

MULTI FLOOR AUTOMATIC CAR PARKING USING PLC

Patil Aishwarya ¹, Patil Rupali ², Patil Aboli ³, Vijaykumar Kamble⁴

^{1,2,3,4} Savitribai Phule Pune University, India¹,
Department of Electrical¹, AISSMS's Institute Of Information Technology,
Kennedy road, Near RTO, Pune, India, patilaishwarya94@gmail.com

ABSTRACT

Automated parking is a technology that efficiently parks a vehicle using a three dimensional movement system guided by computers. Once parked on the track, depending on the specific system, the cars are lifted with electric power and stacked one above the other on shelves. Cars can be retrieved in less than two minutes after a driver swipes a card to identify their vehicle. With automated parking, there is no more need to search a sea of cars at the mall trying to remember where you parked, no more door dings and scratches. In fact, no human even touches the car once a driver parks it on the lift.

Keyword : - PIC microcontroller1, Relays2, LDR3, LCD4, PLC5

1. INTRODUCTION

With the increasing speed of life, the demand to perform tasks at a higher speed is being led out too. In the modern world, technology has linked each town, city and country with the other through means of transportation. This has ultimately led to a massive increase in number of vehicles. To manage these vehicles there is need of a proper parking system. The most common often encountered while dealing with vehicles is over crowding of parking places, which finally leads to the wastage of fuel and precious time of people. The ultimate aim of the technology is to reduce the load on people and ease. So here we develop an automatic parking system, which can manage the number of cars inside the parking area. It also have the provision to inform person trying to enter the parking area, whether a space to park vehicle is available inside the parking area. In this project we have deployed a PLC which used to sense the movement of cars and depending upon whether there is a capacity of cars to enter, it either opens or close the gate.

There are two types of car parking systems; manual and automatic. In automatic car parking, the driver leaves the car inside an entrance area and technology parks the vehicle at a designated area. Mechanical car lifters, with the help of PLC raise the vehicle to another level for proper storing. The vehicle can be transported vertically (up and down) and horizontally (left and right) to a vacant parking space until the car is needed again. When the vehicle is needed, the process is reversed and the car lifts transport the vehicle back to the same area where the driver left it.

1.1 Concept

The concept of our project is to park car automatically. For this purpose we choose the PLC programming. We used various sensors, DC motor, platform to move the car, PLC module-delta DVP 552 series. In this project we set the program, by this when car is entered it is placed on platform, then it is sensed by proximity sensor. PLC program sends signal to the DC motor according to empty slot. DC

motor moves platform to empty slot. Position sensor senses a platform position and car parked at empty slot. In this manner parking is done.

1.2 PLC panel-2

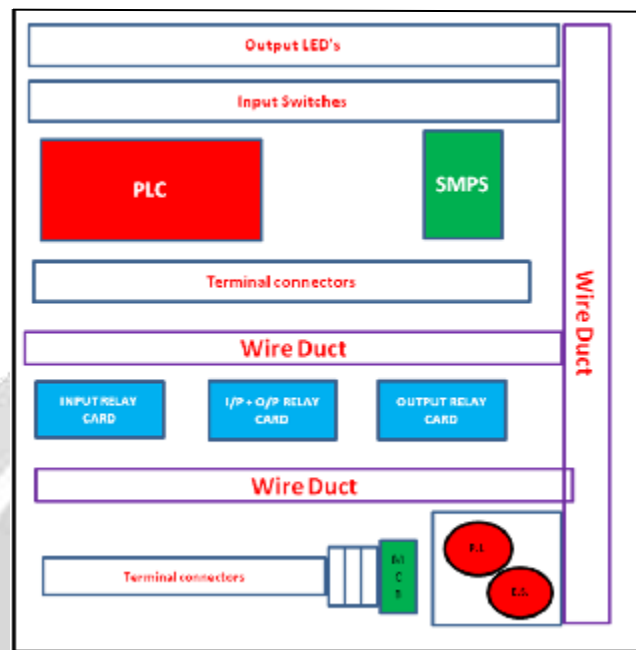


Fig -1: PLC panel

2. COMPONENTS OF PLC PANEL

2.1 PLC

PLC is a user friendly, microprocessor based specialized computer that carries out control functions of many types and levels of complexity. Its purpose is to monitor crucial process, parameters and adjust process operations accordingly.

