Android Application Smart Parking System

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ABSTRACT: Parking seek is a challenges venture in most urban areas. Traffic congestion is a not unusual phenomenon in developing countries. The visitors as a result of drivers cruising for parking has a high-quality impact on the environment. The improvement of era has an impact on the transportation sector, one in all them is set parking the vehicle. Due to the high populace is the main motive for heavy visitors' congestion This is the state of affairs in maximum of the metropolitan cities of the world. Because of heavy traffic, people lose their treasured time from their busy schedules. One of the prime reasons for this traffic congestion is parking at the roadside. So, a want arises to broaden a parking system so that it is able to lessen the traffic congestion inside the near future. Parking is a state where a vehicle isn't always shifting for a quick time because the driver is going someplace else. It discusses a assignment which affords a version of an automated car parking system that could regulate and control the number of motors that can be parked in a given area at any given time based at the availability of parking spot. Automated parking is a way of parking and exiting motors using sensing devices. The entering to or leaving from the parking zone is commanded by using an Android-based totally utility. This is the purpose why the writer develops a utility for a car parking zone using an android smartphone. The describe uses Rational Unified Process Methodology and the tool that uses Photoshop CC2019, Firebase, and Android Studio.

I. INTRODUCTION

Parking gadget can be two forms of parking masses in line with the control and control machine, parking plenty that use boundaries and parking masses without barriers. Parking lots without barrier have a simple system: absolutely everyone can park if there is an empty spot and might pay through a "Parking-meter", text message the usage of an SMS composer application for smartphones or send manual an SMS, or thru subscription. In a automobile parking space without a barrier is difficult to track empty spots. Parking masses with barrier have a piece extra complex system: you can see if there are empty spots on parking lot, at barrier if there are empty spots you can ask about a price tag and may get in park, price tag is used to get in, counts the time spent in car parking zone, additionally to pay according to time spent; after the price tag has been paid you have a couple of minutes to go away the automobile parking space, otherwise you couldn't depart it and you ought to pay another extra time. Here monitoring of the empty spots is made simply with tickets from the barrier, or extra sensors are used at each parking spot. How you see these structures can do their job smooth, but we live in a international in which we want greater mobility, smooth ways to do things and to spend less time to discover an empty spot wherein we will go away the car. Parking slot occupancy is calculated with the aid of treating every parking slot as a unmarried mobile and each cell is surveyed to come across the supply of space. Though sensor-based vacant parking slot detectors are being used in positive places, that continues producing ultraviolet waves to locate the presence of object by its reflection, it does appear to be disadvantageous due to the expenses want to be incurred to mount it onto every slots as can focus on best one slot a number of the whole parking space. Hence, it appears to be unfeasible on a massive scale. The proposed solution is a client-server gadget, in which, you could see parking lot address, address on Google Maps, and also if there are or not available (empty) spots inside the parking lot for drivers. The administrator can effortlessly add inside the control machine new towns or parking masses and controlled all of them. Now we set up the android application we are able to without difficulty locate the parking location by way of the closest to the destination direction minimum 2kilometers and we can set the parking restrict. During the destination, we can set the parking time restrict and use GPS for location.

1.2   Smart Parking System

The concept for the parking machine become and is driven by way of factors: a need for parking areas and a scarcity of available land. Smart parking application that provides real-time information on parking availability. This application lets in customers to book their spots just by way of making some clicks. With the assist of a mobile-primarily based app that enables you in locating a loose parking slot and then guiding you all the manner to the empty slot found.

An automobile parking space is a place that is assigned for parking. Normally, the parking areas are marked on the ground with white or yellow traces that shape squares that each healthy one car. Parking masses are common close to shops, bars, restaurants, and other centers that require parking. There are parking lots which might be open at some point of the year, but there are also improvised parking masses that are in particular assigned for an event. The clever parking system implemented particularly in Europe, the USA and Japan are advanced with the incorporation of advanced technologies and researches from numerous academic disciplines. With its deployment inside the vehicle park, it's miles hoped that it would resolve the aforementioned problems faced via the patrons within the automobile park.

1.2.1 Advantages & Disadvantages

• Advantages
1. It saves user time in search of parking space available in such a long parking area.
2. The system provides a graphical view of the parking.
3. Users can pay online on the spot and confirm their space.
• Disadvantages
1. It requires an internet connection.
2. It requires a large database.

1.2.2 Parking Garages

A parking storage is also known as a automobile park, parking structure, parking building, parking ramp, parking deck.

There are several sorts of parking garages:

Single level parking garage

A single stage parking storage is a parking garage that handiest has handiest one floor.

