



INTELLIGENT CAR PARKING MONITORING SYSTEM USING PLC

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Abstract-

This paper describes an intelligent car parking monitoring system using Programmable Logic Controller (PLC). PLC is used to capable of storing instructions to implement control functions such as sequencing, timing, counting, arithmetic, data manipulation and communication. The I/O interfaces provide the connection between the PLC and the information providers (inputs like pushbuttons, sensors,) and the controllable devices (outputs like valves, relays, lamps,). In the modern world everything is going automatic we have built a system which will automatically sense the entry and exit of cars with the help of PLC. This project aims at saving the ground space required for parking. All these activities make the car parking system completely automatic. The development of this system is cost effective and useful to make solutions to car parking space problems in city areas.

Keywords-

PROGRAMMABLE LOGIC
CONTROLLER(PLC), IR SENSORS, DC MOTOR,
CONVEYOR,COUNTER,LCD.

I. INTRODUCTION

In this project, the automation process of an automatic car parking system is designed using a

fully functional ladder logic design. In this project we have automatically park the car with the help of PLC. This is the technique which not only reduces the space but also saves time. This project the main aim was to reduce the time. This has ultimately LED to a massive increase in number of vehicles. The concept of our project is to park car automatically. Moreover there is a lot of men labor involved for this process for which there is lot of investment. So the need is to develop a system which indicates directly which lane is vacant. So the project is to develop a system to indicate the vacant lane. Currently, automatic parking system is one of the major issues in a parking lot due to increase of personal vehicles, shortage of space and to avoid any roadblock. Infrared sensor (IR) electronic sensors were installed at the entrance and departure gates to sense the car those are waiting for either entry or exit. It emits invisible infra-red or visible red light to detect the presence of a car. Programmable logical controller is a device that is capable of being programmed to perform a controlling function. The PLC was designed to provide flexibility in control based programming and executing logic instruction .PLC allowed for shorter installation time and faster commissioning through programming rather than wiring. The PLC has in recent years experienced an unprecedented growth as universal element in industrial automation. The working is such that when a car will reach the entry



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gate of the parking area and at the same time then the gate is opened or closed using motors with the help of PLC ladder language. In this parking area separate IR sensors are placed in gate open and close side. IR sensor is used to produced the IR beam and the beam is mainly used to detect the object. If the room is too full, then the sensor will sense the status of the cars and passes the information to the PLC controller. Then the PLC operate the automatically park the car. The main condition of the car parking system is, when the car will reach the IR beam then the IR sensor is set the logical condition [1] and when the car will not be reach the IR beam then the IR sensor is set the logical condition [0]. so finally resultant boolean function is [0] (AND operation [If Either one states are TRUE, then the output is FALSE]). Then the resultant output is [1] (AND operation [If Both states are TRUE, then the output is TRUE]). The main condition of the car parking system is when the person will reach the IR beam then the IR sensor is set the logical condition [1] so finally resultant boolean function is [1] (AND operation [If Both states are TRUE, then the output is TRUE]). otherwise IR sensor is actively [1]. Since in modern world, where space has become a very big problem and in the era of miniaturization its become a very crucial necessity to avoid the wastage of space in modern, big companies and apartments etc. Both automated car parking systems and automated parking garage systems are used to reduce the polution. states, then the sensor is set the logical condition [0] and at same time the OFF DELAY TIMER will start to operated and also report to the motor gets turn OFF. so these kinds of problem solved by using buzzer system with the help of switches used to stop the process reduce the space.

II.OBJECTIVE FOR AUTOMATIC CAR PARKING SYSTEM:

The main objectives of our project can be given as follows:

- Now days in many multiplex systems there is a severe problem for car parking systems .

- There are many lanes for car parking, so to park a car one has to look for the all lanes.
- Moreover there is a lot of men labor involved for this process for which there is lot of investment. So the need is to develop a system which indicates directly which lane is vacant.
- So the project objective is to develop a system to indicate the vacant lane.
- The project involves a system including infrared transmitter and receiver in every lane and a led display outside the car parking gate Conventionally, car parking systems does not have any intelligent monitoring system.
- Parking lots are monitored by human beings.
- All vehicles enter into the parking and waste time for searching for parking slot. Sometimes it creates blockage.
- Condition become worse when there are multiple parking lanes and each lane have multiple parking slots.

