

AN ANONYMOUS SMART PARKING AND PAYMENT SCHEME IN VEHICULAR NETWORKS

Submitted in partial fulfillment of the requirements for
the award of
Bachelor of Engineering degree in Computer Science and Engineering

by

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF COMPUTING**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with Grade "A" by NAAC**

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MARCH 2022



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Tadi Ravi Kishore Reddy (38110586)** and **adi Sai Pradeep Reddy (38110587)** who carried out the project entitled —AN ANONYMOUS SMART PARKING AND PAYMENT SCHEME IN VEHICULAR NETWORKS under our supervision from November 2021 to March 2022.

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DECLARATION

We **Tadi Ravi Kishore Reddy (38110586)** and **adi Sai Pradeep Reddy (38110587)** hereby declare that the Project Report entitled “**AN ANONYMOUS SMART PARKING AND PAYMENT SCHEME IN VEHICULAR NETWORKS**” done by me under the guidance of **Dr. R. Sathyabama Krishna** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Computer Science and Engineering.

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ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to **Board of Management of SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. T.Sasikala M.E., Ph.D**, Dean, School of Computing, **Dr.S.Vigneshwari M.E., Ph.D. and Dr.L.Lakshmanan M.E., Ph.D.** , Heads of the Department of Computer Science and Engineering for providing me necessary support and details at the right time during the progressive reviews.

I would like to express my sincere and deep sense of gratitude to my Project Guide **Dr, R, Sathyabama Krishna M.E., Ph.D.**, for her valuable guidance, suggestions and constant encouragement paved way for the successful completion of my project work.

I wish to express my thanks to all Teaching and Non-teaching staff members of the **Department of Computer Science and Engineering** who were helpful in many ways for the completion of the project.

ABSTRACT

Cruising for a vacant and economical parking spot causes not only time-consuming and frustrating driving experiences, but fuel waste and air pollution. Public parking spots in crowded cities are scarce and expensive. On the contrary, private parking spots usually have low utilization rates, and the spot suppliers are willing to provide their extra parking resources due to a maintenance cost by charging parking fees. Given this situation, it is imperative to call for a smart parking system that collects and provides private parking spots (e.g., around home or workplace) to ease public parking concerns. However, when the suppliers (drivers) are providing (querying for) parking spots, their privacy (e.g., location, identity) is inevitable to be disclosed and existing parking schemes cannot achieve anonymous authentication and anonymous payments simultaneously. To tackle these problems, we propose an anonymous smartparking and payment (ASAP) scheme in vehicular networks. Specifically, we use short randomizable signature to provide anonymity and conditional privacy. We achieve quick result matching with hash map and anonymous payment with E-cash. Security analysis and experimental results show that ASAP can protect privacy in a conditional way and has low computational costs and communication overhead.

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CHAPTER 1

INTRODUCTION

Driving for a vacant parking area is not only time consuming but also frustrates driver and causes air pollution and wastes fuel. Government owned parking spots are expensive and scarce in crowded cities. In this paper we propose an anonymous smart parking and payment scheme in VANET environment where we propose to utilize private parking spots like apartment parking spots and hospitals and restaurants which are generally underutilized and also parking spot owners are willing to provide parking for cars for a pay to compensate the parking area maintenance. The recent increase in use of smart phones has provided the opportunity to collaboratively sense and share information.

1.1 PROJECT PURPOSE

We present a novel anonymous smart-parking and payment (ASAP) scheme in vehicular networks. With the private parking spots provided from suppliers and processed by server, cruising drivers can find extra parking spots besides public lot with less fuel and time, suppliers will improve the utility of their spots and make a profit, and public traffic congestion is further reduced. ASAP preserves the users' privacy by utilizing the short randomizable group signature.

Specifically, a supplier (driver) sends a supplying report (parking query) to the server anonymously. Meanwhile, a trusted authority can trace a targeted user if a dispute happens. ASAP achieve quick parking result retrieving through hashmap storing all parking spot information and achieve anonymous payment with E-cash from driver to supplier even though anonymous authentication is adopted to protect the users' privacy.

We run extensive experiments to evaluate the communication overhead and computational costs of ASAP, and formally prove the security and privacy of ASAP.

1.2 PRODUCT PERSPECTIVE

User Authentication A user should be authenticated before sending a supplying report/parking query, such that no adversary can impersonate a legal user.

User Privacy: Users' identities are protected from the server, other users and external adversaries. Users' locations are protected from the server, other users and external adversaries, except the matched user. Given two supplying reports/parking queries from one user, no one can link them to the same user.

Data Confidentiality and Integrity: The contents of supplying reports and protected from the server, other users and external adversaries. All accepted messages should be transmitted without being altered.

Traceability TA can trace the real identity of a misbehaved user in case a dispute happens.

Anonymous payment The driver's real identity is not disclosed when paying coupons to a supplier and the supplier's real identity is not disclosed when verifying the coupons with the help of the server and cashing coupons at the server. In addition, unlinkability must be protected, meaning any user's coupons cannot be linked together.

Quick result retrieval: After storing enough information about private parking spots from different suppliers and parking queries from drivers, the server should efficiently match parking queries with supplying reports.

1.3 ORGANIZATION OF THE THESIS

The report is divided into 5 chapters

Chapter 1 describe about the introduction and overview of the || Accident Detection and Development and Application of the Smart Helmet for Disaster and Safety – .

Chapter 2 describe the literature survey of the Project.

Chapter 3 describes the block diagram, Schematic diagram and flow chart of the developed tool. Describe about hardware and software that are used in developed system. Deals with the system implementation of the project.

Chapter 4 , the Results and Discussion.

Chapter 5 deals with the summary and conclusion of the project. It also includes the future scope of the project.

CHAPTER 2

LITERATURE SURVEY

[1] **Title:** “ParkNet||Drive-by Sensing of Road-Side Parking Statistics,2016.

Author: Suhas Mathur, Tong Jin, Nikhil Kasturirangan, Janani Chandrashekharan

Scanning for accessible parking spots is a significant issue for drivers in packed urban communities, causing traffic blockage, air contamination, and burning through drivers' time. Shrewd stopping frameworks empower drivers to request constant stopping data and book stopping openings. Driving for an empty stopping zone isn't just tedious yet in addition baffles driver and causes air contamination and squanders fuel. Government possessed parking spaces are costly and rare in jam-packed urban communities. Point of this undertaking is to propose a savvy stopping furnishing namelessness and contingent security with E-money installment plot in vehicular systems. Right now propose an unknown shrewd leaving and installment plot in VANET condition where we propose to use private parking spaces like condo parking spaces and clinics and cafés which are b y and large underutilized and furthermore parking space proprietors are happy to give leaving to autos for a compensation to remunerate the stopping zone upkeep. The ongoing increment being used of advanced mobile phones has given the chance to cooperatively detect and share data.

[2] **Title:** “Privacy-Preserving Fine-Grained Data Retrieval Schemes For Mobile Social Networks||,Advances in Automobile Engineering, Vol. 3.

Author: Mohamed Mahmoud , Khaled Rabieh, Ahmed Sherif, Enahoro Oriero

we propose privacy-preserving fine-grained data retrieval schemes for mobile social networks (MSNs). The schemes enable users to retrieve data from other users who are interested in some topics related to a subject of interest. We define a subject to be a broad term that can cover many fine-grained topics, e.g., History can be a subject and World War I can be a topic. We consider centralized and decentralized network models. Our centralized scheme allows users to securely outsource data to a server such that the server matches the users who are interested in same topic(s) and have defined social attributes with privacy preservation. Searchable encryption scheme anda

proposed cryptography construct are used to enable the server to match the topics and attributes without knowing any private information. By using the social attributes, users can prescribe the other users who can be connected to. We also propose a decentralized scheme that can be used when there is no connection to the server, i.e, shortage of Internet connectivity. The scheme leverages friends of-friends relationship and transferable trust concept, where each user trusts his friends and the friends of friends. If a friend is not interested in the requested subject, he/she can link him/her to his/her friends without knowing the requested subject to preserve privacy. Our schemes use Bloom filters to store the topics of interest to reduce the storage and communication overhead. This is important because the number of ine grained topics can be large. Different techniques to store the topics in the filter are proposed and investigated. Performance metrics are proposed and evaluated using real implementations. Our analysis and implementation results demonstrate that our schemes can preserve the privacy of the MSN users with high performance.

[3] Title: " A Reservation-based Smart Parking System", International Journal of Data Science, 2016.

