Automatic Car Parking System Based On Android Application

Snehal S. Gaikwad [1], Kiran V. Mohite [2], Prashik Sakhare[3], Bharati S. Pansare[4], Prof . K. Venkat Raman[5]
[1, 2, 3, 4, 5] Dept of Information Technology
[1, 2, 3, 4, 5] MGMCET

Abstract- *The aim of this paper is to automate the car and the car parking as well. It discusses a project which presents a miniature model of an automated car parking system that can regulate and manage the number of cars that can be parked in a given space at any given time based on the availability of parking spot. Automated parking is a method of parking and exiting cars using sensing devices. The entering to or leaving from the parking lot is commanded by an Android based application.*

We have studied some of the existing systems and it shows that most of the existing systems aren't completely automated and require a certain level of human interference or interaction in or with the system. The difference between our system and the other existing systems is that we aim to make our system as less human dependent as possible by automating the cars as well as the entire parking lot, on the other hand most existing systems require human personnel (or the car owner) to park the car themselves.

To prove the effectiveness of the system proposed by us we have developed and presented a mathematical model which will be discussed in brief further in the paper.

I. INTRODUCTION

Our project presents a miniature model of an automated car parking system that regulates the number of cars that can be parked in a given space at any given time based on the parking space availability.

The aim of this project is to automate the car park for allowing the cars into the parking. LCD is provided to display the information about the total number of cars that can be parked and the place free for parking. When a car arrives at the entrance, it will be stopped over a path leading towards the parking lot. The owner, then, de-boards the car and using the Android application on his Smart phone, will command the car to park it. On receiving this command, the car will begin to trace the path that leads towards the parking lot.

When a car comes in front of the gate of the parking, it will wait on the white marking outside the parking space for the searching of free space. On allocation of free slot, the car will further trace its path to free parking spot. On successful parking, the data on the LCD will be updated automatically.

Four basic modules are required for implementation of this system. (1) Interfacing of Micro-controller with LCD. (2) Interfacing of Micro-controller with GSM. (3) Interfacing of Micro-controller with RF Module. (4) Android Application. The car driver initially positions the vehicle on the path leading to the parking space. Then, with the help of an Android Application he sends an encoded SMS saying "Park the car". The car traces the path to the gate of the parking. On the gate, the micro-controllers of the parking unit and the car communicate and availability of free parking slot is checked for. If a free slot is found, it is allocated and the car traces the path to the slot and gets parked. The data on LCD gets updated simultaneously. Thus, the aim of this system is to provide an efficient car parking system with minimal human intervention.

II. LITERATURE SURVEY

Various methods are prevalent for development of autonomous or intelligent parking systems. Study of these systems shows that these require a little or more human intervention for the functioning.

One of the intelligent systems for car parking has been proposed by making use of Image processing.

[1] In this system, a brown rounded image on the parking slot is captured using camera and processed to detect the free parking slot. The information about the currently available parking spaces is displayed on the 7-segment display. Initially, the image of parking slots with brown-rounded image is taken. The image is segmented to create binary images. The noise is removed from this image and the object boundaries are identified. The image detection module determines which objects are round, by determining each object's area and perimeter. Accordingly, the free parking space is allocated.

[2] A vision based car parking system is developed which uses two types of images (positive and negative) to detect free parking slot. In this method, the object classifier detects the required object within the input. Positive images contain the images of cars from various angles. Negative images do not contain any cars in them. The co -ordinates of parking lots specified are used as input to detect the presence of cars in the region. However, limitations may occur with this system with respect to the type of camera used. Also, the co-ordinate system used selects specific parking locations and thus camera has to be at a fixed location. Limited set of positive and negative images may put limitations on the system.

[3] Number Plate Recognition technique for developing autonomous car parking system uses image processing basis to process the number plates of the vehicles. In this system, the image of the license number plate of the vehicle is acquired. It is further segmented to obtain individual characters in the number plate. Ultrasonic sensors are used to detect free-parking slots. Then the images of number plate are taken and analyzed. Simultaneously, the current timing is noted so as to calculate the parking fees. The LCD displays 'FULL' sign to indicate that a parking slot is not available. However some limitations with the system include background color being compulsorily black and character color white. Also, analysis is limited to number plates with just one row.