III.WORKING:

FIGURE.1: INTRALOGIC L2O PLC





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PLC:

A programmable logic controller, PLC is a digital computer used for automation of typically industrial electro mechanical processes such as sequencing, timing control, counting, arithmetic, data manipulation etc. It can be viewed as an industrial computer that has a central processor unit, memory, input output interface and a programming device. The central processing unit provides the intelligence of the controller. It accepts data, status information from various sensing devices like limit switches, proximity switches, executes the user control program stored in the memory and gives appropriate output commands to devices such as solenoid valves, switches etc. In this project we have used INDRA LOGIC L20DP PLC with 8 INPUT & 8 OUTPUT as shown in Fig. 1.

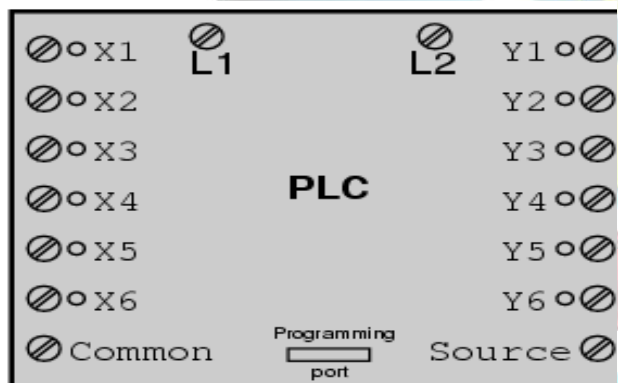


FIG2:PLC PIN DIAGRAM

PLC acted as the brain of this system because it controlled all the operations with the external devices.

MAJOR COMPONENTS OF PLC:

A.POWER SUPPLY:

It provides the voltages needed to run the primary PLC components.

B.I/O MODULES:

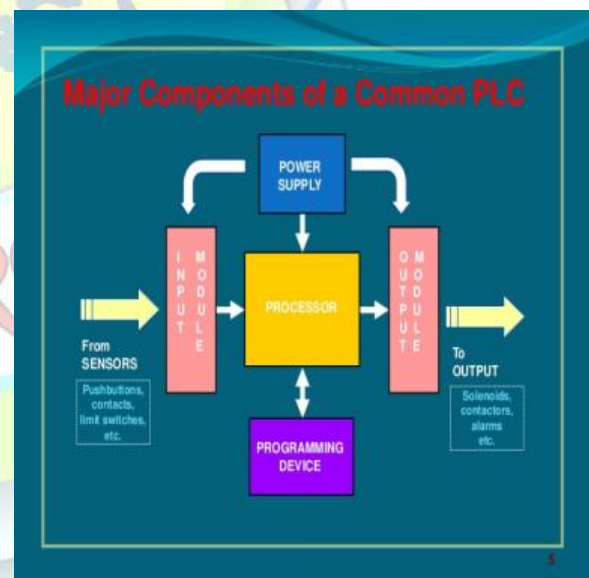
It provides signal conversion and isolation between the internal logic signals inside the PLC and fields high level signal.

C.PROCESSOR:

It provides intelligence to command and govern the entire activities of the entire PLC systems.

D.PROGRAMMING DEVICE:

It is used to enter the desired program that will determine the sequence of operation and control the process of equipment or driven machine.



2. LED

LED is used to display the free space for car parking. We are used LED indicators are used in this project. The first indicator is installed with the reset switch to signify the user if he/she resets the system. The other two indicators are used with the changeover on the control box to indicate which mode he/she is using i.e. manual mode or automatic mode. light-emitting diodes (LED display) were used



to display the status of the parking system. It indicates whether the parking space is available or not.

4. INFRARED SENSOR:

IR sensors were used for non-contact detection of targets at a distance regardless of material. It emits invisible infra-red or visible red light to detect the presence of a car. In this project, the target is detected when it breaks a beam of light to activate the sensor output. In this project, we are using Infrared Sensors which are installed at the cars entry & exit. It is a sensor able to detect the presence of nearby objects without any physical contact. The object being sensed is often referred to as the sensor's target. A sensor consists of an emitter and a receiver. An Infrared beam is emitted by emitter and received by the receiver. If any obstacle comes in between them, the receiver senses obstacle and gives the signal to the PLC. These sensors work on the supply of 24V DC. These sensors are of NPN type.

