

Introduction

As the population grows day by day, there is an increase in transport facilities in the urban areas. The basic modes of transport include public bus, trains, taxi and private transport. Nowadays there is huge increment in the private transportation. So to manage these cars, we have to deal with a bigger issue, that is, how to manage these cars in an organised way in the urban areas. Hence Car Parking System comes to play. It will make the job easier and a more organised way to deal with clients.

Car Parking System is a new concept to manage cars in a parking lot without the overhead of many employees for a easier workflow. The main criteria of this parking system is to manage cars for both registered user and unregistered users. The functional requirements of this system is to develop a new technique in ticket generator when the car enter a garage and when it exits a garage, payment gateway for both guest and registered user, access of parking in the garage to ensure that no cars will enter the garage when the parking is full. To manage all these the stakeholder's provision is to be fulfilled.

Functional requirement of the car parking system

The functional requirement of the car parking system is to maintain a steady workflow using and specifying the workflow of the system. This can be achieved by drawing a proper system requirement specification and a proper use case diagram along with a class diagram. Some of the basic functional requirements are as follows :

- The first thing when a car enters a parking is to generate a ticket. This is automated facility. When a car enters a facility a ticket is to be generated which tell the time and date of arrival of the car. This ticket will specify whether the customer is a registered user or guest. This ticket is again required when the car is exiting the facility, during payment. A fine is required when the ticket is lost.
- A gate is blocking the car parking facility. There are sensors to detect whether a car is present or not. A ticket is generated when the sensors detects that a car is standing in front the gate.
- The payment is handled at the exit point of the facility. Over there the user will specify whether the customer is registered or guest. If the customer is registered then the payment will add to its tab, or if the customer is a quest user if will print the proper invoice. A separate database is to be maintained for the registered user for their usage and payment details.
- The parking fees is to be calculated and it can increase over time according to the requirements. If a guest user arrives the parking fees is to be paid at the time of the exiting the facility. If a registered user exits the parking facility the fees is added to their individual tabs in database. The database should store all the details if the cars for further reference. The payment can be done sectional wise.
- The car parking system is an intelligent system. It will maintain a record the how many cars are entered the facility. It knows that how many parking spaces is available is each floor. If the parking space is full it will now allow any cars to enter the facility. It will also check for empty parking space. It will monitor the cars which is exiting the facility.

- At the exit point the customer will be asked to give the ticket number. If it is a guest user then the payment is paid at the time of exit. If it is a registered user, the security will ask the customer to pay now or add it into the tab. If the registered user pays then the previous history of car parking is deleted and the user will start from zero balance to be paid.
- As the parking facility is huge, security became a huge factor. As a thief can enter the parking facility and steal car parts. So CCTV camera surveillance is mandatory and there should be a person to monitor those cameras. A lot of illegal activity happens in a parking facility. There should be also a security management facility to keep in track number of security working in that shift. Their payment should be stored in the database. Their interaction with the customer has a functional requirement.
- There should be a fault management system that will be used as a backup if the car parking system fails. The fault management is done manually by the employees. Any task done on the fault management is to be again entered in the database. This management is very useful in case of power failure, system update.

In the car parking system there are many non-functional requirements and that can be updated for better functionality. The non-functional requirements are to judge the operating system and how stable the system is in full working state. The basic non-functional requirement in the car parking system is as follows :

- The parking facility should allow both registered user and guest user if parking space is available. If the new guest user wants to be a registered user or seasonal user he/she will have to apply for the requirement. After inspection if the requirement passes then the

customer will receive a special card for their identity. there should be a limited registered to avoid overflow.

- The CCTV camera surveillance should be monitored by the security all the times to avoid crimes. The feeds of the camera should be saved for at least thirty days.
- The email id and credit card details should be matched for validation.
- All the registered user will get a email from the system during holidays or any important notices.
- Loyalty points should be given to old and registered user. Using these loyalty points the customer will get a discount during payment.
- The parking place is not a place to loiter around. So registered user will use the elevator within three minutes from the time of parking. These things are monitored using the cameras.
- The system should have the facility to detect itself if there is a server connection problem or any malfunction that can happen to the system. in this case the system should automatically call for fault management.

User atmosphere for registered user or seasonal user

At first the user will enter the parking system facility. A gate will block the path where the user will have to collect the ticket. The ticket will contain all the relevant information like date and time. There should be sensors which will detect cars and will generate ticket in real time. A heads up display will be there to tell in which floor parking is available. The heads up display will be marked red if any floor the parking the parking is full otherwise green. If the parking is full, the signal will direct it to the basement parking, as the basement parking is reserved for registered user only. During ticket generator the user will have to enter the membership id to

verify that he/she is a registered user. The system will keep a record on the parking space which is available on the system. now the user can park its car according to the space available. After entering the facility through checking is done underneath the car to ensure safety. The user can also park in which floor which they want to get off. The user will have to enter the premise within three minutes after parking in the facility. This is monitored by the security. The registered will have many facility and discounts that the guest user will not enjoy.

