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Design and implementation of automated car parking system using RFID

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ABSTRACT

In this modern world, with the rapid growth of population vehicle traffic has become a part of our day to day life. Moreover, unauthorized vehicle has also increased. Thus our proposed system aims to ensure proper management of vehicles in the public places such as educational institute, office etc. in order to prevent unauthorized vehicle parking and traffic. The features include detection of permitted and non-permitted vehicles on the main gate, detection of unauthorized vehicle parking in the restricted zone thus sending SMS to the authority to take action and taking fine from the vehicle user. Parking charge is also taken from the parked vehicles inside the parking lot before they leave. There are also parking lights which will be lit whenever a car enters a specific parking lot.

INTRODUCTION

Variety of occasions turns up when we visit various public places like Shopping malls, 5-star and 7- star hotels, multiplex cinema halls, etc. The difficulty we encounter at these places is finding the availability of parking space. Most of the times we need to traverse through multiple parking slots to find a free space for parking. The problem becomes more tedious if the parking is multistoried. Thus, the problem is time- consuming. This situation calls for the need for an automated parking system that not only regulates parking in a given area but also keeps the manual intervention to a minimum. Our proposed system presents an Autonomous car parking that regulates the number of cars that can be parked in a given space at any given time based on the parking space availability. When a car arrives at the entrance, it will be stopped at the main gate and the driver de-boards the car. Using the Android application on his Android device, the user commands the Parking Control Unit to check the Status of available Parking slots, through an SMS. On receiving this command, a search for free slot is carried out and

corresponding information is provided to the user, by means of SMS. If the availability of Parking space is confirmed, the user commands the car to get parked to the designated slot. The car traces its path to the entrance of the parking area. Here, it waits and the details required for parking of car at the proper slot are communicated to the Car Control Unit. On receiving the information, the car will further trace its path to free parking spot. On successful parking, the data on the LCD will be updated automatically. For retrieval purpose, the user commands no park, through the Android Application. On reception of this SMS, the car begins to trace back the path to the entrance, where the car driver is waiting. Thus this system proves to be useful for the purpose of the car parking automation and thereby helps reduce the car driver's time, as the searching of the free parking space is handled by the Parking Control Unit. It also causes economical loss to commercial places like shopping malls, amusement parks as people are more likely not to visit these places due to this parking hazard. As we are advancing with time, the manual car parking system in commercial spaces is

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creating hurdle which is causing wastage of time and some economic losses as well. Therefore we need a solution which can overcome these problems. Here we are introducing Automated Parking Systems as a solution of these problems as well as car parking system in commercial spaces is creating hurdle which is causing wastage of time and some economic losses.

EXISTING SYSTEM

The study of some existing systems shows that the level of automation in them is limited only to features like Number plate extraction, Comparison based on Snapshots of parking spaces, processing of images or Mechanical lifts in case of multilevel parking. Always monitoring by any person for empty space detection and gate open /close [1-5].

PROPOSED SYSTEM

The authorized vehicles are identified with the help of a registration process which is integrated with the system. Whenever a car tries to enter into the restricted zone, it can be verified if it is already registered and authorized. If it is found to be authorized, then it will be allowed to enter into the restricted area. Again inside the restricted area, there is a parking space with a limited capacity. If the capacity is yet to be full, then the car entering the area will be allowed to park. If it is full, then that car will be given five minutes time to drop or pick the passenger and leave. There will also Be a system of parking charges in an hourly basis. The overall functionality of the system, according to the top view of the model in is as follows. Whenever there is a vehicle at the entry point which is not registered, all the information related to the vehicle is checked to find if the information is valid or not. If the information is valid then it is sent to the

server. In case of already registered vehicle, vehicles RFID card is detected and the validity of RFID information is checked.

BLOCK DIAGRAM OF PROPOSED MODEL

If the RFID is valid then the vehicle can check in. After the vehicle is checked in, the time of entry is stored. When the vehicle is about to check out from the parking zone, its bill is generated and then the vehicle is allowed to exit. The system is made in some parts where some work is done in an individual part. That means that the modules used are interfaced using different arduino. In the first arduinouno, the pins 2 and 3 are used as receiver and transmitter of the RFID reader module. That means the readings obtained from the RFID reader module is taken as the entry of a particular vehicle and its reading goes to pin 2 which acts as the receiver and the pin 3 is the transmitter. This acts as the registration of vehicles and deleting a vehicle from the database. This is mainly the main entrance to the parking lot. Here two servo motors are connected. One goes to the pin 5 which acts as the entry barrier which opens if the card punched is accepted. And the other servo motor is connected to the pin 7 which acts as the exit barrier. The time is calculated and it is saved in the database. A GSM module for sending sms in case of unauthorized parking is set at pins 11 and 12. And there is a buzzer which is set at the pin 9 of the arduino. In the second arduinouno, the pins 2 and 3 are used as receiver and transmitter of the RFID reader module. That means the readings obtained from the RFID reader module is taken as the exit of a particular vehicle and its reading goes to pin 2 which acts as the receiver and the pin 3 is transmitter [6-9].