5. DC MOTOR:

Two DC motors were used to open and close the barrier for entry and exit of the cars. This project makes use of two DC geared motors. First motor is high torque 60 rpm motor and second is 5 rpm low torque motor.

6. LIMIT SWITCH:

An electromechanical limit switch applied for breaking the electrical path for interrupting the current flow.

7. POWER SUPPLY

We are using Switch mode power supply. This supply converts the 220V AC into 24V DC with the current rating of 2 Amperes. There is a regulator also, by using which we can control the output value of SMPS. SMPS transfers power from a source, like mains power, to a load, such as a personal computer, while converting voltage and current characteristics. Unlike a linear power supply, the pass transistor of a switching-mode supply continually switches between low-dissipation, full-on and full-off states, and

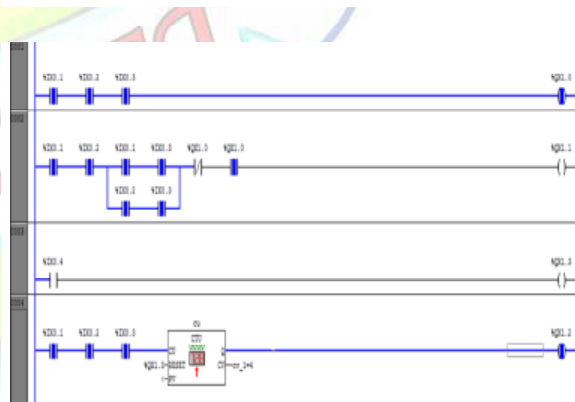
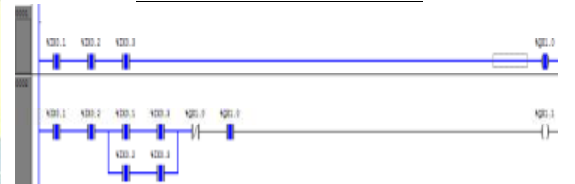
spends very little time in the high dissipation transitions, which minimizes wasted energy. Ideally, a switched-mode power supply dissipates no power. This higher power conversion efficiency is an important advantage of a switched-mode power supply. In this project, a special type of regulated DC power supply was designed which has two types of output voltage (12V and 24V).

7. PLC PROGRAMMING

Ladder logic is the most common programming language used to program a PLC.

IV. LADDER DIAGRAMS FOR GATE OPEN AND CLOSE

LADDER DIAGRAM





PROPOSED SYSTEM

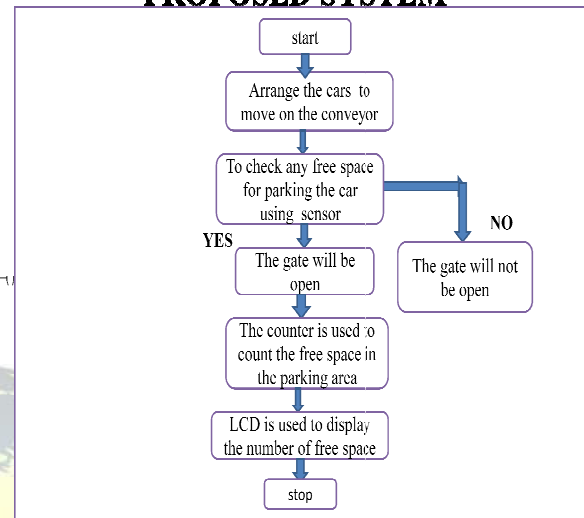


FIGURE2:LADDAR DIAGRAMS FOR CAR INCREMENT AND DECREMENT AND GATE OPEN AND CLOSE.

