AUTO LEVEL PARKING MODEL

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Specially dedicated to
my beloved parents, brothers, and sisters who have encouraged, guided and inspired
me throughout my journey of education.

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ABSTRACT

Nowadays, majority of the people in our country are using car as transportation for them to go for a work, traveling and other purpose that are related to it. When so many people are using car as transportation, so it will be required more parking area for the car to be park. As we know, many type of parking area that has been build such as home parking area, standard parking area that need huge area for parking and also level parking that are build in a building like in the shopping complex. Although we have so many type of parking area, we still have some sort of problem appear that are make the car user difficult to find the parking lot at the parking area or to know that the parking area are already full. To solve this problem, development of the auto level parking system is the best solution. This project main objective is to develop auto level parking system model as a prototype to represent the real application as a parking system in a building. This prototype is separate by two parts that is the hardware to show the real application and the software as a controller or brain for the system. This system model can make the car user easy to park their car because the car will be park automatically unneeded the user to drive the car to the parking lot. This system model also can show whether the parking area are full or not.

ABSTRAK

Pada masa kini, kebanyakan dari pada rakyat di negara kita menggunakan kereta sebagai pengangkutan utama untuk mereka pergi bekerja, mengembara atau apa sahaja aktiviti yang menggunakan kereta sebagai pengangkutan. Oleh kerana terlalu ramai yang menggunakan kereta sebagai pengangkutan utama, maka keperluan kawasan tempat meletak kenderaan juga semakin meningkat dari semasa ke semasa. Seperti yang diketahui, perbagai jenis tempat meletak kenderaan telah dibina seperti kawasan meletak kenderaan di rumah, kawasan meletak kenderaan biasa yang memerlukan kawasan yang luas, kawasan meletak kenderaan secara bertingkat di dalam bangunan dan juga bawah tanah. Walaupun mempunyai perbagai jenis kawasan meletak kenderaan, masih lagi timbul beberapa masalah yang berkaitan seperti sukar untuk mencari tempat meletak kenderaan atau sukar untuk mengetahui sama ada kawasan meletak kenderaan tersebut sudah penuh atau tidak. Cara terbaik untuk mengatasi masalah tersebut adalah dengan terciptanya sistem meletak kenderaan bertingkat secara automatik ini. Objektif utama projek ini adalah untuk mencipta model ataupun prototaip yang berfungsi untuk meletak kenderaan secara automatik bagi menggambarkan aplikasi yang sebenar sistem ini. Prototaip projek ini terbahagi kepada dua bahagian iaitu rangka serta komponen yang lengkap dan juga program. Bahagian program ialah bahagian yang akan mengawal segala aturcara sistem dan boleh dikatakan sebagai perancang dalam sistem ini. Sistem meletak kenderaan bertingkat secara automatik ini akan memudahkan pengguna kenderaan untuk meletak kenderaan mereka tanpa perlu memandu ke tempat meletak kenderaan dan sistem ini juga dapat memberitahu pengguna bahawa kawasan meletak kenderaan tersbut sudah penuh.

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CHAPTER I

INTRODUCTION

1.1 Project Overview

Auto level parking is a project model or just a prototype. The reason for this project been design is to present the application that can allow car user to park their car automatically on the parking lot in a certain building. The purposed of this project is to reduce space for the parking area at a small place and to park the car more easily.

The application of this project is particularly suitable for large parking of several hundred car spaces, such as public parking with hourly rates or private parking for large buildings. This project is suitable for underground parking, above ground parking and a combination of both.

This project is divide by two parts that is hardware for the building and software to control the system. The hardware is also divide by two parts that is the elevator and the shuttle. Elevator is used to transfer the car on the parking level and the shuttle is used to transfer the car from the elevator to the parking lot. The main controller for the system is using Programmable Integrated Controller (PIC). Limit switch is use as a detector. Actually this project is almost same with the elevator system but it can move the car to the parking level automatically unneeded the user to manually park the car.

1.2 Project Objectives

The objectives of this project to design and build a prototype or model for an auto level parking and to gather all the knowledge had been gained and put them into applications by building this model. Building this model require basic concepts as well as technical experience in order to fabricate the auto level parking structure with electronics circuitry and software programming.

