

# SMART PARKING AND SECURITY SYSTEM USING EMBEDDED

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**Abstract**—Project is designed with Microcontroller, LCD Display, Relays, Gate model, GSM Module, RFID Reader, IR sensors. The Microcontroller programmed to interface the RFID reader with the microcontroller to scan the RFID tag to read the amount. It uses IR sensor to identify the availability of free space in the parking area. Parking space are secured by gate system. So the gate is opened only for the user who registers the parking area through SMS by interfacing GSM module. It scans the user RFID, their existing amount is known, only if there is enough amount and controller allows them to park in the parking area. The parking is reserved for that user, if there is a parking area is available. If the users have to show the RFID tag to with amount in their account, then the gate is opened for user to park his vehicle, the gate is opened/ closed by controlling a pair of relay. When the user taking his vehicle from the parking area, the RFID tag is again used, so the based on the IN and OUT time difference, total parking time is calculated and the amount for such parking time is detected from the account.

**Keywords**—Microcontroller; GSM; RFID

## 1. INTRODUCTION

The shortage of parking space in creates a challenging problem. Substantial needs to do design efficient car parking mechanisms. It can be easily deployed into further intelligent transportation systems. Parking a vehicle is a challenging hazards or problems in now-a-days. In metropolitan cities, there are many complements to parking the vehicles and parking demands are high. Users losses the working hours and they are consume fuel for the searching the parking slots or areas. So we used SMART PARKING SECURITY SYSTEM in which the main objective of our project is to design a smart parking & security system to securely park the vehicle in paid parking system. It helps us parking the vehicle safely in a paid gated parking system with SMS registration method. Smart Parking system is already in the circulation of parking areas. But it does not helps us to parking the vehicles securely. So we used gate model system for the security of the vehicles.

## 2. LITERATURE SURVEY

The Recent studies on the existing method for parking and security Car Parking Occupancy Detection Using Smart Camera Networks and deep Learning. This paper presents an approach for real-time car parking occupancy detection that uses a Convolutional Neural Network (CNN) classifier running on-board of a smart camera with limited resources. Experiment show that technique is very effective and robust to light condition changes, presence of shadows and partial occlusions. [1].

Improving Utilization and Customer Satisfaction of Parking Space with M2M Communication. This paper shows the shortage of parking spaces creates a challenging problem for both drivers and parking space operators. SPS

not only tracks the number and location of available parking spaces in a parking lot but also utilizes Machine-to-Machine communications (M2M) to provide drivers useful information [2].

Smart Parking: An IoT Application for Smart City. This paper is a modern version of smart parking Smart parking can be regarded as a part of IoT application by using wireless sensor nodes. The advantage of this paper is to present a smart parking solution utilizing a min-max detection algorithm.

[3]. Parking Availability Prediction for Sensor-Enabled Car Parks in Smart Cities. The growth in low-cost, low-power sensing and communication technologies is creating a pervasive network infrastructure called the Internet of Things (IoT) such as minimizing road congestion and making better use of the limited car parking facilities [4].

Reservation based Multi-Objective Smart Parking Approach for Smart Cities. It has been revealed in which inspecting for parking is one of the main sources of road congestion and pollution, as well as daily discomfort and stress experienced by drivers ROSAP helps drivers to find the most suitable parking slot within the areas of interest and with respect to their specified constrains [5].

Smart Parking System: A Survey. The technologies around parking availability monitoring, reservation of parking and random costing and see how they are consumed in different settings [6].

Smart Parking With Reservation in Cloud Based Environment. This paper presents an efficient method to check the availability of the parking slot and to reserve a slot. This make the drivers easier to park the vehicles and also overcome traffic congestion.

Drivers can initiate request using reservation app in the android mobile to determine the availability of the parking slot [7].

Smart Traffic & Parking Management using IoT. The initiate of this paper With the help of Internet of Things we have proposed a remedy to all these to control traffic congestion and the smart parking system. We have also discussed smart toll tax collection using Internet of Things [8].

