

SMART-PARKING SYSTEM BASED ON RFID AND GSM TECHNOLOGY

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Abstract

This paper presents a design and implementation of a smart and unique car parking system to support the modern day tedious car parking design using RFID reader and microcontroller. In the presented prototype model we describe and implement a parking tower with 2 floors and 2 slots per floor. The system designed with Arudino controller automatically identifies the empty slot and parks the car at the corresponding slot. A group of Sensors, GSM and software are embedded together to work as a system to transport the car to its calculated parking slot. The System embedded with a RFID smart card helps us to calculate the time period during which the car is parked, thus helping an automatic e-commerce system to deduct the amount for the mentioned time period from the users account. The system has a GSM add-on module which will automatically respond's to the users SMS request by letting him the available slots at a given time. TempSensors, CO2 sensor are used to indicating the security aspects in the overall parking system.

Keywords: ArudinoController, IRsensors, co2 sensor, Tempsensor, Ldr, Relays, Lift motor, Lcd, GSM and RFID.

I. INTRODUCTION

Considering the present day car parking tedious job where not only the

number of cars are increasing but also the parking space is very limited. Thus it is not

only a cumbersome task to find out the available slot and this includes the car movement across the multiple slots and there by even wasting a considerable amount of fuel as well. The movement of the car along the parking slots may also damage the other cars which are parked and even resulting in the traffic slowdown and congestion. Considering the present day parking systems where the user don't even have an idea of the available parking Slots though there are some available slots as we they lack the monitoring system for the same. Thus the situation where a user faces the traffic congestion in parking areas is very much obvious. Thus to solve the above problem different approaches have been used to resolve the same which includes wireless sensor system, a vision-based system, and the multi-storied parking system[1]-[4]. Car parking system designed with multi-stored space allotment is one of the most efficient and trending approach to meet the present day space requirements.

II. RELATED WORKS

V.W. S. Tang, Y. Zheng, and J. Cao, Wireless sensor networks (WSNs) have attracted increasing attentions from both academic and industrial communities. It can be deployed in various kinds of environments to monitor and collect information. In this paper, we describe a WSN-based intelligent car parking system.

In the system, low-cost wireless sensors are deployed into a car park field, with each parking lot equipped with one sensor node, which detects and monitors the occupation of the parking lot. The status of the parking field detected by sensor nodes is reported periodically to a database via the deployed wireless sensor network and its gateway. The database can be accessed by the upper layer management system to perform various management functions, such as finding vacant parking lots, auto-toll, security management, and statistic report. We have implemented a prototype of the system using crossbow nodes. The system evaluation demonstrates the effectiveness of our design and implementation of the car parking system.

M. Wada K.S. Yoon, H. Hashimoto, This paper is the first to apply a multilevel driver assistance system in the development of a system to aid in the parking process. The development of this system is described within the iCAN (intelligent car navigation systems) project framework. A parking assistance system, parking administration system, and employed sensor system are described. The general architecture of a driver assistance system based on path planning and human-machine interface (HMI) modules is proposed. The paper follows describing the parking assistance system development using this architecture. The parking possibility region-based path-planning method proposed for implementing the proposed architecture is described, as is the design of the system's HMI. A prototype of the parking assistance system based on the proposed architecture was constructed. The adopted hardware, software, and implementation solutions in this prototype construction are described. Finally, the results of lane and row parking experiments conducted using the prototype system are shown.

C. W. Cheng, S. J. Chang, and T. H. Li, This paper is devoted to the design and implementation of a complete intelligent mechatronic system—a mobile robot possessing autonomous parallel parking capability. In this paper, the configuration of the overall system is firstly introduced. The intelligent parallel-parking control method is addressed in the second topic, where a feasible reference path is provided for the fuzzy logic controller to maneuver the steering angle of the robot. The simulation results illustrate the effectiveness of the developed control algorithm. The authors not only investigate intelligent parallel-parking control methods but also real-time maneuvering of the developed sensor-based mobile robot. The real-time control of the parallel parking system demonstrates the feasibility of the fuzzy control scheme.

Kamrul Hassan, Md. Mustafizur Rahman, Fatema-Tuz-Zohra, Mohammad Sakib Hossain, R.M.M.Hasan. To cope with the increasing population of Developing Countries the transportation section are now in an alarming position. Thus traffic jam becomes a vital concern to get an efficient output through some fruit full steps. With this goal developed countries are now adopting some project. Automation plays an increasingly important role in enhancing the betterment of daily experience. As such, it is vital that those in engineering fields understand the technologies associated with this area. Multi-Level Automatic car parking system is now looking feasible to adopt more easily. This project will include the design and construction of a Microcontroller based Multi-Level automatic car parking system. This system is now looking feasible to adopt more easily. Developing countries like Bangladesh can really think about this as this project is under investigation and research to make easier to install and use. This system builds upon topics learned

in this course. A working system will ultimately be demonstrated to validate the design. Thus we have chosen to build an idea about this fact to have a worry free transportation system by using IR card security system. We are using IR because it's cheap, does not require manual inspection or optical scanning and its interrogators can be integrated with IT infrastructure (databases, etc).