Author: Hongwei Wang and Wenbo Hey

Finding a parking space in most metropolitan areas, especially during the rush hours, is difficult for drivers. The difficulty arises from not knowing where the available spaces may be at that time; even if known, many vehicles may pursue very limited parking spaces to cause serious traffic congestion. In this paper, we design and implement a prototype of Reservation-base Smart Parking System (RSPS) that allows drivers to effectively find and reserve the vacant parking spaces. By periodically learning the parking status from the sensor networks deployed in parking lots, the reservation service is affected by the change of physical parking status. The drivers are allowed to access this cyber-physical system with their personal communication devices. Furthermore, we study state-of-the-art parking policies in smart parking systems and compare their performance. The experiment results show that the proposed reservation-based parking policy has the potential to simplify the operations of parking systems, as

well as alleviate traffic congestion caused by parking searching. Index Terms—smart parking; modeling; simulation.

[4] Title: “A Secure and Privacy-Preserving Navigation Scheme Using Spatial Crowdsourcing in Fog-Based VANETS”, 2017.

Author: Lingling Wang, Guozhu Liu and Lijun Sun

Fog-based VANETs (Vehicular ad hoc networks) is a new paradigm of vehicular adhoc networks with the advantages of both vehicular cloud and fog computing. Real-time navigation schemes based on fog-based VANETs can promote the scheme performance efficiently. In this paper, we propose a secure and privacy-preserving navigation scheme by using vehicular spatial crowd sourcing based on fog-based VANETs. Fog nodes are used to generate and release the Crowd sourcing tasks, and cooperatively find the optimal route according to the real-time traffic information collected by vehicles in their coverage areas. Meanwhile, the vehicle performing the crowd sourcing task can get a reasonable reward. The querying vehicle can retrieve the navigation results from each fog node successively when entering its coverage area, and follow the optimal route to the next fog node until it reaches the desired destination. Our scheme fulfills the security and privacy requirements of authentication, confidentiality and conditional privacy preservation. Some cryptographic primitives, including the Elgamal encryption algorithm, AES, randomized anonymous credentials and group signatures, are adopted to achieve this goal. Finally, we analyze the security and the efficiency of the proposed scheme.

[5] Title: “WhoPay: A Scalable and Anonymous Payment System for Peer-to-Peer Environments”, 2018.

Author: Kai Wei Yih-Farn, Robin Chen, Alan J. Smith Binh Vo.

An electronic payment system ideally should provide security, anonymity, fairness, transferability and scalability. Existing payment schemes often lack either anonymity or scalability. In this paper we propose WhoPay, a peer-to-peer payment system that provides all the above properties. For anonymity, we represent coins with public keys; for scalability, we distribute coin transfer load across all peers, rather than rely on a central entity such as the broker. This basic version of WhoPay is as secure and scalable as existing peer-to-peer payment schemes, while providing a much higher level of user anonymity. We also introduce the idea of real-time double spending detection by making use of distributed hash tables (DHT). Simulation results show that the majority of the system load is handled by the peers under typical peer availability, indicating that WhoPay should scale well.

Intelligence is one of the most important aspects in the development of our future communities. Ranging from smart home, smart building, to smart city, all these smart infrastructures must be supported by intelligent power supply. Smart grid is proposed to solve all challenges of future electricity supply. In smart grid, in order to realize optimal scheduling, a Smart Meter (SM) is installed at each home to collect the near real-time electricity consumption data, which can be used by the utilities to offer better smart home services. However, the near real-time data may disclose user's privacy. An adversary may track the application usage patterns by analyzing the user's electricity consumption profile. In this paper, we propose a privacy-preserving and efficient data aggregation scheme. We divide users into different groups and each group has a private block chain to record its members' data. To preserve the inner privacy within a group, we use pseudonym to hide user's identity, and each user may create multiple pseudonyms and associate his/her data with different pseudonyms. In addition, the bloom filter is adopted for fast authentication. The analysis shows that the proposed scheme can meet the security requirements, and achieve a better performance than other popular methods.

CHAPTER 3

METHODOLOGY

3.1 HARDWARE REQUIREMENTS

- Hard Disk : 500GB and Above
- RAM : 4GB and Above
- Processor : I3and Above
- Android Mobile : 1

3.2 SOFTWARE REQUIREMENTS

- Windows 7 and above
- JDK 1.8
- Tomcat 7
- MySQL 5

3.3 THE JAVA PLATFORM

A platform is the hardware or software environment in which a program runs. The Java platform differs from most other platforms in that it's a software-only platform that runs on top of other, hardware-based platforms. Most other platforms are described as a combination of hardware and operating system.

The Java platform has two components :

- The Java Virtual Machine (JVM)
- The Java Application Programming Interface (Java API)

You' ve already been introduced to the JVM. It's the base for the Java platform and is ported onto various hardware-based platforms.

The Java API is a large collection of ready-made software components that provide many useful capabilities, such as graphical user interface (GUI) widgets. The Java API is grouped into libraries (**packages**) of related components. The following figure depicts a Java program, such as an application or applet, that's running on the Java platform. As the figure shows, the Java API and Virtual Machine insulates the Java program from hardware dependencies.

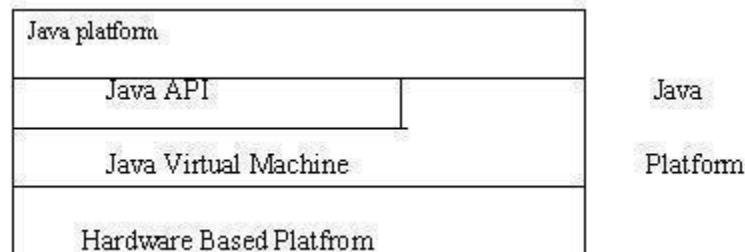


Fig. 3.1: Java Platform

As a platform-independent environment, Java can be a bit slower than native code. However, smart compilers, weel-tuned interpreters, and just-in-time byte compilers can bring Java's performance close to that of native code without threatening portability.

3.4 APACHE TOMCAT SERVER

Apache Tomcat (formerly under the Apache Jakarta Project; Tomcat is now a top level project) is a web container developed at the Apache Software Foundation. Tomcat implements the servlet and the JavaServer Pages (JSP) specifications from Sun Microsystems, providing an environment for Java code to run in cooperation with a web server. It adds tools for configuration and management but can also be configured by editing configuration files that are normally XML-formatted. Because Tomcat includes its own HTTP server internally, it is also considered a standalone web server.

Environment

Tomcat is a web server that supports servlets and JSPs. Tomcat comes with the Jasper compiler that compiles JSPs into servlets.

The Tomcat servlet engine is often used in combination with an Apache web server or other web servers. Tomcat can also function as an independent web server. Earlier in its development, the perception existed that standalone Tomcat was only suitable for development environments and other environments with minimal requirements for speed and transaction handling. However, that perception no longer exists; Tomcat is increasingly used as a standalone web server in high-traffic, high-availability environments.

Since its developers wrote Tomcat in Java, it runs on any operating system that has a JVM.

Product features

Tomcat 3.x (initial release)

- implements the Servlet 2.2 and JSP 1.1 specifications
- servlet reloading
- basic HTTP functionality Tomcat 4.x
- implements the Servlet 2.3 and JSP 1.2 specifications
- servlet container redesigned as Catalina
- JSP engine redesigned as Jasper
- Coyote connector
- Java Management Extensions (JMX), JSP and Struts-based administration
- Tomcat 5.x
- implements the Servlet 2.4 and JSP 2.0 specifications
- reduced garbage collection, improved performance and scalability
- native Windows and Unix wrappers for platform integration
- faster JSP parsing

3.5 AIM

The main aim of this project is to propose a smart parking providing anonymity and conditional privacy with E-cash payment scheme in vehicular networks. The recent increase in the development and use of smart phones has provided the opportunity to collaboratively sense and share information for the common good. Individuals with sensing, storing and computing devices are now able to collect and contribute valuable data (usually in a form of a report) to a server for different applications, such as finding parking spots. Therefore, we can utilize the people to help improve smart-parking with timely and accurate parking information.

In this paper, we proposed ASAP to enable the cruising driver to find a parking spot and supplier to make a profit from providing private parking resources. The parking spots are better utilized and traffic congestion is further reduced. A supplier and driver can anonymously send a supplying report and a parking query to the server. Meanwhile, a trusted authority is able to disclose a user's identity if a dispute occurs and users achieve anonymous payment with E-cash. Our scheme also supports finding public parking spot which only needs to add a counting item in the hashmap.

3.6 SYSTEM DESIGN

3.6.1 *System Implementation*

We design an Anonymous Smart parking and Payment (ASAP) scheme in vehicular networks to provide private parking spots for cruising drivers. ASAP consists of six phases: system initialization, driver querying, supplier reporting, result retrieving, identity disclosing, and anonymous payment. Specifically, we use short randomizable signature to anonymously offer and query the private parking information to a server. Second, we construct a hashmap storing all the parking spot information in the cloud for quick matching and return the parking results sorted by the price. Last, we establish a connection between driver and supplier while utilizing E-cash to solve the anonymous payment problem from driver to supplier.

