SMART PARKING SYSTEM

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ABSTRACT

The proposed project is a smart parking system that provides customers an easy way of reserving a parking space online. It overcomes the problem of finding a parking space in commercial areas that unnecessary consumes time. Hence this project offers a web based reservation system where users can view various parking areas and select the space to view whether space is available or not. If the booking space is available then he can book it for specific time slot. The booked space will be marked red and will not be available for anyone else for the specified time. This system provides an additional feature of cancelling the bookings. User can cancel their books space anytime. Users can even make payment online via credit card. After making payment users will get a notification on his/her phone with unique parking number or can also check the bookings in his/her profile.

1. INTRODUCTION

Parking is limited in almost every major city in the world – leading to traffic congestion, air pollution, and driver frustration. For example, the Manhattan Central Business District (CBD) has 109,222 off-street public parking spots for a ratio of approximately one off-street public spot for every 16 CBD workers. Yet, often parking spots are wasted. In large parking lots, a driver may exit the lot without knowing about new spots that have just become vacant. Finding an empty parking spot may also lead to driver frustration if another car takes the spot before the driver can reach it.Thus, innovative parking systems for meeting near-term parking demand are needed. With wireless communications, computer, control, and electronics technologies, intelligent service-oriented parking management can improve parking space utilization and improve driver experience

while decreasing drivers' frustration. Our motivation is to fill the near-term parking demand using the wireless technology. The contributions of our system include: 1) increasing space utilization, 2) improving drivers' experience, and 3) providing intelligent management. From the point of users' view, SmartParking system which is a secure and intelligent parking service. Parking information, order information, and vehicle information are collected and transported by sensor detection and the wireless network. The proposed infrastructure prevents most security/privacy attacks. The parking navigation is convenient and efficient. Drivers can view and reserve a parking spot on the fly. The parking process can be a straightforward and non-stop process. From the point of management's view, SmartParkingis an intelligent parking system. The parking process can be modeled as birth-death stochastic process and the prediction of revenues can be made. Based on the prediction, new business promotions can be made. For example, promotion prices (onsale prices) and new parking plans can be advertised and broadcasted to all the passing vehicles without extra costs. In SmartParking, new promotions can be published through wireless network. We address hardware/software architecture, implementations, and analytical models and results.

The rest of the paper is organized as follows. The related work in literature is presented in Section II. Then, the architecture and operations of the secure and intelligent parking service are described in Section III. In Section IV and V, the management and the maintenance of the parking system are introduced. Simulations are performed in Section VI to show the advantages of the system. Finally, we will conclude the paper in Section VII.

2. RELATEDWORK

Caliskan et al. proposes a parking system in which parking automats are the producers of resource reports. The infrastructure uses IEEE 802.11 to broadcast these reports as raw text packets. The report packet size is 92 bytes. The assumption is that parking automats are able to sense their occupation status at any moment. Each vehicle starts with an empty cache, i.e. it has not obtained any resource report. During its trip, it receives resource reports from parking automats or other vehicles. Received reports are integrated into a vehicle's cache. These reports are aggregated and disseminated among vehicles. The decision strategy of which parking lot is used is based on two influencing parameters: the age of a resource and the distance to a resource. This system is not

concerned with security or privacy issues, which are important. The basic infrastructure of a parking system relies on devices to detect if parking spaces are occupied. Several approaches are employed to detect reliable information. First wired sensors are widely used 1) inductive loops, 2) pneumatic road tubes, 3) magnetic sensors, 4) piezoelectric sensors, 5) weigh-in-motion systems. Wolff et al. use the Earth's magnetic field to detect parking spaces. These devices or sensors are physically wired to the control computers. One shortcoming of the wired sensor systems is that long and complicated wiring is required from parking lots to the central control unit. Also, the cost for developing this system is high because a large amount of sensor units are required. Therefore some wireless sensors can be applied to the parking space detection. Tang et al. developed such a system using Crossbow Mote products and the extended Crossbow XMesh network architecture. Stiller et al. proposed Cognitive Automobiles which have intelligence to handle some events in real scenarios. Benson et al. propose RF transceiver and antenna with an ATMega 128L micro-controller system. Third, image processing is applied to detect the vehicles Funck et al. uses images to detect the parking space. These methods, however, may incorrectly detect parking vehicles. One example is that a vehicle temporally uses one slot to park in another slot, or that a vehicle just happens to be in the intersection of these sensors. Panayappan et al. propose a parking system in VANET to locate the available parking lots and spots. This system uses roadside units to relay parking messages and GPS to locate vehicle position. Roadside units maintain the security certificates and parking information. The security issue addressed in this paper is to ensure fare-play among drivers by encryption and frequently sensing the available spots. The greedy drivers are prevented from gaining more advantage from the system by lying. But there are some security problems. For example, a roadside attacker pretending to be a vehicle can reserve as many slots as he wishes. In our system, all the communications are triggered by physical pressure on a sensor-based detector/belt and are enabled by short range signals. There is no way to launch a roadside attack.

