

Automated Vehicle Parking In Indian Context

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Abstract: Today's world is changing drastically. With the changing world the problem of vehicle parking system has worsen. In metropolitan cities, vehicle parking issues has reached to its peak level and has become a major concern in all busy areas. Inorder to solve these issue different types of vehicle parking system are being tried to create worldwide. In this paper we cover the idea that if the automated vehicle parking needs to be introduced in India then what all things we need to add to make it successful. The basic aim of our project is to create a cost efficient parking system which can accommodate atleast 25 cars within a parking area of 32.17 m².

Keywords: Automated vehicle parking, RFID tag reader, IR module, automated train carriage.

I. INTRODUCTION

The advancement and progress of any nations is being measured by the possibility of there use and application of latest invented technologies in all aspects of life. It became to a great concerns in many areas such as industry, agriculture, medicine, education and infrastructure. Automatic control systems have emerged as an integrated part in telecommunications, electricity, fuel and other applications. This paper is devoted to the use of control systems in parking systems. The control system plays a major role in organizing the entry and exit of the vehicles from the parking slots. Therefore, the need of using technologies became inevitable. In the modern world, where parking-space has become a very big problem, it has become very important to avoid the wastage of space and park more and more vehicles in small area.

With this technology, you need to do only is to simply drive your car to an entry position and leave your car to be automatically picked up by the computerized lifts, the lift will safely pick your vehicles and park it in the empty space on the particular platform. When you want to leave, you return to the same entry position and your car is swiftly retrieved to you.

II. ADVANTAGES OF AUTOMATED VEHICLE PARKING SYSTEM

- 1) No human interaction is required during parking and retrieval of vehicle.
- 2) As the whole process is made controller based efficiency is maximum.
- 3) The maximum utilization of space can be made.
- 4) More cars can be parked in less area.
- 5) Automated Parking is more safe and secure.

III. AUTOMATED VEHICLE PARKING SYSTEM IN INDIAN CONTEXT

Many of the car drivers are being found parking there cars in the locations where they found the empty space. The worst is the case in front of the shopping malls and the cinema theaters where tremendous amount of cars enter and leave at the same time. It sometimes become very difficult to control this chaos, often proving to be hectic to the drivers and the passerby.

After the admin had started the system, the driver was prompted to enter a key for his designated parking spot and he was given the choice either to park or retrieve his car. Each key had been checked for accuracy and had been assigned a designated parking spot.

If there was a car on the driveway that has been detected by the IR circuit, which is connected to the PC via the pins of a parallel port; the driver was given the choice to park his car. However, if the IR circuit doesn't detect a car, there were three different scenarios. If the entered password was checked on the database and the car was already parked, the driver was given the choice to retrieve his car. If the database was checked and the car wasn't parked or he entered a wrong password, he got an error.

IV. VARIOUS THINGS TO BE CONSIDERED FOR BRINGING ABOUT AUTOMATION

A. Train Carriage for Carrying Vehicles for Parking:

The train carriage is mainly designed to carry the vehicles to the parking slots. The stepper motor of rotary wheels of the train carriage has been connected to the microcontroller and is being programmed with the help of C language. The software used basically for the programming is keil and flash magic software is used for debugging the program on the controller.

The stepper motor of the train carriage and RFID controller both are connected to the same microcontroller and has the decision making ability. When asked by the vehicle owner for the vehicle while going, the owner has to enter the vehicle number. The role of the controller then starts. The controller will ask the RFID to track the position of the vehicle. After tracking the vehicle the train carriage will lift the vehicle and come back to the original starting position and thus the vehicle can be retrieved.



Fig. 1. Automated train carriage

B. Introduction of RFID technology for Parking Access Control Systems:

The introduction of the RFID technology in the project is done mainly to identify the car when it is need to be retrieved when to be dispatched. Radio Frequency Identification (RFID) technology has been among the most rapidly growing technology in the field of the Automatic Identification Data Collection industry [3]. RFID makes the use of electromagnetic field wave's in order to transfer the data, and to automatically identify and track the tags being attached to the objects. These tags can store information in an electronic manner. Some tags are powered to make use of the electromagnetic induction from magnetic fields produced near the reader. RFID uses tags to transmit these information upon RFID reader query. It responds to query which can be any information asked by the user because of its fixed unique serial number. This fixed tag ID enables the user the easy tracking of tags. In addition to the unique serial number, tags can also be used to store user's information [4].

