Application Development for Reservation Based Parking Slot Allotment and Management System Using Android

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***Abstract*—Modernization is the last word for a developed community. To increase the standard of living and for better transportation means, people own vehicles. Increase vehicle in number increases the complexity of traffic and parking. Parking of motor vehicles is becoming a major problem in day to day life. This paper presents a design and implementation method of a smart car parking technique for less time consuming car parking using mobile application. The system is designed to identify the empty slot automatically by a proximity sensor and to park the car at the corresponding slot for a particular time period by using RFID, GSM and ATMEGA controller.**

Keywords— Car parking, Proximity sensor, ATMEGA Controller, GSM and RFID.

I. INTRODUCTION

Nowadays car parking is a major issue in metro cities which has minimum availability of parking space. Advanced technologies can be implemented to overcome this problem in an effective manner. An mobile application is developed for effective parking system. Using this application, free slots can be booked for parking the vehicle. Proximity sensor check the whether the slot is empty or not and sends the information to ATMEGA controller. GSM is used as a transceiver. There is an RFID (Radio-frequency Identifier) used to confirm whether the booked vehicle has arrived in the allotted slot at the particular time. Radiofrequency identification uses the electromagnetic fields for data transferring purpose automatically, by recognizing and tracking the attached objects. The information in this tags are electronically stored.

II. EXISTING SYSTEM

Various systems were done to ensure the car parking areas. The manual implementations are used in old techniques. The entrances of the car park are controlled by gate model whereby parking has been simplified in many ways. RFID technology [1] could be used for the purpose to enter and exit in the parking slots. Using this view point, time wastage in queue system for entrance and exiting payment could be completely eliminated. This method does not used for searching the available parking slots. The LCD displays are used in almost every parking floor to display the number of available parking slot. In order to uniform the users on parking availability ,each parking slot is mounted with lights. The drawbacks of these methods are users will need to circle around to search for the empty spaces. In some places, users can book their parking spaces through online and need to log in by the specified website for the reservation [2]. In other areas, users can check the availability of parking spaces using the Global Positioning System (GPS) and reserve the parking slots with the help of any website or mobile phones [3]. Another technique in smart parking models is that the users are actually guided to the empty parking slot by the arrow mark indicators located at the ceiling. The users can book their the parking slot via online and will receive the confirmation code through SMS [4]. Statistics by the Malaysian Communications and Multimedia Commission, the number of phones and internet users per 100 inhabitants in Malaysia in the year 2007 are 85.1 and 57.8. The total number of SMS and MMS usage in the first four months of the year 2008 is about 16.8 million, in which the numbers increases every year [5]. By compared to the internet the usage of cellular phones and SMS are more popular. The users can reserve their parking details by the SMS without having to go online. When the reservation is conformed the details of parking slot should be SMS. The SMS was transmitted by using the Global System for Mobile Communication (GSM) antenna. GSM was chosen because of high data transfer speed and low cost for wide service distribution network. [6][7].

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III. PROPOSED METHOD

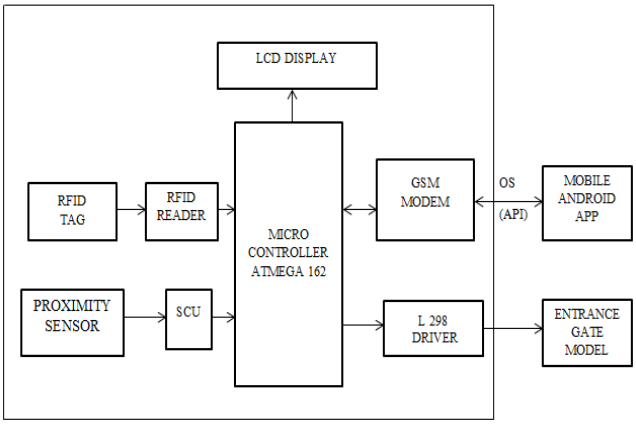

Fig.1 Outline of Parking System

A.BLOCK DESCRIPTION

Reservation based parking slot allotment and management is described using the block diagram shown in the Fig.1.The main hardware components used are:

1. ATMEGA162 Controller
2. RFID Tag and Reader
3. Proximity sensor
4. Signal Conditioning Unit (SCU)
5. LCD Display
6. GSM Modem
7. Mobile application
8. L298 Driver
9. Entrance gate model

1. ATMEGA162 CONTROLLER:

High-Performance, Low-power bit Microcontroller and Advanced RISC Architecture. This controller uses two serial port, One port for GSM Module and another port for RFID communication. It reaches up to 16 MIPS throughput at 16 MHz. The microcontroller unit shown in the Fig.2.