3.6.2 Architecture Diagram

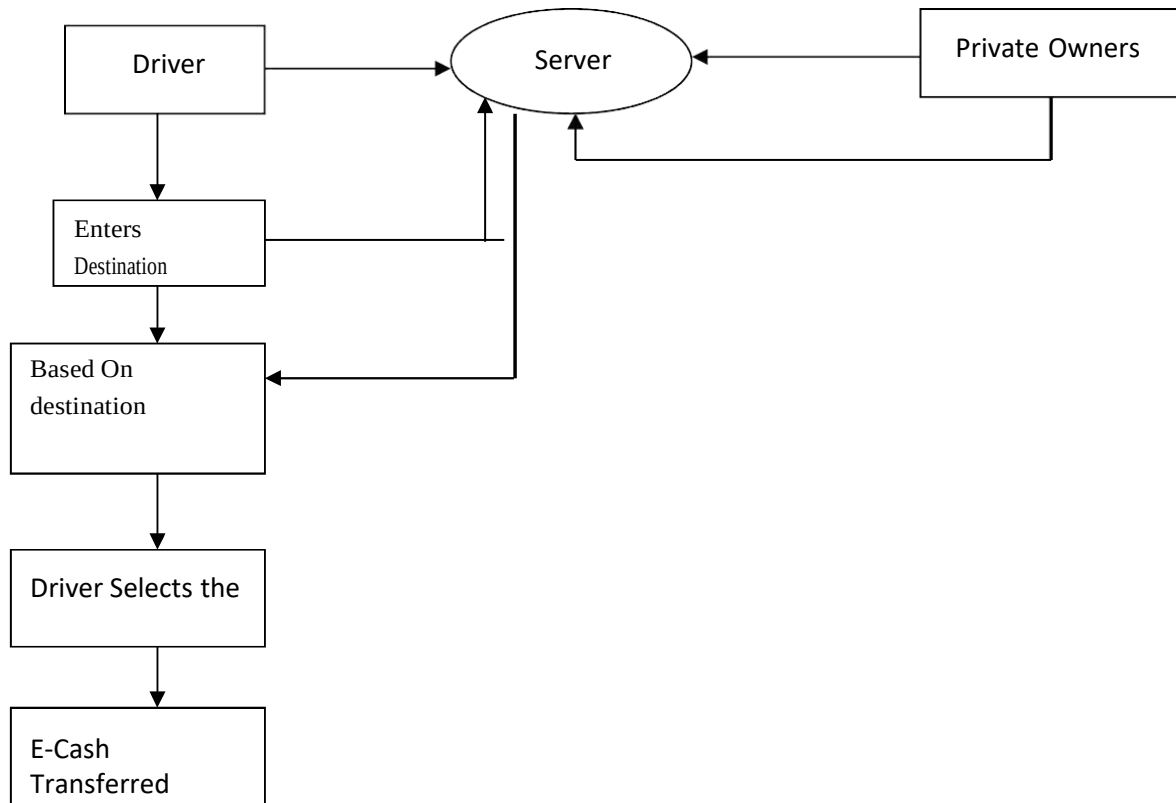


Fig. 3.2: Architecture Diagram

3.6.3 Existing System

Using public infrastructure alone cannot solve parking problems in big metropolitan cities where there will be large number of vehicles searching for parking spots. It creates unnecessary traffic and air pollution. For example cars cruising for parking spots travelled 945,000 extra miles, burned 47,000 gallons of gasoline and produced 728 tons of carbon dioxide in Los Angeles district for a year. Comparing developed countries the situation is even getting worst in developing countries where number of vehicles is increasing day by day.

Problem Definition

- Only using public infrastructure we cannot solve parking spot problems.
- Privacy problem while sharing data.

3.6.4 Proposed System

We propose a new anonymous smart-parking and payment (ASAP) scheme in vehicular networks where private owners are willing to offer their parking spots to cruising vehicles in return for a pay to compensate the maintenance cost of their parking lot and also to make profit and traffic congestion is reduced. Our proposed system protects the user privacy by utilizing the short randomizable group signature. In our system the driver will send the parking request anonymously to the server. If a dispute happened between driver and parking spot owner our trusted authority will trace the targeted user. We establish connection between driver and parking lot owner while utilizing E-Cash to solve the anonymous payment problem from driver to parking lot owner.

3.7 MODULES

- **User Registration And Private Parking Announcement**
- **Driver Request for Parking Spot**

- **Private Parking Spot**
- **Acknowledgement**

3.7.1 User Registration And Private Parking Announcement

In this module both user and private parking slot owners will register to server. During the system initialization phase both the drivers and private parking spot owners will register their details with server. Server will also act as trusted authority. To avoid illegal suppliers or drivers from submitting invalid messages to the server, registration is necessary for all entities which will be authenticated in each report and query to make sure that they are the registers. Suppliers that is private owners will announce their parking space availability to the server. Private owners will fix the price to their parking slot.

3.7.2 Driver Request For Parking Slot

Right now client and private stopping space proprietors will enlist to server. During the framework introduction stage both the drivers and private parking space proprietors will enlist their subtleties with server. Server will likewise go about as confided in power. To evade illicit providers or drivers from submitting invalid messages to the server, enlistment is essential for all elements which will be confirmed in each report and question to ensure that they are the registers. Providers that is private proprietors will declare their parking spot accessibility to the server. Private proprietors will fix the cost to their stopping opening. The basic economic concepts of supply and demand should be more utilized when solving complex traffic congestion and parking problems . The basic idea behind the concept of congestion pricing is to force drivers to travel and use transportation facilities more during off-peak hours and less during peak hours. The idea of congestion pricing is primarily connected with the road or airport operators. In the context of parking problems, this means (a) that different parking tariffs should exist for different users; (b) that the parking fees should increase and/or decrease few times during a day.

3.7.3 Private Parking Spot

Two sorts of parking spaces are accessible to client private parking spaces and open parking spaces. At the point when driver picks private parking spaces it sidetracks to a page where driver needs to look through dependent on the goal he will enter. After driver enters goal and time dependent on the outcomes will be shown in the guide. Parking lots tend to be sources of water pollution because of their extension. Most existing lots have limited or no facilities to control runoff. Many areas today also require minimum landscape in parking lots to provide shade and help mitigate the extent of which their paved surfaces contribute to heat islands. Many municipalities require a minimum number of parking spaces, depending on the floor area in a store or the number of bedrooms in an apartment complex. In the United States, each state's department sets the proper ratio for disabled spaces for private business and public parking lots. Various forms of technology are used to charge motorists for the use of a parking lot. Modern parking lots use a variety of technologies to help motorists find unoccupied parking spaces, retrieve their vehicles, and improve their experience.

3.7.4 Acknowledgement

Once the driver selects the parking spot he wishes to park his vehicle and connection will be established between the owner of the parking slot and driver for payment access. Payment process takes place between driver and parking slot owner based on the number of hours the driver uses the parking slot.

SEQUENCE DIAGRAM

A Sequence diagram is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of Message Sequence diagrams are sometimes called event diagrams, event sceneries and timing diagram.

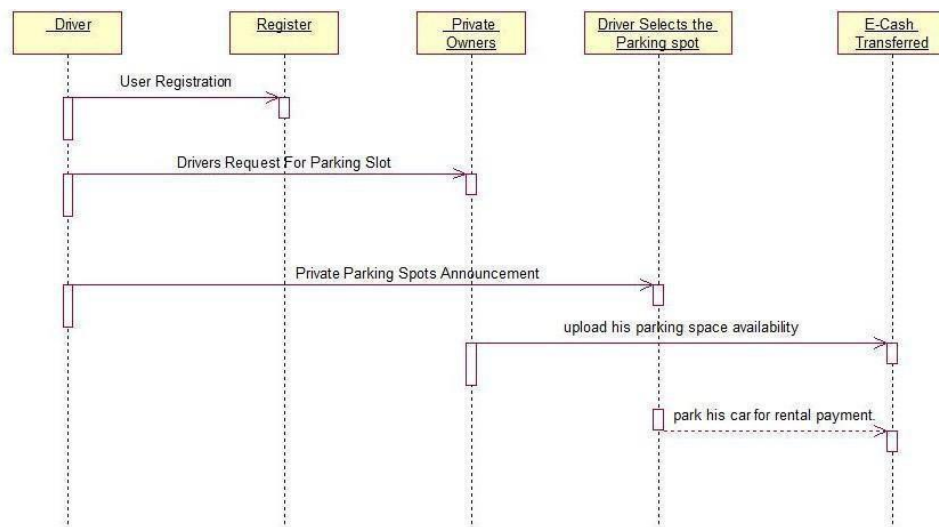


Fig. 3.3: Sequence Diagram

USECASE DIAGRAM

A Use case Diagram is used to present a graphical overview of the functionality provided by a system in terms of actors, their goals and any dependencies between those use cases.

