



Smart Parking using RFID card for College

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ABSTRACT

In a conventional parking system that is currently still widely used, vehicle owners must show the parking card or the receipt for the parking hours so that the fee will be paid. In this project, a parking system is going to be developed by utilizing radio frequency identification (RFID) technology based on a microcontroller control system. The use of this technology will make it possible to create a subscription parking system that is served automatically and flexibly by a parking lot. RFID has data information that can be used as a user's identity to enter the parking area. In this research, parking system design and implementation were made by simulating a miniature portal door system to enter and exit vehicles on campus using RFID cards or cards as subscription IDs. The AT89C51 microcontroller is used as a system controller. By using this RFID technology, the parking subscription system becomes more flexible and faster.

KEYWORDS: Microcontroller, LCD display, RFID module, parking, Servo motor, Ultrasonic sensor module

1. INTRODUCTION

In recent times, the number of vehicles has been consistently rising, and parking space is becoming a major issue in urban and semi-urban cities and also in colleges, so there is a need to design a parking system that will reduce manual work as well as the problem of cars parking in colleges. So it becomes important to reduce these problems. Automatic car parking enables the parking of vehicles without problems.

In this module, we implemented the concept of a microcontroller-based car parking system. As we see in the modern world, everything is going automated. Here, we have deployed an automatic microcontroller-based system that is used to sense the presence and movement of cars, and depending on the availability of space, it allows parking. The same is displayed on an LCD panel.

There is also an RFID module that will provide security as users who have authority can swap the RFID cards and get entry; otherwise, they cannot. The details of the parked vehicle are also uploaded to the cloud for security.

STRUCTURE OF PAPER

The paper is organized as follows: In Section 1, the introduction of the paper is provided along with the structure, objectives and overall description. In Section 2 we discuss related work. In Section 3 we have the complete information about RFID Card Reader and Card. Section 4 tells us about the methodology. Section 5 tells us about the future scope and concludes the paper with acknowledgement and references.

OBJECTIVE

The main objective of the project is to minimize the miscommunication between the staff's and student's parking slots in which the staff and student have to park their vehicle's in separate parking slots.

2. RELATED WORK

There are numerous works that have been done related to image processing machine learning algorithms.

Eirini Eleni Tsiropoulou, John S. Baras, Symeon Papavassiliou & Surbhit Sinha^[1] have adopted the passive Radio Frequency Identification (RFID) card-to-card communication paradigm within the context of a smart parking system, which is evangelised in terms of achieving improved energy efficiency and operational effectiveness. The analysis provided in this paper assumes that all nodes share a common channel and that interference is appropriately mitigated, either using TDMA without spatial reuse or by the use of several orthogonal channels appropriately allocated.

Manjusha Patil and Vasant N. Bhonge^[2] developed a sensor network that carries all information about the parking space from the sensor node to the management centre. The sensor network and the information and management centre constitute a PGIS. The experimental results determine that the PGIS that developed can satisfy the application. This system can be conveniently installed in the parking slots.

Kay Li Ng^[3] have proven the results to be an effective power-saving solution for RFID systems. This method also helps in improving road safety by tracking the vehicles, ensuring smooth traffic, especially around parking areas, and upgrading the convenience of road users as well as parking management authorities with automation.

Ayesha Atta, Sagheer Abbas, M. Adnan Khan, Gulzar Ahmed, Umer Farooq^[4] have proposed intelligent smart traffic congestion control system using RFID that overcomes the drawbacks of the existing traffic congestion control system. This was achieved by the capacity of the fuzzy device to take its own decision by either extending or terminating the timing of a signal.

Zeydin PALA and Nihat INAN^[5] made a prototype in which, all the parking lots in a city could be operated in an economical and fast way. This prototype will provide automated operation and control capabilities for all of the parking lots in a city by using standardized devices.

3. RFID CARD READER AND CARD

RFID CARD READER

RFID Reader has a transceiver that generates a radio signal and transmits it through the antenna. This signal itself is in the form of energy which is used to activate and power the card.

When the RFID card comes in a range of signals transmitted by the reader, the transponder in the card is hit by this signal. A card draws power from the electromagnetic field created by the reader. Then, the transponder converts that radio signal into usable power. After getting power, the transponder sends all the information it has stored in it, such as a unique ID to the RFID reader in the form of an RF signal. Then, the RFID reader puts this unique ID data in the form of a byte on a serial Tx (transmit) pin. This data can be used or accessed by PC or microcontroller serially using UART communication.