Towards the Development of Smart Parking System using Mobile and Web Technologies. This paper come detecting and progressing the collected data from parking lots, this smart parking system allows drivers to obtain real-time parking information and alleviates parking contentions the use of intelligent system have become the most widespread among the world furnish to the process implementation of daily economical business in a more efficient and flexible reveal [9].

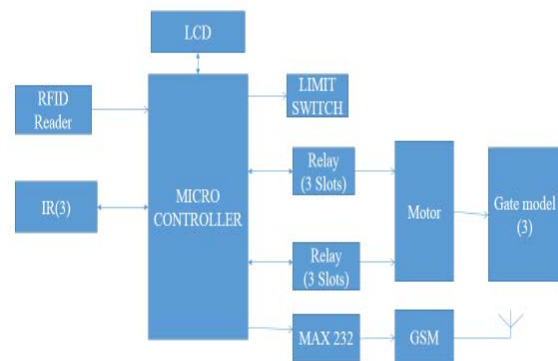
**3. EXISTING SYSTEM**

Many parking guidance system have been proposed in recent years it is required a mechanism to detect if a vehicle in the parking spot. To detect the range from a simple ultrasonic sensor that detect based on threshold distance or RFID chip activated based on complex optical sensor. Once the sensor detect it should notify driver or a parking sport being occupied. A VANET makes it possible for an Ad Hoc network to be formed between all sensor and vehicles within a certain range and this system no longer needs a sensor at each parking spot as they use strategically placed transmitter to triangulate the location of vehicle to determine the occupying parking system It does not compatible with the system without modification. The infrastructure be installed by some system using wireless sensor through Zigbee network.

Typical system model for smart parking is consists of two fundamental parts : parking detection and user notification. Parking detection is responsible for detecting if vehicle is in a parking spot. This can be done with different types of sensors. The way of detecting the parking spot vacancy might be different but all sensors should return either that the parking spot is vacant or that the parking spot is occupied. This information should then be sent to user notification system. User notification will relay the status of each parking spot to the end user. This can be done with either through simple system such a light being toggled or it can be done with a complex web interface.

**4. PROPOSED SYSTEM**

**BLOCK DIAGRAM**



Figure(1) Block Diagram

The microcontroller used here is a flash type microcontroller, in which we have already programmed to interface the RFID reader with the microcontroller to scan the RFID tag to read the amount.

The project uses IR sensor to identify the availability of free space in the parking area. Each and every parking space is secured by gate system. So the gate is opened only to the user who registers the parking area through SMS. A LED indication is shown to indicate the available parking area. The project uses RFID reader to scan the user ID, so when the RFID scan the user ID, Their existing amount is known, if they have enough amount the controller allows them to park in the parking area. For that the users have to register the parking area through SMS, in this project for receiving the SMS, we are interfacing GSM module, which can receive SMS. When the SMS is made to the phone number in the GSM module, the parking is reserved for that user, if there is a parking area is available. If the users registered through SMS and have shown his RFID tag to with amount in his account, then the gate in his registered parking space is opened for user to park his vehicle by the controller, the gate is opened/ closed by controlling a pair of relay. The registration is not done If the parking area is full or if amount in the account is low. When the user taking his vehicle from the parking area, the RFID tag is again used, so the based on the IN time and OUT time difference, total parking time is calculated and the amount for such parking time is detected from the account.

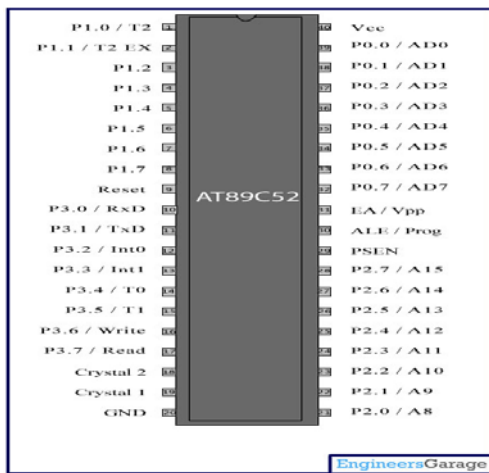


Figure(2) Parking Space

5. HARDWARE DISCRPTION

A. ATMEL MICROCONTROLLER:

The AT89C52 is the very low power, large system performance, 8-bit microcontroller with 8K bytes of in system programmable flash memory. This device is manufactured using ATMEL'S high density non-volatile memory technology and is compatible with the industry. The features ATMEL is 8K bytes of flash,256 bytes of RAM, 32 I/O lines, watch dog times, two data pointers. Three 16 bit timer/counter.