[4] Smart Parking system designed proposed a mechanical model with an image processing facility. The car would be parked with the use of lift at multiple levels. Also, image processing is used to capture the number plate and store in database for comparison to avoid illegal car entry.

Thus, we aim to design a car parking system that represents a fully automated model with minimum human intervention and overcome the limitations of previous systems.

III. SMART PARKING

In earlier days, different models like CLAMP, PARKISM, PARAGENT, MULTILAYERS were used for parking.

Over the past 20 years, traffic authorities in many cities have developed a model called Parking Guidance and Information (PGI) system for good parking management. PGI systems, tells about the dynamic information of parking in the controlled area and guides the users to the vacant parking slots. Parking information will be displayed in the VMS (Variable-message sign) board at major roads, streets and at the intersections. The parking guidance system has several shortcomings, hence to overcome all these problems we go for smart parking.

Designing, developing and producing a leading-edge parking technology is called as Smart parking. It is a vehicle parking system that helps drivers find a vacant spot. Using the IR sensors in each parking slot, it detects the presence or absence of a vehicle, and sends messages to user. Smart Parking system is proven as an exact, robust and cost efficient way to ensure that road users know exactly where unoccupied car parking spaces are. The features of the proposed system are;

- Less number of drivers searching to park, thus reduces the traffic congestion
- Guides drivers find available parking spaces near them
- Avoids air pollution & global warming.
- Scalable, robust and reliable.
- Reduces the driver stress and improves the urban area.
- Provides tools to optimize the parking space management
- Accurately find out the vehicle occupancy in real time.

This system explicitly reserves and allocates optimal parking space to drivers, as opposed to simply guiding them to a space that may not be available by the time it is reached. The reservation in our "smart parking" system is different from that in the e-parking platform and others mentioned earlier. In the "smart parking" system parking slots will be reserved for the user and by the user which are selected to be optimal based on a well-defined objective function structure.

a) Overview of smart parking

This proposed system, uses the "Smart Parking" which takes the basic structure of PGI systems as one component. It includes Driver request processing centre (DRPC), smart parking allocation centre (SPAC) and Parking resource management centre (PRMC)

b) Driver request processing center (DRPC)

It is the first stage in the allocation process; drivers who are looking for parking spots will send requests to the DRPC. The request consists of two constraints: parking cost and the walking distance between a parking spot and the driver's actual destination. It also contains the user's information, such as current location, license number, car size, etc.

C) Smart parking allocation center (SPAC)

The SPAC collects all the driver's requests from the DRPC over a certain time and makes an overall allocation at decision points in time. An assigned parking space is sent back to each driver via the DRPC. If a driver is satisfied with the assignment, he/she has the choice to reserve that spot. The allocated parking space is updated in the PRMC

D) Parking resource management center (PRMC)

The PRMC updates the corresponding parking spot from vacant to reserve state and makes sure that other drivers have no permission to take that spot. If a driver is not satisfied with the assignment or fails to accept the slot, he has to wait till the next allocation decisions are made by the SPAC. Drivers with no parking assignment have theopportunity to change their cost or walking-distance. The status of the parking space is updated in the VMS (variable message sign) such as the number of parking spot occupied, reserved and also that are open to reserve.

IV. PROPOSED WORK

In this paper, we present the proposed architecture of our system. We aim to develop an autonomous car parking system which is commanded by Android application and thus aim to provide an efficient car parking system.

The Proposed system architecture diagram gives a schematic of the design required to develop this system. Here, we see two sub-architectures – One for the car and one for the Parking area. The Parking system is commanded by the Mobile Phone with Android application as shown in the figure.

The Parking system communicates with the system installed in the car so as to control the motion of car to the parking space.

The proposed system is the combination of smart parking and the Slot allocation with the Android application. In the existing system, a dynamic algorithm is carried out, which is a random allocation method. It randomly allocates parking lot to the users.

