 1 until chapter 5. In chapter 1, explained about project background, problem statements, objectives, work scope, expected results and project summary.

Chapter 2 consists of literature review. Previous researches conducted by senior undergraduates and different researcher on the available cabinet safety system on the market in presents will be discussed here.

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In chapter 3, the project methodology and flow explained. Thus, the study on programming and equipment developments of the undertaking and the project management are talking about.

In chapter 4, the project data and also the results was discussed. Based on the result the discussion explained. It contained graph and also component performance.

Finally, chapter 5 was about the overall conclusion about this project analysis and also future work for this project. The future work explained about the changes that can made in this project to create a very secure type of cabinet and also more advance level of IOT.

1.6 Expected results

Results is one of the important in any project as outcome. For this keypad safety cabinet will include hardware and software development to get expected results. This project components are arduino uno, matrix 4x3 keypad, 16x2 LCD display screen, GSM module, servo motor and smart phone. All this components will program using C language to get desired results.

The matrix 4x3 keypad is used to enter password to access the cabinet. Real-time access will track and an alert message will send to the user smart phone through GSM connection. The operation will display on LCD screen. The access using correct password will send signal to GSM module to send message to user hand phone and also to servo motor to open the cabinet door. When identify wrong password entry will alert user by the smart system that we created in the smart phone.

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So expected results gave a view that only user can open the cabinet and all the real-time access will notify that cabinet user. This cabinet more safe for student to keep their valuable things without any doubt. The data in chapter 4, will gave a clear view on the cabinet safety system and also the performance.

Project summary

Summary describe this project flow, which give a clear picture about the parts that going to conduct on this project. From this project summary got to know that which part need to complete according to the arrangement.

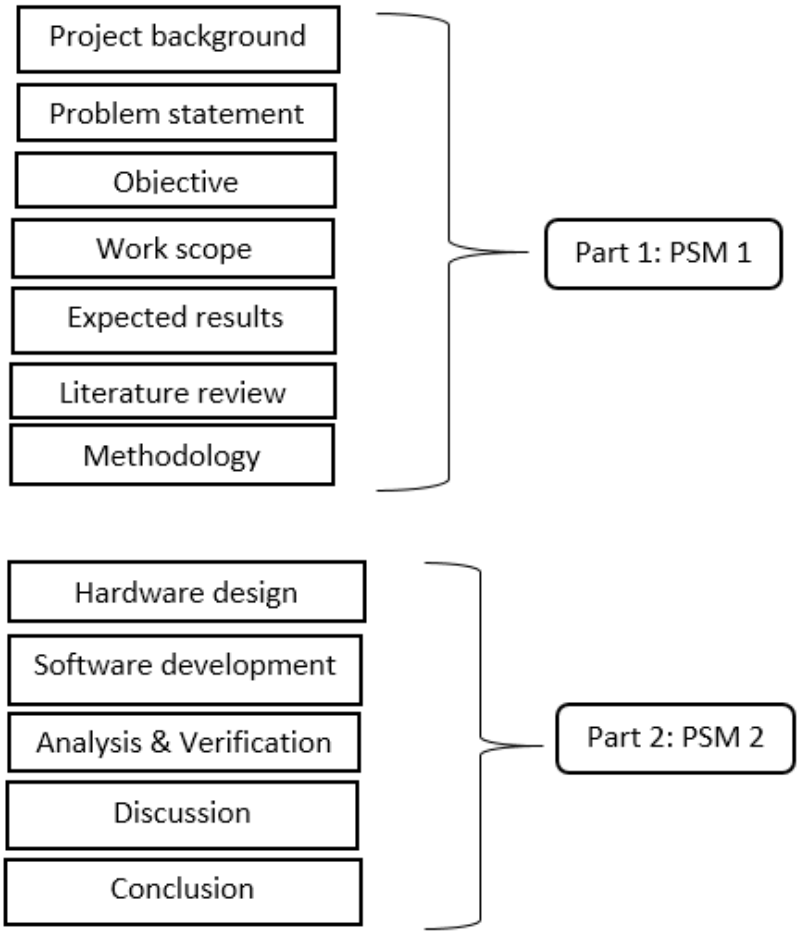

Figure 1.6 Project flow chart

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