GPS Based Online Booking Parking Space and Tracking Application

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Abstract
Today it is very difficult to get parking place for vehicle and it takes time and money too. So to save time and for ease of access we are preparing a journal about how to book a parking place for our vehicle in parking zone safely and how to track the location of our parked vehicle online. Latest gadgets on Android Smart Phone can be used for various purposes like browsing Parking Zone, online booking, payment and tracking vehicle’s location etc. We study the art of parking policies in smart parking systems, and show that the smart parking system needs to be “smarter”. Here we use google map to track the current location of our vehicle. We first capture the location where we parked it and then we can surf it from anywhere. And we have used firebase database to track the activity of user like how many times he used tracking system, how much time he spent on application in a day, in month etc. we also keeps the user data for record. Here we use GPS for location tracking. The goal of “Android parking systems” Research Paper include: (1)To abridge the operations of parking systems, (2) Expand drivers’ satisfaction, (3) Increase parking revenue, and(4) Improve traffic congestion.

Keywords: Android, GPS, GSM, Online Booking, Vehicle tracking.

Introduction:
This is a simple android application which will help the users to park and track the vehicle anytime anywhere in metropolitan areas. Parking management influences driver’s search time and cost for parking spaces, parking revenue, and traffic congestion. Searching for a vacant parking space in a metropolitan area is the daily concern for most people and it is time consuming. The system deeply depends on human interaction with the physical space and object. It commonly results more traffic load and air pollution in certain area only for an available parking space. The wide-ranging location of wireless parking patterns with detecting and communications capabilities, allows the parking expert to observe the state of each parking space in real time and optimize the parking management. This research paper is a smart parking booking and tracking system that offers customers an easy way of reserving a parking space and tracking online. It overcomes the problem of finding a parking space in commercial areas that unnecessary consumes time and to track the parked vehicle in large parking zone. Hence this journal offers a net based reservation system where users can outlook many parking zones and select the space to view whether place is available or not. If the booking space is available then he can book it for particular time slot. The booked space will be marked yellow and will not be available for anyone else for the registered time. For demonstration we will be using 4 parking spaces and each parking space will have 20 time slots. This system provides an additional feature of cancelling the bookings. User can cancel their booked space anytime. Users can even make payment online via credit card. After making payment users are informed about the booking by email along with unique parking number. The customer application allows parking booking on android cell phone.
The server side web service is kept on a web service. We will use GPS for locating or tracking the position of vehicle. We will also find the location of the vehicle in real time. We can track vehicles through android application using GPS to find out where the vehicle is parked, its location longitude and latitude, its nearby address and route to reach out to address.

**Android Operating System Architecture:**

**Mobile platform:** The Smart phone is one of the fastest and accepted technologies in human history. As the price of smart phone comes down, we will see a rapid shift in how mobile phones are observed: from simple communication devices to general purpose mobile computers. With changing times new technology keeps on coming so we have used one the new technology Android operating system. Smartphone uses Android technology. Today's smartphone is used for various purposes like browsing mobile, internet, playing games, emailing, and blogging, messaging, GPS, YouTube, Google search, Gmail and more. Modern smartphones are coming with so many features likebuilt-in cameras. With the rise of mobile phone applications, so-called apps; people today are looking for more information on the go. This is one area of mobile phone technology improvement that allows developers and programmers to offer users just what they look for under their desired part of interest. Google’s Android is one of the latest and unique developments, which rapidly has taken over the mobile phone. Therefore users can use smartphone for booking parking zone and tracking vehicle

**Linux kernel:** The bottom layer of Android Operating System Architecture is Linux. This provides basic functionality like process management, memory management, device management like camera, keypad, display etc. Also, the kernel lookout all the things that Linux is really good at such as networking and a huge array of device drivers, which takes care of interfacing to peripheral hardware.

**Libraries:** It is situated on the top of Linux kernel and they including open-source Web browser engine Web Kit, known as library libc. SQLite database is a useful warehouse for storage and sharing of application data, libraries to play and record audio and video, SSL libraries liable for Internet security etc.

**Android Runtime:** It is a third section of the architecture and available on the second layer from the bottom. It provides a key component called Dalvik Virtual Machine which specially designed and optimized for Android. The Dalvik VM makes use of Linux core features like memory management and multi-threading, which is essential in the Java language. The Dalvik VM allows each and every Android application to run in its own process, with its own instance of the Dalvik virtual machine.