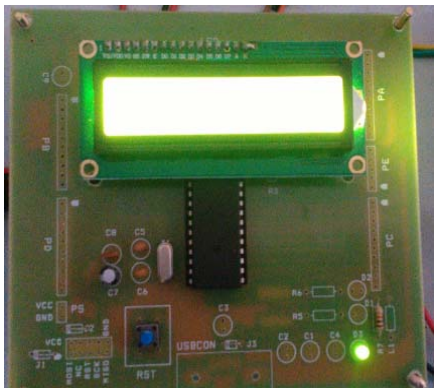

Fig.2 Micro controller Unit

2. RFID TAG AND READER:

The RFID tag is electrified when it comes in contact with the RFID reader. This tag sends the data to the reader and which is further passed to the ATMEGA-controller for further processing. The time at which the tag is sensed is dispatched to the ATMEGA-controller from the RTC (Real Time Clock).

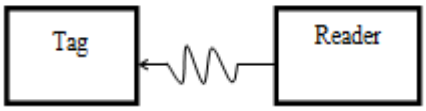

Fig.3 Tag and Reader interaction

3. PROXIMITY SENSOR:

Proximity sensors are used to detect any existence of object which is not having any direct contact with them. The life time and reliability of the proximity sensors are long only because they don't have any mechanical parts or physical contact between the sensed object.

Fig.4 Proximity sensors

4. SIGNAL CONDITIONING UNIT:

The SCU accept input signal from the sensor and gives a nourished output to the entire radius of parameter. This SCU provides necessary interface between a sensor and a controller unit.

5. LCD DISPLAY:

A 16x2 LCD display which displays 16 characters in 2 lines. It displays the current status of the parking area.

6. GSM MODEM:

A GSM modem is one which acquires a SIM card, and works over a subscription to mobile operator, similar to that of the mobile phone. A GSM modem can be a devoted modem device with a serial, USB or Bluetooth connection. It's operates on various frequency like 850MHz, 900MHz, 1800MHz, 1900MHz, in this project using 900MHz frequency band. The Fig.7 shows the GSM Module.

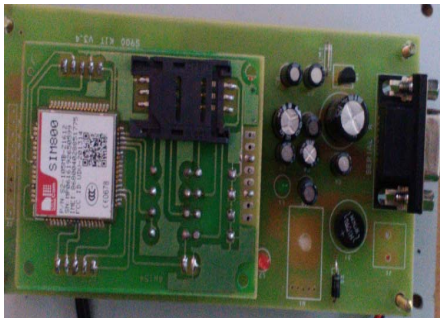

Fig.5 GSM Module

7. MOBILE APPLICATION:

A mobile application is designed to work on mobile devices such as smart phones and tablet computers. Most of the devices come with pre-installed software such as a web browser, email client, calendar, mapping program are sold along with an app for buying music or other media or more apps.

8. L298 DRIVER:

The L298 is a driver circuit designed of a high voltage, high current dual full-bridge driver to accept inductive loads (relays, solenoids, DC & stepping motors) and standard TTL logics. It's used in the design to control the entrance gate model.

9. ENTRANCE GATE MODEL:

Entrance gate model is a device, it is used for opening the slot in the particular time after booking the slot. If the time exceeds then automatically the slot booking get cancel.

B. WORKING

User sends the request for allotment of parking slot from the mobile application. Then proximity sensor sense whether the parking slot is empty or not and sends the data to the ATMEGA controller. The controller sends the information to the user by using GSM. User book the free slot for a particular time. During that time user show the RFID Tag to RFID Reader for confirming the slot. If the tag number is matched then the entrance gate model will open. Otherwise the booking slot will be canceled and left free for another user to occupy it.

C.FLOW CHART:

When the process gets start, the request message from the mobile application is given to the hardware prototype fixed in the respective parking slot. When the request made is possible then the prototype displays the available parking area and messages the details via GSM to the smart phone. Now the corresponding person can park their vehicle according to the RFID tag provided to them. If the tag detail does not match the allocated parking area, then an alert message will be delivered to the phone indicating inappropriate parking or else the system initializes to restart its checking. The Fig.6 shows the flow chart for over all parking system.

