6th Semester Project

Software Solution for Visitor Management System

Mentor : Dr. Sonali Agarwal

Ashwin A. Vardhan

IIT2015104

Amit Kumar

IWM2015005

Ujala Singh

ISM2015005

Abhishek Negi

IIT2015126

Manish Thakur

IIT2015133

OVERVIEW

- Visitor entry/exit maintained on registers - offline.
- No current system to fetch visitors' current location.
- No method to perform apt security deployment at appropriate/odd hours.
- Paucity of visitor data records in digital form.
- No existing way to control access of visitors.

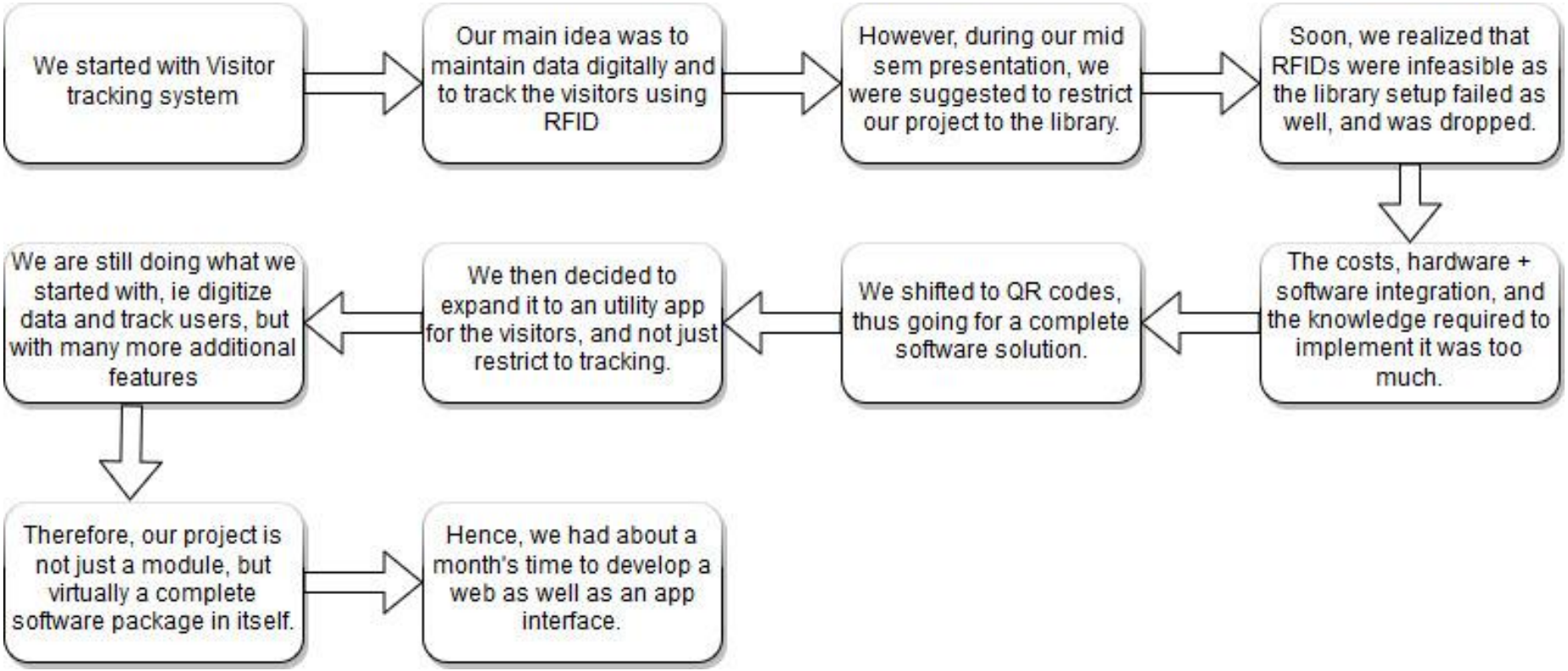
OBJECTIVE

- Developing a utility application for visitors.
- Keep track of their movements within the campus.
- Maintain an admin dashboard to control access and visualise data of all visitors.
- Digitise visitor data.
- Provide hassle-free experience to visitors.

WHY THIS?