2.2 SMPS(SWITCH MODE POWER SUPPLY)

A SMPS is an electronic power supply that incorporates a switching regulator to convert electrical power efficiently. Like other power supplies, an SMPS transfers power from a source, like mains power, to a load, such as personal computer, while converting voltage and current characteristics. Unlike a linear power supply, the pass transistor of switching mode supply continually switches between low dissipation, full on and full off states, and spends very little time in the high dissipation transitions, which minimizes wasted energy. Ideally, SMPS dissipates no power. Switching regulators are used as replacements for linear regulators when higher efficiency, smaller size or lighter weight are required. They are, however, more complicated, their switching currents can cause electrical noise problems if not carefully suppressed and simple designs may have a poor power factor.

2.3 EMERGENCY STOP

An emergency stop, also known as a kill switch; is a safety mechanism used to shut off a device in an emergency state of affairs in which it cannot be shut down in the usual manner. Unlike a normal shut down switch/procedure, which shuts down all systems in an orderly fashion and turns the machine off without damaging it, a kill switch is designed and configured to a) completely and as quickly as possible abort the operation, even if this damages equipment and b) be operable in a manner that is quick, simple, and usually, c) be obvious even to an untrained operator or a bystander.

Kill switches are featured especially often as part of mechanisms whose normal operation or foreseeable misuse may cause injury or death; designers who include such switches consider damage to or destruction of the mechanism to be an acceptable cost of preventing that injury or death.

2.4 RELAY AND RELAY CARD

Relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid state relays. A relays are used where it is necessary to control a circuit by a low power signal (with complete electrical isolation between control and controlled circuit), or where several circuits must be control by one signal. A type of relay that can handle high power required to directly control and electric motor or other loads is called contactor. Solid state relays control power circuits with no moving parts, instead using semi conductor device o performed switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults, in modern electric power system these functions are performed by digital instruments still called protective relays.

2.5 INDICATING LAMP

Indicator consisting of light to indicate whether power is on or motor is in operation.

2.6 TERMINAL CONNECTOR

It connects multiple wires individually to a single terminal points in an enclosed housing. They are available in many sizes, but they lack the circuit protection and connection simplicity of other connectors. Co nnection include PCB terminal blocks, multiple terminal connectors (MTC), pluggable terminal blocks, and barriers trips. Application includes printed circuit boards(PCB's) and various electrical devices.