Use case diagram consists of two parts

Use case A use case describes a sequence of actions that provided something of measurable value to an actor and is drawn as a horizontal ellipse.

Actor An actor is a person, organization or external system that plays a role in one or more interaction with the system.

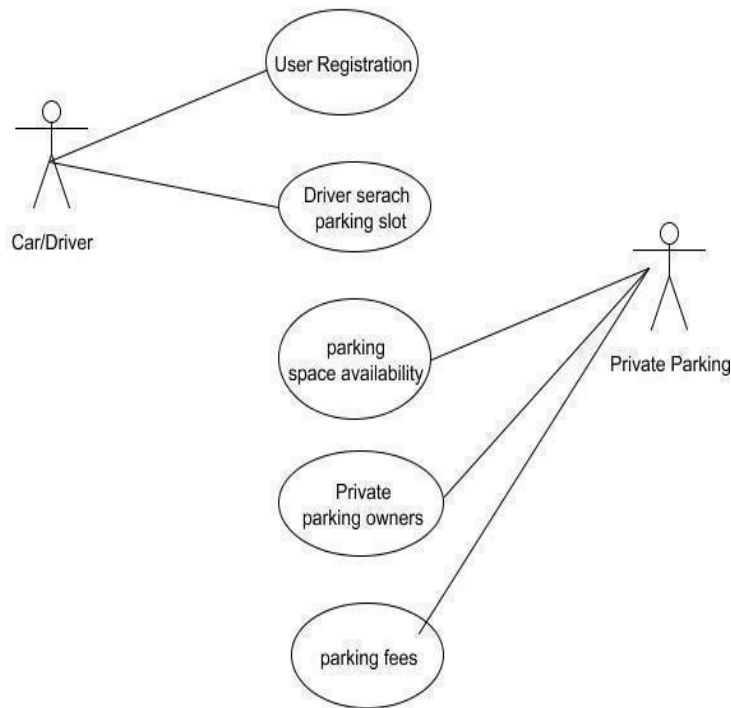


Fig.3.4: Usecase Diagram

ACTIVITY DIAGRAM

Activity diagram is a graphical representation of workflows of stepwise activities and actions with support for choice, iteration and concurrency. An activity diagram shows the overall flow of control.

The most important shape types

- Rounded rectangles represent activities.
- Diamonds represent decisions.
- Bars represent the start or end of concurrent activities.
- A black circle represents the start of the workflow.

- An encircled circle represents the end of the workflow.

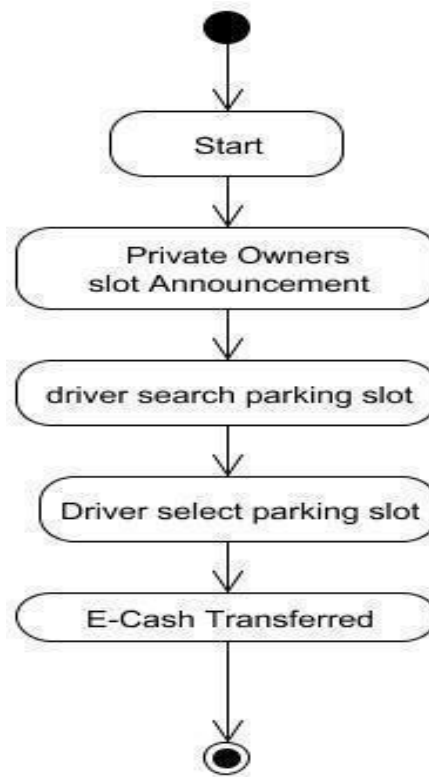


Fig.3.5: Activity Diagram

COLLABORATION DIAGRAM

UML Collaboration Diagrams illustrate the relationship and interaction between software objects. They require use cases, system operation contracts and domain model to already exist. The collaboration diagram illustrates messages being sent between classes and objects.

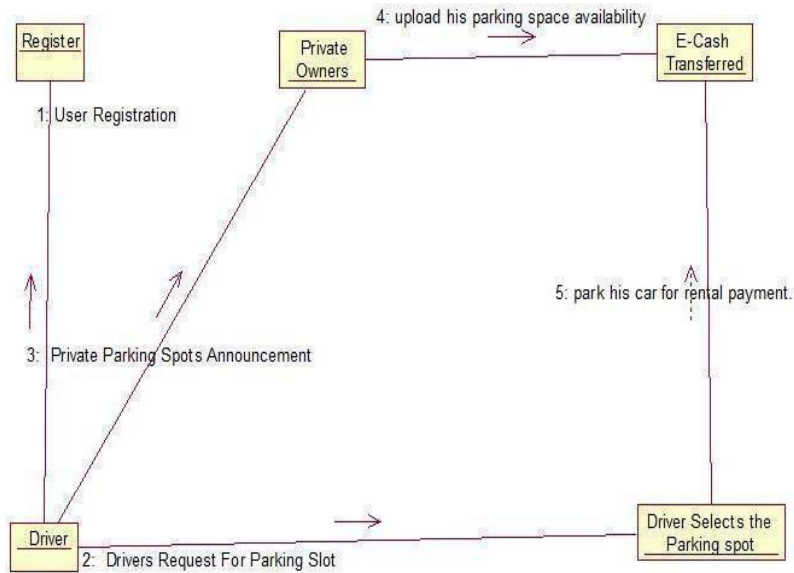


Fig. 3.6: Collaboration Diagram

DATA FLOW DIAGRAM

A Data Flow Diagram (DFD) is a graphical representation of the "flow" of data through an information system, modeling its aspects. It is a preliminary step used to create an overview of the system which can later be elaborated DFDs can also be used for visualization of data processing.