- During our visit to IITK, we had to use Maps services very often.
- There have been several instances of security breach in our institute.
- Effervescence 2017
  - Few unauthorised people entered the campus due to which a lot of chaos was generated.
- Several theft cases in Boys' Hostels
  - According to our product, any unauthorised person can neither enter, nor leave the premises.
- Prevention is better than cure, right?

PROJECT HISTORY



RFID VS QR | COSTS

RFID based system

- The total cost for setting up an elaborate system for RIFDs is around 80-90 lacs (20 lacs for library alone!)
- Further, installation charges by a third-party may cost about 10-20 lacs.

QR based system

- Costs of QR scanning machines range from 5000 INR to 12000 INR, while QR codes are free!
- Estimated total cost may range from 5-10 lacs.

READER COLLISION PROBLEM IN RFID

- If the channel is limited then in-channel collision may increase.
- If a tag is in the range of the two antennae it will be detected at multiple places at the same time which leads to discrepancy in database.
- A possible reason that might have led to the library's RFID project failure.

ALTERNATIVE? QR CODE

- A QR (Quick Response) code is a 2D barcode formed by conversion of a BitMatrix into a Bitmap.
- The required data is extracted from patterns that are present in both horizontal and vertical components of the image.
- A QR code can be read by an imaging device such as a camera, or through specialised scanners.

