Automatic Multi-Level Car Parking System

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ABSTRACT

In the modern world, where parking space has become a very big problem, it has become very important to avoid the wastage of space which helps to minimize the car parking area. In this paper, the basic multi-level car parking system with two floors is designed. The system developed is able to sense the presence of vehicles through an IR sensor. The RFID module provides security as users who have authority can swap the RFID cards. The project is designed for automatically parking car into the parking spot in a multi floor parking lot using elevators which is controlled by Arduino Uno controller along with XY plotter.

Keywords . IR sensors, XY plotter, stepper motor, RFID, automatic parking system.

I. INTRODUCTION

The advancement and progress of nation is measured by the possibility of their use and application of latest invented technologies in all aspects of life. Vehicle parking is becoming a major problem nowadays. Car parking has been, and still is, a growing problem with increasing vehicle sizes in the luxury segment. This is especially true when bearing in mind the confined parking spaces in parking lots and cities. As the population is increasing, the number of vehicles on the roads is also increasing leading to an insufficient area to park these vehicles. This project is devoted to the use of control system in parking system. Control engineering is one of the aspects which have been given a great deal by many researchers. The control system plays a major role in organizing the entry to and exit from the parking lots. It also presents the design of multi-level parking lots which occupies less need on the ground and contains the large number of cars. Therefore, the need of using technologies becomes inevitable.

Multi-level car parking system enables the parking of vehicles, floor after floor and thus reducing the space used and it will helps in less manual intervention.

Automatic multi-level car parking system helps to minimize the car parking areas in companies, mall, and apartments etc. and it reduces the pollution. In automatic car parking system mechanized lifts transports the car to different levels at a certain position. The driver leaves the car in an entrance module. It is then transported to a parking spot by a robot trolley. For the driver, the process of parking is reducing to leaving the car inside an entrance module.

Automated multi-level car parking offers greatest possible flexibility or the realization of optimum parking solution. Drivers' does not have to manoeuvre his cars on each level. If there is no vacant space on the ground floor, the lift automatically goes to first floor. Such a system has been proposed and designed in this project by making additions for existing system. Implementation of the design is carried out in Arduino Uno and XY plotter.

In this paper [3], proposes the development of a mathematical model for automated car parking system. Where LCD shows the number of autos stopped in a given parking space. When the auto

arrives it will send signal to the controller. The android is interfacing with LCD and GSM. GSM is utilized for sending and getting message to and from microcontroller. Radio recurrence is used to transmit the correspondence between stopping range of the auto. Now the messages will be decoded by android application and accordingly future will take place.

This paper [4] has introduced intelligent automated car parking system and developed the hacking intimation feature for the car owners. An automated slider system provides the motion for the overall system with the help of IR sensors, limit switches and flame sensors to initiate alarm signals if there is a fire inside the parking area. Where the IR sensor is used to record the position of the robot slider and its movement is controlled by microcontroller using DC motors. IR sensor will also detect weather the car is parked or not and intimate to the microcontroller. Here also GSM technique is used to receive the status of the car and send a feedback to the car owner.

The paper [5] is devoted to the function of control system in parking system. It is designed and constructed it by using PLC. The mechanized lift is used to transport the car to different levels by DC motor. PLC will control the movement of elevator and working of pneumatic mechanism, relays are used for forward and reverse direction control. Programming is done by ladder logic which uses symbols. Thus control and manage parking system with effective utilization of area and reducing time to park the car.

In this paper [6] it aims for parking space detection based on image processing technique where the capture and process of brown round is done by MATLAB. The first module is to initialization the system to automatically identify the location of parking lot in the image. The second is image acquisition module, which captures and stores the digital images. The acquired signal is given to MATLAB program. The third module is image segmentation, which separate the objects from the background and differentiate the pixels nearby values. The fourth module is image enhancement where the noise is removed by morphology functions and the last module is image detection, which is used to determine the rounded brown image drawn at each the parking lot.

In his paper [7], the system has two main modules. First the identification module identifies the visitor and then lot checking module checks the slot status. The model is done by HDL and implemented on FPGA. The working of parking system is given by describing the output that depends upon past state as well as present input. At the entrance of parking area, LCD displays the status of parking system. According to space status motor rotates in clockwise direction and then identification unit identifies the person. After identification, slot status is checked. Status can be filled, empty or reserved. RF sensors are used here.