Figure(3) AT89C52 Pin Diagram

B. RFID READER:

Radio frequency identification (RFID) is a fast developing technology that has the strength to create low cost impacts on many industries. RFID systems consist of small transponders, or tags, attached to physical objects. RFID systems are one type of automatic identification system, similar to optical bar codes. There are more types of RFID technology used in different uses and settings. These technology have different power sources, functionalities, and operating frequencies.

C. IR TRANSMITTER AND RECEIVER:

IR Transmitter is one type of LED which emits infrared rays. Similarly IR Receiver. The IR TX and IR RX have to placed straight line to each other. The TX signal is given to IR TX and passes the IR rays to the receiver. The IR RX (receiver) is connected to the comparator. The comparator is built with LM 741 operational amplifier (OPAMP).

D. DC MOTOR:

A DC motor is an AC synchronous electric motor that from a modeling perspective looks very same to a DC motor. Some designs use Hall effect sensors or a rotary encoder to directly measure the rotor's position. Others measure the back EMF in the un driven coils to infer the rotor situation, excluding the required for discrete Hall effect sensors, and therefore are often called "sensor less" controllers. instead of a mechanical compensation system, although this is misleading, these components are the two motors are fully different. (The rest of this article assumes the reader is familiar with the principles of electrical motors.) In a BrushLess DC (BLDC) motor, the (EM)

electromagnets do not move; instead, the permanent magnets rotate and the armature remains static. This gets around the problem of how to transfer current to a moving armature. In order to do this, the brush-system assembly is replaced by an intelligent electronic controller. The controller performs the same power-distribution found in a brushed DC-motor, but using a solid-state circuit rather than a brush system.

Because of induction of the windings, power requirements, and temperature management some glue circuitry is important inbetween digital controller and motor. BrushLess DC motors offer several features on brushed DC-motors, including higher efficiency and reliability, reduced noise, longer lifetime (no brush erosion), elimination of ionized glittered from the commutator, and overall reduction of Electromagnetic Interference (EMI.) The maximum power that can be applied to a BLDC motor is exceptionally high, limited atmost entirely and completely by heat of the factors, which can damage the magnets. BrushLess DC's important demerit is larger cost, which arises from two issues. First, BLDC motors require complex electronic speed control to run. Brushed DC-motors can be standardized by a comparing trivial variable-resistor (potentiometer or rheostat), which is inefficient but also satisfactory for cost-sensitive applications. Second, many reasonable uses have not been completely developed in the profitable sector. For example, in the RC hobby scene, even economical brushless motors are often hand-wound while brushed motors use armature coils which can be non - economical machine-wound.

BrushLess DC motors are examined more efficient than brushed DC-motors. It means of the similar input power. A BrushLess DC motor will converted extra electrical power into mechanical power compared to a brushed motor, mostly due to non appearance of erosion of brushes. The enhanced efficiency is greatest in the no-load and low-load region of the DC motor's achievement's curve. Under high perfunctory loads, BrushLess DC motors and high-quality brushed motors are proportional in efficiency.

Because the controller must direct the rotor rotation, the controller needs some means of resolving the rotor's direction / location (relative to the stator coils.) Such as AC motor, the voltage on the undriven coils is sinusoidal, but over an integrated commutation the output appears trapezoidal because of the DC output of the controller.

The controller consists of three bi-directional drivers to large-current DC power, which are controlled by a logic circuit. Simple controllers employ comparators to determine whenever the OP (output) phase should be high performed, while more advanced controllers employed a microcontroller to manage stimulation, control speed and fine-tune efficiency. Controllers that sense rotor location established on back-EMF have additional challenges in starting motion because no back-EMF is produced when the rotor is stationary. This is usually accomplished by beginning rotation from an obituary phase, and then bounding to the correct phase if it is determined to be fake. It can cause the motor to run briefly backwards, adding even more difficulty to the startup sequence.

