



Android Based Smart Car Parking System

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ABSTRACT: The purpose of this system is to computerize the parking space reservation. Its talk about undertaking which introduces a miniature model of car parking that can direct and manage the number of cars that can be parked in given space at any given time based on availability of parking space after doing the registration by user using android application on his smart phone. Automated parking is a strategy for parking and leaving cars utilizing detecting device i.e., sensors. The entering to or leaving from parking lot is also commanded by an android based application. This provide users to book parking spaces online in advance for given location and then park the vehicle with minimal fees. We have concentrated on some current systems and it shows that the current systems are not totally automated and require a certain level of human interference and communication with the system. The difference between our system and existing systems is that we intend to make our system as less human independent by automating whole parking area.

KEYWORDS: Parking space detection, Automated parking, Image processing, Android Application, Microcontroller

I. INTRODUCTION

Variety of occasions turn up when we visit various public places like shopping malls, 5-star hotels, multiplex cinema halls etc. The difficulty we encounter at these places the availability of parking space. Most of the times we need to travel to find a free space for parking. The problem becomes more tedious if parking slots are full and it becomes time consuming. This situation calls for the need for an automated parking system that not only regulates parking in given area but also keeps the manual intervention to a minimum. Our project introduces a scaled down model of an automated car parking system that provides the parking slot at any time to user. Also the system proposes parking fee collection based on number plate recognition. On using Android application on user's device he can make reservation for parking space by providing the information like name, date, time and number of car. When car arrives at entrance parking area, image of number plate is captured by camera. By using image processing and character recognition technology, the car number is matched with registered number to check corresponding information given by user. If the information is confirmed then user can park the car at designated slot. LED's are given to show the information about free slot thus after successful parking, the data will be automated automatically. For retrieval purpose the user has to pay bill and extra charges if any then only barrier will get opened. The system is based on modules (1) Android Application (2) Interfacing of Microcontroller with LED (3) Interfacing of Microcontroller with camera. Thus this system proves to be useful for the purpose of the car parking automation and thereby helps to reduce car driver's time as the user can book his parking spot beforehand.

II. LITERATURE SURVEY

1. D. J. Bonde "Automated car parking system commanded by android application" in Proc. IEEE Conf., 03-05, Jan 2012

The aim of this project is to automate the car and car parking as well. A miniature model of an automated car parking system that can regulate and manage number of cars that can be parked in given space at any given time based on the availability of parking slot. Automated parking is a method of parking and existing cars using sensing device. The entering and leaving to the lot is commanded by an android application [1].



International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 3, March 2016

2. Yanfeng Geng, Christos G. Cassandras, “A new “Smart Parking” system Infrastructure and Implementation”, *Science Direct, Social and Science Behavioral sciences*, 1278-1287 ,2012

Smart Parking adopts the basic structure of PGI systems. In addition, such a system includes Driver Request Processing Centre (DRPC) and a Smart Parking Allocation Centre (SPAC). The Parking Resource Management Centre (PRMC) collects and updates all real time parking information and disseminates it via internet. The DRPC gathers driver parking requests and real time information (i.e., car location), keep track of driver allocation status, and sends back the assignment result to driver. The Smart Parking Allocation center makes assignment decisions and allocates and reserve parking spots for driver.[2]

3. M. A. R. Sarkar, A. A. Rokoni, M. O. Reza, M. F. Ismail, “Smart parking system with image processing facility”, *I. J. Intelligent System and Application*, 41-47, 2012.

Smart Parking Systems obtain information about available parking spaces, process it and then place the car at that position. A prototype of the parking assistance system based on the proposed architecture was constructed. The effective circular design is introduced having rack-pinion special mechanism which is used to lift and place the car in certain position[5].

4. M. M. Rashid, A. Musa, M. AtaurRahman, and N. Farahana, A. Farhana “Automatic Parking Management System and Parking Fee Collection Based on Number Plate Recognition” *International Journal of Machine Learning and Computing* , 93-98, 2012.