Image source: google images

LANGUAGES, TOOLS & IDE USED

- HTML | CSS
- JavaScript
- JQuery
- AngularJS
- Firebase

Web Development

- Java
- Android Studio
- CodeIris

Android Development

- PlantUML
- Draw.io

Flowcharts

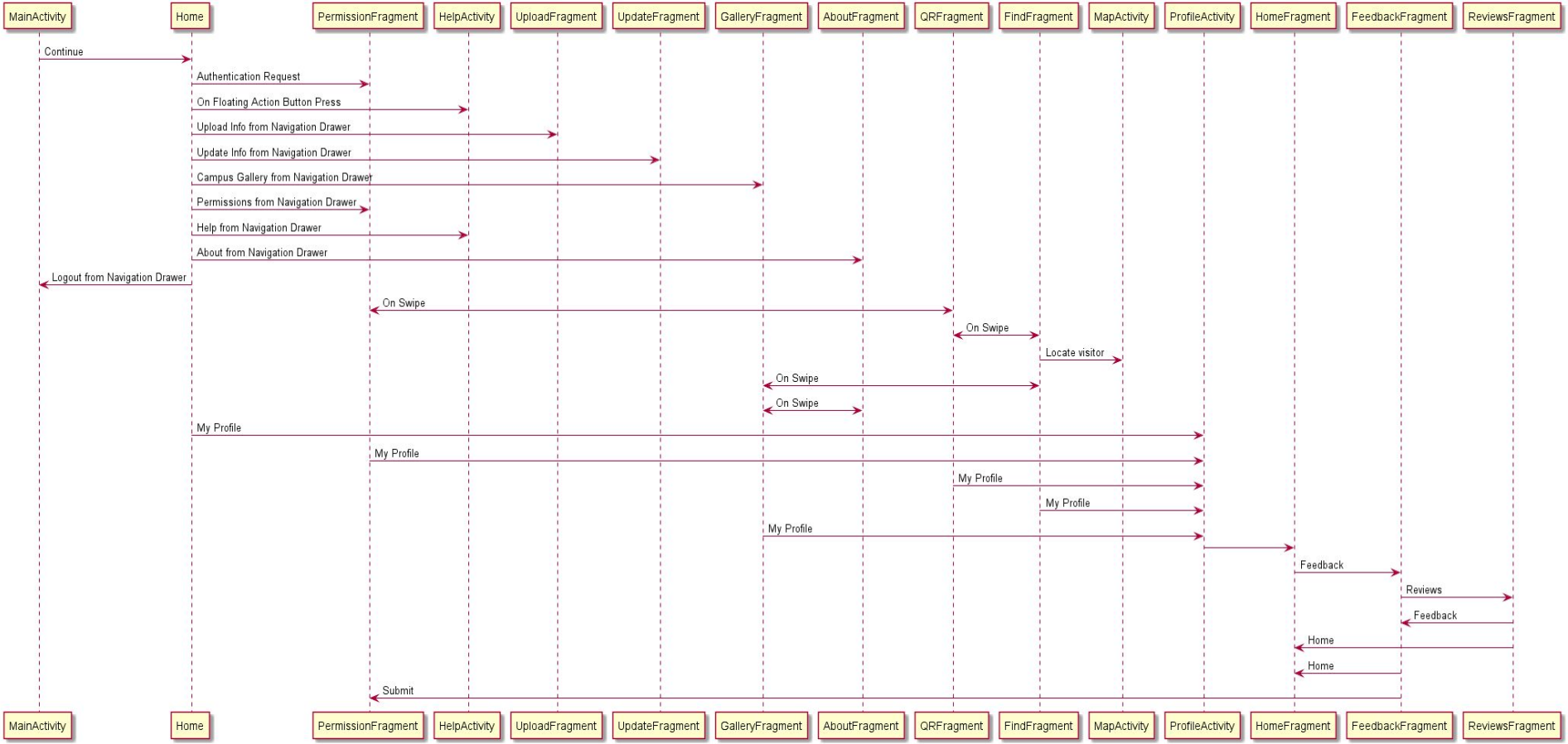
APPLICATION PREREQUISITES

- The SDK version set for minimum supported API is 21 (Android 5L), while the targeted API was set to 27 (Android 8O).
- The following permissions are to be granted for the app to run smoothly
  - *INTERNET*
  - *ACCESS_NETWORK STATE*
  - *ACCESS_COARSE_LOCATION*
  - *ACCESS_FINE_LOCATION*
  - *CALL_PHONE*
  - *READ_PHONE_STATE*

ANDROID APPLICATION STRUCTURE

- The app consists of 8 Activities, 8 fragments and a navigation drawer.
- Activities are the basic layout screens that you'd see in most apps.
  - They are easy to create and handle.
  - They don't get messy.
- Fragments are an advanced version of layouts, and when combined with tabbed layouts, form powerful UIs.
  - They are complex but neat.
  - Are rarely implemented successfully — **Play Store**, Facebook, Messenger and Whatsapp.
- Nav drawer and bottom nav drawers are common.

SEQUENCE DIAGRAM



HIGHLIGHT

The Map

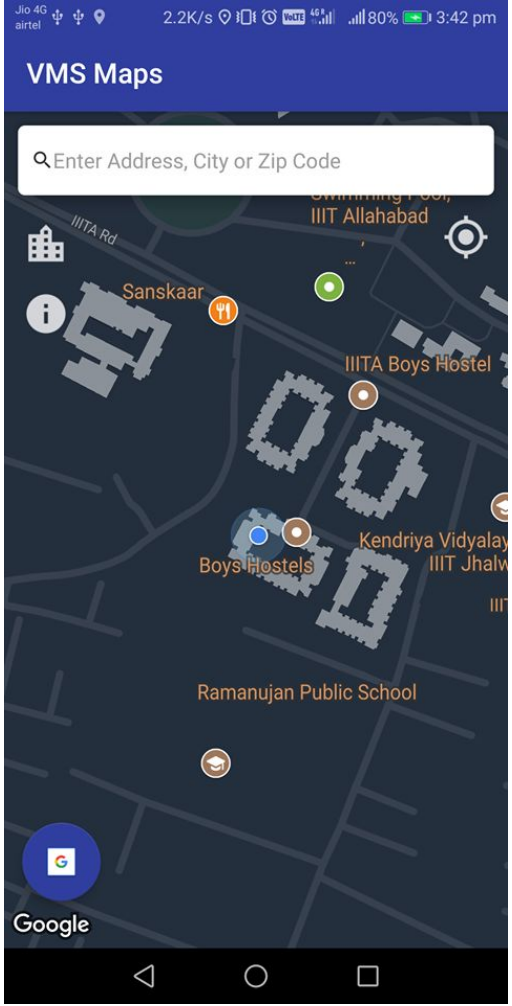
- Our custom map implementation uses a dark theme, has much of clutter removed, and still functions the same as Google Maps.

- We used our own json object file to create map which shows clear routes, buildings, parks, water bodies etc.

- APIs used are Google Maps and Google Places.