Multilevel or multi-save parking garage

Multilevel or multi-tale parking garages are parking garages which have multiple flooring to park at. The layout of a multilevel parking garage can be very different. The most not unusual design is a storage with ramps to move from one degree to another. Less commonplace are parking garages that use lifts to move from stage to stage. Then there also are parking garages with robot structures that flow vehicles from one level to another. The floors of the parking storage can both go up, down or both.

Underground parking storage

An underground parking storage has levels underneath the floor and none above ground. Most regularly underground parking garages are positioned in the city center wherein there's now not much space available to build a parking facility, however there may be a large need to build one.

1.2.3 Safety and Security

While using a car parking gadget, drivers don't must spend time looking round for an to be had spot as an alternative they could without delay pass to an to be had area that is both shown at the board, indicated through the sensor or shown in their mobile relying on the type of parking machine being implemented. Driving round looking for parking can be dangerous due to the fact drivers do not have a complete awareness on the street because their focus is on seeing an to be had spot. Therefore, accomplishing a parking slot absolutely makes it smooth for drivers and also

removes tension and frustration which increases safety around the automobile parking. The parking system also video display units the driver's' vehicles which additionally increases protection

1.2.4 Space Efficiency and Economical

In a few parking systems along with the conveyor belt parking, the customer does now not should be concerned about a way to park or wherein to park. All they ought to do is to leave the automobile at a certain spot and the auto could be carried through the conveyor belt to a free area. This machine can contain at the least 40% more cars than what a ordinary vehicle parking could contain. This machine eliminates the need of car owners to transport across the parking searching out space to park and hiking stairs or the workout of remembering in which they parked their automobile. Even though this system is known to be high-priced in phrases of maintenance, and different expenses, this gadget simply presents efficient space around. This kind of gadget might be mentioned further.

1.2.5 Benefits

1. Optimized parking – Users find the best spot available, saving time, resources and effort. The parking lot fills up efficiently and space can be utilized properly by commercial and corporate entities.
2. Reduced traffic – Traffic flow increases as fewer cars are required to drive around in search of an open parking space.
3. Reduced pollution – Searching for parking burns around one million barrels of oil a day. An optimal parking solution will significantly decrease driving time, thus lowering the number of daily vehicle emissions and ultimately reducing the global environmental footprint.
4. Enhanced User Experience – A smart parking solution will integrate the entire user experience into a unified action. Driver's payment, spot identification, location search, and time notifications all seamlessly become part of the destination arrival process.
5. Decreased Management Costs – More automation and less manual activity save on labor cost and resource exhaustion.
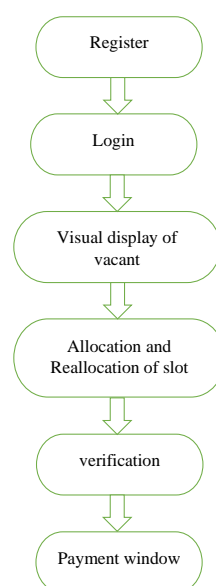
1.3 History

Android Inc. was founded in Palo Alto, California in October 2003 by Andy Rubin, Rich Miner, Nick Sears, and Chris White. Rubin described the Android project as "tremendous potential in developing smarter mobile devices that are more aware of its owner's location and preferences". The early intentions of the company were to develop an advanced operating system for digital cameras, and this was the basis of its pitch to investors in April 2004. The company then decided that the market for cameras was not large enough for its goals, and by five months later it had diverted its efforts and was pitching Android as a handset operating system that would rival Symbian and Microsoft Windows Mobile.

1.4 Applications

These are the basics of Android applications:
• Android applications are composed of one or more application components (activities, services, content providers, and broadcast receivers)
• Each component performs a different role in the overall application behavior, and each one can be activated individually (even by other applications)
• The manifest file must declare all components in the application and should also declare all application requirements, such as the minimum version of Android required and any hardware configurations required
• Non-code application resources (images, strings, layout files, etc.) should include alternatives for different device configurations (such as different strings for different languages).

1.5 Types of Automated Parking System

The automated parking system can mostly be divided into five different types namely Parking Guidance and Information System (PGIS), Electronic Parking, Automated Parking, Smart Payment System, Transit Based Information System. Looking at the names, different types have different functionalities of which they address various issues related to the car parking facilities. Later on, the report will explain the implementation and characteristics mixed with examples that can be found around the world.