Ahmed Afaz Uddin, Khaled Mohammed Shahriar, ALI Mohammed, RAHMAN Mohammad Mahbubur, The application of computer interfaced controlling devices is increasingly rapidly in modern age. Analogous wired systems are substituted by computer interfaced system alternatives in growing number of industries. Such control systems had been developed with complex and critical high-end stuffs. In this paper, we developed an automated system that controls the switching of electric feeder power supply featuring the existing GSM technology. The target is to operate the device according to a preset sequence of on-off mode for three feeders after a particular time interval and to monitor the running condition. The device sends short message updating the status of every action. It also warns the consumers about load shedding using GSM module via sending message. Controlling the gate pulse of a MOSFET that operates the relay, it executes on-off operation of the circuit breaker of the respective feeders. Since GSM technology is used worldwide for communication, third world countries that are still struggling to meet the power demand can use this technology to operate and monitor the

The proposed model prototype is shown in the fig.1.

The hardware requirements for the prototype include Arudino microcontroller, IR sensors, co2sensor,Temp sensor, relays ,lifitmotor,LCDdisplays,GSM and RFID

condition of power distribution. To operate the GSM device, AT command of GSM location operation for SIM900 is used. This paper targets to improve the power distribution system in developing countries like India, Bangladesh, Nepal where power crisis and load shedding is quite a common phenomenon.

III. SYSTEM DESIGN OVERVIEW

The Smart car parking system enables the parking of the vehicles floor after the floor in a vertical fashion thus reducing the space used. The System is controlled with software that has been implemented using a Arudino controller and thus reducing the time wasted by a person to find a parking slot manually and park the vehicle.

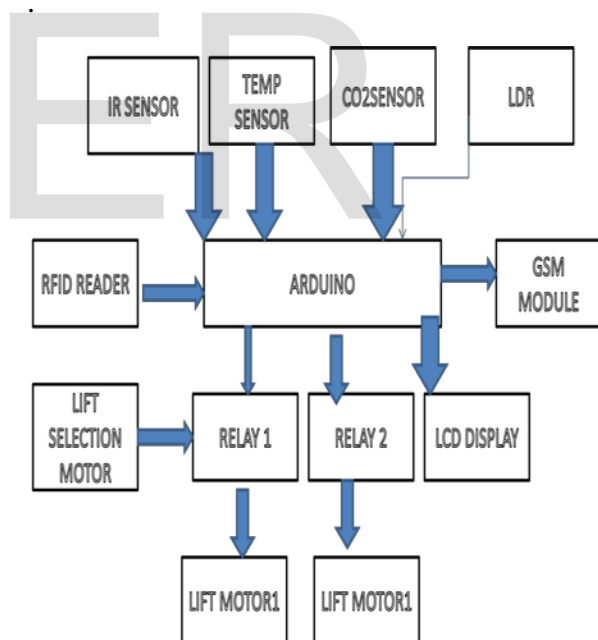


Fig.3 1. Model of the proposed car parking system.

IR SENSOR, CO2 SENSOR, LDR, TEMP SENSOR.

Each and every parking slot is assigned with an IR Sensor, Once the Car is parked

the IR sensor will no longer send the free slot signal and thus the system knows which all parking slots are filled. Co2 sensor is used for controlling and measuring the carbon dioxide in the parking system. LDR which sends an alert pop-up when the darkness increases. The LCD display at the entrance will poll all the IR Sensors at the regular intervals and also when a car is parked and un-parked, so as to display the available slots.

RFID SYSTEM

Once the user finds any available slots in the LCD display, the user proceeds to the RFID tag reader sensor and presents his RFID card to the Sensor. The user then places the car on the entrance conveyer belt and leaves the car. The car is then parked in the parking slot as mentioned earlier and the count is increased in the LCD display and the real time clock for that parking slot will be activated. The lift will now move to the ground floor or neutral position to serve other's requests. RFID CARD so that it can debit the money from the user's bank account. The lift will then move the car to the ground floor where the user can drive the car exit from the parking station.

GSM TECHNOLOGY

. The System is also integrated with GSM SIM 900 Model controller [8]-[10] which will respond to a user's SMS request (Ex: A message AVAILABLE_PARKING_SLOTS sent to GSM number : 9985123456) for the empty parking slots by finding out the empty parking slots via the Arudino Controller with the help of the IR Sensors fitted at the parking slots. An example message mentioning the available parking slots would be "Available Parking slots 2, 3 @ 10:30 AM of 20/4/2017" Or "Currently No Parking Slots are available". Thus the system with all these capabilities provides an accurate, efficient and reliable method for

car parking for the present day metropolitan cities.