The main objective of this project are as follows:

i. To design and implement the auto level parking system.
ii. To learn PIC programming and how to implement it on the hardware installation.
iii. To learn the concept of electrical DC motor system and the speed controlling system.
iv. To learn wiring system and connectivity and also the mechanical such as gearing system.
v. To learn troubleshooting and analyzing

1.3 Project Problem Statement

Nowadays, we have many type of parking system such as large parking area or level parking area in a building. This type of parking system is called manual parking. Meaning users still need to park their car their own self. This type of parking system has some sort of disadvantage such as waste time and low security system.

To park their car, user still need to fine the parking lot that is empty and that will take more time during the finding process. The user also doesn't know whether the parking area is still has empty parking lot or the parking lot is already full. The security system on the manual parking area is very low. Although it has security guard, but the security guard are not 24Hours monitor on each of the car in one time.

1.4 Project Scope

There are few scopes and guidelines are listed to ensure the project is conducted within its intended boundary. This is to ensure the project is heading to the right direction to achieve its objectives. This project is just a model of the auto level parking. Because of that, this project only has four level of the parking lot. First level is for the user to enter the car into the model before it park automatically. The other levels will be the parking lot for the car. This project model is dividing by two parts; Part A is the elevator to bring the car up and down. Part B is for the parking lot. In this project, PIC programming has been used as a controller system. This programming will control the whole system of this auto level parking model.

1.5 Project Methodology

1.5.1 Project Process Flow

i. Choose the project title
ii. Analysis the project scope and background
iii. Do the literature review, project objectives, problem statement, and methodology
iv. Design and drawing the model
v. Prepare the hardware
vi. Prepare the software
vii. Troubleshooting and analysis
viii. Final presentation.

Every process of work will have its own flow to make the work be done perfectly. From the Figure 1.1 below show the process flowchart for this project. This project flow is dividing by two that is designing the model or hardware and the programming for the system.

