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AUTOMATIC MULTILEVEL CAR PARKING & CONTROLLING SYSTEM USING PLC

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Abstract - *In this paper, the basic multi-level car parking scheme with three floors is considered to display the use of control systems in parking systems. The control method will perform a major part in organizing the arrival to and leaving from the parking track. It also presents the arrangement of multi-level parking track which occupies less need on the ground and contains the large number of cars. In the modern world, where parking-space has become a very big trouble , it has become very important to avoid the decrement of area in modern big Automatic multi-level car parking method helps to minimize the car parking area companies and apartments. The parking track have an elevator to carry cars to different floors according to the vacancies. The elevator is controlled by a programmable logic controller (PLC) along with the assist of some sensors.*

***Key Words*: PLC Ladder Logic, Car park system, sensors and DC motor**

1.INTRODUCTION

The development and advancement of nations is measured by the alternative of their usage and application of latest invented technologies in all aspects of existence. Control engineering is one of the aspects which have been given a great deal by many researchers. It became to a great concerns in many areas such as industriousness, farming, medicine, education and infrastructure. This paper is devoted to the function of control systems in parking systems. The control method will act a major activity in organizing the arrival to and leaving from the parking track. It also presents the arrangement of multi-level parking track which occupies less need on the ground and contains the large number of car. In the modern world, where parking-space has become a very big trouble, it has become very important to nullify the decrement of area in modern big Automatic multilevel car parking system helps to minify the car parking area companies and apartments etc. There are two types of car parking systems: traditional and automated. In the long term, automated car parking systems are likely to be more price effective when compared to traditional parking garages. Automatic multi-stored automated car park systems are less expensive per parking slot. A multilevel car parking is essentially a building with number of floors or layers for the cars to be parked. An automated car parking has mechanized lifts which transport the car to the different levels at a certain place. Therefore, these car parks take less building volume and less land space and thus save on the expenditure of the building. Multi–level car parking system is essential especially in regions facing area shortages, also in areas which supply huge crowds.

2 Objective of the project work

The goal of this paper is to designing and construct a model car parking scheme with PLC. To evolve an intelligent, user friendly automated car parking scheme which reduces the manpower, traffic crowding and fuel consumption of the vehicle. To offer safe and secure parking slots within limited area. This paper makes use of "Allen Bradly Micrologicx 1400" PLC. Programmable Logic Controller, or PLC for short, is simply a special computer device used for industrial control systems. They are used in many industries such as oil refineries, manufacturing lines, conveyor systems and so on. Where ever there is need to control devices the PLC provides a flexible mode to "soft wire" the component together. The PLC works as a controller for this project. PLC is activity to control the movement of elevator and working of pneumatic mechanism.

3. COMPONENTS

Relay board

Relay board is placed to drive the outputs of PLC. It contains 4 relays. Relays are used to supply power to 12volt DC geared motors. Voltage required to drive the DC motor is 12V DC. PLC gives 24V DC output. Hence to drive the 12V motor by PLC, relay interfacing is essential. In this paper, movement of escalator is in both forward and reverse direction. Hence single DC motor is driven by two relays.

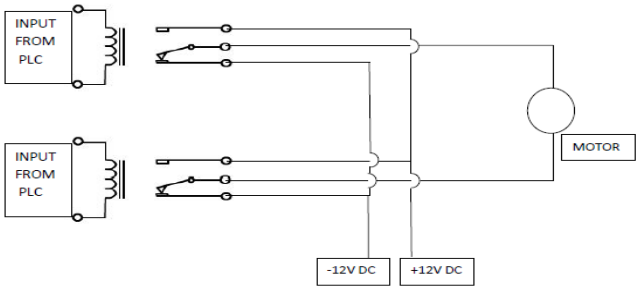

Fig -1: Relay connection

DC motor

In this paper makes use of three 200 rpm DC motors. First motor is used for vertical motion of escalator. Since the weight of escalator is very high, torque required to lift the escalator is also very high. This motor is mounted on the top of the assembly. Since this is prototype model, simple screw mechanism is used for vertical motion of the escalator. Second motor is used for horizontal motion of the escalator. A mechanical screw is coupled with the shaft of motor. Motor is connected to PLC through the relay board. Rotational motion of the escalator is achieved by third DC motor. This motor is mounted on the bottom side of the escalator. Shaft of this motor is attached to the escalator lift mechanism.

Limit switches

The motion of the escalator is terminated safely with the help of Limit switches. Nine limit switches are used for precise movement control of escalator. Building is three floor building, each limit switch is mounted on each floor to ensure correct stopping of lift. Limit switch mounted on each floor is normally open When escalator comes in front of the selected prototype building, limit switch mounted on that building turns to normally close position as a result motor stops rotating.

Fig.4.5.Limit switch

Power supply

A power supply is an electronic device that supplies electric energy to an electrical load. The primary purpose of a power supply is to replace one from electrical energy to another and known as a electric power converters. The power supply necessity is generally 12V, 5V and 3.3V DC output with about 3 Amp (Max) current capacity. Power supply required for different controller.

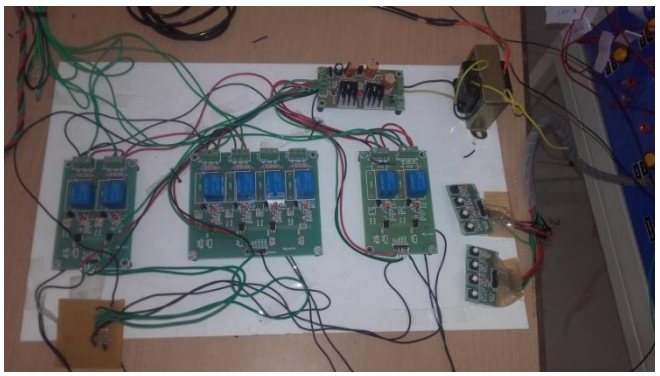

Fig -2: Power supply

4. PROGRAMMING A PLC

In these modern times a PC with specially dedicated software from the PLC Manufacturer is used to program a PLC. The most widely used category of programming is called ladder logic. Ladder logic uses symbols, instead of words, to simulate the real world relay logic control, which is a object from the PLC's history. These symbols are interconnected by lines to show the flow of current through relay like contacts and coils. Over the years the number of symbols has increased to provide a high degree of functionality. The completed program looks like a ladder but in existence it represents an electrical circuit. The left and right rails indicate the positive and ground of a

power supply. The rungs represent the wiring between the different components which in the case of a PLC are all in the virtual world of the CPU. So if you can understand how basic electrical circuits work then you can understand ladder logic. In this simplest of examples, a digital input (like a button connected to the first position on the card) when it is pressed turns on an output which energizes an Indicator light.

Advantages of multilevel car park system

- Vehicle safety.
- Minimum space required for construction.
- Maximum utilization of ground space.
- Easy for the driver.

5. CONCLUSION

Multilevel car parking system had designed and developed. The PLC with the assist of some sensors checks the accessibility of the vacant place on each floor. The movement of the elevator between the floors was continuous and smooth as requested. By using PLC we can manage the number of cars inside the parking easily. We can decrease time to park. By using PLC we can control and manage the parking system.

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