II. METHODS AND MATERIAL
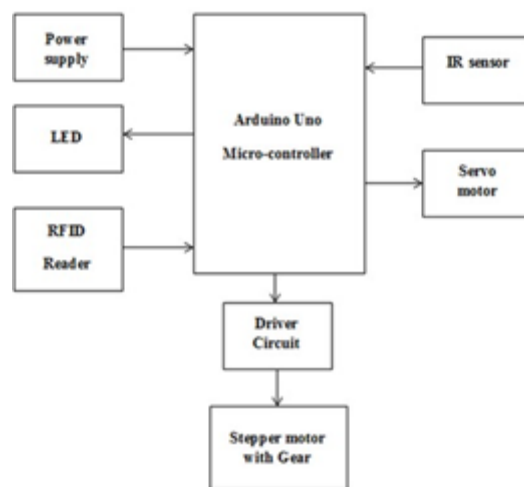
Figure 1. Block Diagram of Automated Multilevel Car Parking System

The Automated Multilevel Car Parking System consist of

1. Arduino microcontroller is the heart of the system where the programming is written.
2. Power supply is regulated power supply of 5v.
3. H Bridge is used for current amplification and to control motor in clockwise and anti clockwise.

4. IR sensor is used as interrupter sensor to check the slot is free or not.

5. Servo motor is used for controlling gate. RFID reader is used to read the card.

As shown in Figure 1, the elevator carries the car to each floor and the elevator comes in front of the floors to allow the car get in or get out. First the cars will be parked in one floor and then in other floor. The green LED will be ON if the slot is free. When the car approaches near the front/enter gate the user will be given an ID card. The elevator will work automatically and goes to the slot with respect to priority given and the car will be parked. If there is no vacant space on all floors the red light will be ON in front of the parking to indicate the driver that there is no empty space to park and the front gate will be closed automatically.

In the case, the car is inside and wants the car to come out, then the user has to show the ID card which is given and the elevator will automatically go to that particular car and picks the car from respected floor, then it comes to the exit gate to allow the car to go out. The main objectives of the car parking system are-to design and fabricate a multilevel car parking system and to design and fabricate a cost-effective model, to develop a fully automated control system and to prevent illegally parked vehicles.

The system will first check for login ID and the data received will be sent to microcontroller. If it is valid then the front gate will be operated and the controller will check for empty space. If there is no space left for parking then the control will go back to login stage. If there is space left for parking the vehicle then a signal will be sent to the stepper motor to move the elevator to the empty space for parking.

III. RESULT AND DISCUSSION

Case 1. A lift mechanism is used to park the car on the first floor which is implemented using motor. Motor is rotated clockwise it stops when it reaches on the first floor. The car is parked on the first floor successfully.

Case 2. The car which was parked on the first floor, was successfully retrieved.

Case 3. A user tried retrieving a car which was never parked in actual or a wrong RFID card was swapped up, in both the cases, an error signal was indicated on the LED.

The prototype of the proposed system is shown in Figure 2.
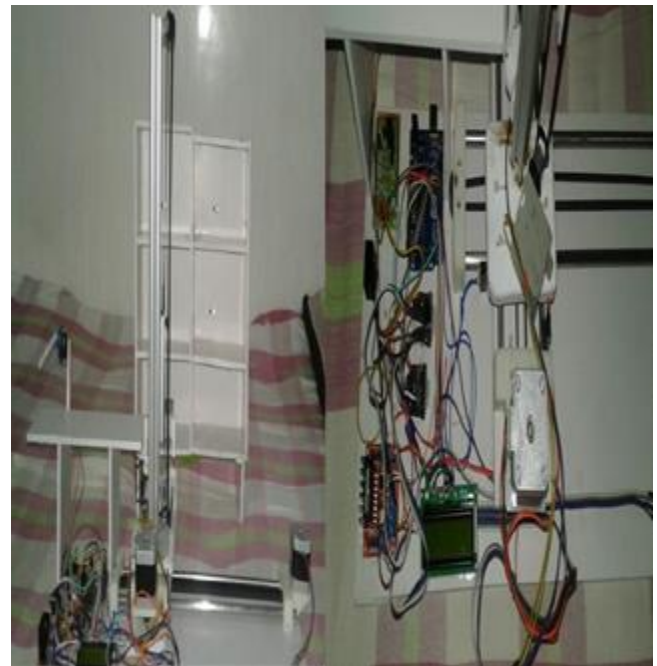
Figure 2. Prototype of the proposed system

IV. CONCLUSION

Automatic multi-stored car parking system is very good substitute for car parking area. This design is an efficient one because compared to other existing design it can handle more cars in a limited space. The lifting mechanism is also simpler and cost effective. Two IR sensors TX RX pairs are used in this project to identify the vacant spaces. It is a versatile project with application in almost every field, be it residential or industrial.

V. REFERENCES

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