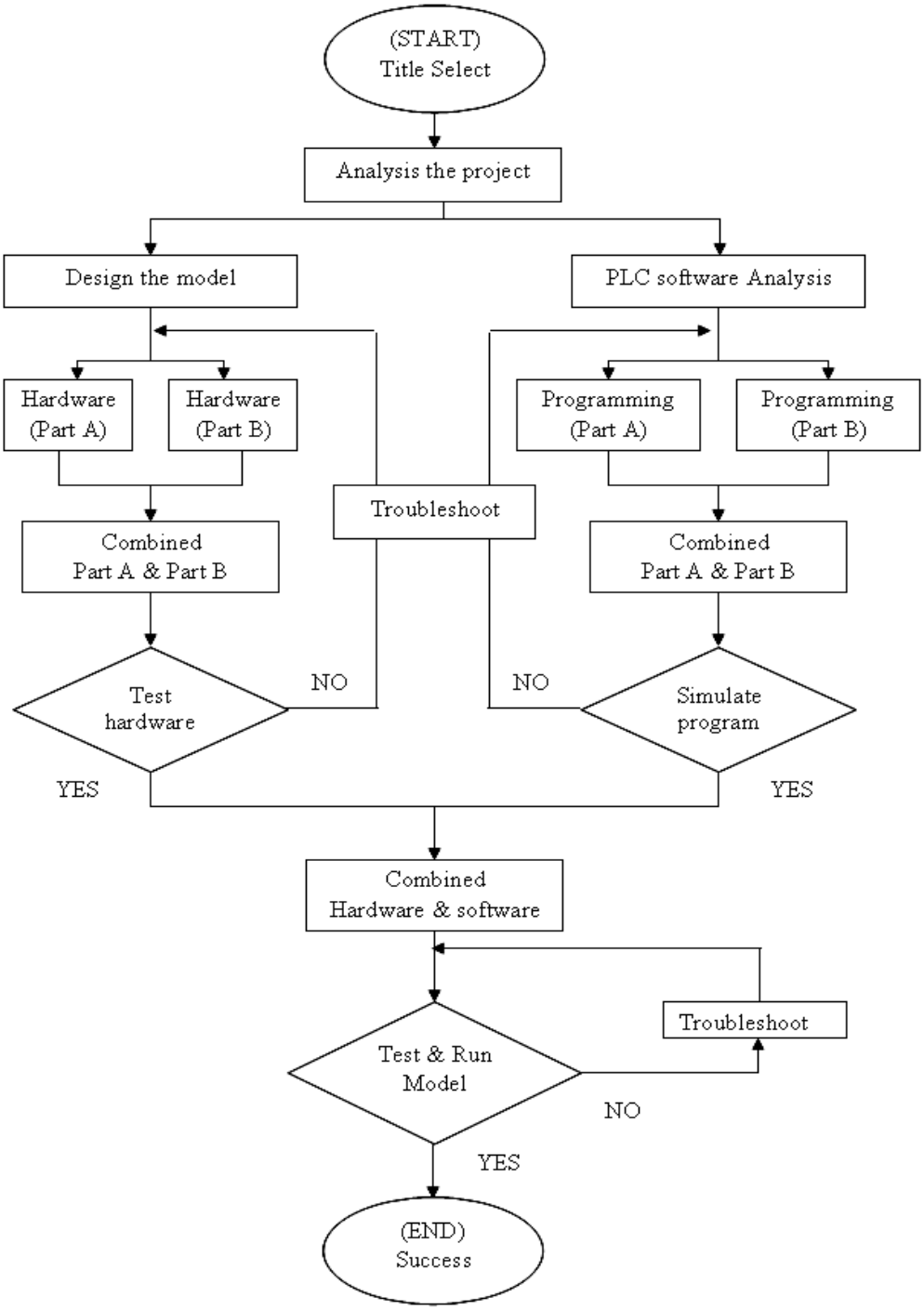

Figure 1.1 Project Flowchart

1.6 Thesis Outline

This thesis describes the auto level parking model. In this thesis, it consists of five chapters. A brief introduction about the project including the objectives, problem statement and scope of the project will be explained in chapter 1. A literature review of recent work on the auto level parking model theory and the application that is related to this project is presented in chapter 2. Chapter 3 gives a detailed description of each component that is used in the project and how each of the components can be used in the project. All the analysis and result regarding to the project will be presented in chapter 4. And finally, chapter 5 will be summarizes the contributions of this work along with suggesting avenue for future explorations.

CHAPTER II

LITERATURE REVIEW

This chapter presents all the literature review and some research requiring based on the auto level parking system. This literature review is primarily restricted to published research results on elevator system and automated multistoried car parking system. This literature review is required to study all the characteristic and their algorithm, requirement needed, and general idea of this project. All the information that has been collected is very important to ensure that this project achieved their objectives.

2.1 Control Of A Four-Level Elevator System Using A Programmable Logic Controller

This project focuses on the design and implementation of a PLC-based controller for a four level elevator. The PLC used is an Omron Sysmac C20K with 12 inputs and 8 outputs. The design incorporates an intelligent controller that services all the requests in an energy-saving way, rather than on a first-come, first-served basis.

2.1.1 Hardware Design

The objective of the hardware design is to develop the interface circuit between the PLC and the elevator system and the elevator control panel, with both external and internal requests. These requests are produced by push buttons that send continuous signals to the PLC when activated. Each push button is connected to an LED to identify the request placed. In addition, the four floors are represented by four LEDs, one for each level. Furthermore, an alarm switch is installed to produce a flashing signal whenever activated.

This facility was introduced to simulate the desire for a sudden stoppage of the elevator either for reasons of safety or for requests for a repair job to be carried out on the elevator. In order to obtain the desired setup, we needed to find a way to capture the pulse generated by a depressed push button. We also needed to make sure that the PLC is recognizing these signals in order for it to correctly perform the required action. As explained below, both issues were resolved by using set/reset flip flops and relays respectively.

The block diagram of the system's layout is shown in Figure 2.1, where both the interface between the PLC and the elevator system with the control panel are drawn.