### E. LCD DISPLAY:

The majority of belonging equally used Character based LCDs are based on Hitachi's HD44780 controller or other which are compatible with HD44580. In this tutorial, we will discuss about character based LCDs, these are interfacing with various microcontrollers, various interfaces (8-bit/4-bit), programming, special stuff and tricks you can do with these simple looking LCDs which can give a new look to your application. In this project the LCD display is used to display the parking slot availability.

### F. RELAY DRIVER:

Relay is a switch worked by an electromagnet. It is useful if we want a small current in one circuit to control another circuit containing a device such as a lamp or electric motor. In which requires a high current, or if we wants individual different switch contacts to be operated simultaneous

## 6. RESULT

Thus the experimental result based on parking and security system, this parking system is controlled by using ATMEL AT82C52 microcontroller, the GSM module is used for reservation purpose. The amount can be detected by the prepaid RFID.

## 7. CONCLUSION

Since parking is the major problem in smart cities, to satisfy the customer we have proposed new technologies, to satisfy the customer we have provided reservation and security system.

## 8. FUTURE WORK

Introducing the latest technology that is Prepaid RFID has to be used in which we can utilize that RFID in the parking area. In this paper, we can park our vehicles with automated process. Now a days parking a vehicle is complexity. By using Prepaid RFID, we can park the vehicles without any manual action in which time and difficulties parking are reduced. The amount will detected by time consumption of IN and OUT time difference in the parking area.

## REFERENCES

- [1] P.Lucic: Intelligent parking systems, European journal of operational research,vol.175,no.3,pp.1666-1681,2006.
- [2] G.Yan,W.Yang,D.B.Rawat,and S.Olariu, smart parking: A secure and intelligent parking system, Intelligent transportation systems magazine,IEEE,vol.3,no.1,pp.18-30,2011
- [3] H.Zhao,L.Lu,C.song,and Y.Wu, IPARK:Location aware based intelligent parking guidance over infrastructureless VANETs,International journal of distributed sensor networks,vol.2012
- [4] K.Axhausen J.Polak ,M.Boltze,and J.Puzicha, Effectiveness of the parking guidance system in frank Traffic engineering and control,vol.35,no,pp.304-309,1994
- [5] A.Kianpisheh ,N.Mustaffa, and P.Limtrairut, Smart parking system architecture using ultrasonic detector, International journal of software engineering and its applications vol.6,no.3,pp.55-58,2012
- [6] Z.Pala and N.Inanc, smart parking application using RFID Technology, in RFID Eurasia,2007 1st annual,2007,pp.1-3.
- [7] J.Chinrungrueng and S.Traiamulamlerd,Smart parking : An application of optical wireless sensor network ,SAID.B.Rawat,D.Treeumnuk ,M.Abuela,and Olairu, Challenges

- and a visible scene in the construction of notice architecture for vehicular communications, in 5th IEEE International conference on mobile Ad Hoc sensor system ,2008 pp.707-711
- [8] R.Lu,X.Lin,H.Zhu SPARK: Vehicular AdHoc Network as a new method of VANET based smart parking scheme for large parking lots, in INFOCOM 2009,IEEE 2009,pp.1413-1421.
- [9] D.B.Rawat Adaptive Connectivity, Security and privacy in transportation cyber physical system 2016
- [10] H.Wang and W.He, A reservation based smart parking system ,in Computer Communication Workshops IEEE conference on ,2011,pp.690-695.
- [11] ArduinoUno,https://WWW.arduino.cc/en/main/ArduinoBoardUno
- [12] NT Workshops 2007.International symposium on,2007,pp.66-66
- [13] D.B.Rawat, D.C.Popseu, G.Yan, and S.Olairu, Enhancing vanet performance by joint adaptation of transmitter power and contention window size, IEEE Transaction on parallel and distributed system vol,22,no.9,pp.1528-1535,2011