

# The Parking Project

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### Abstract

Finding parking places in crowded city like Mumbai has always been a problem and thin lanes add on to the irritation that too without the guarantee of availability of the parking. Mumbai with a staggering population of over 12 million, is still growing and with the growth the available space is getting lesser and lesser. The growing middle class population has also accommodated to the city life by buying cars and other vehicles for travelling.

With so many people driving on the roads, and so less space to actually accommodate all the vehicles. A systematic approach has to be developed to solve the issue of parking and wait times. The existing parking infrastructure which involves open space parking and in few cases tier level parking near stations in the outskirts of the city are too vague. The number of people who are aware of such parking spaces is less and hence these adds to the growing traffic due to parking randomly on road sides.

The hardware and software combination of the The Parking Project helps counter this issue easily by providing easy management of available parking spaces and easy one touch reservation to avail the service and help keep the roads clear to also solve the problem of tolling. This system is aimed at building a smart parking system for a smart growing city like Mumbai, Chennai, Pune and many more.

### I. INTRODUCTION

#### A. Importance of The Parking Project and its Background:

Due to increase in population, and availability of automobiles for cheap price the number of vehicles has increased exponentially but the place to park them is the same the traditional approach of random parking now needs a systematic approach in order to reduce the commotion. This has resulted into development of smart systems that are adaptive and vigilant to provide a systematic method to provide parking spaces to the customers. One of them is Smart Park which is an application that provides the user benefits of geolocation of parking spots that also guides user to park their car and also to relocate them in case they forget about their parking spot.

If you're in a new city and don't know about the parking rules and regulations, you need not to worry about the parking places because our system will filter places based on area, availability, rules and many more conditions. An application that will simplify your life and your parking issues. Our Arduino systems and servers are always available day and night to provide you parking places efficiently.

#### B. Issues faced in traditional parking system:

The major issue faced in traditional parking methodology is based on random parking spots available for parking, this approach is applicable for cities in which the parking spaces are in abundant or as per required but population inflated cities like Mumbai, Chennai, etc. need a systematic approach.

#### C. Literature Survey:

Smart Park is a system that is used to help managing cars in parking area in other to avoid congestion and arrange cars in an allocated position. The system also helps to track how many cars pass through the gate and the duration taken by each, and then it will calculate the amount of money a car should pay when exiting. Parking is being used in many congested area or location where there are many meeting point of people like where there is more than one shopping complex near to each other or where there is megamall or stadium.

### Types of car Parking System

#### Wired Sensor-Based

Wired sensor-based system is using detection sensors such as ultrasonic sensors which are installed at each parking lot. These sensors are wired to a central control unit that store and manage the parking occupancy information. This information is then forward to display panels at intentional locations in the car park. The display panels provide information, direction and guide the drivers to vacant parking lots [3].

#### Wireless Based

With the advancement of wireless technologies, wireless based methods have been employed in parking guidance systems. Wireless sensors nodes are deployed and each parking lot is equipped with one node. The sensor board is equipped with the sensors of light, temperature, acoustic and a sounder.

In using wireless technologies, disadvantage in employing sensor at each parking lot is still present and can be very costly as each sensing unit is usually attached with a processing unit and a transceiver [9].

#### Image based

Image based techniques or some people call it as video sensor techniques. There are arguments concerning the viability of using image-based techniques. The disadvantages are video sensor is energetically expensive and video sensor can generate large amount of data which can be difficult to transmit in a wireless network [5].

#### Counter-based

The last category of car park guidance systems use is Counter-based systems which use sensors to count the number of vehicles entering and exit a car park area. This can be gate-arm counters and induction loop detectors located at the entrances and exits. This system can give information on the total number of vacant lots in a closed car park area, but does not help much in guiding the driver to the exact location of the vacant lots [8].

#### D. General features of smart parking system

1. Enable the driver to collect ticket upon entrance: car Parking system should be able to allow the driver to get his ticket after he press the button of the gate barrier.
2. The system should record the entire cars that pass through the entrance.
3. The system should allow the gate to open whenever a driver has press the button and take his ticket.
4. Allow the drivers to make payment: if it's of commercial use, the system should enable the drivers to make payment of their charges before exiting.
5. Allow the driver to exit: if the driver has paid his charges and require exiting, the system should open the gate to allow him exiting.

#### E. Processes involved in smart parking systems

From the research conducted, there is not much direct interaction between the system and the user. Though some parking systems have different procedures

The customer presses the button on the machine ticket will come out from it and the customer take his ticket and then the gate will open. The customer will now proceed to the available space. The available spaces are known by the green light bulb on top of each available lot. The red light on top of parking lot indicate either the space is being reserved or there is car parked at it.