1.5.1 Parking Guidance Information System

PGIS may be classes into two different elements. This can be applied to monitor a whole town or just unique parking. The noted classes are normally implemented in massive towns around the sector which includes Japan, UK, and USA.PGIS offers basically the equal advantage as the Smart Parking System which was referred to previously. The primary similarity comes in selection making. The data which is supplied by the machine facilitates the drivers to make choices on a way to reach their supposed destinations and additionally in locating available parking space in the parking facility. PGIS may be broken down into 4 different aspects specifically Information Disseminating Mechanism, Information Gathering Mechanism, Control Center and Telecommunication Networks. In PGIS, Variable Message Signs are used to be able to offer drivers with ways to take when looking for an empty spot. An example will be the system in Weymouth England, the town parking is categorised with a number of to be had areas and also the route of the parking slot.

1.5.2 Transit-Based Information System

Transit Based Information System within the kind of parking which is ordinarily implemented in the UK, France, USA, Germany, and Japan. Its functionality is similar to the PGIS. But the distinction is that Transit Based Information System focuses extra on facilitating drivers to easily park and drive-by imparting real-time records on the parking slot, schedules of public transportation and additionally road visitors' condition. That additional facts is used to offer drivers with better road planning by eliminating inconveniences. Looking at Transit Based Information System, the other advantages are as follow:

1.5.3 Smart Parking System

This is a type of parking machine that enables triumph over the problem of the same old payment technique which is completed thru parking meter and replacing it with a extra technological approach. This method is seen to be

higher due to the fact the standard payment technique reasons delays and problems for drivers because they have got to cope with cash. Looking at the new payment gadget, when it comes to upkeep and staff necessities for managing payments, and also controlling visitors is reduced. The Smart Payment System is primarily utilized in countries such as Italy, the UK, the USA, and Finland. This device entails different methods including:

1.5.4 Electronic Parking

This is the form of parking gadget that permits drivers to pick or enquire about the availability of a parking slot. And if a spot is available, then they are able to reserve for area as they wish in order to make sure that they do no longer have troubles parking when they arrive at their destination. The Electronic Parking System allows drivers to book for a niche in various ways such as: Sending SMS, Phone call and online. This system is broadly speaking used in airports (Airport Parking Reservation Systems). The gain of the usage of the Electronic Parking System is that drivers are free from all the hassles of locating a spot.

1.5.5 Counter Based Parking

This is one of the parking types wherein sensors are located at the doorway and at the go out of the parking so that it will count the wide variety of cars which are entering and exiting the parking. This form of parking calculates the number of available parking slot by way of subtracting the variety of cars that are registered every time through the sensor located at the doorway to the whole range of spaces registered in the system.

1.5.6 Image-Based Parking

This is the form of parking that makes use of cameras to register photos of the parking. This gadget is basically used around because when a photograph is registered, whilst a automobile parks to a positive spot, routinely the photo of the parking is changed. Therefore, a new photograph is a shop with new information stating the changes inside the parking. An example of the form of parking is shown below

1.5.7 Wired Sensor-Based Parking

This is the type of parking that uses ultrasonic sensors at each point of the parking which are connected with wires to carry their signal to the server. This system is commonly used to retrieve data about the parking from each individual parking slot. But this type is known to be expensive.

1.5.8 Wireless-Based Parking

This type of parking is similar to the wired based parking but the only difference is nodes are communicating wirelessly. The advantage of such a system is that it reduces the installation and maintenance cost which therefore makes the system more flexible. This system uses component such as temperature sensor, light and acoustic to send data to an online server which processes the data and also to the parking users to check availability of the parking online

1.5.9 Convey Belt Parking

This is a more advanced and sophisticated type of parking system that uses a conveyor belt to carry a vehicle to its allocated parking slot. A little history about the conveyor belt. This was first introduced in the 1800. Of which some are made out of leather, canvas, and rubber. Parking compared to other parking systems. When it comes to maintenance, the Convey Belt Parking is very difficult to maintain compared to other parking systems.

1.5.10 Pallet Parking System

This is similar to the conveyor belt parking system but the difference is that the driver parks the car in a pallet cabin and then the car will automatically be transported to a lift which will take the car to an available slot via roller conveyors. The main advantage of using this type of parking system is that the use of space within the parking is flexible. It is highly recommended for office buildings and residential areas.

1.5.11 Tower Parking System

This is the type of parking that also uses the conveyor belt to store vehicles but this parked car one on top of the other. This type of parking saves a lot of space and time because cars are dropped to the conveyor belt and then a spot is automatically assigned to the car.

