

Smart City Based Smart Parking System in Metropolitan Area Using R.F.I.D

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Abstract: The present day metropolitan areas have seen a burgeoning growth in human population as well as vehicles. With shrinking spaces, operating a managed, busy & expensive parking lot having multiple gates can pose significant challenges, especially to a government organization that also owns some of the vehicles in the lot. In this paper, a solution has been provided for the problems encountered in parking lot management systems via RFID readers, RFID labels, computers, barriers and software are used as for the main component of the RFID technology. The software has been handled for the management, controlling, transaction reporting and operation task for parking lots located on various parts of the city. Check INS and Check-outs of the parking lots will be under control with RFID readers, labels and barriers.

Index terms: RFID card, RFID modle, L293D motor driver, IR Pair.

I. Introduction

Vehicle traffic congestion is a worldwide problem. In recent years, efforts have been made to introduce a method to reduce parking problems such as congestion, accidents and hazards. Parking systems can also take advantage of innovative technologies in order to improve the ease and convenience of paying for parking. Now a day, Smart cards minimize transaction time by allowing a user to simply wave their card in front of a reader. Mobile devices can also be used in payment transactions. Public utilities need a parking system that can function efficiently and be integrated with the other urban city utilities. For allotment of parking slots there is no proper way thus parking management system fails in coordination and centralizing the information for an effective system.

RFID is called a new technology, but it is actually older than barcodes. The first use of RFID technology goes back to World War II for airplane identification. In 1994, all rail cars in the United States used RFID for identification. Although it has been known for a long time, it has not been widely used in industry (Landt 2005). Because it was expensive and there was no standardization

Among the manufacturing companies, it took it a long time to be widely utilized. RFID allows the wireless storage and automatic retrieval of data. It provides a significant improvement over not only conventional identification, tracking, and stocking of objects, but over the barcode system as well. RFID is expected to help boost supply chain efficiency, improve security, cut down on theft and counterfeiting, increase asset visibility, enhance inventory control, automate stock replenishment, etc. (Land 2005).

By the use of RFID technology, manually achieved workloads will be decreased considerably (Penttila et al. 2006). RFID technology is universal, useful and efficient (Zhang et al. 2005). RFID technology increases company efficiency and provides advantages on both company and client-wise (Higgins and Cairney 2006). RFID technology is much more secure (if cryptographic modules are involved) compared to other networks (Xiao et al. 2006). RFID labels play an important role as an inventory tracking technology (Goodrum et al. 2006).

RFID is becoming an important identification technology in applications such as inventory management, security access, personnel identification, factory automation, automotive toll debiting, and vehicle identification to name just a few (Ostojic et al. 2007)

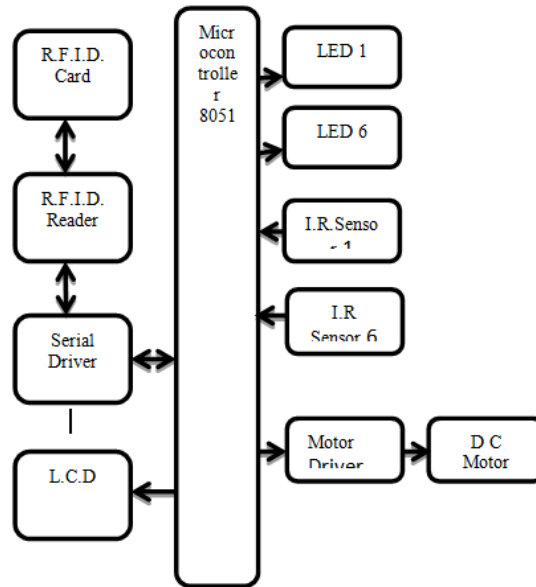
II. Implementation of Smart Parking System using R.F.I.D

The block diagram of proposed smart parking system using R.F.I.D. consists of Microcontroller, RFID Card, RFID Module, L293D Motor Driver, IR Pairs, 2x16 Lcd, DC Motor, LEDs. The purpose of microcontroller is to read the data from RFID reader module and analyze the data perform operation as written in program either valid card or invalid card. RFID reader is used to read the RFID card number and get unique number. When RFID reader module receives the card number it sends to controller using serial communication.

DC motor is used to control the gate to open the gate and close the gate. Motor Driver is used to amplify the signal to drive the motor as required level. Microcontroller send a signal is 5V and 15mA current which is amplified to 12V DC and 600mA. IR sensor is used to identify the vacant place using Infrared sensor

and opamp as comparator. The systems start working as soon as RFID labels are acquired from RFID centers. Label selling centers are located on certain areas of the city which

Vehicle owners could easily reach. Upon the purchase of RFID labels, a lot of information concerning the vehicle is recorded to vehicle information table of RFID data database. In that way every one of RFID enabled vehicles will easily be identified and their check ins and check outs to the determined parking lots will be monitored.



III. Working of Parking System using R.F.I.D



The system starts working as soon as RFID labels are acquired from RFID centers. Label selling centers are located on certain areas of the city which vehicle owners could easily reach. Upon the purchase of RFID labels, a lot of information concerning the vehicle is recorded to Vehicle Information table of RFIDDATA database. In that way, every one of RFID-enabled Vehicles will easily be identified and their check-ins and check-outs to the determined parking lots will be monitored. In this project the RFID labels were distributed by the central server office. When an RFID-labeled vehicle attempts to check-in to a parking-lot, the system queries if the vehicle is registered to the database or not. If it is a registered vehicle and it has not checked out of an unauthorized RFID-enabled parking-lot, the system will allow its entrance. Upon the entrance, the vehicles identification information, entrance date and time and current parking-lot title are recorded in the VehicleCirculationInfo table of the database. The check-in information carries great importance since it will be compared to the check-out information of the vehicle. If a vehicle has made an unauthorized check-out of a parking-lot, the vehicle will not be able to check-in to any of the RFID-enabled parking-lots. The only solution

for the vehicle to check-in is for the owner to pay the fine to the fine office. Upon receiving the approval, the barrier lifts up and initiates the check-in process.

IV. Conclusion

In this paper, it is proven that by utilizing RFID readers and RFID labels with a centralized database system, all the parking-lots in a city could be operated in an economical and fast way. This prototype will provide for automation of the operation and controlling ability for all of the parking-lots in a city by using standardized devices. Compared with traditional barcode identification technology, RFID possesses characteristics; such as reading multiple tags once, reading/writing many times, and so on. Implementation of the RFID technology, in an existing parking lot access control system, has given benefits to all interest parts (the Parking Operator, parking place users and parking collectors) People using parking place are spending much less time waiting in line to buy the tickets for the on-street parking and much less time waiting at the entry and exit barriers of a parking lot or garage.

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