**** SLOT allocation algorithm****

The slot allocation method follows a sequence as discussed above. It has the Parking Area Control Unit and the Smart Parking Area control Unit (SPAC). The functions are as follows:

- Initially the slot selection is made from the mobile phone
- Transforming request for parking slot from the mobile using Android application
- The Parking Allocation Control Unit (PACU) gets the request slot number from the mobile
- Checks for the parking slot for availability. If it is free go to the next stage. If the slot is not free goes to the initial state.
- If the parking slot is free, the requested slot is reserved in the parking area
- After reserving the parking slot in the parking area, it checks for a condition if it is available. (i.e. Whether GREEN led is on)
- If the parking slot is not free then it will go to the initial stage.
- After reserving the parking slot in the parking area then the status of the led will be RED=ON && GREEN=OFF.
- If car gets entered into the parking slot, the timer gets ON and measures the total time. If not, the timer waits till car to get in.
- Once the car is to move out of the parking slot, the timer gets OFF and displays the total cost.
- Displays the total cost finally and updates the free slot information.

V. EXPECTED RESULT

A proposed system on Autonomous Car parking commanded by an Android application has been discussed in this paper. The result expected from successful implementation of the system is an efficient car parking and retrieval method. The successful implementation of system consists of allotment of free parking slot to the car and a proper path-tracing to the slot. Also data on the LCD display is updated as per allotment and de-allotment. If the parking space is full, no car is allowed to enter the parking space until any of the parking slots, is made available.

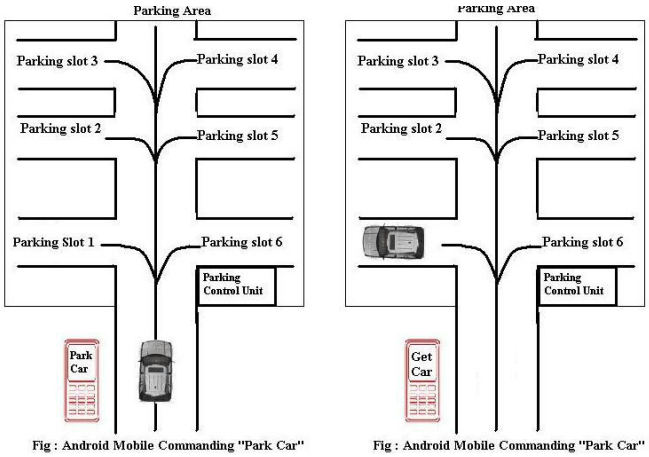

Figure-2. Expected Result

VI. CONCLUSION

A proposed architecture of the automated car parking system commanded by Android application is presented in this paper. The allotment of the parking slot by an autonomous searching method makes the parking of vehicles at public places more efficient.The Smart parking system based on Slot booking is implemented, using the Android application. Using the slot allocation method we can book and block our own cheapest and shortest distant parking slot. It is an efficient one for solving parking problems, which overcomes the traffic congestion and provides automated billing process using the RFID tag. We plan to expand the tests on the real time environment where the users can have the "Smart Parking" system in their handheld devices Like smartphones, mobile,etc.

REFERENCES

[1] M.Ataur Rehman, M.M. Rashid, A.Musa, A.Farhana and

[2] N.Farhana,"Automatic parking management and parking fee collection based On Number Plate Recognition", International Journal of Machine Learning and Computing, vol. 2, no. 2, pp. 93-98, 2012.

[3] Patrick Sebastian, Hamada R.H. Al-Absi, Justin Dinesh Daniel Devraj and Yap Vooi Voon, "Vision based automated parking System", 10th International conference on Information Science, Signal Processing and their Applications (ISSPA 2010), no. 1, pp. 757-760, 2010.
Norazwinawati Basharuddin, R. Yusnita, Fariza Norbaya,"Intelligent
Parking space detection system based on image Processing", Internation Journal of Innovation, Management and Technology, vol. 3, no. 3, pp. 232-253, 2012.

[4] M.A.R. Sarkar, A.A. Rokoni, M.O. Reza, M.F. Ismail, "Smart Parking system with image processing facility", I.J. Intelligent Systems and Applications, 2012, vol. 3, pp. 41-47.

[5] Adamu Murtela Zungeru, Ufaruna Victoria Edu, Ambafi James Garba,
"Design and implementation of Short Message Service based Remote Controller", Computer Engineering and Intelligent systems, ISSN 2222-1719 (Paper) ISSN 2222-2863 (Online), Vol. 3, no. 4, 2012.