1.6 Vehicle Detection Systems

Car parks are widely used in our days and for automation of those car parks, there are two types of sensors that can be used to help detect vehicles entering or exiting the parking. These are Intrusive and Non-Intrusive sensors. With the intrusive sensors, cars vehicles are detected one at the time and then they are placed below the vehicle. While the non-intrusive sensors can detect more than one vehicle at the time

1.6.1 Intrusive sensors

These are the type of sensors that requires a certain type of modification to the road so as it should be able to detect cars. The type of modification that the intrusive sensor requires can be making a hole in the road, creating a tunnel under the road or making a certain attachment besides the road. The main problem with this type of sensor is that since it has to be placed by the road, itis prone to be damaged by cars. Some of the intrusive sensors are, Magnetometer, rode tube, Magnetic System sensors and Weigh-in motion.

Magnetic System Sensor

With this type of sensor, cars are detected using the magnetic field generated by their own generated disturbance.

Weigh-in motion

This is the type of sensor that makes use of a piezoelectric sensor which is then laid across the road; mostly in a specific location for access control. To use this type of sensor accurately, it has to be combined with either another non-intrusive or intrusive sensor so as to provide additional cross-checks while collecting data.

1.6.2 Non-Intrusive Sensors

These are the type of sensors that do not require any type of modification to the road before it could be operational. This can easily be placed without disrupting the flow of traffic. This is commonly used around because it doesn't require extraordinary components before they should be placed. Some of the non-intrusive sensors are Ultrasonic Sensors, Microwave Radar and Active Infrared sensors.

Ultrasonic Sensors

This is similar to the microwave infrared sensor and its frequency is known to be above the human hearing range.

Microwave Radar

This is the type of sensor that is known to be better than other sensors. It can easily detect cars traveling across multiple lines and then calculate their speed. This is done by emitting electromagnetic signals and then detect the object through the reflection of the signal. The disadvantage of this system is that stationary cars cannot be detected without the aid of additional sensors.

II. EXISTING SYSTEM

The hardware technique being used in certain countries is the sensor-based parking slot. Sensor in general refers to a transducer that is used to sense the changes in the environment. Sensors are installed in many ways based in the nature of the car parking grounds. the sensor being fixed on to the ceiling and is useful in indoor parking spaces. Each and every parking slot has sensor mounted onto it that would produce 'red' signal if the slot is busy and 'green'

signal if the slot is vacant. Thus, the sensor detects occupancy. Proper parking of the car in that exact slot is necessary for accurate detection.

III. PROPOSED SYSTEM

To overcome these challenges, computer vision technique is being used. It is evidently a cost-effective solution to detect and track parking spaces. It would simply make use of CCTV camera as in for the purpose of video surveillance and capturing images, and makes use of background subtraction algorithm to detect occupancy by processing the images in the video frame by frame in order to detect the foreground object under consideration. Here, car is considered the foreground object to be detected by this method. The architecture of this proposed method involves three

techniques:

1.Histogram analysis – It is done to identify the presence of foreground object(car).

2.Background subtraction – It is performed to detect the foreground object and slot where it is located.

3.Decision making – It involves taking decision as per the occupancy or vacancy of car parking slot.

4.Walking distance (L) –the distance (meters) from parking spot to destination. Usually driver chooses the shorter walking distance.

5. Driving distance (D) –the distance (meters) from current position to some parking spot, which is calculated by Google map. Driver prefers to the route of short driving distance.

6. Available parking spaces (E) – number of current available parking spaces in a parking zone, which are monitored and updated periodically by server of parking center. The more the available parking spaces are, the much easier for the drivers to park there.

7.Parking fees (F) – parking fees are charged on hourly basis. The fewer the better.

IV. MODULES

PREPROCESSING
4.1 Home Page

A home page is an android application serves as the starting point of the android. It is sometimes also called the front page or main page or written as "home page". It is default android that loads when you visit a web address that only contains a domain name. The home page is located in the root id of android studio. Most android application allow the home page to have one of several the different filenames. The default filename of a website's home page can be customizing on Firebase android studio. Since the home page file is loaded automatically from the root id, the home page. A home page can also be used the context of android application, such as to refer the principal screen of a user interface, frequently referred to as a home screen on mobile devices such as mobile phones.

Fig 1 Index Page

4.2 Customer/Place owner Login

The customer/place owner can login to the application by giving email id, password. If the administrator gets successfully login then the user is said to be authorized. After getting login to the application the administrator can carry out many tasks, adding parking locations, view parking locations, view all users, view all Bookings.