Level 0 DFD

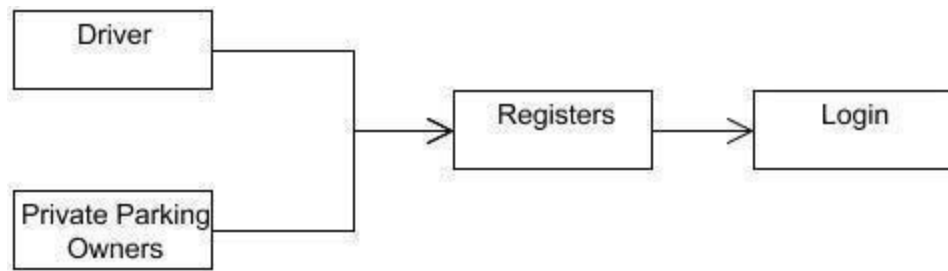


Fig. 3.7: Level 0 Data Flow Diagram

Level 1 DFD

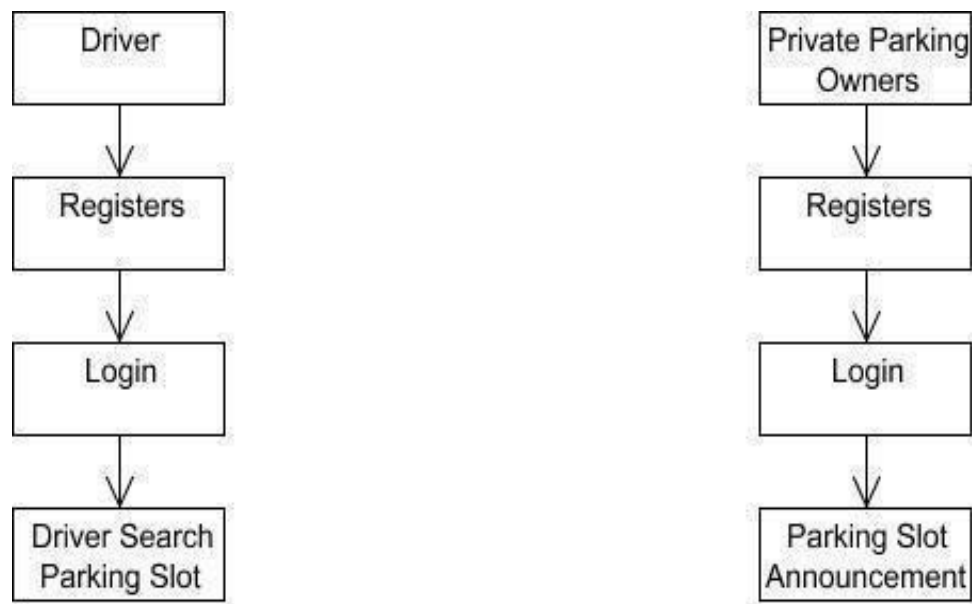


Fig. 3.8: Level 1 Data Flow Diagram

Level 2 DFD

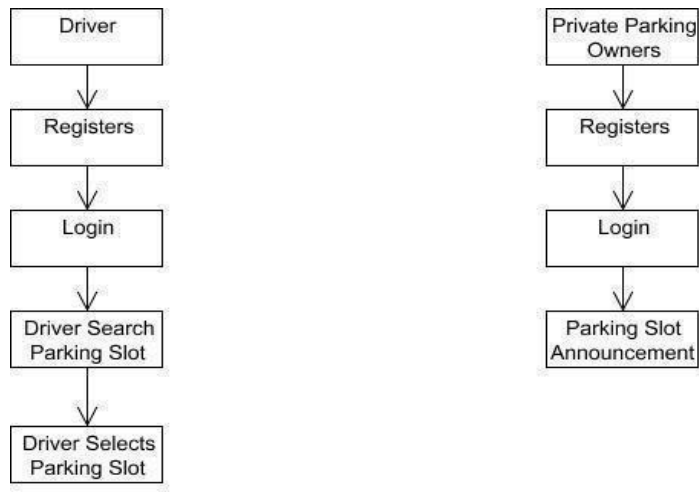


Fig. 3.9: Level 2 Data Flow Diagram

Level 3 DFD

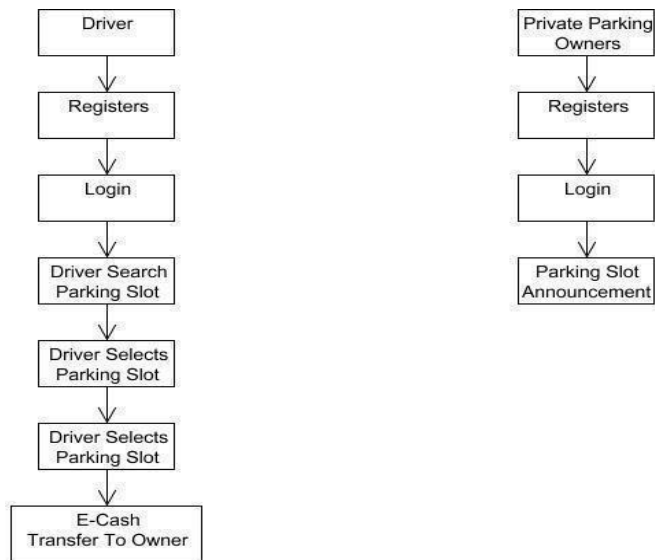


Fig. 3.10: Level 3 Data Flow Diagram

CLASS DIAGRAM

A Class diagram in the Unified Modelling Language is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects.

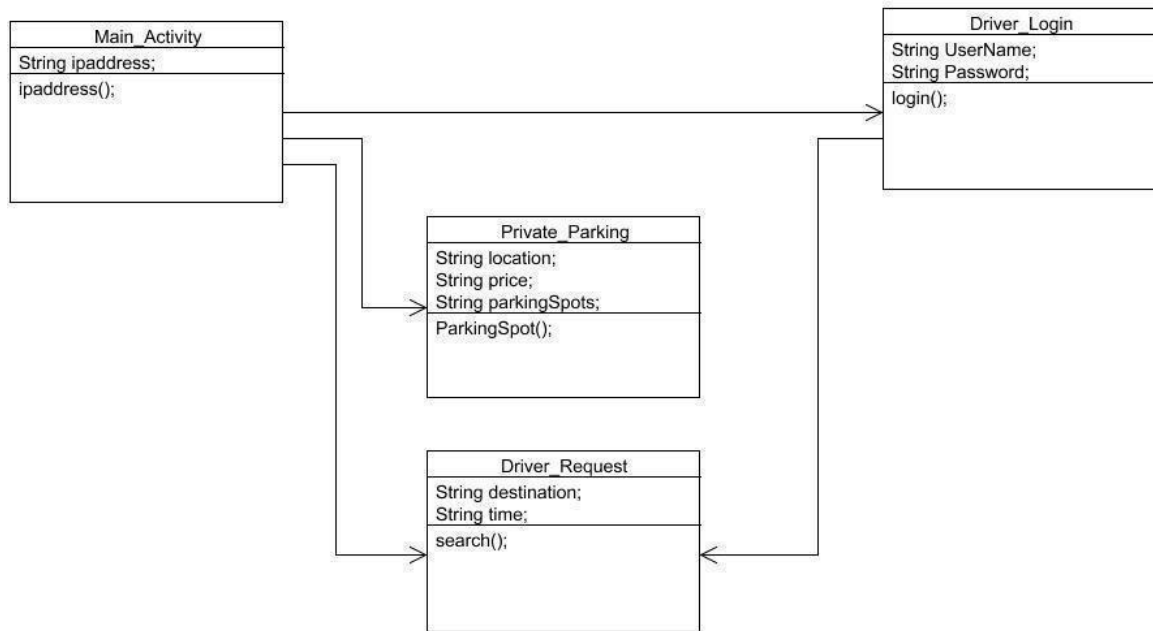


Fig. 3.11: Class Diagram

CHAPTER 4

RESULTS AND DISCUSSION

4.1 SUPPLIER MOTIVATION

In a typical data collecting and sharing platform, the workers or reporters have incentives to participate because they will get rewards from the system manager for valid contributions. In ASAP, suppliers earn parking fees which is the incentive by providing private parking spots.

Therefore, in order to recruit more suppliers, the system can provide extra benefits (e. g., gas coupons) to suppliers and the drivers can behave according to the negotiation result such that the system will enter a healthy circulation and assist society in trust establishment. In addition, if more than one spots are available for one driver, the suppliers can compete to be selected by the driver according to a bidding system

4.2 COMBINING TECHNIQUES

It is difficult to combine the techniques in ASAP. Imagine that when the system attempts to achieve payment process between suppliers and drivers, an intuitive method is that drivers pay by e-cash. A digital signature can be added to protect the integrity of the e-cash. However, when a driver buys an e-cash with his credit card or debit card, his real identity is exposed at the same time. The privacy cannot be preserved because the system can record the card number and the e-cash ID in its database. Another alternative method is to use anonymous payment technology. However, if we use anonymous payment such as Bit coin and TOR, there will be disadvantages: for the Bit coin approach, the suppliers and drivers have to register a Bit coin account in the first place; the driver must wait for at least 1 hour (6 blocks) to be found in order to gain high confidence that the transaction with a driver is actually acknowledged in the network. Therefore, it is not practicable for the supplier to actually receive the payment. For the TOR approach, it will raise more communication overhead since layers of encryption and decryption are required in transmission.

4.3 SECURING PARKING SPOTS

One supplier's renting out neighbor's parking spots be prevented by using a remote control ground parking lock. Only after the supplier agrees to lend her parking spot to a driver, she will unlock the parking lock for the driver, or tells the driver how to unlock it. Furthermore, this behavior will incur legal sanction because private parking spots are personal property as well.

A screenshot of a mobile application's registration screen. The title 'REGISTRATION' is at the top in blue. Below it are five input fields: a name field with 'kumar', a password field with seven dots, a phone number field with '9494366180', an email field with 'kumar@gmail.com', and a license plate field with 'TN22DL'. A purple 'SIGN_UP' button is at the bottom.

REGISTRATION

kumar

.....

9494366180

kumar@gmail.com

TN22DL

SIGN_UP

Fig. 4.1: Driver Registration

The Driver Registers through the android application and can logon to the Driver Portal Where Location and Availability Status of Parking Slots resides.

