UNIVERSITI TEKNIKAL MALAYSIA MELAKA

SMART ELEVATOR VIA ANDROID SYSTEM

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

by

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TAJUK: **SMART ELEVATOR VIA ANDROID SYSTEM**

SESI PENGAJIAN: **2014/15 Semester 2**

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I hereby, declared this report entitled "SMART ELEVATOR VIA ANDROID
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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 Power) (Hons.). The member of the supervisory is as follow:

…………………………

(Mr. Shahrudin bin Zakaria)

ABSTRAK

Projek ini berkaitan dengan mereka bentuk lift kawalan yang dapat dikawal dengan menggunakkan telefon android dan Arduino di tempat yang peribadi dan sesuai sahaja. Hal ini kerana, terdapat sebilangan orang yang bukan tertentu menggunakan lif peribadi demi kesenangan beliau. Maka projek ini direka untuk menyelesaikan segala permasalahan ini. Tujuan projek ini juga adalah untuk memberikan kesenangan dan keselesaan pada pengguna dimana mereka dapat mengawal lif dengan menggunakan telefon pintar. Projek ini mengabungkan rekaan yang melibatkan lift dan perisian mengunakan program Arduino. Ia menggunakan telefon android yang bertindak sebagai butang tekan untuk ke tingkat yang hendak ditujui. Medium penghantaran data dari android ke Arduino adalah dengan menggunakan sistem Bluetooth. Dengan menggunakan sistem Bluetooth ini, ia berupaya menghantar data di dalam kawasan bangunan. Jadi pengguna boleh menghantar data sebelum sampai ke lif. Di dalam projek ini juga, Arduino di jadikan sebagai tajuk utama sebagai pengawal utama dan android phone pula digunakan sebagai bahan pengantaraan data ke Arduino.

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ABSTRACT

This project is related to the design elevator control that can be controlled with using an android phone and a Arduino in a private and suitable place only. This is because, there is some persons who are not authorize still using a private elevator for his convenience. So this project is designed to solve all these problems. The purpose of this project is to provide convenience and comfort to users where they can control the elevator by using an android phone. This project is incorporates with the design that involves the elevator and the software that use Arduino. It uses android phone that acts as a push button to the destination floor. The medium transmission will send the data from android to the Arduino is using the Bluetooth system. By using this Bluetooth system, it is capable of sending data within the building, so users can send data before reaching to the elevator. In this project also, the Arduino is used as the major topic that as main controller and android phone is used as transmission of data to Arduino.

DEDICATION

To my beloved parents

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

PLC	-	Programmable Logic Controller
DC motor	-	Direct Current motor
LED	-	Light Emitted Diode
I/O	-	Input/ Output
APP	-	Application
USB	-	Universal Serial Bus

CHAPTER 1

INTRODUCTION

1.1 Introduction

The Smart Elevator Via android system is design and developed to make improvement on the system of the private elevator. This project is using Arduino as main device which it can control the whole system of this project. These chapters will briefly discuss the general background of this project, objectives, scope, problem statement, and project significant.

1.2 Background

In the modern world and economic activity, the elevator has been one of the most important things for daily use. It is also considered as one of the most important transportation equipment, especially at high rise building. In this paper, Arduino is use as one of the most important topics. All the design of the smart elevator via android system is controlled by the Arduino application and android system.

This project using a concept of the existing elevator system and add an android system that acts as a push button for someone want to ride the elevator. Most of the elevator is used for public usage, but this project designed for a specific place. In other words, this elevator is only used for a service elevator.

This project is not fully automatic system. Before the user want to enter the elevator, they needs to click the button at their mobile phone. This is because the

project is designed not to have control panel button outside the elevator like other elevator. The function of the button at mobile phone is to active the elevator. All door of the system will close when the elevator is in use. When the elevator is moving up to the demand level, the elevator will automatic stop. The user needs to give instruction in their mobile phone to elevator up or down and the Arduino will be operated.

In this project is using 240 Volt to control the system of the elevator and Arduino module. However, the output device will take the supplied about 12VDC and 5VDC.

1.3　Problem statement

Many users always ignore the instructions and use the service elevator for their convenience only. This will also make it difficult to authorize person do their job. This problem happens because the concept of private elevator is same as other normal elevator. For example the control panel button of the private elevator is located at outside. For these reasons, this project is proposed to solve this situation. In other words, only the VVIP and authorizes person use this elevator. This project is designed only using a prototype elevator because the lack of funds and time to build a real elevator.