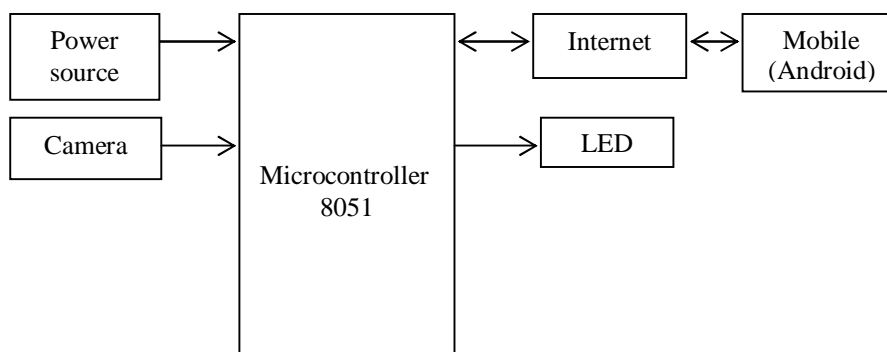
This paper discussed on automatic parking system and electronic parking fee collection based on vehicle number plate recognition. The aim of this research is to develop and implement an automatic parking system that will increase convenience and security of the public parking lot as well as collecting parking fee without hassles of using magnetic card. The auto parking system will able to have less interaction of humans and use no magnetic card and its devices. In additions to that, it has parking guidance system that can show and guide user towards a parking space. The system used image processing of recognizing number plates for operation of parking and billing system. Overall, the systems run with pre-programmed controller to make minimum human involvement in parking system and ensure access control in restricted places.

5. R. Yusnita, FarizaNorbaya, and Norazwinawati Basharuddin “ Intelligent Parking Space Detection System Based on Image Processing”, *Internation Journal of Innovation, Management and Technology*, 232-253, 2012.

This paper aims to present an intelligent system for parking space detection based on image processing technique that capture and process the brown rounded image drawn at parking lot and produce the information of the empty car parking spaces. It will be display at the display unit that consists of seven segments in real time. The seven segments display shows the number of current available parking lots in the parking area. This proposed system, has been developed in software and hardware platform.

III. PROPOSED WORK

The proposed system architecture gives the schematic of the design required to develop the system. Here we see two sub-architectures, one for the car and one for the parking area. Parking system commanded by the mobile phone with android application as shown in figure.



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A. Android Application

In this module, an Android Application is developed to instantiate the system. The Android Application would be developed by making use of Android ADT-bundle and the platform used would be Eclipse-Kepler. The Android application is developed using JAVA code. Using the JAVA compiler the source files are converted to JAVA class files. The Android SDK contains a tool which converts java class files into a .dex (Dalvik executable) file. The .dex file and android application are packed into .apk(Android package file). The resulting .apk file contains all data to run the android application. The Android system is more secured and contains permission system. Using slot allocation method the android application is developed. The request is updated in server and forwards it to parking area.

1. Modules:
 - Registration
 - Login
 - Date & Time selection
 - Parking slot selection
 - Price calculation & payment
2. Connectivity:
 - A PHP web services are used to connect application to MySQL database.
 - JSON parsing method is used to send & retrieve data through internet.
3. Database:
 - MySQL database is used to store parking customer data.
4. Eclipse version:
 - Latest version of Eclipse is used for development as IDE.
5. Image processing:
 - Tesseract Library is used to implement OCR in Android Application.
 - Android's optical character recognition API is used to get number plate value to the TEXT format.
6. Image comparison:
 - We are using BRIEF & BRISK algorithm to compare images.
 - In this processing 100 random key points are selected from images and compare individual key point with each other.
 - Maximum number of points matched, image is much similar to each other.