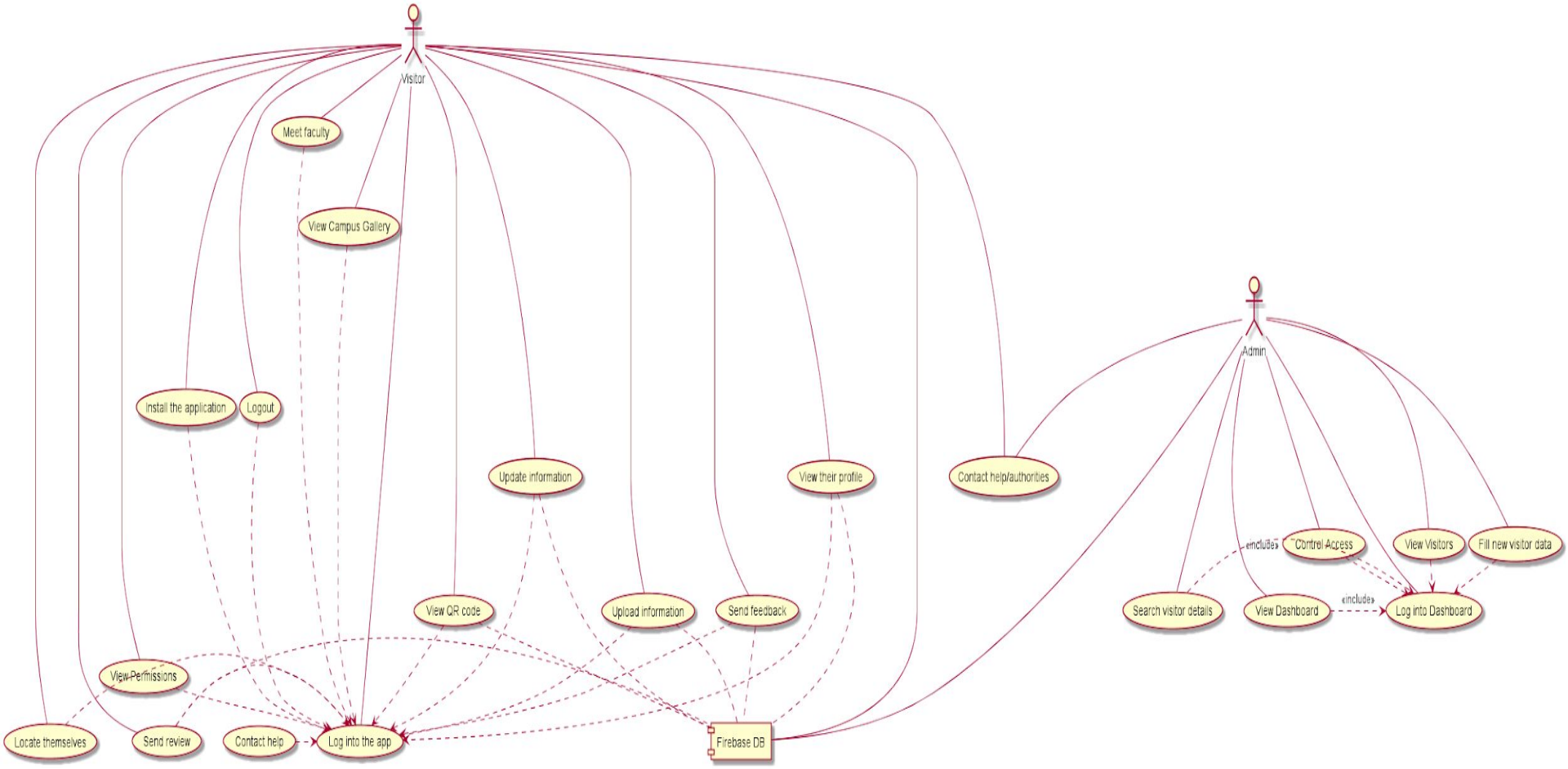

```
    {
      "color": "#6b9a76"
    }
  ]
},
{
  "featureType": "road",
  "elementType": "geometry.fill",
  "stylers": [
    {
      "color": "#2b3544"
    }
  ]
},
{
  "featureType": "road",
  "elementType": "labels.text.fill",
  "stylers": [
    {
      "color": "#9ca5b3"
    }
  ]
},
{
  "featureType": "road.arterial",
  "elementType": "geometry.fill",
  "stylers": [
    {
      "color": "#38414e"
    }
  ]
},
{
  "featureType": "road.arterial",
```