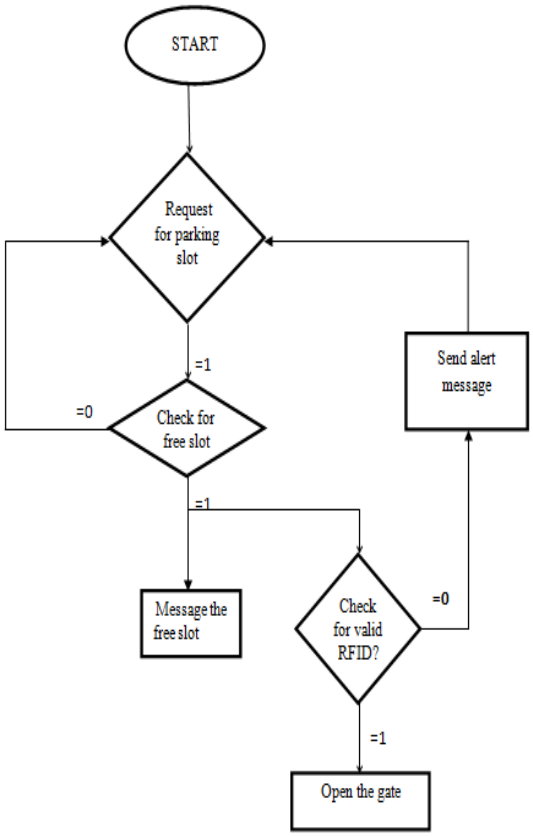

Fig.6 Flow chart for over all parking system

IV. RESULT AND DISCUSSION

A.PROTEUS:

Proteus 7.6 is a Virtual System Modeling (VSM) that includes simulation of a circuit, component that are animated and models of microprocessors to co-simulate the microcontroller based circuit designs. Proteus is a testing tool for most of the microcontroller design.

B. SIMULATION:

The simulation requires a model to be developed and this model represents the key representations of the selected process. The Fig.7 and Fig. 8 shows the simulation output.

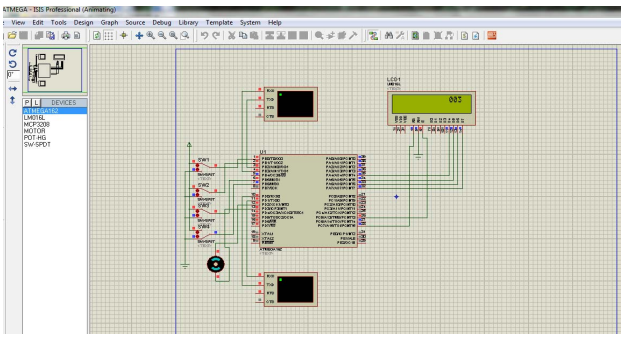

Fig.7 Modeling free space using Proteus

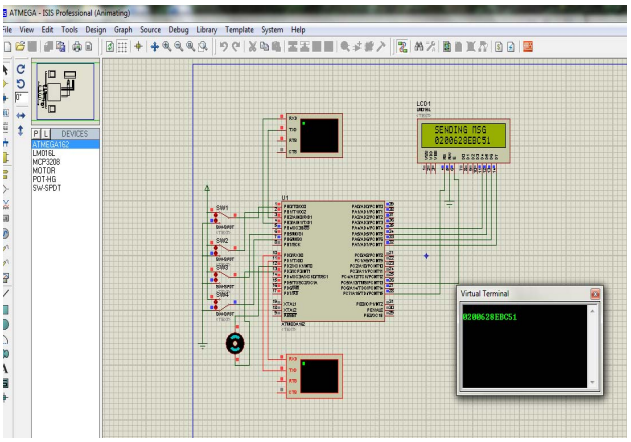

Fig.8 Modeling entrance gate of the parking system using Proteus

C.HARDWARE RESULT:

The Fig.9 and Fig.10 shows output of the car parking system.

Fig.9 Embedded car parking

Fig.10 GSM Initialization output

V. CONCLUSION

A proposed car parking system commanded by Mobile application is presented in this paper. The allotment of the parking slot by method called searching makes the parking of vehicles at campus more efficient. The searching and allotment of parking slot based on the status of available slots, the microcontroller makes the path for the vehicle to the appropriate free slot, makes parking of the vehicle easier. This system makes use of Mobile application to facilitate the parking of the vehicle, for the user. This system reduces the human efforts required for parking the vehicle at campus. Thus, the proposed design provide a car parking system by using a free slot searching method, supported by the GSM Module, RFID Module and the microcontroller.

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