For the process of exiting, if the customer is using "touch and go" (Malaysian prepaid card), there is a sensor provided which will read the card and if there is enough money the system will deduct the amount of the charges.

But if the customer is going to pay cash there are available paying machines which the customer will insert his ticket and the system will read the ticket, estimate the hours spent and calculate the amount to be paid by the customer. Customer should insert the money stated by the system into machine. The system will validate the ticket and assign 15minutes on it which is enough for a person to his vehicle to the nearest exit gate.

#### F. Advantages of a smart parking system

1. The automated parking system increases the number of cars that can be parked in a garage. It provides more parking spaces since the cars are well organised parked.
2. If you use automated parking system, you will need only a less area of land for building a garage.
3. This system enables safe parking of cars as compared to the ramp-style parking facilities.
4. This method of parking is so convenient for the drivers and they need not have to walk in search of parking spaces.
5. This system reduces the maintenance costs of the garages since it significantly lowers the ventilation and lighting requirements and no need of costly deck repairs as well.
6. As said earlier, the chances of vehicle getting damaged due to improper parking are considerably reduced in automated system.
7. With automated system, there are no or very minimal chances of the vehicle getting lost. But, this is not the case in traditional parking method.

#### G. Existing Car Parking System

India currently does not have smart parking systems; most of the cities have the traditional parking spaces with few malls implementing digital systems to manage parking.

#### H. Strengths of Existing Systems

8. The interface design of most of the systems is made simple and rare advertisements are displayed. This permits users to perform their activities effectively.
9. There is no restriction or limitation of time for a car to spend in each parking area.
10. All the system provides very affordable price to the customer. The charges are based on hours spend by a car in the parking area.

#### I. Limitations of the Existing Systems

1. None of the system is providing the information of each car (plate number). For security purpose. For example, security agency wants to know the car that are inside the parking area for traceability.
2. The system does not assign car to a specific parking lot and this result in roaming of cars inside the area in searching of parking space.
3. Some of the systems do tax for the free parking zones even after the vacation of vehicle.

## II. MOTIVATION:

The current scenario of the parking system is too tedious and difficult to manage. With too many vehicles and less space in the city, proper parking perimeters are not set and most people end up parking in busy roads. So the motivation behind The Parking Project is to provide a simple solution to any vehicle owner for parking assistance in the city. We achieve this by providing the details of parking spots which is nearest to the user's current location. The most important part of which is to guide the user by providing directions to the exact location.

This way the user won't have to search for parking space and can just find the available spots and reserve it while the user is arriving at the location.

So with the use of specialized hardware and customized software we decided to provide the best possible solution to the growing parking problems across the city I.o.T., i.e. communication between devices helps us implement smarter alternative to traditional parking amenities in the city.

### III. SCOPE OF THE PROJECT:

The scope of the project is as defined below with basic features:

1. Location update
2. Parking spaces
3. Reservation
4. Payment
5. Routing Solutions
6. Tracking

Apart from the above basic features we have added additional features to make it more productive to provide additional security and error free reservation system on the go.

Additional Features:

- 1) Secure Socket Layer (SSL) connectivity to ensure security.
- 2) Optimized AJAX usage for better user interaction
- 3) Usage of JQuery for Pluggable look and feel.
- 4) Password modification is made easy using JDBC connectivity.
- 5) Reports exportable in .XLS, .PDF or any other desirable format
- 6) Use of Graphical tool like JASPER to show strategic data to admin.

### IV. PROBLEM DEFINITION:

Mumbai with a staggering population of over 12 million is still growing and with the growth the available space is getting lesser and lesser. The growing middle class population has also accommodated to the city life by buying cars and other vehicles for travelling.

With so many people driving on the roads, and so less space to actually accommodate all the vehicles. A systematic approach has to be developed to solve the issue of parking and wait times. The existing parking infrastructure which involves open space parking and in few cases tier level parking near stations in the outskirts of the city are too vague. The number of people who are aware of such parking spaces is less and hence these adds to the growing traffic due to parking randomly on road sides.

The hardware and software combination of the project helps counter this issue easily by providing easy management of available parking spaces and easy one touch reservation to avail the service and help keep the roads clear to also solve the problem of tolling. The project is aimed at building a smart parking system for a smart growing city like Mumbai.

The constant data collected over the time will help the project provide more optimized solutions for future needs as it will show the markup zones in the city. This markup zone are the busiest and most demanding part of the city which may need faster and efficient solution than the other parts of the city.