Other considerations

If a driver does not pay the parking fee, the supplier can file a complaint to the TA, if the driver cannot provide the payment proof received from the supplier, the TA deems the driver as a violator, recovers his real identity, and inserts the driver into a blacklist. The parking duration time can be calculated by a camera at the private area

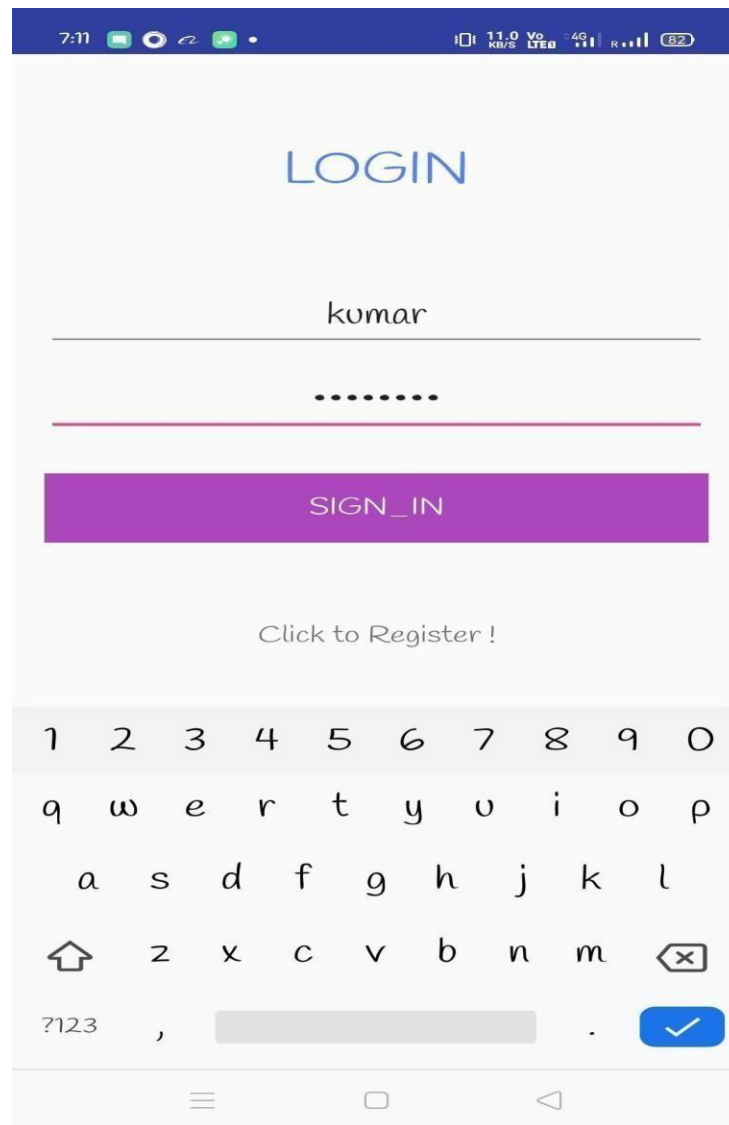


Fig. 4.2: Driver Login

There are two types of cameras: ones installed by the government and ones installed by residents. For the first type, we trust the administrative personnel which has professional ethics and their regular monitoring through cameras is not considered as a privacy violation to the residents (ASAP users) whether the cameras are obfuscated. Even if someone misuses the camera and violates users' privacy, he/she will be punished by the law. Meanwhile, some cameras only aim at detecting certain users, such as the roadside cameras only take pictures of over speeding vehicles. For the second type, the cameras which are obfuscated can be used in ASAP, since the face and plate number will not be clearly recorded; we do not consider the physical attack from cameras which are not obfuscated because anyone with a smart phone .Apart from the challenges faced while meeting real-time localization of vacant parking spots, the gathering and processing of reliable sensor data poses its own set difficulties. We discuss the details of the most challenging issues we encountered below.

4.4 POWER SOURCE

One unexpected difficulty turned out to be noisy sensor data affected by the power source for the in-car nodes. Initially, we used a power inverter to convert the 12 volt DC vehicle power supply to AC power suitable for a standard PC power supply. Although this setup supplied adequate power, it lead to very noisy sensor data. The ultrasound transducer may have been affected by the modified sine wave output of the inverter, which is known to affect sensitive electronic equipment. To address this issue, we installed DC to DC power supplies in each car node and connected them directly to the fuse box. This solution worked in some vehicles, but in vehicles with weaker battery, turn on the vehicle node was readable.

Multi-lane roads

Detecting parked cars on a multi-lane road requires lane-detection so that vehicles being passed or passing the sensing car in a different lane are not classified as parked cars. GPS accuracy is unlikely to be sufficient for lane detection. The data collected and reported upon in the paper was taken entirely on single-lane roads. We found, however,

through preliminary trials that it is often possible to distinguish moving vehicles in the neighboring lane from parked vehicles by the length of sensor dips. A car moving at similar speeds as the sensing vehicle, for example, will generate a very long dip. Another promising approach is to use a sensor with a much larger range – this can greatly help lane detection.

Speed Limitations

A limitation of using an ultrasonic sensor is that we are limited by the speed of sound. Our sensor provides a maximum range of 6.45 meters, and since Fit must wait for a return echo before sending out the next pulse, the sensor provide only 20 distance readings per second. This implies that if the sensing vehicle is driving too fast, it will not be able to sense a parked vehicle. For example, at a speed of 15 meters per second (roughly 33 miles per hour), a 5 meter long parked car should produce about ~ 6 distance readings from the sensor. However, the speed limit in areas with street parking is usually in the range of 35- 40 miles per hour and so our choice of sensor should not be a limiting problem.

4.5 OBTAINING PARKING SPOT MAPS

One issue that may seem to limit large deployments is the effort to obtain parking spot maps, particularly when complicated time-dependent parking rules are in place. Beyond manual construction from satellite imagery, as in our project, maps may be available to some extent at city authorities. We believe, however, that maps can also be automatically generated through aggregation of sensor data over time periods of weeks to months. The intuition behind this idea is simple: spaces that almost never have cars parked are likely to be invalid parking spaces (driveways, storefronts, illegal parking spots such as fire-hydrants, etc., or simply portions where parking is not allowed), while spaces that always have a car parked are very likely not parked cars, but some other immovable object.

During the peak hours, most parking lots are almost fully occupied in central area. Consequently, guidance strategies users have to select the parking lots in surrounding

area, which are near to their start points. Therefore, it results in the reduction of average driving distance during the peak hours.



Fig. 4.3: Parking Slot Location

An off-line TA bootstraps the system as follows. It selects a large prime number q and creates a finite field Z^*_q of order q . G_1 is an additive group with generator P and order q and G_2 is a cyclic multiplicative group with the same order q . $e^{\wedge}$ is a bilinear pairing function that maps elements in G_1 to elements in G_2 , where for any P_1 and $P_2 \in G_1$, $e^{\wedge}(P_1, P_2) \rightarrow G_2$ [4]. Let $H_1()$ and $H_2()$ be two one-way hashfunctions,

where $H1: \{0, 1\}^*$

$\rightarrow Z^*q$ and $H2: \{0, 1\}^*$

$\rightarrow G1$. skt and PKt are the private and public keys of the TA, respectively,

where skt is a random element $\in Z^*$

q and $PKt = 1/skt \cdot P$.

Similarly, ski and PKi are the private and public keys of user i , respectively, where ski is a random element $\in Z^*$ and $PKi = 1/ski \cdot P$.

The TA computes a certificate for each user to bind its public key to its identity. A typical certificate should have the user's identity, public key, expiration date, and the TA's signature. Using the certificates, each user can

prove that he/she is a legitimate member in the system.

The TA should issue, renew and also revoke the certificates if necessary. For every user to join the social network, he should contact the TA to receive the necessary credentials. As previously explained in the centralized scheme, each user has a group of subjects of interest. The TA distributes a secret $w_i \in Z^*q$ for each user who is interested in subject i . For each user to join the network, he/she has to contact a trusted authority and prove his/her attributes to be able to obtain the corresponding secrets. Without such secrets,

attackers cannot obtain any information about the other users who have the attributes he does not have. Finally, the TA publishes $\{Z^*q, G1, G2, q, P, PKt, H1(\cdot), H2(\cdot), e^{\wedge}\}$ and keeps skt

CHAPTER 5

SUMMARY AND CONCLUSION

5.1 SUMMARY

Currently most research work on smart parkings from the perspective of system design, which focus on implementing a wireless sensor network to detect parking information and provide real-time parking service. In addition, we introduce the pricing-related topics in networks, which provide us a powerful tool to manage parking lots. In [9], the authors present a smart parking management system based on wireless sensor network technology, which provides remote parking monitoring, automated guidance and parking reservation service. They demonstrate this system architecture can help commuters to find vacant parking spaces.

Rongxing Lu *et al* introduce a new Smart parking (SPARK) scheme, which is based on Vehicle Ad Hoc Networks (VANET), provides drivers with accurate and convenient parking services in large parking lots, including real time parking navigation, intelligent anti theft protection, and friendly parking information dissemination. In authors proposed a scalable information dissemination algorithm for discovery of free parking spaces via VANET. Furthermore, appropriate parking control to motivate drivers

to balance their parking demands is another goal for smart parking system. Pricing policy, as an important economic tool, is effective to allocate resource in network. In, Kelly *et al* show that, when selfish users seek to maximize their benefits,

the system can provide incentives to reach the optimization of global network. In, authors proposed a reasonably complete DiffServ pricing model integrated a pricing structure for different service class and the demand behavior of users. They show that, when different service classes operate at different target utilization, they provide different levels of service, and users see a stable service price and maintain stable. Moreover, Feldman *et al* in formulate the fixed budget resource allocation game and study the existence and performance of a distributed market-based resource allocation system.