Screenshot of the JSON file containing the map attributes

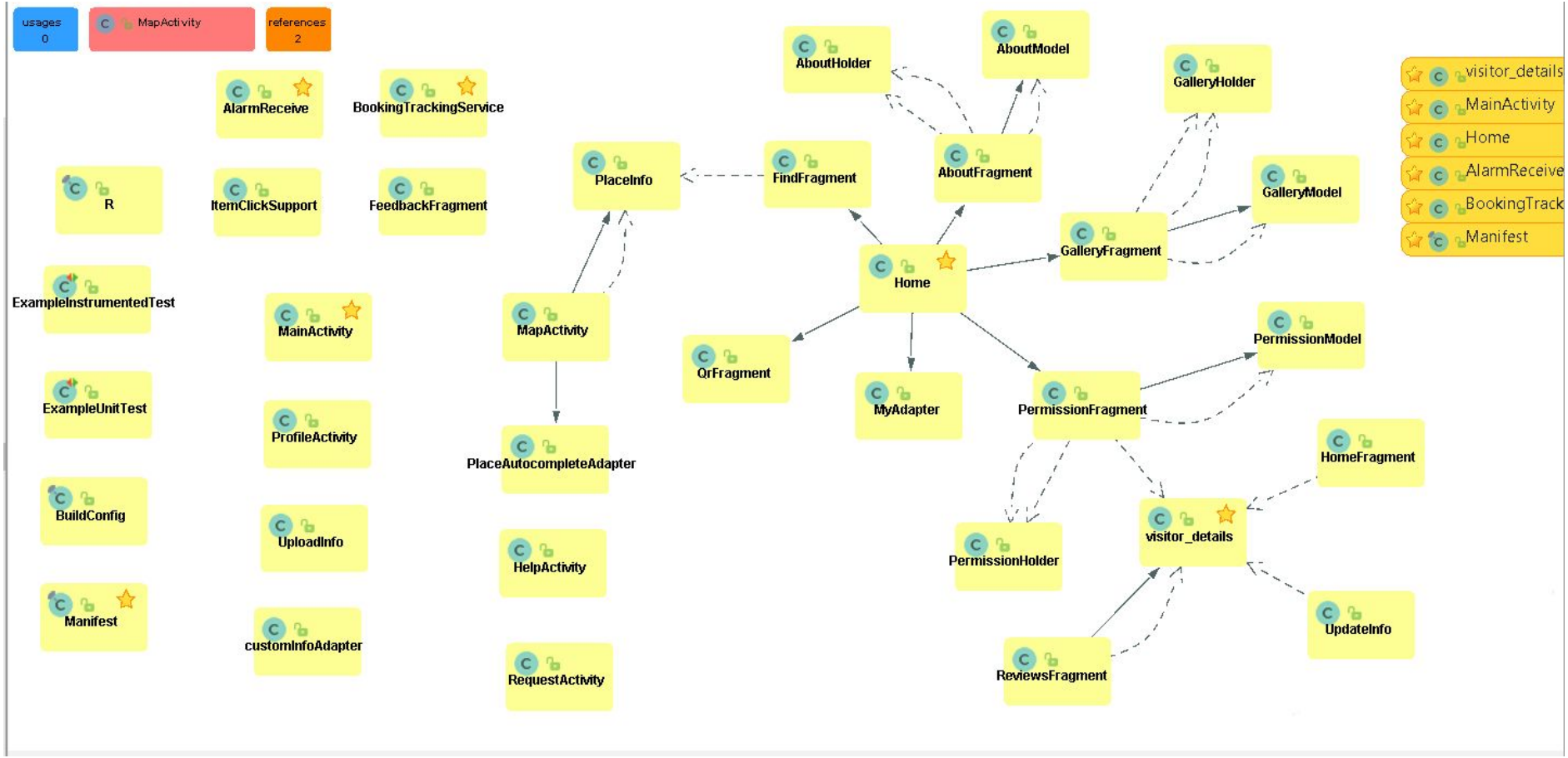


Map as seen on the phone

USE CASE DIAGRAM

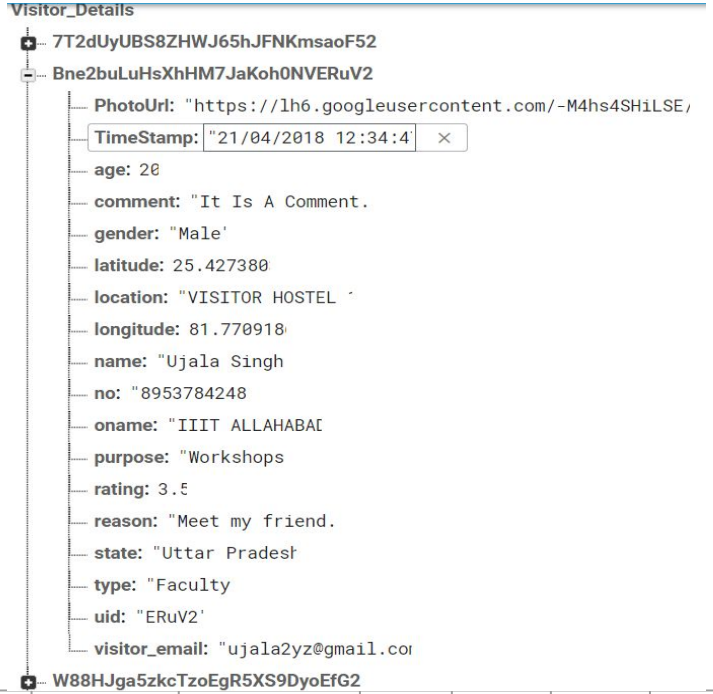


CODEIRIS GRAPH



DATABASE DESCRIPTION

- ★ Database is maintained via firebase.
- ★ Firebase DB is set up through android application.
- ★ This DB was connected to web interface.