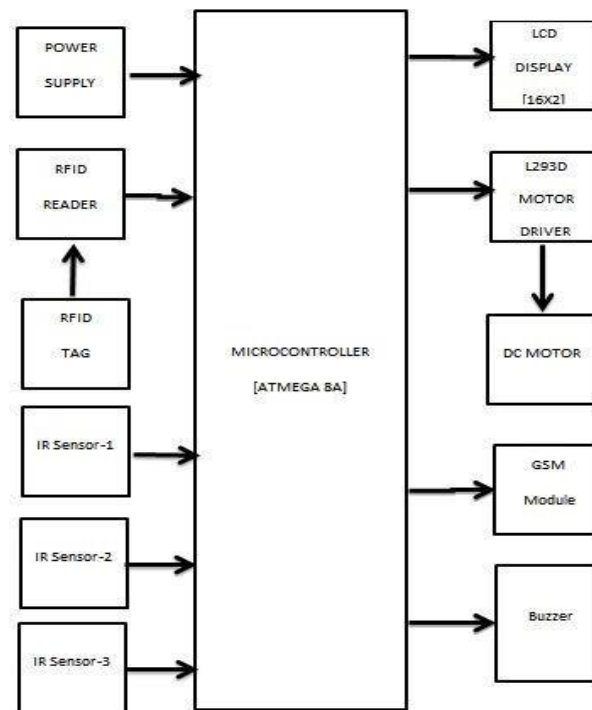
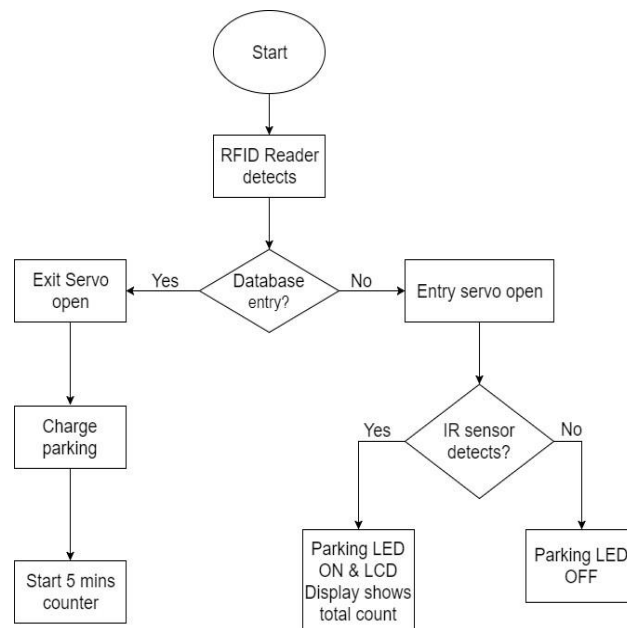


Fig 1. Block Diagram of Proposed Model

A third arduino mega is used for the LCD display, the IR sensors in the parking lot and the LEDs to be lit corresponding to the IR sensors in the specific parkings. The IR sensors are connected to the pins A0, A1, A2 and A3 and their output LEDs are connected to 9, 8, 7 and 6 respectively.

The LCD display shows the number of vehicles currently present in the parking area. After the vehicle is checked in, the time of entry is stored. When the vehicle is about to check out from the parking zone, its bill is generated and then the vehicle is allowed to exit.

SYSTEM IMPLEMENTATION



GSM MODULE

This is a GSM/GPRS-compatible Quad-band cell phone, which works on a frequency of 850/900/1800/1900MHz and which can be used not only to access the Internet, but also for oral communication (provided that it is connected to a microphone and a small loud speaker) and for SMSs. Externally, it looks like a big package (0.94 inches x 0.94 inches x 0.12 inches) with L-shaped contacts on four sides so that they can be soldered both on the side and at the bottom. Internally, the module is managed by an AMR926EJ-S processor, which controls phone communication, data communication (through an integrated TCP/IP stack), and (through an UART and a TTL serial interface) the communication with the circuit interfaced with the cell phone itself. The processor

is also in charge of a SIM card (3 or 1,8 V) which needs to be attached to the outer wall. In addition, the GSM900 device integrates an analog interface, an A/D converter, an RTC, an SPI bus, an I²C, and a PWM module. The radio section is GSM phase 2/2+compatible and is either class 4.

