

# INTELLIGENT APPROACH FOR SMART CAR PARKING RESERVATION AND SECURITY MAINTENANCE SYSTEM

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## Abstract

We approach a special system for smart parking reservation and security maintenance in a commercial car parking area in an urban environment. This system mainly designed to avoid unnecessary time conception to find an empty lot in a car parking area. By the same case we can also save more than 80% of fuel wastage in a car parking area to finds the empty parking slot. The reservation process is happening only by user. Hence the user finds the empty parking lot and makes the action of reservation through an internet access by an embedded process control unit (EPCU) with driver's own knowledge. Here we give the major response to user's reservation action and hence the driver can reserve his own likely parking slot based on the cost function. Instead of efficient car parking we need a special security options to make our vehicle very safe. By this case we have provided a best security guidance of barrier gate control security system (BGCSS) with the help of embedded process control unit (EPCU). There are number of steps taken to make a reservation with different lighting scheme mechanism (DLSM). We have proposed a system with multi-processing queuing mechanism (MPQM) to avoid multi-user approach problem (MUAP) during reservation process in our smart parking reservation system.

**Keywords:** embedded process control unit (EPCU), multi-user approach problem (MUAP), different light scheme mechanism (DLSM), barrier gate control security system (BGCSS) and multi-processing queuing mechanism (MPQM).

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## 1. INTRODUCTION

Nowadays congestion of traffic increases rapidly with the increasing growth of population. With respect to the number of population the usage of cars also increased. Due to more usage of car the traffic congestion occurred on the road. Not only on the road had the congestion it also occurred in the car parking area. Because finding of free parking slot takes more time period. Hence we loss certain amount of time period and also made more than 80% of fuel wastage to find the empty parking slot in parking area. To solve this problem we need a special system in the parking area to measure empty space and show the information to the people who looking for the empty space.

However more number of systems designed previously to avoid time wastage in car parking area. Some of these systems are used to monitor the empty spaces by the sensors placed in the parking lot. These empty spaces are reserved by the short message service (SMS) [6] or internet access [1][2][3][4][5]. By these kinds of systems user could not find exact parking spot due to the traffic congestion or else improper updated information about the parking area.

To overcome these problems I had designed special system to reserve our own likely parking spot by the internet access. These systems provide quick response to every user and also the parking area information quickly updated into the web

page with proper time delay. This web page is specially designed for our smart car parking system (SCPS).

By the chapter III we can observe the system frame work and its operation. Chapter III tells various operations done by my smart car parking system. In this various small systems are working together to performing my system operations. Thus the system block diagram and performance of each block are described clearly on chapter III.

In the smart parking allocation and reservation system [1][2][3][4][5], system itself allocates the parking space for every users. In this, the system observes the distance between the user and parking spaces with the help of global positioning system. With this distance measurement the system calculates the average time conception for the user entering in to the parking space. Then the system allocates the appropriate parking slot for the user. Hence the user may or may not be accept the allocated parking space. If once the user accepts allocated slot then user can able to change his parking slot. This system does not sufficient for all kind of users; example the physically challenge person may require parking spot near the lift or steps. Hence if system allocates the slot then person have to spend much time period to get the sufficient parking slot. All other normal persons also can not able to choose their own likely parking spot. By these case the system not efficient for all kind of users.

These drawbacks are retrieving on my smart car parking system. In my system all the user can able to reserve own likely parking spot. Hence there is no more restriction between the slot reservation and user request. Here the user reserves his spot with respect the system framework described on chapter III. The system performance is respect to flow diagram included on chapter III. Here each step of reservation process is differentiated by DLSM. MUAP is avoided by special queuing process (MPQM) with the embedded process control unit (EPCU) in my smart car parking system. In DLSM each colour notification shows the each and every step of the reservation process happen by user or car driver.

In my smart car parking reservation system I have included one special application for the security maintenance in a car parking area. That BGCSS contains barrier gate with the keypad unit. By entering user name and password in keypad we can able to open or close the barrier gate in the appropriate parking slot. Chapter II tells the operation every block in smart car parking system.