Visitor_Details.child(uid)

UID	Name	Email	Contact Number	Type	Purpose	Gender	Longitude	Latitude	Rating	Comment	Organization Name	Age	State	Photo URL	Timestamp

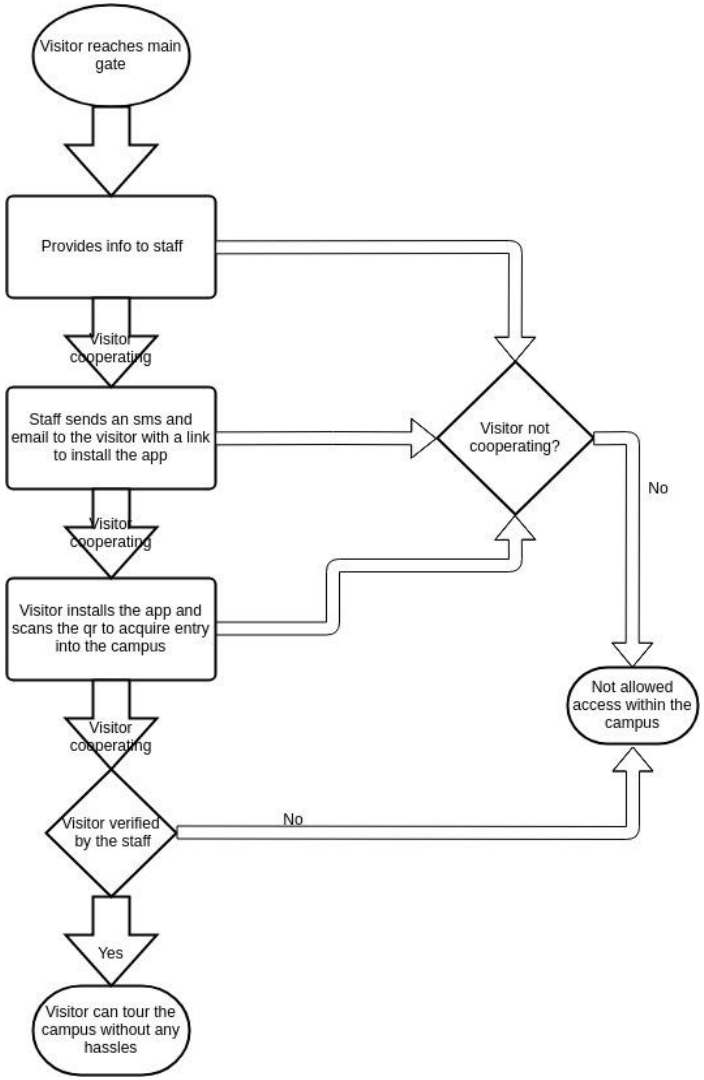
TARGET AUDIENCE

- We have three types of visitors
  - Student Visitor - Hackathons, fests etc.
  - Faculty Visitor - Talks, seminars, workshops etc.
  - Normal Visitor - Friends, family etc.