3. MODEL DESIGN

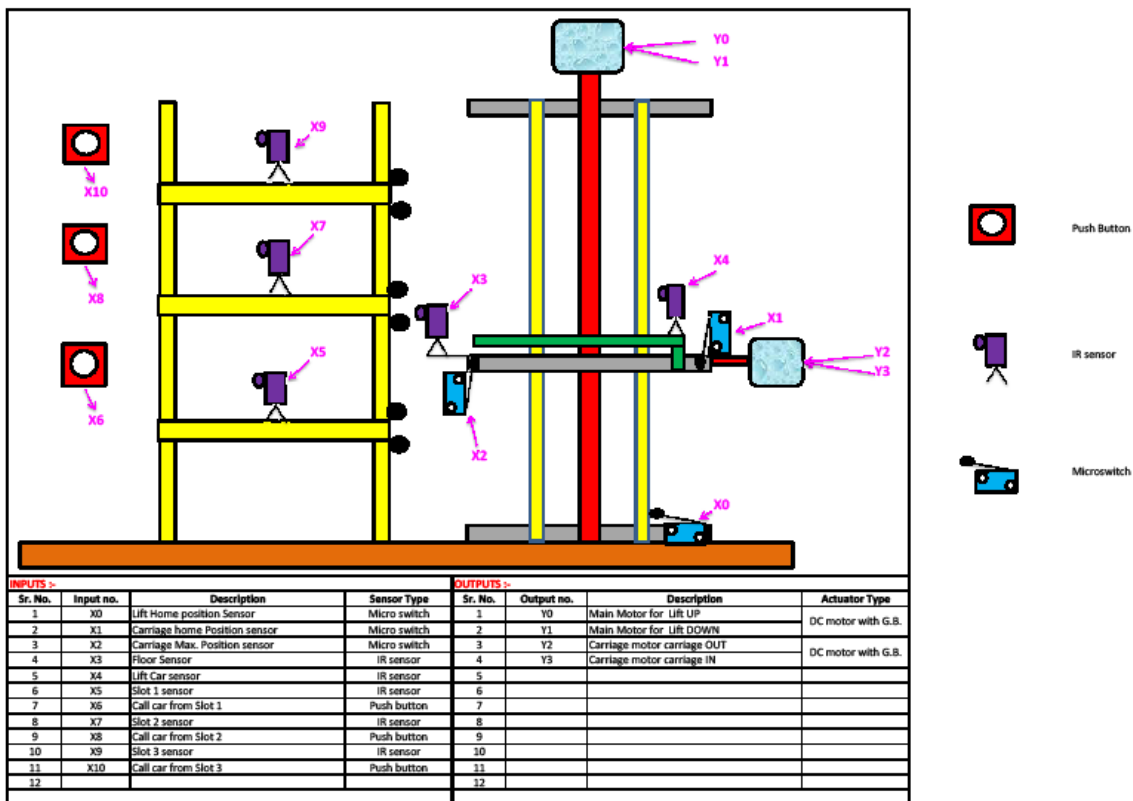


Fig-2: demo model

4. PROCESS

4.1 Automatic car parking process

To park a Car :-	
1	NO action (Absolute dry case)
2	Car Got on Lift
3	Main Motor UP ON
4	Lift home position sensor operated
5	Floor sensor operated (First pulse)
6	Floor sensor operated (two pulse)
7	Carriage motor IN ON
8	Carriage home position sensor operated
9	Slot 1 car sensor operated
10	Main Motor DOWN ON
11	Floor sensor operated (Third pulse)
12	Carriage motor OUT ON (part 1)
13	Carriage motor OUT ON (part 2) Lift car sensor operated
14	Carriage home position sensor operated
15	Main Motor DOWN ON
16	Lift home position sensor operated

Table 1: Automatic car parking

4.2 Automatic car retrieve process

To Retrieve a Car :-	
1	NO action (Absoulute dry case)
2	IF car is not parked at slot 1 (no action)
3	IF car is parked at slot 1 (slot 1 car sensor ON)
4	Call car slot 1 pressed
5	Main motor UP ON
6	Lift home positioni sensor operated
7	Floor 1 sensor (First pulse)
8	Main motor UP OFF
9	Carriage motor IN ON
10	Carriage home position sensor operated
11	Lift car sensor operated
12	After time T, Carriage motor in OFF
13	Main motor UP ON
14	Floor 1 sensor (Second pulse)
15	Main motor UP OFF
16	Carriage motor OUT ON
17	Slot 1 car sensor operated
18	Carriage home position sensor operated
19	Carriage motor OUT OFF
20	Main Motor DOWN ON
21	Lift home positioni sensor operated
22	Lift car sensor operated

Table 2: Automatic car retrieve process

5. ADVANTAGES

1. Because each elevator and cart is operated independently on each level, entry and exit is quick.
2. Retrieval time of a vehicle is less than two minutes.
3. Low noise and vibration.
4. Elevators never touch guide rails, use of urethane rollers minimize noise when transferring pallets from elevator to carts and then to parking slot.
5. Entry and exit is very quick and convenient. We incorporate a built in turntable on each elevator.
6. Completely equipped with multiple sensors and triple safety devices.
7. A self malfunction diagnostic control provides you with an excellent level of safety and reliability.

6. CONCLUSIONS

By using PLC , we can manage number of cars in side the parking area easily. We can reduce the time to park the cars and also fuel. It can easily detect the free space and park the car. By using PLC we can monitor the parking system.

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