5.2 CONCLUSION

We propose a privacy-preserving and efficient data aggregation scheme based on the block chain to preserve user's privacy in smart grid. In each time slot, we select the mining node based on the difference between the user's electricity consumption data and the average value to guarantee the fairness of the selection. Then, the mining node records all users' data into the block chain and publishes the block chain within the group to ensure the message integrity. To defend against the snoop from other users in the same group, we adopt pseudonyms to protect user's identity and each user associate his data with multiple pseudonyms for further obfuscation.

What's more, bloom filter is adopted to realize the fast authentication. The performance evaluation shows that our scheme has significant advantage compared with the conventional authentication scheme and other popular data aggregation schemes in computational efficiency. In the future work, we will continue improving our scheme to reduce the computational overhead caused by the authentication especially during the system initialization.

5.3 FUTURE WORK

Public garages have been using in/out counters at the entry and exit points to count the number of additional vehicles they can accommodate at any given time . This information is often displayed on prominent electronic signs-boards near such garages or on nearby roadways, allowing drivers to decide which way to go to find parking. Airports and rail stations have been using similar parking management systems in recent times . A somewhat newer approach to finding and reserving parking spaces in urban areas, albeit with very limited success, has been tested by web-based markets such as those in that allow users to buy and sell parking spaces on the internet for specified times. Such an internet marketplace allows for owners of private spots (such as residential spaces) and parking garages to offer reservations to users looking for

parking, and for people occupying public metered spaces to broadcast the time at which they will be vacating the parking spot. Needless to say, no reservation mechanism is possible for metered public spaces. Other web-based systems such as allows travellers to access information about the availability of spaces at airports or rail stations and make prior reservations. In the academic literature demonstrated a toy system that monitors individual parking spaces using web cameras, allows users to query the system for vacant spaces on a web front-end and provides the user with the closest vacant parking space that meets the constraints entered by the user.

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APPENDIX

A. SOURCE CODE

DriverIpAddress.java

```
package com.example.asapvehicularparking;

import urlcall.IpAddress;
import android.app.Activity;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;

public class DriverIpAddress extends Activity{

    private EditText ipaddress;
    Protected void
    onCreate(Bundle savedInstanceState){ super.onCreate
    e(savedInstanceState);
    setContentView(R.layout.driver_ip_address);

    submit=(Button)findViewById(R.id.submt);
    ipaddress=(EditText)findViewById(R.id.ipaddress);

    submit.setOnClickListener(new View.OnClickListener()

    { @Override
```

```

public void onClick(View arg0) {

    if(ipaddress.getText().toString().trim().equalsIgnoreCase(""))
    {
        Ipaddress.setError("Enter Ip");
        Ipaddress.requestFocus();

    }
    else{
        String ipport=ipaddress.getText().toString().trim();
        IpAddress.Ip_Address =ipport;
        Intent it=new Intent(DriverIpAddress.this,DriverLogin.class);
        startActivity(it);
    }
}
catch(Exception
e){ e.printStackTrace
e();
}
});

}

}

```

DriverLogin.java

```

package com.example.asapvehicularparking;

```

```

import java.util.HashMap;
import android.app.Activity;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;
import android.widget.Toast;
import urlcall.Connection;
import urlcall.Server_Connection;
import urlcall.Server_Interface;

```

```

public class DriverLogin extends Activity implements Server_Interface

```

```

{

```

```

    private EditText user,pass;
    private Button login;
    private TextView register;
    Server_Connection connection;
    String userName="",password="";

```

```

    Protectedvoid onCreate(Bundle savedInstanceState){

```

```

        setContentView(R.layout.driver_login);

```

```

        user=(EditText)findViewById(R.id.userid);

```

```

            pass=(EditText)findViewById(R.id.password);

```

```

        login=(Button)findViewById(R.id.login);

```

```

        register=(TextView)findViewById(R.id.register);

```

```
register.setOnClickListener(new View.OnClickListener() {
```

```
    @Override
```

```
    public void onClick(View arg0) {
```

```
        // TODO Auto-generated method stub
```

```
        Intent it=new Intent(DriverLogin.this,DriverRegistration.class);
```

```
        startActivity(it);
```

```
    }
```

```
});
```

```
login.setOnClickListener(new View.OnClickListener() {
```

```
    @Override
```

```
    public void onClick(View arg0){
```

```
        userName=user.getText().toString().trim();
```

```
        password=pass.getText().toString().trim();
```

```
        try{
```

```
        if(user.getText().toString().trim().equalsIgnoreCase(""))
```

```
        {
```

```
            Toast.makeText(getApplicationContext(),"User Name should not be  
empty",Toast.LENGTH).show();
```

```
        }
```

```

else
if(pass.getText().toString().trim().equalsIgnoreCase("")){
Toast.makeText(getApplicationContext(),
"Password should not be empty",Toast.LENGTH_LONG).show()}

connection =newServer_Connection(DriverLogin.this, DriverLogin.this);
HashMap<String,Object>param=new HashMap<String,Object>()
Param.put("name",userName);
param.put("password",pass);

connection.setMethod(Server_Connection.GET);

connection.execute(Connection.Driver_LOGIN);
}
}
catch(Exception
e){ e.printStackTrace
e();
}
}
});
}

```

ASAP: AN ANONYMOUS SMART PARKING AND PAYMENT SCHEME IN VEHICULAR NETWORKS

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Abstract— Scanning for accessible parking spots is a significant issue for drivers in packed urban communities, causing traffic blockage, air contamination, and burning through drivers' time. Shrewd stopping frameworks empower drivers to request constant stopping data and book stopping openings. Driving for an empty stopping zone isn't just tedious yet in addition baffles driver and causes air contamination and squanders fuel. Government possessed parking spaces are costly and rare in jam-packed urban communities. Point of this undertaking is to propose a savvy stopping furnishing namelessness and contingent security with E-money installment plot in vehicular systems. Right now propose an unknown shrewd leaving and installment plot in VANET condition where we propose to use private parking spaces like condo parking spaces and clinics and cafés which are by and large underutilized and furthermore parking space proprietors are happy to give leaving to autos for a compensation to remunerate the stopping zone upkeep. The ongoing increment being used of advanced mobile phones has given the chance to cooperatively detect and sharedata.

KEYWORDS:- Vehicular networks, Smart parking, Security and privacy.

I INTRODUCTION

With the quickly developing number of vehicles in the course of recent years, finding an empty parking spot has become a significant issue for drivers in jam-packed urban areas. As indicated by [1], looking for an empty parking spot prompts a normal of 30 percent of traffic clog. What's more, 47,000 gallons of fuel are expended, which produces 728 tons of carbon dioxide by and large every year in the Los Angeles zone alone [2]. Therefore, the thorough quest for accessible parking spots ascends to difficult issues, for example, traffic blockage, air contamination, and squandering drivers' occasions [3]. Because of the headway in remote interchanges and Internet of Things (IoT) gadgets, keen stopping framework has been rising as a productive answer for finding a stopping space. In shrewd stopping framework,

an IoT gadget is introduced in each parking space and uses a ultrasonic sensor to distinguish whether a specific parking space is accessible or not. Subsequently, it provides occupancy status of parking spots to a specialist organization. The specialist co-op empowers drivers to check the accessible parking spots and reserve online spot, which encourages finding empty parking spots.

Finding an empty parking garage in an engorged space or an outsized parking area, particularly, in top hours, is normally long and disappointing to drivers. it's regular for drivers to remain orbiting a vehicle leaving zone and appearance for a leaving. during this paper, we tend to are focused on building up a substitution VANET-based reasonable stopping subject to supply drivers with helpful stopping administrations in huge stopping stores. it's described by utilizing leaving to follow and deal

With offer period stopping route administration to drivers in huge stopping piles.

With VANET stopping route, the drivers will see the empty parking garage rapidly. Subsequently, the petroleum and time goes in looking through the empty is diminished. To the best of our data, this is frequently the essential such exertion inside the setting of VANET-based period stopping route. VANET based assistance, all vehicles make at the shrewd car vehicle leaving zone are watched by the parking area's RSUs. on the off chance that is unlawfully going the car vehicle leaving zone, can rapidly see the inconsistency. With these benevolent stopping data, the drivers can conveniently and rapidly pick their most well known stopping bounty near their goals. Driving for a structure site isn't totally time exceptional yet also baffles driver and causes contamination and squanders fuel. Government-possessed parking spaces are overrated and rare in jam-packed urban areas. all through this paper, we've a tendency to propose partner mysterious astute leaving and installment subject in VANET setting where we will in general propose to use individual parking spaces like structure parking spaces and emergency clinics and eateries that are normally underutilized and furthermore parking space householders are happy to create leaving for vehicles for a compensation to remunerate the ton upkeep.