Fig 2 Home Page

4.3 Customer/Place owner Registration

The customer can login to the application by giving email id, password, name, Mobile number. If the administrator gets successfully login then the user is said to be authorized. After getting login to the application the administrator can carry out many tasks, adding parking locations, view parking locations, view all users, view all Bookings, users Feedback. The user can add different locations where parking slots are available. The users can select any location which is nearest to his destination. The user can also delete the location in any time. The user can view different location where parking slots are available and can also check the status of different parking slots. The user can add different locations where parking slots are available. The users can select any location which is nearest to his destination. The user can also delete the location in any time. The user can view different location where parking slots are available and can also check the status of different parking slots.
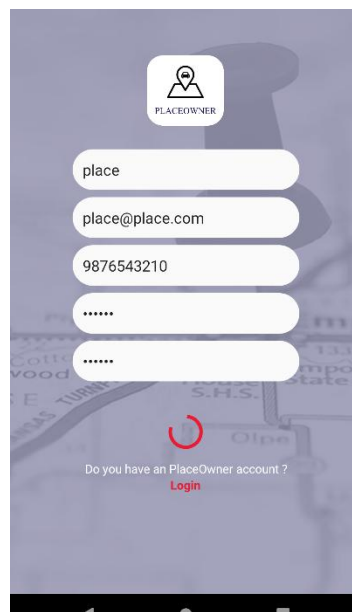

Fig 3 Registration screen

4.4 Customer Map View

In customer map view administrative person can see all active user details in real-time with geo-location details on Google map with this feature. And direct to the particular selective location.

4.4.1 Customer Map View Directions

In map view direction when customer gives the request from the particular place it will search for the place. When the place is found it will automatically direct to the place.

Fig 4 Customer Map View

4.5 Place owner Map View

In place owner map view administrative person can see all active user details in real-time with geo-location details on Google map with this feature. Allocating the place for particular user for particular place.

4.5.1 Place owner Map View Place Allocate

When place owner register /login to the application it will automatically mark the placeforthe customer to visible.

Fig 5Profile

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(A High Impact Factor, Monthly, Peer Reviewed Journal)

Fig 6Place owner Map View

V. RESULTS AND DISCUSSION

This "valid spot" app is a small step to make metropolis a 'clever town'. This can be developed in destiny for wide place so that it is able to help people on huge scale. In future this application may be applied on the existing operation systems like ios and windows. And also, it'd be feasible to add some extra capabilities like enlarge the term of booked slot and have to be feasible to ship message to user before expired time period.

VI. CONCLUSION

The proposed system reduces drive frustration and traffic by providing nearest parking area and available slot. As smart parking system increase the service levels in operation, there is a lot of scope for innovations and implementation through data standardization and management, mobile phone integration, hardware and software integration. Basically, smart car parking system save time, money, space and help to simplify the often-tedious task of parking. Intelligent Parking System (IPS) is used to book parking slots without any great effort by the user using an android device. The user can check the status of parking area and book the parking slot in advance. This will result in overcoming many problems which are being created due to the bad management of the traffic. Mobile computing has proven as the best area of work for researchers in the areas of database and data management so this application is applied in Android Mobile OS. This application is utilized by can be applied nook and corner due to its easy usage and effectiveness.

The management and control parking system as seen from the tests, offers good mobility, precise information of the parking lot status and all of these in one place. We studied the principal requirements to implement such a parking management and control system and provided the obtained feasible solutions. In future, in order to obtain a better management, the system will have also a hardware system for tracking empty spots from parking lots without barrier. Also, will offer a possibility for parking lot responsible to check parked cars using smartphones. Parking system also will be sent on client mail and from there can be printed and in this way the client will have a better tracking. The system in order to obtain fast communication between system components and a better experience for users.

Thus, surveillance of the car parking slot in busy areas is made simple and cost effective by this method and hence, it avoids frustration for the driver to get a suitable place to park their vehicle. The person could view the status of the car parking space in advance with the help of the app, before they reach the place they intended to visit and hence preplant their visit as per their own comfort. With all these future enhancements added, for sure this app would be a demand in urban areas due to rapidly increasing standard of living of the people. An android is something very commonly used by people now-a-days and hence many people would be able to have access with this app too. Therefore, let's not be frustrated thinking about the availability of the car parking space till we reach a place. Just have a peace of mind while travel and simply park the vehicle.

The automatic parking systems based on parking scene recognition, elaborates the research method of an automatic parking control system and designs a parking controller. The parking space scene recognition algorithm is researched, and the results are experimentally verified. According to the actual parking scenario, path planning and a trajectory tracking simulation are performed. The automatic parking control system designed in this paper not only improves the intelligence of the parking system but also improves the utilization rate of narrow parking spaces and enhances parking convenience.

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