Fig. 1 RFID Card Reader

This module directly connects to any microcontroller UART or through an RS232 converter to a PC. It gives UART/Wiegand26 output.

RFID CARD

An RFID card consists of an integrated circuit and an antenna. This card carries 12 unique numbers. The card is also composed of a protective material that holds the pieces together and shields them from various environmental conditions. The protective material depends on the application. For example, employee ID badges containing RFID cards are typically made from durable plastic, and the card is embedded between the layers of plastic. RFID cards come in a variety of shapes

and sizes. cards can be attached to almost anything like Animals, Employee ID Card, vehicles, assets, Shoes, etc. There are two types of RFID cards.

- 1) Passive cards
- 2) Active cards

In this module we have used passive cards. Passive cards are the most widely used, as they are smaller and less expensive to implement. Passive cards must be "powered up" by the RFID reader before they can transmit data.

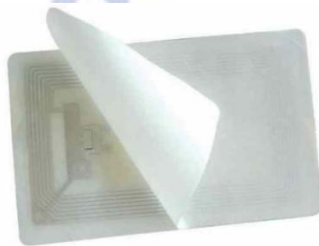


Fig. 2 RFID Card

Passive cards are comprised of three elements: an integrated circuit or chip, an antenna, and a substrate. The RFID chip stores data and perform specific tasks. Depending on its design, the chip may be read-only (RO), write-once, read-many (WORM), or read-write (RW). Typically, RFID chips carry 96 bits of memory (12Bytes).

4. METHODOLOGY

In this paper, we are using a 230 volt AC supply, which is further stepped down to a 12 volt AC supply with the help of a step-down transformer. Further, this AC supply voltage is converted into a 5 volt DC supply with the help of a bridge rectifier circuit because the components used in the circuit work on the 5 volt DC supply only. Then, with the help of the capacitors, the unwanted noise is removed from the voltage, and we get a pure pulsating voltage. Here we are using two types of capacitors. Then this voltage is regulated with the help of a regulator for the proper and safe working of the circuit. The regulator is attached to the heat sink for the components' safety from temperature rise.

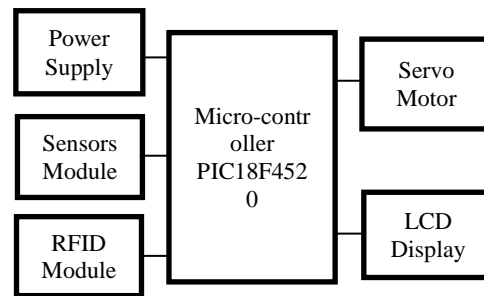


Fig.3 Basic block diagram of smart parking

The microcontroller circuit contains the IR sensor, ultrasonic sensor, buzzer, servo motor, display, and EM18 module, and all these components are connected to the microcontroller module. The ultrasonic sensors are used for the detection of the vehicle in the respective slots. This data is then sent to the microcontroller and, further, to the display. The display will show the availability of parking in the respective sections, such as the teacher and student sections. If it shows "E" for any of the slots, then it means that the slot is empty and available for parking, and if it shows "F," then it means that the slot is full. The IR sensor is used to detect the movement of the vehicle, and it will send a signal to the microcontroller to open and close the barricade, respectively. The servo motor is connected to the barricades. The servo motor is used for the opening and closing of the barricade depending on the signal received by the microcontroller from the IR sensor and the EM18 module.

5. FUTURE SCOPE AND CONCLUSION FUTURE SCOPE

For future work, all data (vehicle details, time of entry, time of exit, history of vehicle entry and exit) will be stored in the College Cloud database and can be accessed only by college authorities. Also, in order to avoid vehicle halts for the recognition of an RFID card, instead of an RFID card, a barcode can be used. Instead of an RFID reader, a camera can be used. This will avoid a halt of vehicles at the Barricade.

6. CONCLUSION

The project is aimed at building a flexible invoicing system which can precisely match content PDF files, easily match line items and tables and automate the entire invoicing process for any major organization. The

system has the ability to obtain all relevant information from the document with 100% accuracy while ensuring speed and reliability. This project has a huge potential for further development. While the problem focuses on digitization of invoices, this could be extended to digitizing any document for processing, thereby removing any manual efforts, errors and management of document processing within companies.

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Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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