The ongoing increment inside the work of cell phones has given the likelihood to cooperatively detect and share data. The present stopping controlling frameworks get the inventory of stopping regions abuse the sensors put in over the whole stopping zone. Be that as it may, conveying sensors during a monstrous stopping zone is beyond all doubt won. in addition, the sensors will get mistaken and would quit working just once time passes. Accordingly, it's incredibly wanted to claim a solid and worth compelling gratitude to follow

out there stopping territories and guide drivers to the accessible parking spots. Other than endeavoring to discover there leaving territories, vehicle robbery in huge leaving piles conjointly has become a huge concern confronting our lives.

II RELATED WORK

The plans [5] and [6] proposed brought together privacy preserving stopping reservation administrations. These plans safeguard the protection of drivers' genuine personalities utilizing secrecy. They likewise use area obscurity systems to ensure the drivers' ideal goals. Notwithstanding, the area obscurity procedures lessen the exactness of choosing the closest stopping during the booking procedure. They likewise uncover data about the mentioned region for stopping. *Ni et al. [7]* introduced a brilliant stopping route where clients are guided by a cloud server and road side units (RSUs) to accessible parking areas in their goal. The plan for the most part saves drivers' security by utilizing unknown accreditations. Be that as it may, concealing drivers' genuine personalities isn't sufficient in light of the fact that the cloud server can distinguish the drivers from their stopping areas. Additionally, the drivers uncover touchy data, for example, ebb and flow areas, goals, and appearance times, to the cloud server. This empowers cloud servers to follow drivers no problem at all.

To limit issue and burden to the drivers, a few leaving guiding frameworks are created over the previous decade [3], insights show that there are more than one hundred seventy,000 vehicles taken every year in North American nation. As of late, Vehicle incidental Networks (VANETs), are gotten express consideration each in mechanical and instructional exercise levels [4]–[7]. the On-Board Unit (OBU) specialized gadget, that licenses totally various vehicles to talk with each other in addition as edge foundation, i.e., RSUs, in order to improve

not exclusively road wellbeing anyway conjointly higher driving aptitude , the SPARK topic may likewise ensure the contingent protection conservation of the OBUs, that is believed to be the principal security request in VANET interchanges [9]–[13]. The SPARK topic comprises of 4 sections: framework setting, period stopping route, and agreeable stopping information spread. Before portraying them, we tend to survey the straight matchingsystem.

Lu et al. [8] proposed a safe route plot SPARK to give drivers precise and helpful stopping administrations in huge parking garages, including constant stopping route administration, savvy antitheft assurance, and agreeable stopping data dispersal. **Lu et al. [9]** introduced another smart and make sure about protection safeguarding stopping plan by utilizing parking garage RSUs to deal with the entire parking area. ParkNet [10] is a framework that gauges road leaving accessibility by utilizing vehicles furnished with a GPS collector and a traveler side-confronting ultrasonic rangefinder. The information is then collected at focal server, fabricating a continuous guide of stopping accessibility and giving this data to drivers looking forstopping.

Parksense [11] is another framework that use the pervasiveness of WiFi guides to screen on road stopping accessibility. It uses a powerful Wi-Fi signature coordinating way to deal with distinguish a driver's arrival to the left vehicle and it utilizes a novel methodology dependent on the pace of progress of Wi-Fi reference points to detect if the client has begun driving. Neighboring stopping, there are a few route plans [12]–[14] in the writing. **Chim et al. [12]** proposed a safe and security protecting route framework VSPN. They utilize mysterious certification to ensure drivers' security, implying that the driver who gives the question is destined to be unlinkable to any gathering including the confided in power.

Ni et al. [13] proposed a security safeguarding continuous route framework. The RSUs helpfully locate an ideal way for a questioning vehicle to the goal as indicated by the continuous traffic data gave by the vehicles in their inclusion zones. In the interim, the believed authority can unveil the drivers' personalities in the event that they transfer incorrect traffic data. **Ni et al. [14]** proposed a CPARN framework through vehicular interchanges. The drivers are guided by a server to empty parking spots close to their goals without trading off protection, including drivers' personalities, references and courses. Be that as it may, there are two critical contrasts between their plans and our own. In the first place, the past shrewd stopping work didn't think about private parking spaces. Second, our plan incorporates an installment stage.

III EXISTING SYSTEM

Utilizing open foundation alone can't tackle leaving issues in huge metropolitan urban areas where there will be huge number of vehicles scanning for parking spaces. It makes superfluous traffic and air contamination. For instance autos cruising for parking spaces voyaged 945,000 additional miles, consumed 47,000 gallons of gas and delivered 728 tons of carbon dioxide in Los Angeles region for a year. Looking at created nations the circumstance is in any event, getting most noticeably terrible in creating nations where number of vehicles is expanding step by step.

IV PROPOSED SYSTEM

We propose ASAP conspire in vehicular systems where private proprietors are happy to offer their parking spaces to cruising vehicles as a byproduct of a compensation to repay the support cost of their parking area and furthermore to make benefit and traffic blockage is decreased. Our proposed framework ensures

the client protection by using the short randomizable gathering mark. In our framework the driver will send the stopping demand namelessly to the server. On the off chance that a contest occurred among driver and parking space proprietor our believed power will follow the focused on client. We build up association among driver and parking area proprietor while using E-Cash to take care of the unknown installment issue from driver to parking area proprietor.

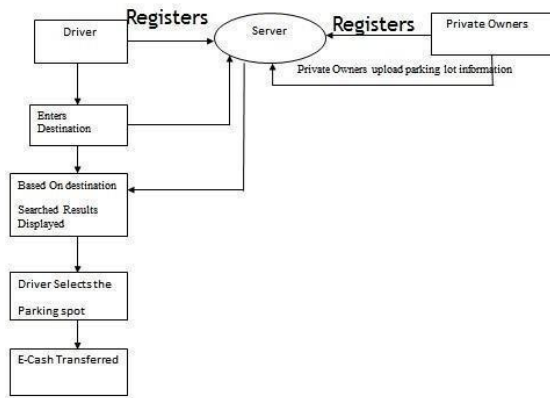


FIG 1 OVERVIEW OF THE PROPOSED SYSTEM

V MODULE DESCRIPTION

USER REGISTRATION AND PRIVATE PARKING ANNOUNCEMENT

Right now client and private stopping space proprietors will enlist to server. During the framework introduction stage both the drivers and private parking space proprietors will enlist their subtleties with server. Server will likewise go about as confided in power. To evade illicit providers or drivers from submitting invalid messages to the server, enlistment is essential for all elements which will be confirmed in each report and question to ensure that they are the registers. Providers that is private proprietors

will declare their parking spot accessibility to the server. Private proprietors will fix the cost to their stopping opening.

DRIVER REQUEST FOR PARKING SLOT

When the private parking garage proprietors transfer their free leaving space data those openings will be accessible for the drivers to leave their vehicles. When the driver enters the goal all the accessible leaving openings will be shown and dependent on that the driver can choose the leaving space he wish to leave his vehicle for rental installment.

PRIVATE PARKING SPOT

Two sorts of parking spaces are accessible to client private parking spaces and open parking spaces. At the point when driver picks private parking spaces it sidetracks to a page where driver needs to look through dependent on the goal he will enter. After driver enters goal and time dependent on the outcomes will be shown in the guide.

ACKNOWLEDGMENT

When the driver chooses the parking space he wishes to leave his vehicle and association will be set up between the proprietor of the leaving opening and driver for installment get to. Installment process happens among driver and stopping space proprietor dependent on the quantity of hours the driver utilizes the stopping opening.

VI CONCLUSION

We arranged VANET to change the cruising driver to look out a parking space and supplier to make an adventure giving individual stopping assets. The parking spaces are higher used and tie up is extra diminished. A supplier and driver will namelessly send a stock report and a stopping question to the server. In the

interim, a dependable authority is in a situation to unveil a client's personality if a question occurs and clients make a few bucks unknown installment with E-money. Our subject also bolsters finding an open and individual parking space that exclusively should include a numeration thing inside the hashmap. For the more drawn out term work, first, we'll consider police examination area assault from drivers previously, which implies a driver may send a stopping question to the server long he shows up at the goal space, and furthermore the framework should be prepared to isolate out this inquiry and assurance framework reasonableness since various drivers in these territories right now need parking spaces a great deal of. on account of the well disposed stopping information spread, there's another appreciate the arranged topic. when the stopping zone is full, any moving toward driver might be advised in time at that point head to acknowledge distinctive stopping. In any case, for a traditional stopping zone, it should set aside a long effort for the thought process power to work out that the stopping zone is full, which finishes in burning through gas and time.

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