1.4　Objective of Project

The objectives of this project are to:

- To make the elevator more secure to use. The users need to get MIT application inventor from admin to access the private elevator.

- To save the customer time and more convenient. The user would not have spent time waiting for elevator because the can click the button at their android phone in about 5 meter from the elevator.

- To ease the human work.

- To send commands from the android phone application to the Arduino devices output to actuate a simulated device (For example, send a command from the cell phone to start/stop the elevator or open/close the door).

1.5 Scope of Project

The scope of this project is limited to the following item so that the project could be focuses to achieve the stated objective.

- The Arduino and android phone will be used to make it operate as user wish.

- The Arduino system is use to control the door of elevator and to select which floor the user want to go.

- This project can be install only at the certain building such as at a private apartment, at a mall, and at a university. In other words, only the authorize person can ride on it.

- This project is using Arduino 1.0.6 software to write the program.

- The elevator will be design and build up by using the model.

- To send the data on Arduino, it only requires for android phone because the application that will be used in project is MIT application inventor.

1.6   Project Significant

In this paper, the purpose of this elevator is designed to renew the existing system of private elevator. The use of android and Arduino is very important to renew the weaknesses in the elevator system in this age. This project uses Bluetooth system as a medium of data transmission to the Arduino and the elevator will be moved to the destination that user wants to go. With the creation of this project, it can help the user in terms of time, safety and comfort when the user riding on it. The most important thing is this product does not product any hazard and environmentally friendly. So, the users can use this product safely without any hesitation.

1.7   Summary

This chapter describes the introduction of this research. Firstly, the basic knowledge of the elevator has been presented. The Elevator is the most important element in this study. Secondly, the problem statement has been reviewed. This problem statement describes the main reason why this kind of project has been chosen or conducted. Thirdly, the objective of this project has been stated. This objective is the things that will be achieved throughout this research. Fourthly, the scope or the limitations of this project has been discussed. This will help to narrow down the field of this study for better understanding. Lastly, all the benefits from this study has been discussed in the project significance section. This project has been found to overcome all the weakness in private elevator.

CHAPTER 2

LITERATURE REVIEW

3.1   Introduction

The literature on the elevator event is wide. There are several textbook and journal that are available and related to this project. In this chapter 2, the elaboration was focused on the understanding about elevator system and component that will be used on the elevator and the method to solve the problem.

3.2   The Elevator System

In this section, the first journal was entitled Application of PLC for elevator control system (Sharma 2011). To produce a control system, an attempt has been made by the author in order to unify the programmable logic controller with an elevator. The author clearly states that the elevator control system is very important for the use of PLC. This paper using the PLC GE- FANUC and it also uses four inputs and four outputs. A huge differences will been made in this part, where the project that will be design by using the type of Arduino module that act to replace PLC. The similarity between this journal and the project that will be design is the elevator system, where both project is using the permanent magnet motor that will be open and close the door of elevator. There are many advantages in the Arduino compared to other control systems. Where the cost of using the Arduino is inexpensive and operating speed is very good. In addition, the Arduino is also able to correcting the error and using less space than the space of PLC.

For the second journal of Design and practice of an elevator control system based on PLC (Yang et al. 2008), it uses and developed lift type 2 nine-storey to control the system of residential building. PLC is adopted as a controller for the control system and to run 2 elevators in parallel mode, parallel connection will be used to dispatching rule based on 'minimum waiting rule'. In this journal also discuss more details about the elevator system and method for realizing the principle and how to control it. The operation of elevator is one aspect that the key in these system. To improve the reliability and performance of the elevator, the system is highly desirable to use because it has simple peripheral circuit. The difference between this journals with the project to be designed is the number of elevator use and the use of a module controller. The number of prototype elevator that will be design is kind of single elevator and also the PLC will not use in this project and it will be replaced with Arduino module.

In this journal of Development of a Real Time Monitoring and Control System for PLC Based Elevator (Irmak & Colak 2011), it is discusses about the design of prototype elevator based on real-time monitoring and how to control it. To develop Visual basic more visual, it need the main control interface to guide it and by using Simatic version 4.0 it will improve the software system of the PLC. This journal applied the dc motors, sensors, gas smoke detectors and temperature sensors and it is installed in a laboratory sized elevator prototype. To transfer data in the PLC and control interface, this journal using the OPC server but this technique would not be used in this project because this project is using Bluetooth system to transfer data from android to PLC. Furthermore, this journal is constructed to control and monitor lift system. However, this project is not designed to monitor the movement of the elevator but to show how the elevator can be controlled by using the Arduino and the android system. Not to forget about the similarity between this journal and the project that will be design is a dc motor, PLC and prototype elevator.

For the third journal is Implementation of PLC Based Elevator Control System (Htay et al. 1956). The author state about Programmable Logic Controller (PLC) based control systems. In this case, the author wants to implement their projects on parking floors. Programmable Logic Controller and elevator model is used as a very important matter for this journal. The elevator will be determined by

using Hall Effect Sensor. The movement up and down of the elevator car will be controlled by using a DC motor. This journal uses a push button to call the elevator car. The display unit that is used in this journal is to know the position of the elevator. To control the lift system, the authors use the auto station software to program the ladder logic. There are some inequalities devices that will be apply into this project. For example Hall Effect Sensor, type of PLC module and the type of software that will be use. This project will not use the Hall Effect Sensor, but it will use the limit switch to determining the position of elevator. There is little difference which the writer dealing with PLCs type IVC1 1410MA TPLC but in this project it will be use is Arduino. Besides, not the Auto station software will be used in this project but Arduino 1.0.6 software.

In this journal of A Control System Design For Hand Elevator Based On PLC(Wang 2011) , the author state about Programmable Logic Controller (PLC) based control the hand elevator. The Author tries to discuss the structure of hardware and software to be used in the lift system. Through this method, the authors were able to achieve to mobilize the elevator in automation and can stabilize the output to the elevator. To monitor the operation of elevators and alarms, the authors use the touch screen type of ‚easy builder 800 'on elevator human mutual interface (HMI). The WINCC software used in this journal is use to monitor the system and it will be loaded on the touch screen. The WINCC application is also used to ensure that the lift is more stable and easy to maintenance the elevator. The motor that is use in this journal are AC servo motor.

The tractive elevator safety process control is the thing that will be discussed in this journal of Development of Elevator Intelligent Safety Control System Based on PLC (Jun & Min 2013). This is because the author wants to create a safe elevator conditions while in use. The use of PLC is a way to control an elevator that is required in this journal. The stream outline of PLC of programs control door is presented. Work field area controls the elevator by utilizing PLC. The process of elevator monitoring requires the latest technology such as software configuration to complement the monitoring system. To through the real testing, it requires a stable and reliable condition in order to develop the elevator safety control system based on PLC.

The elevator incorporates four parts that is the elevator door, floor monitoring screen, the call catch and inside pick board. Safety control is the establishment of PLC control tractive elevator. The outline in both mechanical components and control software ought to fit in with the standards of safety system. This paper acquaints a few measures with enhance the safety of the elevator system, which helps the stable operation of monitoring system field area PLC and guarantees the correspondence between master and slave machine. Testing result indicates that the framework security capacities of a traction elevator could meet the requests, and the elevator is in great operation. With the ever increasing amount requisition of new technology, in this project the Arduino will acknowledge the elevator safety system will be most excellent than PLC.

In the Journal of Variable Frequency Speed-regulation System of Elevator Using PLC Technology (Jiang & Zhang 2011), the author state that the arrangement of variable frequency speed-regulation focused around PLC is proposed. The main aim of the authors in this journal is to control the speed of the elevator. Firstly, the general structure of the control system was resolved. Inverter and programmable logic controller (PLC) were decided to finish variable frequency speed-regulation. Furthermore, parameters of inverter were set by creating system hardware. To unite with PLC interface, the creators utilize the rotating encoder to reconnect when the PLC driver selection and distribution of 110 points have been completed. To analyse the elevator system based on software methods, authors is design flow chart and ladder programs. Variable frequency speed-regulation and programmable rationale controller innovation were utilized to change old elevator. The dependability of the elevator was enhanced through sensible equipment choice, parameter setting and software design.

The elevator have evident favourable circumstances, for example, structure conservative, low commotion, high effectiveness, essential support and low disappointment rate. The elevator focused around variable frequency speed regulation and PLC innovation has enhanced passenger comfort and reliability. The support expenses and power utilization of the motor were decreased fundamentally. There are still numerous area the author wants to develop that is changed with variations in movement, the capacities of select course of the