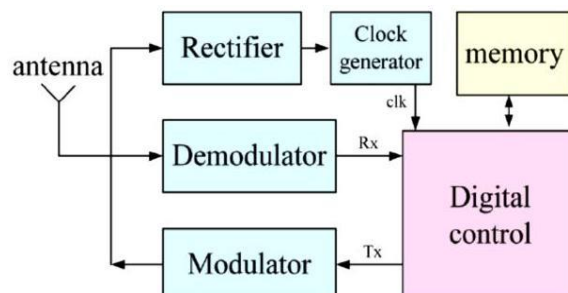


Fig. 2. Block diagram of RFID

An RFID reader transmits an encoded radio signal to identify the tags. These RFID tags receive the message and then are responsible to respond to the identification and other information. This contains a unique tag number serial in nature, or may contain a product-related information such as a stock number, lot or batch number, production date, or other specific information. As the tags have their individual serial numbers, the RFID system design can easily discriminate among themselves that might be within the range of the RFID reader and read them simultaneously.

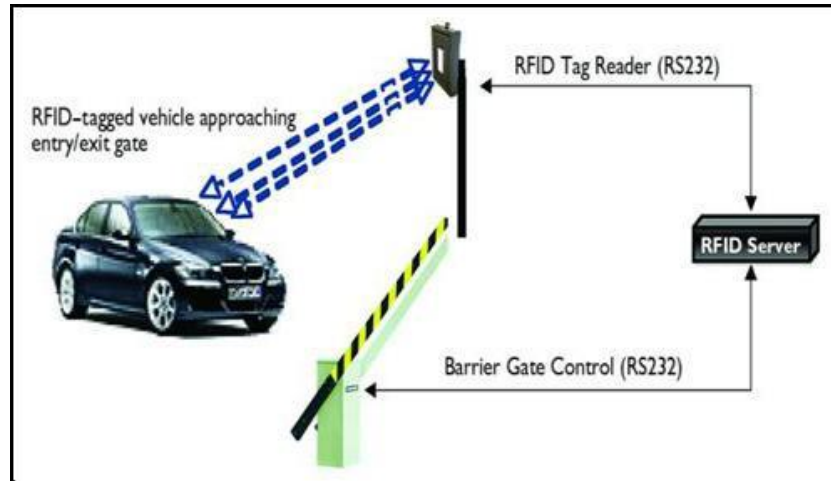


Fig. 3. RFID tag and reader

The use of RFID tags, antennas and readers makes us easier to automate the in and out privileges of parking subscribers. The RFID technology is now-a-days replacing the old barcode technology of tracking inventory. In the recent past, RFID tagging was being considered as a viable concept but it was too expensive to implement. About two to three years ago, an RFID tag consist of a little box that cost about 30\$ to 50\$. The technology has advanced, with the advanced system RFID tags sizes have also been reduced upto the size of a mailing label, they are now being made of paper, and are very much cheaper.

Advantages of Using RFID Tag:

Even though the RFID is not likely to entirely replace commonly used barcodes in the near future, the following suggested advantages additionally apply RFID for its added value of identification:

Tag detection does not require human intervention thus reduces the employment costs and eliminates the chances human errors from data collection. RFID tags have a longer read range than barcodes. Tags can have read/write memory capability, while barcodes doesn't possess this. An RFID tag can store a very huge amount of data of a unique identifier. Unique item identification is easier to implement with RFID than that can be done with barcodes. Here we can read many tags simultaneously, Automatic reading of tags at several places had reduced time lags and inaccuracies to an inventory.

Disadvantages of Using RFID Tag:

Cost: The cost of tags being used depends on their type. The economic use of tags taking has associated about 53% decrease in labor costs and zero tag information generation costs into account as well would require a maximum of 25 cents per tag for high end products, and 5 cents for common item-level tagging. Prices of active or semi-passive tags has been even more problematic, looking towards their economic application, before scanning there high value goods over long ranges.