Admin:

- **Login:** The system is under supervision of admin who manages the bookings made.
- **Add Slots:** Admin add Parking slots with all its information.
- **View Feedback:** The admin can view all the feedbacks sent by the users.

- **View Users:** The admin can see all the users registered into the system.
- **View Booking:** The system will give all the booking information against start and end dates as inputs.

User:

- **User login/registration:** Users have to first register themselves to login into the system.
- **Book Parking:** The user can select any one from a large parking slots either by seeing them on map selecting them based on the pincode. The Bookings are made on basis of start and endtime and can book the only if his wallet has enough balance.
- **Parking availability check:** User can click on spaces to view the availability. If the space is already booked it will be marked red and the available ones will be seen in white color.
- **Automatic cost calculation:** The system calculates the total cost incurred for parking based on the time that user has asked for booking.
- **Parking cancellation:** User may even cancel their bookings by login into the system anytime.
- **Profile:** The system will show all the user details, wallet balance and valid bookings.
- **Feedback:** The system has a feedback form, where user can provide feedback into the system.
- **Add Balance:**The user can recharge the wallet using his/her card details.
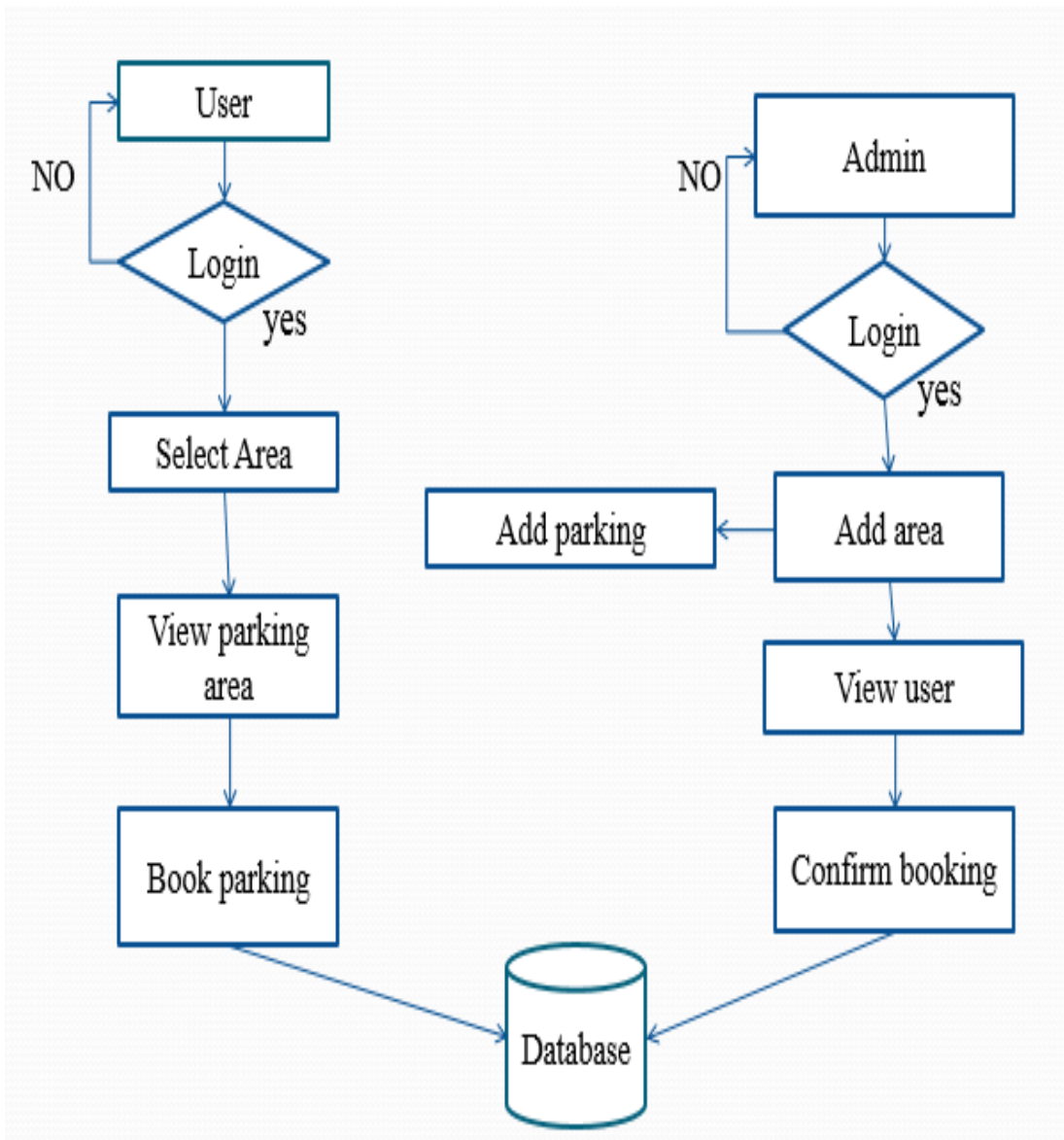
User side functionality:

- Book parking space
- Cancellation
- Feedback
- Recharge Account

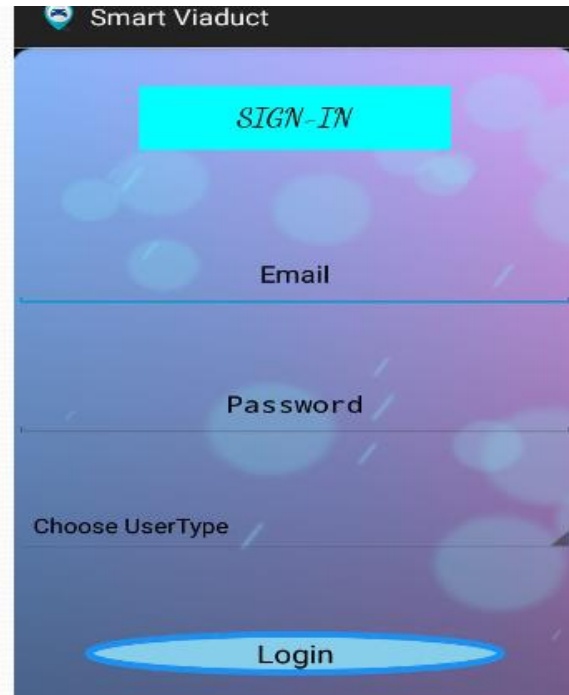## Admin side functionality:

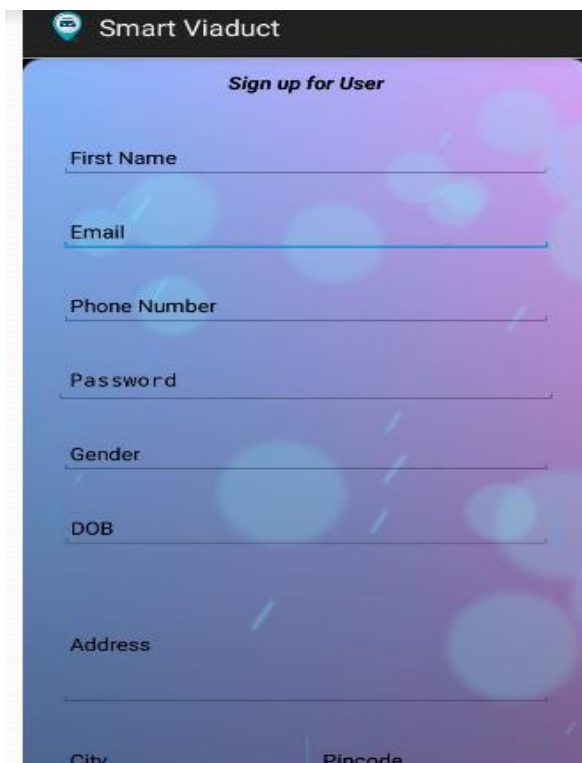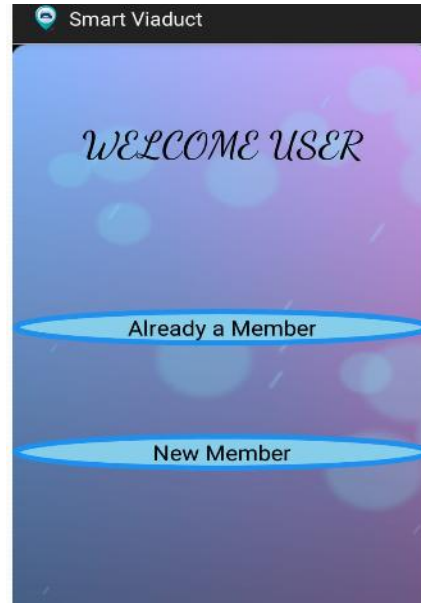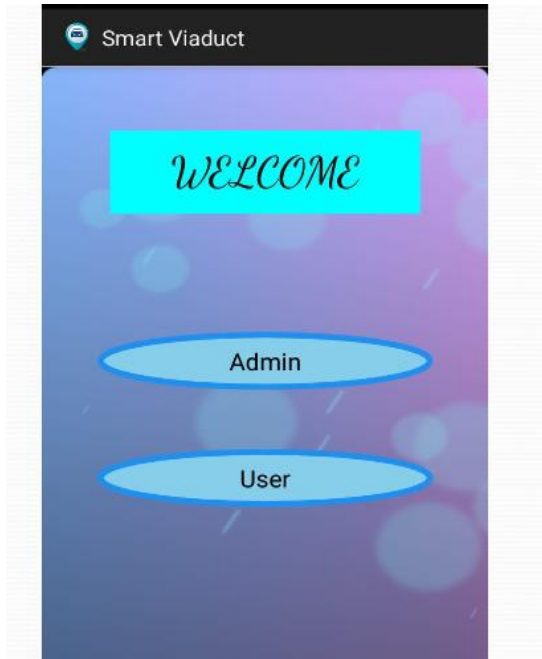- Administers parking booked
- Add new parking Slots