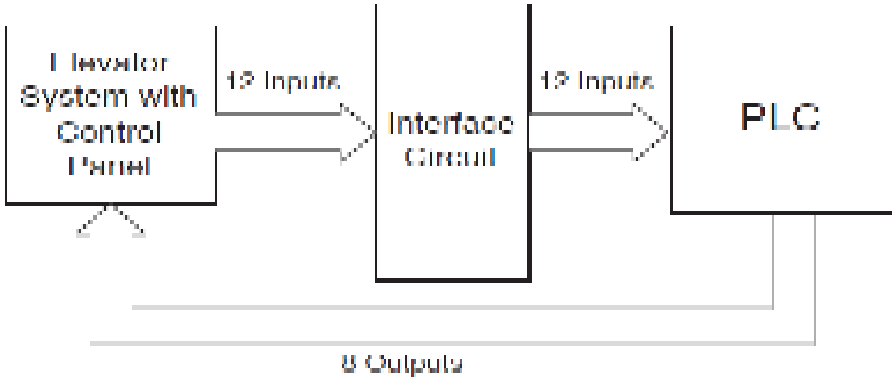

Figure 2.1 Block Diagram of the System Layout

2.1.2 Description Of The Interface Circuit

The hardware components used in the project is Omron Sysmac C20K PLC, 74LS04, 74LS279, 74LS156, which are inverters, SR flip flops and buffers, respectively. Also used voltage supply, push buttons, LED, resistors, relays, a switch, and connecting wires. Since the number of required inputs and outputs, i.e. 12 and 8 respectively, matches the maximum input/output capability of the PLC used, there is no need for any multiplexing or demultiplexing operations. Thus all inputs and outputs used can indirectly controlled by the PLC.

As shown in Figure 2.2, the push buttons were connected to the SR flip flops, since the PLC needs continuous signals to process, and so do the lights that indicate the requests placed. The flip flop holds the signal until the reset is activated. The reset of the flip flop is the level position for levels L1 and L4.

So when the elevator reaches one of these two levels and a request is placed the output will reset the requested signal. However levels L2 and L3 are reset by software. The reason for that is because L2 and L3 are intermediate levels. So when the elevator is traveling upwards or downwards, it has to either flash at the level it passes to show the current elevator position or service this level if its request has the appropriate direction by setting its request. In this case, it will also reset all requests associated with the serviced levels.

2.1.3 Description Of The Control Panel

The 12 inputs and 8 outputs used in this project are listed and defined in Table 2.1. As shown in Figure 2.3, the elevator system consists of three sections: internal requests, external requests, and the elevator position. The internal requests are represented by the push buttons inside the elevator which consists of four push buttons (1–4) and a door open (DO) push button. A door close push button could not have been included in the design because of the limited number of available inputs. The external requests are represented by the six push buttons located outside the elevator and distributed according to their corresponding floors. It consists of six push buttons distributed according to the position of the level. The elevator position

is displayed by the four LEDs, one for each level, which are directly controlled by the PLC according to the location of the elevator.

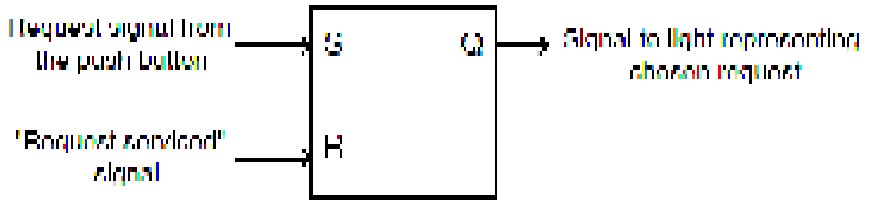

Figure 2.2 General Scheme for the Used of an S/R Flip Flop

Table 2.1 List and Definition of Input and Output Used

Inputs		Outputs	
Symbol	Function	Symbol	Function
1U	Outer request at level 1 to go up	L1	Indication that the elevator is at level 1
I1	Inner request to go to level 1	L2	Indication that the elevator is at level 2
2D	Outer request at level 2 to go down	L3	Indication that the elevator is at level 3
2U	Outer request at level 2 to go up	L4	Indication that the elevator is at level 4
I2	Inner request to go to level 2	DO	Indication that the door of the elevator is open
3D	Outer request at level 3 to go down		
3U	Outer request at level 3 to go up	A1	Indication that the alarm switch was activated
I3	Inner request to go to level 3		
4D	Outer request at level 4 to go down	L2R	Signal to reset outer requests at level
I4	Inner request to go to level 4	L3R	Signal to reset outer requests at level 3
A1	Alarm switch		
DO	Door open request		