**Application Framework:** This layer provides many higher-level services to applications. Developers can use of these services in their applications.

**Application:** All the Android application are at the top layer. Our application is to be installed on this layer only, which we have prepared. Example Contacts Books, Browser, and Games etc. These component are building blocks of an Android application and describes each component of the application and how interact with each other.
Android GPS: The Global Positioning System (GPS) is a device which has capabilities such as: maps, streets maps which are displayed in human readable format via text or in a graphical format. It also includes navigation to the human for their vehicle for every movements or turns via text or speech. This Directions fed directly to an autonomous vehicle via a robotic probe, where Traffic congestion maps are depicted and the alternative directions are suggested. It also informs us on nearby services such as restaurants, fueling stations, and tourist attractions.

Android Tracking System
Tracking allows base station to continuous track the current location to parked location of vehicle longitude and latitude location. Using Google maps we can trace our vehicle from anywhere and find the shortest route between the two locations. GPS may be able to answer: Traffic congestion and alternative routes, International Roads or paths that might be taken to get to the destination. Here User interface is Android application, Server and Database is Firebase.

Methodology
The system will allow user to:
1) To book online parking place and pay charges by credit card.
2) Track the parked vehicle and its location.
3) Get the details of the address of the parked vehicle point.

Proposed system

A) System Architecture
We are going to locate the position of vehicle by using GPS. We will also find the location of the vehicle in real time. We can track vehicles through android application using GPS to find out where the vehicle is parked, its location longitude and latitude, its nearby address and route to reach out to address. Here user book a parking place via internet to the corresponding parking owner, then owner will collect information from their database whether place is available for parking or not, if it is available user books a place and all the records will be stored in server database.
B) Modules:

**Admin Login:** The system manages the administration and supervision of registration. A system administrator is a person who is responsible for the maintenance, configuration, and providing reliable operation of the application such as server for multi-user. User login/registration: Users will have to register themselves first access system.

**Parking availability check:** Click on free space for the user to see availability. If the space already booked and will be viewed by the grey color, yellow will be marked available.

**Parking booking online for date and time:** Users can book parking space in their required date and time. For 3 hours they can park their vehicle on that slot.

**Automatic cost calculation:** The cost of a reservation system, the user is ask for parking time calculated based on total cost.

**Parking cancellation:** The user can cancel their registration at any time by login into a system.

**Email on successful parking booking:** Parking space user is successful, the system sends a confirmation and thanks offense related to e-mail file space.

**Feedback:** It is a form of system and provides feedback to the user in the system.
C) Firebase Real Time database:
We have used firebase real time database to store the data of user for analysis of system. Here we can see how many users have used this system weekly, monthly and how much time he or she has spent on it and what operation he or she has done. User’s name email-id etc. user related data can also be seen.

![Firebase Real Time Database View](image)

**Figure 4. Firebase Real Time Database View**

Flow Chart:
Flow chart is used to represent graphical view of a logic system. It is also used to show work or developed process, organization chart, or similar formalized structure. It also provides people with a common language or reference point when dealing with a project or process. It also uses basic geometric symbols and arrows to define relationships. For instance, in programming, the beginning or end of a program, a process, a decision, an I/O process and Internet are represented by an oval, a rectangle, diamond, parallelogram and cloud respectively.
Additional Requirements
- Access to the latest route information in GTFS format.
- Smartphone (Android) require Internet access.
- Administrator privileges for creating database in MySQL.
- Google Map/Navigator service.

Advantages
- Users can have an idea about the parking areas at particular locations.
- It saves user’s time in searching place for parking.
- The system make available a graphical vision of the parking spaces.
- User can pay online on the spot and confirm their space.
- It eliminates the requirement of human efforts for handling parking spaces.
- The system generates online bill for requested time and even sends an email.
- Cost-effective.

Future Enhancement
This Project can be used for many purposes with slight changes in the content for the requirements. Tracking Goods & Commodities is the need of the Next Generation for proactive information. Quality of the project can be improved by adding many options that can make this project multipurpose. It is now only available for Android platform but can be developed for other platform for massive response. UI/UX can be enhanced to make this application more interactive GUI could be more attractive and rich.

Conclusion:
The paper proposes an application which will enable user to book online available parking space and gives them access to keep an eye on their parked vehicle and its exact location online thus saving user’s time and energy.

References: