

Project Idea – ParkME

I. Motivation and Pitch:

A city can be friendly to people, or it can be friendly to cars, but it can't be both', we feel there is a grain of truth in there when it comes to our country.

To ensure that people are following all the parking rules in India, there is a need for the implementation of stricter rules. However, there is a limit to which the traffic police or the people in charge can enforce the same.

Our app is a big sigh of relief for big societies and corporations. Struggling to find a vacant spot to park your vehicle is a day-to-day scenario that one doesn't need to imagine. It is frustrating to spend essential time finding parking slots especially when someone else has parked in place of your parking area.

It may happen that two wheelers are parked in place of car parking or cars are parked in a haphazard manner. Looking at this mis-management, it is difficult to manage the parking area, which is one of the biggest problems in big corporations or societies. One person managing the complete parking space is impossible. The common problems faced by societies and corporations are:-

- Vehicles parked in a haphazard manner, making it difficult to use parking space efficiently.
- Two wheelers packed in four-wheeler space.
- Vehicles parked in no-parking spaces.
- Vehicles parked in other's parking spaces.
- Due to haphazard parking, it's difficult to sometimes make an exit from parking space.

Our app will provide a common solution to all these problems, and will make the process of managing the parking space smooth and quick. Just one picture-click and push notification, can make things easy.

Features offered by the app include: -

1. Communicate with wrongly parked vehicle owners
2. Send push notifications
3. Chat instantly, if required
4. Penalise officials or locals by society or corporation.

II. Stakeholders:

- Societies
- Corporations
- Institutions / Colleges/ Schools

III. Related work:

There are many apps in the market available web/android based providing different parking solutions. These include features like automatic parking, cashless parking, find/book a parking spot and many more.

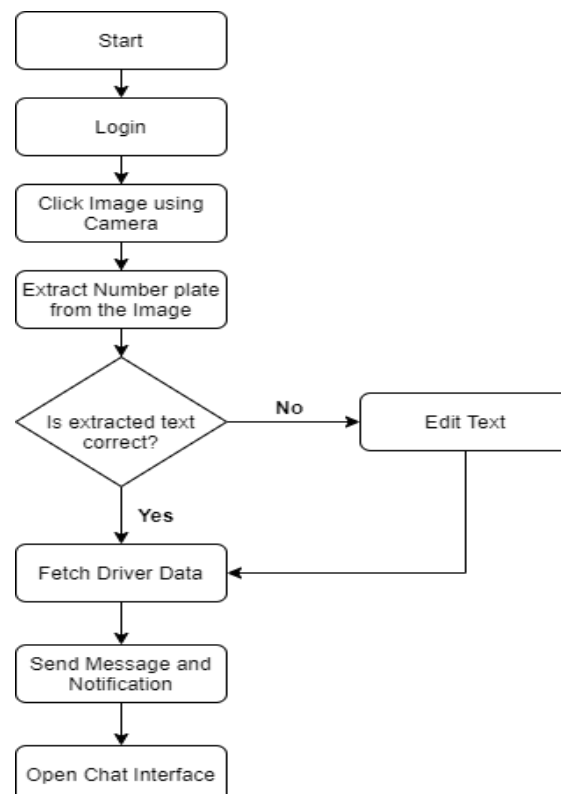
- a) Parking Rhino: ParkingRhino Operator Mobile App helps parking attendants to manage parking reservations. ParkingRhino helps parking providers to go online using the mobile app-based plug and play parking management system which connects existing access control hardware like parking meters, cameras, boom-barriers and sensors to deliver real-time occupancy information.
- b) SpotHero: It offers features like monthly parking passes and pre booking for a parking space which in return provides an e-pass through email/SMS.
- c) Parkit.direct - Lets you assign your spot to a specific employee or a group, guests or external user. Simplify parking for visitors by notifying the security and let them figure out where the parking is available.

As per our research all the apps in the market are designed from the perspective of the user/driver aiming to provide some kind of convenience. With our app, we are trying to enforce acceptable parking practices which make the drivers more responsible. The app would target societies wherein the defaulters can be notified and reminded to park properly by the security personnel or any watchful member of the society. It also has a feature to authenticate and authorize visitors through the camera enabling a safe and sound environment.

IV. Our approach - an initial idea:

After the installation of the app, users will be asked to log into the app using the credentials that will be provided to them by their organization. Once the user logs in, these login details will be verified with the database where login credentials along with the other details of the user would have been stored. After successful login, In the main activity, the user can click the picture of the number plate of the car which is parked wrongly. After the picture is clicked, a ML model will extract the number plate from the image and this extracted text will be shown to the user. The user can verify and edit the number plate if some character is not extracted properly. After verification, the user will click on the submit button and details of the number plate will be matched with the details of the car owner in the database. The car owner will receive a message and a push notification notifying him that his/her car is not parked correctly. After this, a chat interface will be created between the user and the car owner where they can further communicate with each other.

The workflow of our approach is illustrated in the flowchart below:



V. Our Final approach:

Adding to the idea of notifying wrongly parked vehicles, our final idea also allows users to find empty parking slots. The other features added involve functionalities like users have the flexibility to cancel a query, to resolve a query once the problem is resolved. Users can also rate other users, and the same rating will be displayed specific to each user on the dashboard.

All the queries intended to unknown vehicle numbers, will directly be forwarded to the admin and can be resolved directly by the admin. This will be helpful for the unidentified vehicles parked in the society.

VI. Tools/Technology/Skills Required:

- **IDE used - Android Studio:** It is exclusively designed for developing Android applications. It consists of all Android SDK tools to design, develop, maintain, test, debug and publish our app. Git support is provided, which helps in easy maintenance and development tasks. After completing the project, the whole application can be put as a .APK (Android Package) file, in which we can run that APK file on any device and use the application.
- **Java:** The default programming language that will be used is Java in Android Studio. The language is flexible enough to maintain code complexity, test, implementation, integration, and support.
- **AVD Manager:** If we want to test our application on desired configuration devices that we may not have access to, we can use AVD Manager for it. Although emulators are a little slow compared to real devices, they provide the flexibility for custom configurations.
- **GitHub (for version control):** An integrated version of GitHub with Android Studio will be used for code collaboration and version control.
- **SQLite:** It is Android's inbuilt database that is used to develop small applications and perform any CRUD (Create, Update, and Delete) operations. It is not flexible enough to support a considerable amount of data; therefore, we will also use an external database.
- **MySQL:** To store the data, we will make use of MySQL database. It is an open-source RDBMS. We will be using it for Data Definition, Management, and Control. A database query will be required when we want to fetch the vehicle owner/driver's information using the vehicle number.
- **Python:** Python will be used as the primary coding language for the required Machine Learning Model for fetching vehicle numbers from the camera image.
- **Colab (for Python):** Colab is a free Jupyter notebook environment that runs on the cloud. We will be using it to create and simultaneously edit the notebook. The ML Model will be built using it.
- **Postman (API Testing):** An API call will be made to the respective ML model for getting the required vehicle number. To test the API using HTTP calls like GET, PUT, POST, etc., we will be using the Postman tool, an open-source API client. It gives the responses to various API calls that can be verified against the desired results.
- **JIRA (for project planning):** JIRA is a project management tool by **Atlassian**, used for management, issues, and bug tracking. It is free for all open-source projects. We will use it to track the assigned tasks and time spent on those and track the testing of few use cases.

VII. The project outcome:

Imagine coming from work to home only to see that some unknown being captures your parking slot!

You are not in a mood to get into verbal communication right now as you have better plans; instead, you want to get your parking slot vacant fast. We have it sorted for you!

As mentioned above, this app's main aim is to warn/inform the drivers/owners of the vehicles when they park at spots not allotted to them or park in a bad fashion. This app can prove beneficial and managerial for the residential societies, organizations like companies, colleges, schools, etc. We are assuming that every registered individual of a particular organization will be assigned a dedicated parking slot. When someone parks wrongly and creates inconvenience, this app will come in handy to notify the driver by simply clicking the number plate's picture, and boom, the driver gets a warning.

Without even knowing whom to contact directly, the app will do it all for you. This app is all that is the need for a better parking experience by people. Also one can find empty parking slots, no need to roam around to find empty parking spaces. There is no privacy intrusion as the app will do all the talking and communication. Users on two ends using the app can never get the Personally

Identifiable Information (apart from the Name), PII of each other, hence respecting everyone's privacy.

It will improve the current parking system and can take it to a whole new level. It will create a sense of responsibility among the drivers/owners of vehicles as nobody would like to get embarrassed on record.

VIII.Features Proposed:

- RAISE QUERY

User will be able to raise a query to the intended user, by capturing the vehicle number and ML model will detect the text on the number plate. User specifies the reason, parking space and query type and query is automatically raised to the respective user. If no such user with the same number plate is registered with the society, the query is directly raised to admin.

- PUSH NOTIFICATION

Once a query is raised, a push notification is sent to the intended user with all other details. On clicking the push notification, the user can see all the details and even chat with other users.

- CHAT FUNCTIONALITY

A chat interface between two users.

- ANNOUNCEMENTS

A message can be delivered to all users using the particular app.

- QUERY RESOLVING

The user can look into queries raised by him or queries raised to him. He can even resolve the query when the work is done.

- USER RATING

On resolving the queries, users will be asked to rate the other users and a rating will be displayed for each and every user over the interface. This rating can then be used by the society to reward/penalize the users.

- FIND SLOTS

Our application also provides flexibility to search empty parking spaces available in the society.

- LOGIN

A login functionality with all checks.

- FORGOT PASSWORD

Forgot password functionality.

- CHANGE PASSWORD

change password functionality.

- VIEW QUERY AND CHATS

Users can view all queries raised by him/to him along with all the chats.

- PROFILE AND SETTING

A profile and settings page. Admin can be contacted through the settings page.

- LOGOUT

A logout functionality.

IX.Features Implemented:

All the below features have been implemented:-

- RAISE QUERY
- PUSH NOTIFICATION
- CHAT FUNCTIONALITY
- ANNOUNCEMENTS
- QUERY RESOLVING
- USER RATING
- FIND SLOTS
- LOGIN
- FORGOT PASSWORD
- CHANGE PASSWORD
- VIEW QUERY AND CHATS
- PROFILE AND SETTING
- LOGOUT

X.Challenges Faced:

- CHAT FUNCTIONALITY : To make chat functionality user friendly and to implement real time chat between two users with mili-sec latency.
- ML MODEL : Determining the right digits from the picture taken of the number plate, so that users need not to retype the whole vehicle number. Finding an accurate model and then integrating the model into the android application.
- PUSH NOTIFICATIONS : Sending push notifications from one user to another
- DATABASE RELATED : It was a challenge to think of ways to store the chat between two users. Along with downloading and uploading of images for the correct user.

XI.Future Work:

Future work in ParME is listed below:

- Adding more functionalities to the admin i.e a separate ui for all the admin where they have more control from sending announcements to resolving any query from their hand etc.
- User Friendly chat functionality : There can be a lot of user friendly features added to the chat interface ranging from adding emoji, adding attachment, sending gifs etc. As a future work the chat functionality can be improved for a better user experience.
- Finding slots functionality currently provides the available slot name, where the user has to find the slot himself. A future work for this will be to provide a specific location to the user and then navigation to the given spot to make the app more user friendly.

Mobile Computing - ParkME

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