### V. DATA FLOW DIAGRAM:

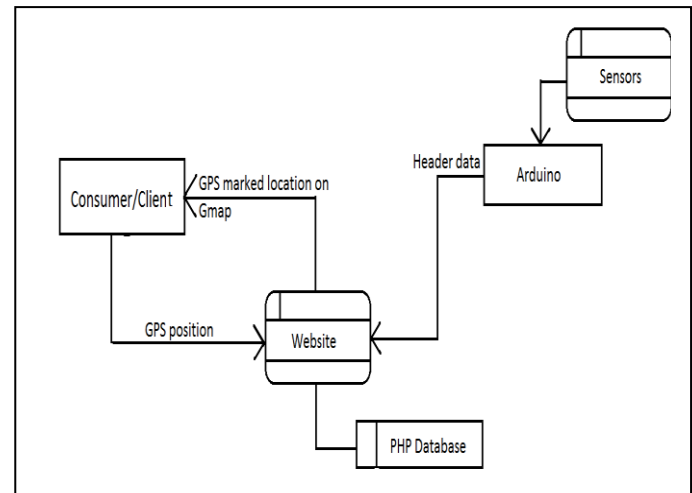
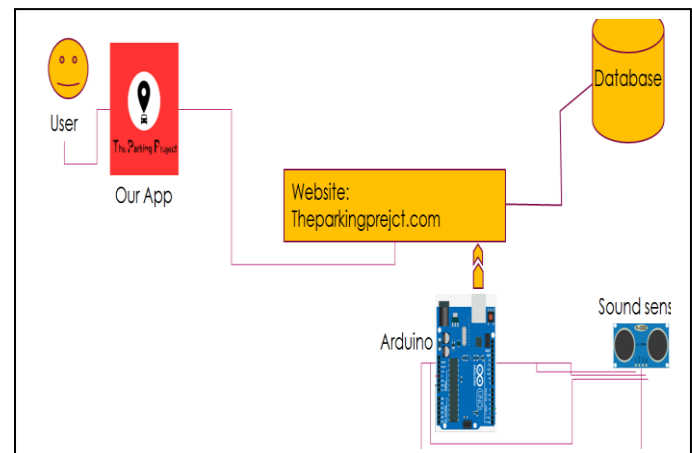


Fig. 1. Data flow diagram of the entire process.



### VI. WORKING:

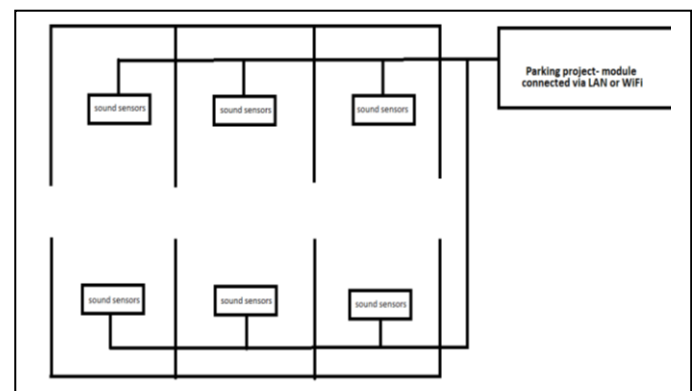


Fig. 1. Sensors architecture.

- The sound sensors help the embedded system to realise if the parking is available or not.

- The embedded system in turn uploads this data to our server which contains a database of location for parking.
- The parking project application helps the user to locate these parking and finally are guided to the particular locatiuon using google maps.

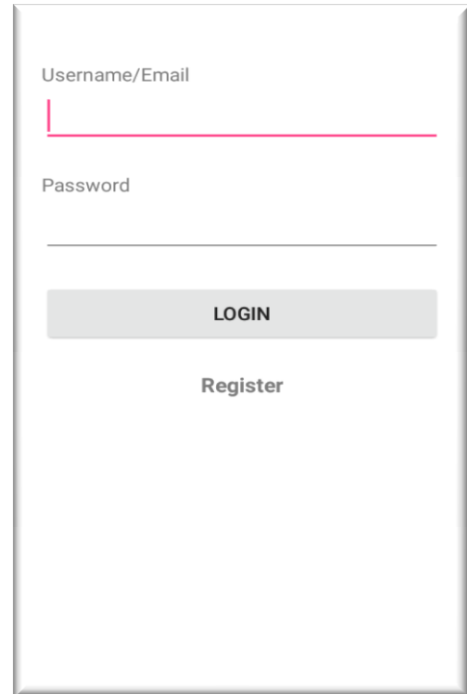
**VII. SCREENSHOTS:**

1



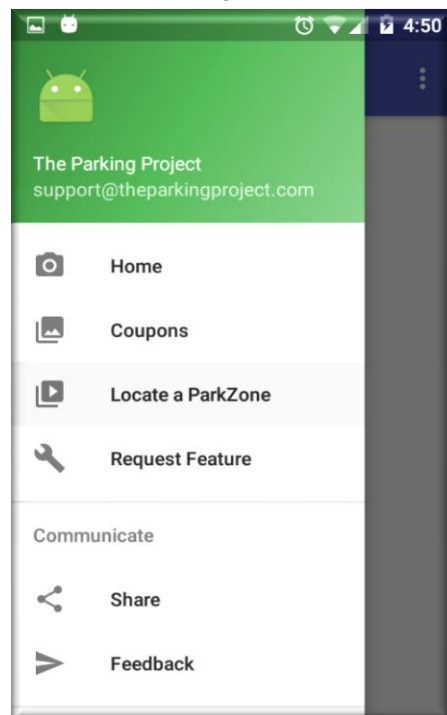
SPLASH SCREEN

2

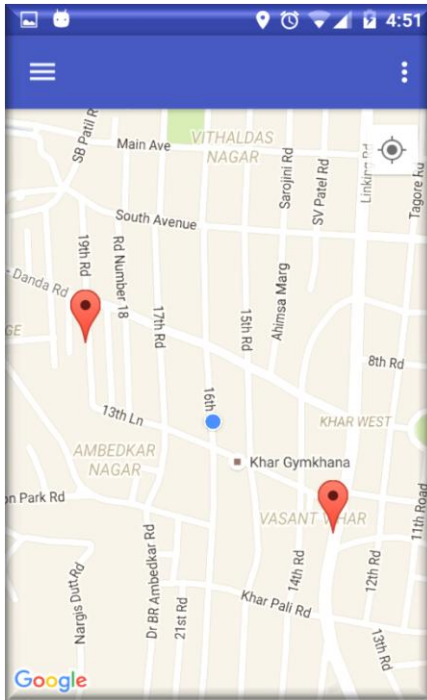


LOGIN ACTIVITY

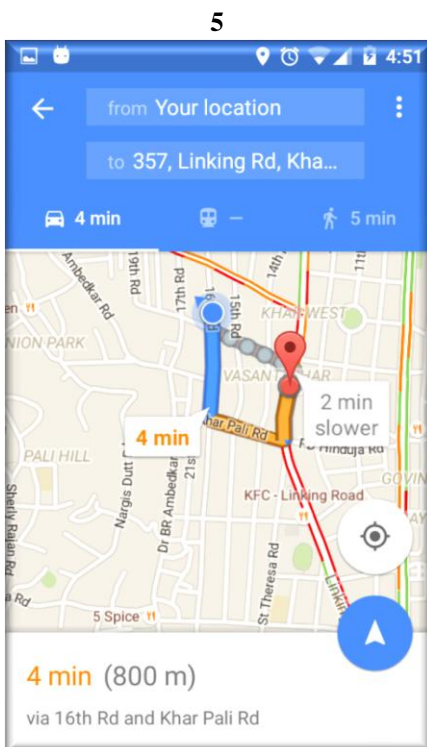
3



NAVIGATION BAR



MAP ACTIVITY



NAVIGATION DIRECTION

## VIII. ANALYSIS AND PLANNING

### A. Feasibility Study:

#### Technology and system feasibility:

Hardware requirement: Arduino board, Ethernet shield, LAN connection, sound sensors, cloud server.

Software required: Android application interface.

#### Operational Feasibility:

The project will be quite adaptive and dynamic during execution, thus resulting into smart and responsive feedback to the user based on the input given to the system; the user can set his own location as per his requirement for a given time slot and can also allow application to automatically track itself. Parking is a tough task in unknown areas our application provides flexibility to the user.

#### Economic Feasibility:

An adaptive and easy on the pocket solution to the user with enhanced interface. Also simple to use and functions as per requirement.

#### Technical Feasibility:

We already have implemented sensor tracking program and our android application which updates the user for available parking spots.

#### Schedule Feasibility:

This is a long duration project and research work related to tracking and hardware is already done, thus this project is feasible to implement in a development span of 3 months along with rigorous testing.

## RESULTS

We will keep updating the system with latest available parking spots across the city to provide nearest parking spots to user. The update will be done in real time and also with the help of community users willing to provide information of un-utilized spaces. Additional features like tracking cars and toll alerts will be part of the system to make sure user is aware of whereabouts of the car and how to reach to it in case of tolls and worst case theft problems.

The project is completely based on I.O.T. concept that deals with communication between devices. During the first phase of the project it will be limited to certain parts of the city with expansion to other parts of the city after infrastructure upgrade and availability.

## CONCLUSION

The traditional parking methodology is not good enough to deal with growing and developing needs of the city, which has resulted into demand for revolutionary and a smart system to solve this problem and provide unique, user friendly application. Presently our system provides quicker response to user queries for parking spots.

## ACKNOWLEDGMENT

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