**2. SYSTEM OVERVIEW**

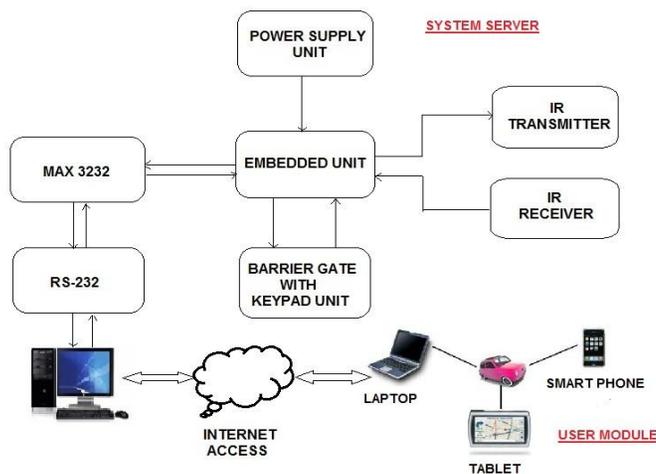


Fig -1: smart car parking system overview

**2.1 System Server**

System server contains number small blocks. These blocks are combined together to perform the operation of SCPS. Mainly the system server is used for measurement and controlling process in SCPS. Fig 1 shows the overview of SCPS. Hence sensor network contains IR transmitter and IR receiver to identify the parking status. By this sensor network we can identify whether the parking slot is empty or filled by any other car and the corresponding information is updated into the web page through EPCU. Here each reservation steps are differentiated by the DLSM. By the chapter III we can get clear idea about operation held on the web page for reservation process. EPCU contains ARM processor for the system controlling operation. Because of high response and

higher data transmission at high speed we have used ARM processor. The application of BGCSS also interfaces with the EPCU. Here the BGCSS contains the keypad unit to enter the username and password of the reserved driver. This username and password is checkout by the EPCU. EPCU always synchronies with web page specially designed for SCPS system. So we can get all updated information into the web about the status of the parking spot. Hence the EPCU interfaces with the computer through the interfacing unit. During keypad access EPCU compare present username and password entry with the original username and password for corresponding barrier gate. The original username and password are stored in a memory unit in an EPCU. The interfacing unit contains MAX 3223 and serial communication cable (RS-232). By the serial communication we can make higher data rate transmission at higher distance. On every 5 sec the web page is updated with respect to the status of the parking area.

**2.2 User Module**

The user can reserve his parking spot through the mobile phone, personal computer or else with any other system with internet access. It could happen either at stand by position or during driving. The user will get complete layout of the parking area during the web page access specially designed for SCPS. Hence user also gets slot status by the DCSM. By the status we can understand whether the spot is empty or filled. It also shows each and every step of reservation process with different color representation by DCSM. By the internet banking we can able to pay our price for car parking. Hence the reservation process and car checkout process are explained with the flow diagram in chapter III.

**3. SYSTEM FRAMEWORK**

**3.1 Reservation Process**

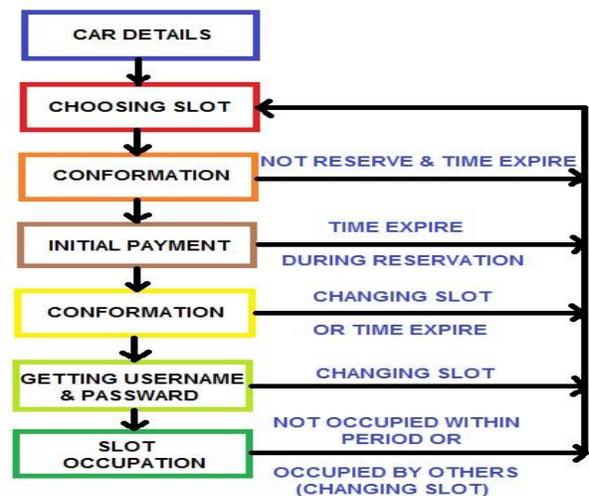


Fig -2: flow diagram of reservation process

By the above flow diagram, we get the clear idea about different color scheme used on the reservation process. This different color intimation helps us to get present status of every parking spot. This reservation process is done on the EPCU through the internet access. There is proper synchronization between EPCU and web page with the appropriate time period. Every single change in the parking spot will be automatically updated into the web page. So the empty slot or occupied slot information is quickly updated into the web page. The user has to make following action to make reservation in the car parking area. If any one of below step is missed, then we cannot able to do successive reservation.

- In the first step, the users have to enter details about the car. The details could be car number, car name, drivers name, driver's license number etc.
- In second step, user chooses his own likely parking spot to reserve in a web page. User chooses his slot with respect to its status. Hence the empty slot is notified by red color. The occupied slot is notified by green color. If a slot under reservation but not occupied then we get light green color notification. However we are getting different color notification for users understand.
- Third step, user has to accept conformation order within a fixed time period. After conformation user gets orange color notification. If user does not accept the conformation order then process will expired.
- Fourth step, user has to provide initial payment with a time period to reserve the parking slot. The payment process should be done through net banking. After successive payment process user gets purple color notification. The reservation will expire if the user does not pay money with in a period.
- Fifth step, user has conform his payment details within a period. The payment will not accept without conformation. After conformation user gets yellow color notification.
- Next step, user will get his username and password to enter into the security system. The security system of barrier gate is fixed into the parking area. The username and password will enter into the keypad along with the barrier gate.
- At final step, user has to occupy his corresponding slot within a period of time. If user does not occupy his slot at correct time then he will lose corresponding slot. But he can able to reserve any other slot with previous payment. Instead of late arrival user has to follow from second step. After successive occupation of the slot web page shows green color notification. If user reservation is canceled then web page shows red color notification. By the way it is intimate that particular slot as empty.