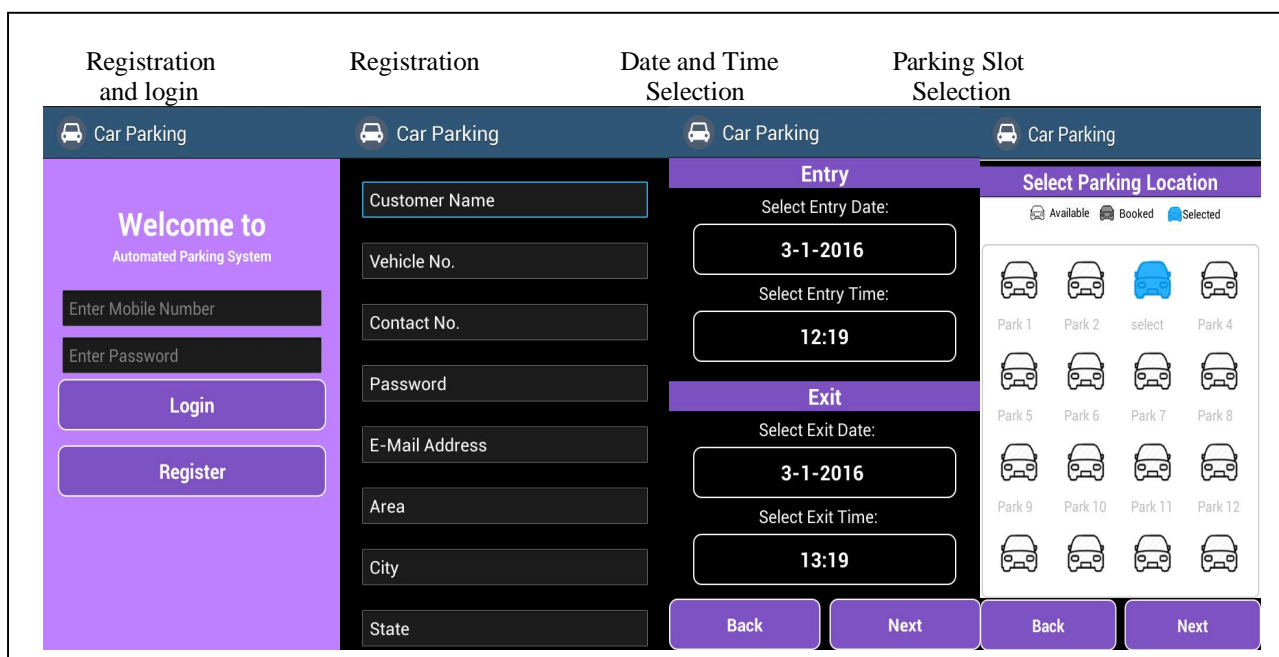


Fig.2. User Application Interface



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Vol. 5, Issue 3, March 2016

B. Interfacing LEDs with microcontroller

Interfacing of microcontroller with LEDs mainly used for indicating the parking slot status date to the system user. The green LED indicates the parking slots are available while Red one indicates parking slots are busy. The LED module is controlled by microcontroller as the status of slots are updated to embedded kit using internet.

C. Number plate recognition

Recognition of number plate is the effectiveness of this system. Firstly the image of number plate is captured and save that image in storage. We are using optical character recognition that process and identifies individual alpha numeric characters on number plate. The following is the image recognition process :

1. Click picture, save that picture in storage with the file called “tessdata” with language which we are recognizing here i.e., English.
2. Rotate image as per the Tesseract Library if image clicked by user is wrong.
3. Then convert that image to ARGB_8888 format required by Tesseract Library
4. Send that image to Tesseract API to recognize text on that image. In that API convert image to gray scale, resize image, remove extra space around.
5. Increase contrast to better implementation.

IV.CONCLUSION

In this paper, the development of reservation for parking slots commanded by android application, number plate recognition, parking slot status and electronic billing system is implemented. The proposed system reduces the drivers effort and time to search parking space. Also the payment transaction is handled online which makes the system less human dependent.

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