At the time of exit the user will have to show their membership card along with the auto generated parking ticket. The parking fees is added against the membership card. If the user wants to pay the bill, then they will have to swipe their card or pay it by cash. The employee in the cash counter will ask the user that they wants to pay or they wants to add it in the tab. This will reduce the total overhead.

The whole system should be dynamic in nature and a constant server to client connection is required. In case of power failure the system will be backed up into the server. The designing of the database is mandatory to specify and store all the relevant information about the user. The security of the system should be good to avoid hacking of other user's private information.

User atmosphere for quest user

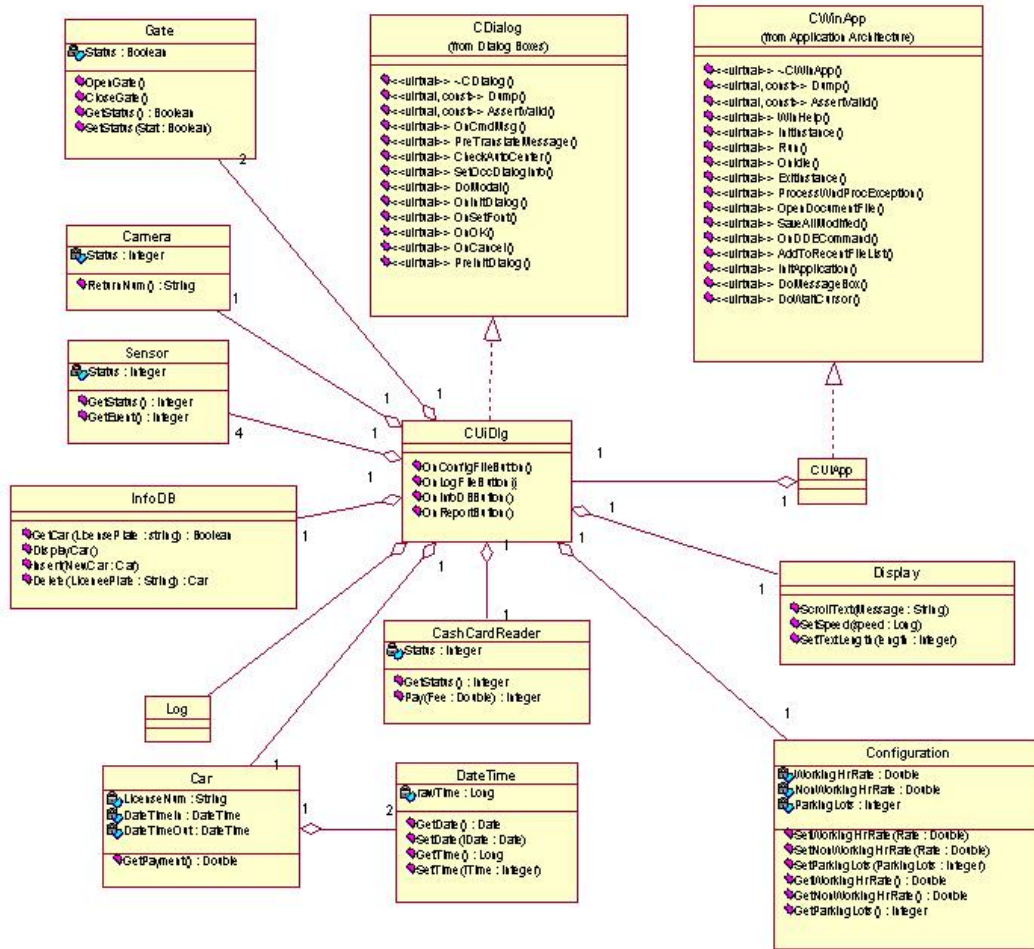
The system of entry of a guest user is same as for registered user. At the time of entry the user will have to specify that he/she is a guest user. If the parking is full then the heads up display will show the relevant information, that is, it will be marked red in all the floors. The user will have three option to choose from. First, if he/she is lucky enough then a space will be available if a car leaves the system. As it is a dynamic system it will detect if a car leaves the facility. Second option is to obtain a membership card then they will have the privilege to park in the basement.

The last option is to leave the car parking system facility. At the time of entry the user will have to collect an auto generated ticket which will show relevant information like time, date and type of card.