Collision: Attempting to read several tags at a time may result in signal collision and ultimately to data loss. To prevent this, anti-collision algorithms can be applied at an extra cost. The development of these methods, aimed at reducing overall read time and maximizing the number of tags simultaneously read, still goes on.

Faulty manufacture of tags: Manufacturing of tags is not yet 100 percent failure-free today; about 2030 percent of tags used in early RFID pilots have been defective .

C. IR Reflector Module:

The IR rejection module works on the rejection criteria. The IR led and photo diode are placed adjacent to each other.

When any reflecting surface or any obstruction comes near to IR LED and photo diode pair the reflected rays of light from IR LED falls on the photo diode which continuously decreases the resistance of the photodiode and the photodiode now starts conducting. At this point of time the voltage at pin 3 of LM38 is approximately about 5 V which exceeds the voltage level at pin 2 of LM38 and the output at pin 1 goes high. The sensitivity of the IR sensor can be controlled with the help of the variable resistor. On changing the value of the variable resistor, we can easily change the sensitivity of the IR sensor which in turn results to the increase and decrease in the distance accordingly.

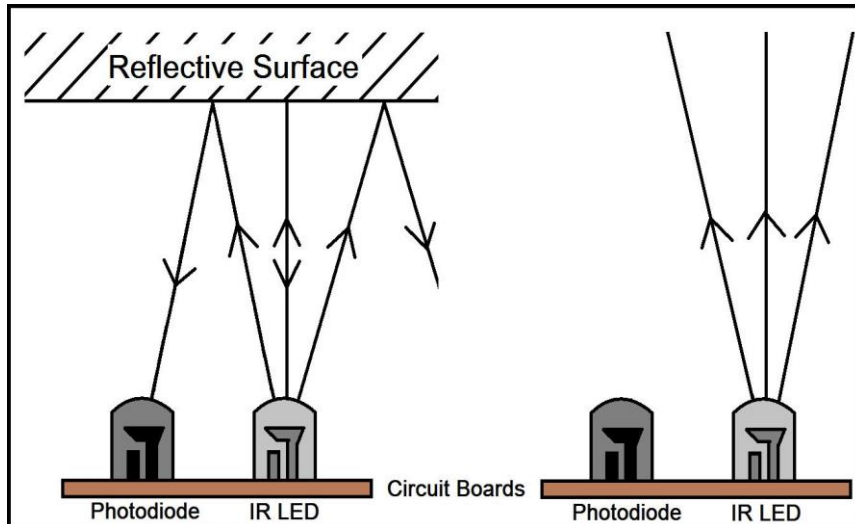


Fig. 4. Working Of IR Module

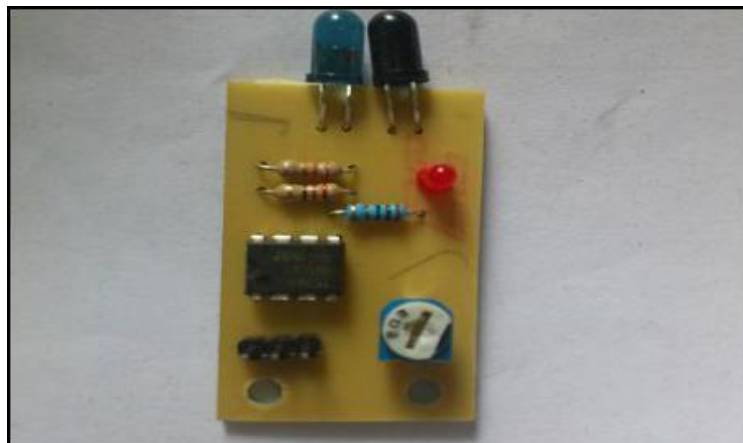


Fig. 5. An actual IR module

V. CONCLUSION

Thus the automation of the of the vehicle parking system has been achieved. For the automation the vehicle parking system we made use of the automated train carriage. The train carriage was used carry the vehicle to the parking slot and also retrieve it. The RFID has been used to store the information of the car such the vehicle number, model number and the date of entry and departure and also the timing. Thus the automation of the vehicle parking system has been achieved.

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