The TTL serial interface is in charge not only of communicating all the data relative to the SMS already received and those that come in during TCP/IP sessions in GPRS (the data-rate is determined by GPRS class 10: max. 85,6 kbps), but also of receiving the circuit commands (in our case, coming from the PIC governing the remote control) that can be either AT standard or AT-enhanced SIMCom type. The module is supplied with continuous energy and absorbs a maximum of 0.8 A during transmission.



Fig 2. SIM900 GSM Module

POWER SUPPLY

Transformer

A transformer is an electro-magnetic static device, which transfers electrical energy from one circuit to another, either at the same voltage or at different voltage but at the same frequency.

Rectifier

The function of the rectifier is to convert AC to DC current or voltage. Usually in the rectifier circuit full wave bridge rectifier is used.

Filter

The Filter is used to remove the pulsated AC. A filter circuit uses capacitor and inductor. The function of the capacitor is to block the DC

voltage and bypass the AC voltage. The function of the inductor is to block the AC voltage and bypass the DC voltage.

Voltage Regulator

Voltage regulator constitutes an indispensable part of the power supply section of any electronic systems. The main advantage of the regulator ICs is that it regulates or maintains the output constant, in spite of the variation in the input supply.

RFID

Radio-frequency identification (RFID) is a technology that uses radio waves to transfer data from an electronic tag, called RFID tag or label, attached to an object, through a reader for the purpose of identifying and tracking the object.

Some RFID tags can be read from several meters away and beyond the line of sight of the reader. The application of bulk reading enables an almost-parallel reading of tags

LCD Display

A liquid crystal display (LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. Each pixel consists of a column of liquid crystal molecules suspended between two transparent electrodes, and two polarizing filters, the axes of polarity of which are perpendicular to each other. Without the liquid crystals between them, light passing through one would be blocked by the other. The liquid crystal twists the polarization of light entering one filter to allow it to pass through the other.

IR Sensor

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat

of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor

Dc Servo Motor

The servo motor is used for controlling the parking gate.

RESULT AND CONCLUSION

As the number of vehicles continues to increase rapidly, parking spaces are at a premium in city streets. Moreover, due to the lack of knowledge about street parking spaces, circling the blocks in search of empty slot not only costs drivers time and fuel, but also increases city congestion. In order to build as a convenient, green and energy efficient smart city a user friendly, simple, yet effective parking system is needed. The system that we have designed does not only help to manage unauthorized parking but also reduces traffic congestion and saves our time.

REFERENCES

- [1]. Lee and M. Gerla, "A Survey of urban vehicular sensing platforms," *Computer Networks*, 54(4), 2010, 527-544.
- [2]. Kim, M. H., Lee, Y. T. and Son, J "Age Related Physical and Emotional Characteristics to Safety Warning Sounds: Design guidelines for intelligent vehicles," *IEEE Transactions on Systems, Man, and Cybernetics, Part C: Applications and Reviews*, 99, 2010.
- [3]. Nachimuthu, S. Pooranachandran, B. Sharomana Aarthi, "Design and implementation of a vehicle to vehicle communication system using Li-Fi technology" *international research journal of Engineering and technology (IRJET)*, 03(05), 2016.
- [4]. Shih-Nan Lu, Hsien-Wei Tseng, Yang-Han lee, Yih-Guang Jan and Wei-Chen Lee (2016), "Intelligent safety warning and alert system for car driving" *Tamkang journal of Science and Engineering*, 13(4), 2016, 395-404.
- [5]. Suresh B. Mer, "Smart Vehicle-to- Vehicle Communication with 5G Technology" *International journal on recent and innovation trends in computing and communication*, 3(5), 2014.
- [6]. Swati B, Dr. Preeti R. Bajaj, Dr. Latesh G Malik, "Prediction Of Vehicle Collision Probability at intersection using V2V Communication" *International journal of scientific & Engineering Research*, 6, 2016.
- [7]. Thomas Kiber, StefenPofperl. Gotthard Bock, Hans-peter Huber and EberhardZeeb, "Optical data Buses for Automotive Applications," *journal of light wave technology*, 2004.
- [8]. Umair Ali Khan , Dr Sahibzada Ali Mehmud, MusatfaBasit, "Inter-Vehicle Collision Avoidance Using Zigbee Sensor networks" *international journal of scientific & Engineering Research*, 4(4), 2013.
- [9]. VineethKodire, SreebhaBhaskaran, Vishwas H.N "GPS and ZigBee Based Traffic Signal Preemption" *Amrita School of Engineering, Bengaluru, India, Publisher IEEE*, 2015.