By keep following above seven step user will achieve peaceful car parking reservation in the car parking area. Each and every step will be achieved only on the web page specially designed

for corresponding car parking area. This reservation process only achieved through the internet accessible devices. On every reservation process there is continue communication between web server and EPCU. EPCU stores every action happen in a web server. This information is helps to checking every action of web server. In case any of illegal access happened in the parking area we can able to avoid them with this information. For the anti-theft action we can use this information. if any misbehavior happen in a car parking area we can able identify vehicle theft in car parking area.

### 3.2 Car Checkout Process

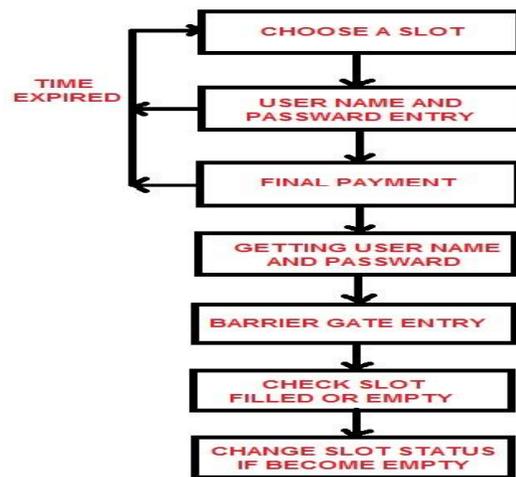


Fig -3: flow diagram for checkout process

The above flow diagram shows the checkout procedure for all users in car parking area. Every user compulsory should make checkout procedures before checking out their car from parking slot. Without follow checkout procedure user cannot able to takes their car from parking slot. The checkout procedure is explained below.

- First step, user has to select their car parked slot in a webpage. Hence every user has to make this only by an internet access. This will helps to improve quality of security system.
- Second step, user has to enter his username and password in the webpage. By this the unauthorized person cannot able to theft a car. If time expires before entering username and password then user has to follow the procedure from first step.
- Third step, user has to make his final payment for his parking. If time expired during final payment then user has to follow from first step. After final payment user has to checkout his car immediately within short time duration or else the username and password will locked. So he has to make checkout procedure from first step.
- Fourth step, user gets new username and password to enter into the barrier gate. This username and

password will be locked if it is not used within a time period. In this case user has to make checkout procedure from first step.

- Fifth step, user has to enter his new username and password into the barrier gate to checkout his car from the parking slot. The barrier gate will not open if time expires to enter the username and password. After barrier gate opened if the user takes long duration to checkout his car from slot then the gate will automatically close. At this stage user has to make procedure from first step.
- At sixth step EPCU checks the slot whether it is empty or filled. If the slot still not becomes empty then it
- sends the signal to barrier gate to lock the gate. Hence user has to pay fine amount for his response less habit.
- At final step if the slot is really become empty then EPCU changes the slot status as empty by providing red color notification.

The above six steps help the user to checkout his car from a parked slot. By making above process we can easily checkout our car without any fine payment. During checkout if there is any misbehavior happened with the user then he has to pay a fine for his action. All the above checkout process happens only through an internet.

#### 4. CONCLUSIONS

We have proposed a smart car parking system to make easy and efficient use of car parking area. This system efficiently detects the empty parking slot and updates the information on the web page specially designed for the parking area. The average time consumption for update the information is very less than previous systems. However the reservation takes less time period at higher quality of system handling. The maintenance of a system is much secured so unauthorized persons cannot be able to hack our system. This system solves the problems arising on the parking area by finding an empty space and traffic in the parking area. We have included special security maintenance system with the BGCS. It is highly protect our car from an unauthorized person. Our smart car parking system is easy to use it provides flexible response to all user. Current research work focused to reduce the average time consumption for user arrival into the parking area. It also focused to make number of car parking area reservation with a single server. By this we can be able to reserve our required parking spot from number parking area. Hence the system handles number of parking area so it should be higher reliable one. Moreover the system speed should be maintaining a high level.

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#### BIOGRAPHIES



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