IV. IMPLEMENTATION AND RESULTS

IMPLEMENTATION ON IR SENSOR AND GSM WITH ARUDINO MICROCONTROLLER

IR sensor will sense the parking system at regular interval of time and sends to the microcontroller as parking slots are filled or empty and displayed in LCD screen. Through GSM user can reserve their parking slots via their android mobile phones. User can send SMS to GSM number to Book their parking slots using their unique mobile number ,RFID card . If the parking slots are Full it will navigate or send notification as "PARKING IS FULL." GSM Module works with AT COMMANDS where AT stands for Application Terminal. Some useful AT Commands are:

1. AT
2. AT+CMGS
3. AT+CMGR
4. AT+CMGS.



FIGURE4.1 The system is ready to book a parking slot.

After the system ready user can send a SMS to GSM to check the parking space is available or not. If available user can BOOK the slots with their unique RFID TAG number through the smart phones. If its not available user can check alternate parking area.



Figure 4.2 considering 4 slot in parking space.

Initially all 4 slots are empty user can book their slots .After Booking the slots user will arrives the parking within the time or else the parking reservation will be expired.



Figure 4.3 SMS notification for booking a parking slot.

V.SIMULATION

Simulation design for this project using PROTEUS simulation software, Using

virtual terminal we book Our parking slot , co2 sensor for Harmul gas alert, LDR for light indication,Temp sensor for fire alert.

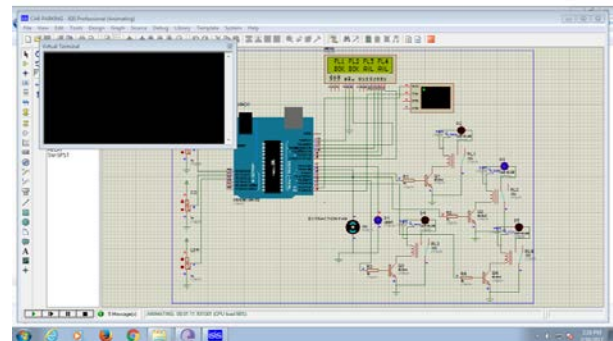


Figure 5.3 Booking for parking slot

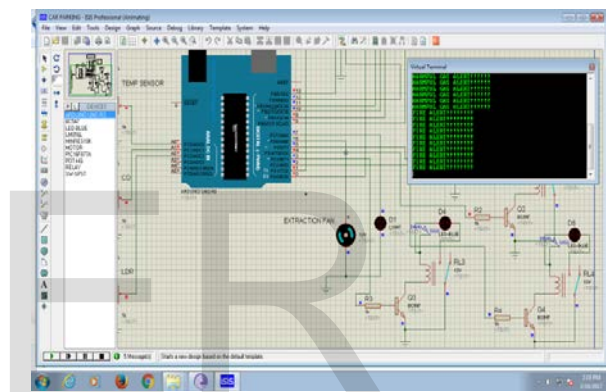


Figure5.2. Harmful gas and Fire alert.

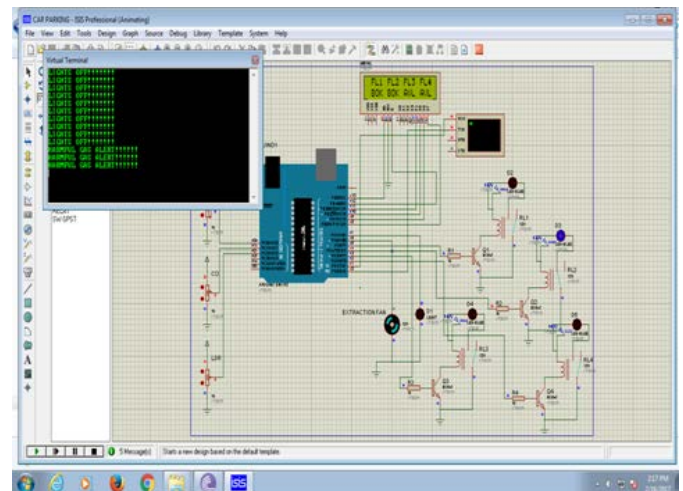


Figure 5.3 LDR indication.

VI. CONCLUSION

The effective and robust hassle-free payment integrated multi-storied car parking prototype design along with the development is presented in this paper. This presented system seems to be one of the promising solutions for the metropolitan cities where the exiting parking traffic needs to wait for long while for the cash transactions related to the parking, which in-turn will cause the traffic congestion. This promising system not only reduces the fuel usage to find the parking slot and time to find a parking slot but also provides additional capabilities to the user which is nothing but the SMS request mechanism with which a user can take an intelligent decision to approach a parking station or not while he is at the home or while is on the way to the parking station. Although the current system meets the present day challenges as it has many advantages compared to others, however there are some real time implementation issues such as we are only supporting the registered RFID's and also the user needs to get the banks approval so that the system can deduct the money from the users account. The System can be further enhanced with the below enhancements.

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