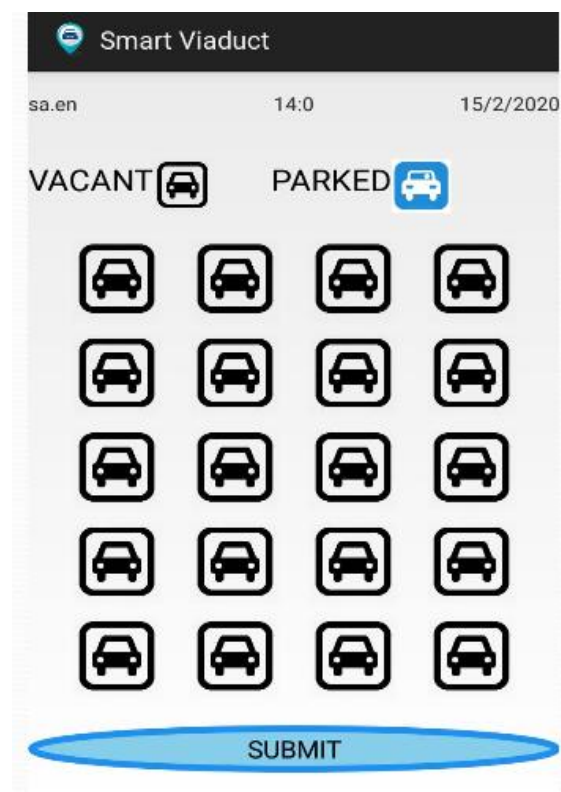- View User Data
- Feedback view and reply

3. ARCHITECTURE DIAGRAM

4. RESULT AND DISCUSSION

5. CONCLUSION

This paper has proposed a smart parking system. By using the secured wireless network and sensor communication, SmartParking is a intelligent parking service application as well as a novel security/privacy aware infrastructure. First, vehicles on the road can view and reserve a parking spot. The parking process can be an efficient and non-stop service.

On the other hand, parking service is an intelligent service. New vacant parking spot and advertisement of discount of parking fees can be distributed to the cars passing by. Second, the parking process has been modeled as a stochastic process. Not only maintenance work can be scheduled but also the revenue of the parking site can be predict. New business promotions can be broadcasted to all vehicles passing by the parking site through wireless networks. Finally, privacy of the drivers and security of the information are protected by using the sensor infrastructure and encryption/decryption approach. Simulation results prove the proposed system results in high

parking space utilization and fast parking spot finding time. The future work includes more extensive simulations on the proposal. The analysis of efficiency needs to be studied as well.

6. FUTURE ENHANCEMENT

The project can be implemented in commercial areas for employee parking.It can be utilized by companies and organizations (hospitals, schools, colleges) to automate their parking system.The system can also be used in public places for public parking like in Government Organization and so on.

7.REFERENCES

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