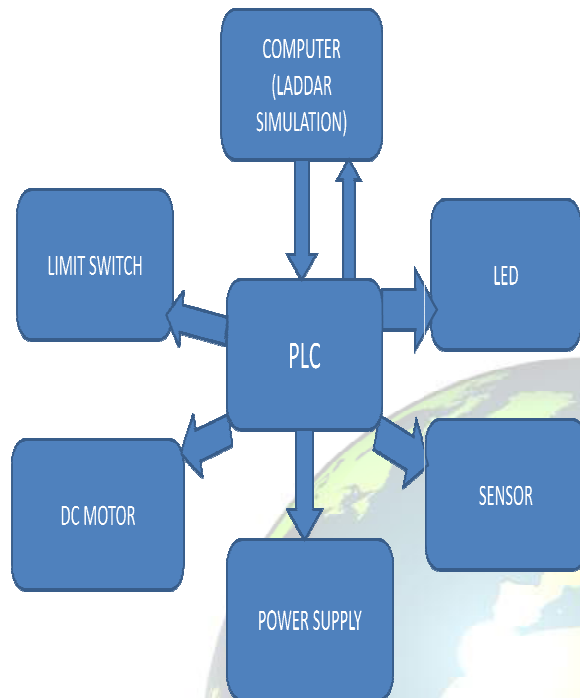
EXISTING SYSTEM

In previous reference papers automatic car parking system has been tested by using microcontroller. Microcontroller has lower performance and its programming language is difficult to understand. It has 8 inputs, so we have detecting material by using more than 8 sensor is not possible. It is possible by using PLC. PLC has 228 flash card (memory). PLC has the advantage, the I/O ports are changeable. PLC can be reprogrammed. Programming of PLC is easier than wiring the relay panels.

The cars are arranged to move on the conveyor. The sensor is used to sense the entry and exit of cars. To check any free space for parking the car using sensor. When there is yes the gate will be ON, otherwise the gate will not be ON. The counter is used to count the free space in parking area. LCD is used to display free space for parking area. If the count reaches 0, i.e. if the parking space is completely filled, the LCD will display NO SPACE FOR PARKING on LCD. If the count reaches 1, i.e. the LCD is display the free space for parking. If any vehicle tries to enter the parking area, the entrance gate of parking system will not be opened since there is no space in. If any vehicle leaves the parking area, the counter will increment the number of count and allows the other vehicles for parking. A user enters the parking facility. At the entrance, there will be a LED panel and a display. LCD displays whether there is empty slot for parking or not.



V.BLOCK DIAGRAM:



LADDER LOGIC TABLE:

SENSOR1	SENSOR2	SENSOR 3	LED OUTPUT
0	0	0	OFF
0	0	1	OFF
0	1	0	OFF
0	1	1	OFF
1	0	0a	OFF
1	0	1	OFF
1	1	0	OFF
1	1	1	ON

OVERVIEW:

1) Motor opens the entry gate when a car is at the entry barrier and the car parking space is not full. A timer starts to count the number of vehicles (with increment) when the entry gate is opened. Then, automatically the entry gate becomes close when the time is over. Finally LED indicates the "Full" signal, if the counter is at maximum level.

2) the motor opens the exit gate when a car is at the exit barrier. The timer starts to count the number of vehicles (with decrement) when the exit gate is open. Then the exit gate becomes close when the time is over. Finally, the LED indicates "Empty" symbol when the counter is at minimum. The LADSIM Ladder Logic Simulator which was used to design the two logics by ladder diagram for PLC programming.

The above table shows the ladder logic conditions. The sensor1, sensor2 and sensor3 are separate IR sensors. The car is present in the parking area when the sensor condition is 1. The car will not present in the parking area when the sensor condition is zero. The AND Gate operations are used in this condition. The sensor output is 1, when the LED is ON and the sensor output is 0, when the LED is OFF.

RELATED WORK:

1. This system will also have lots of utilizations in industries.
2. It can be used in shopping mart, jewellery mart.
3. It can be used in Crowded Areas

ADVANTAGES:

This project can be used to less noise pollution, save time, money, space, avoid car damages.

VI. CONCLUSION

This project is basically to atomize the car park for allowing the cars into the park. LCD panel is provided to display the parking space availability information about the total number of cars that can be parked and the place vacant for parking. Two IR sensors TX RX pairs are used in this project to identify the entry or exit of the cars into/out of park. It is a versatile project with application in almost



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every field, be it residential or industrial. It is a very unique system with many features and these kinds of systems are not readily available in market. I would like to conclude this project as a very great and upgradable experience. industrial sectors. This project was not only good for personality development but also great in terms of imparting practical knowledge. Thus we conclude our project with a very nice and wonderful experience.

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