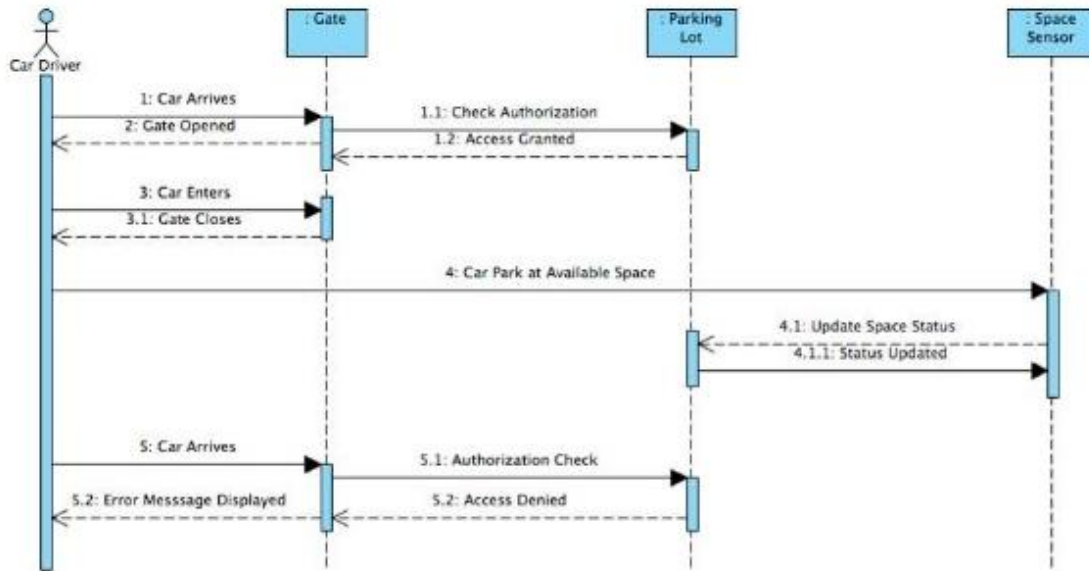
Now the user can park according to his/her convention. Same rule is to be followed for guest user also for security purpose. At the time of exit, the employee of the system should ask for the auto generated ticket. The payment is to be done according to the time of stay. The user can pay by cash or card. If the user wants to be a member of the facility then he/she should carry relevant information that is to be uploaded by the employees. If the criteria is fulfilled then the user will become the member of the facility, and the payment is added to the tab. This type of system should destroy the orthodox way of parking facility.

Use Case Diagram

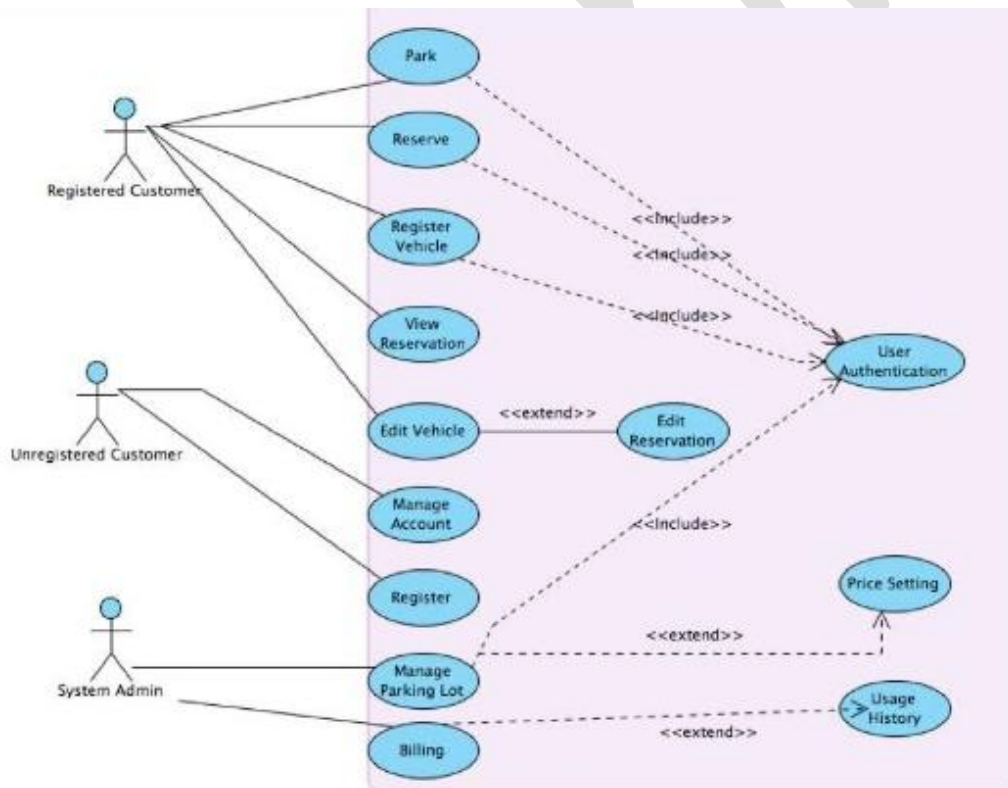
In software requirement specification, the use case diagram is to show the structure of the system. It shows how the actors of the system will take part in the activity. Use case will specify the dataflow of the model so that the user will get a clear idea of the system to operate it. The customer will look at the use case diagram, class diagram, data flow diagram and will check whether it will required specify the user requirements. It is very important to design the use case as it gives a general idea of the project that the employees will work on.



Class Diagram for Car Parking System



Sequence Diagram for Car Parking System



Use Case Diagram for Car Parking System

References

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