

IDEA/ APPROACH DETAILS:

Technology Bucket: Software - Mobile App development

Company Name/ Ministry Name: MixORG

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Category: Software

Problem Code: CS1

College Code: U- 0391

IDEA/SOLUTION/PROTOTYPE

Create an **affordable mobile application and a camera system** to enable a **high safety CCTV based vehicle tracking system in residential societies**.

Tracking a vehicle's entry/exit status will facilitate security and allow for measures against car theft. The app will help automate tasks such as register maintenance by security guards posted at society gates, which is slow, intensive and hence error prone. Whenever a vehicle enters/exits the society, localization and recognition tasks are performed sequentially, per frame, on the live stream by CCTVs at the society gate. As soon as a vehicle is recognized, the owner will be notified. If the owner doesn't approve, an alarm will be set off about possible theft.

Intelligent safety system

- Allows only pre-authorized vehicle without manual verification.
- All vehicle movement is logged, to facilitate investigation if necessary.
- Alert security staff for unauthorized access of vehicles at gates.
- Real-time notifications on visitors and car movement.

TECHNOLOGY BUCKET & TECHNICAL FEASIBILITY

Our Application development process will involve five layers. The first layer is UI/UX of the mobile-app. A friendly UI/UX is the key to a **happy and satisfied customer**. The second is the Android development layer. **Android app** will be developed using Android Studio and in future we will shift to the **Flutter framework** to extend support to iOS. The third is the Physical layer which will involve installation of cameras and its integration with our application. Fourth layer is the backend layer, which will be written using the **Django Framework** and Django Rest-Framework. The backend will involve the development of a scalable and **multi-purpose API** and a well designed database structure. The last and the most important layer will be the Deep Learning Layer, which will be the fifth layer of our application. We will use **Tensorflow Framework and the Keras High-level API** to code the model and it will perform the task of number plate detection and recognition. This model will be trained on **publicly available datasets** as of now and in future on manually gathered **data specialised for Indian Number Plates**. The possible object detection and localisation approaches include: **YOLO, Mask-RCNN, Feature Pyramids**, and others.

USE CASE - WHY WILL PEOPLE USE OUR APPLICATION?

At the front gates of the residential complexes, security manually checks the identity of the entrants (noting down the vehicle no, and resident / visitor details). This process is slow, intensive and hence error prone. Leveraging technology, we are **proposing a platform that will be 'Smart' – for faster and automated entry, 'Safer' – error-proof** and preventing unauthorized entry and **'Agile' – for a faster turn around**. In our solution, the flat owners will be asked to register with their vehicle's number plate. The system will **allow only registered vehicles**. This will ensure safety of the vehicles by **preventing unauthorized access**. Additionally, if the user is travelling by taxi or auto, the **forgotten belongings can be traced easily**. For the convenience of visitors/guests to an owner, he/she can approve beforehand or in **real-time**.

DEPENDENCIES/REQUIREMENTS AND SHOW STOPPER

- Accuracy of the detection depends on the **quality of CCTV footage, brightness of the location and speed of the vehicle** at the entry points. This can be ensured by speed breakers and effective lighting at the entry.
- As Indian number plate are not standardized, ability of character recognition algorithm needs to be robust. This is why we will train specifically on **Indian Number Plates**.
- At peak hours, number of vehicles might enter the society. The system should be **fast enough** to identify and open the barricade. Hence we plan on using robust and fast algorithms like **YOLO and other deep CNN networks**