- This software can be extended to students and faculty of the institute as well in future.

- Staff, library, cafeteria, health center can also be included.

GENERALIZED WORKFLOW



FUNCTIONAL PREREQUISITES

- All visitors should have smartphones with them.
- They should have an active gmail account.
- They should have location as well as data services on at all times.
- All the buildings must be equipped with a QR scanner and desktop systems for visitor verification.
- The staff must be trained well for operating these systems.
- Guards should be present at all times, at all checkpoints.

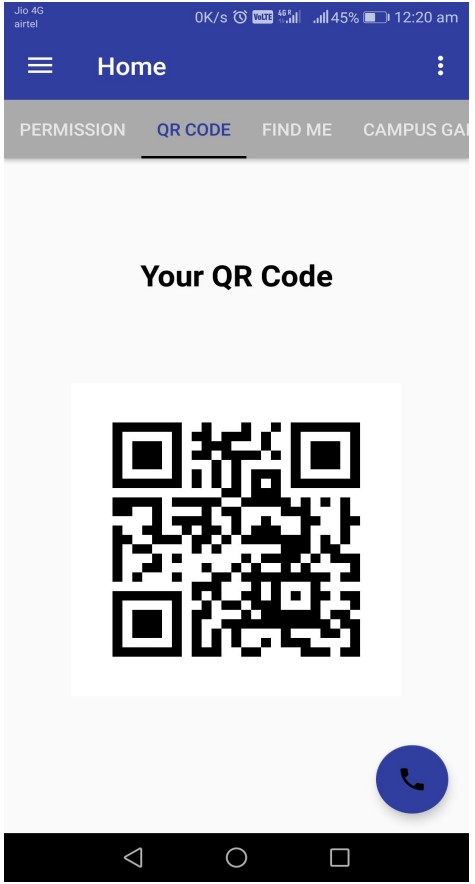
SERVICES WE SHALL PROVIDE

Our utility application and web dashboard will provide a number of services including

- Hassle-free authentication
- Visitor access authorisation
- Locate yourself
- Find route within campus
- See nearby places
- SOS
- Admin access control
- Live visitor tracking

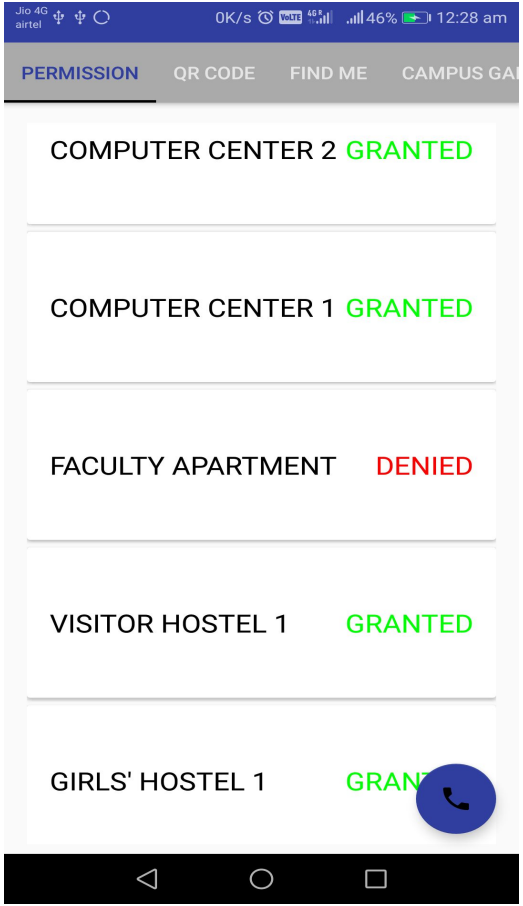
HASSLE-FREE AUTHENTICATION

- Each Visitor will be provided a unique QR Code which will be the key to the access of all the permitted places.
- All the buildings will be having QR code Scanner at the Entrance
- The QR code will be scanned and the UID retrieved will be verified by admin.
- Users don’t need to carry anything except their phones.



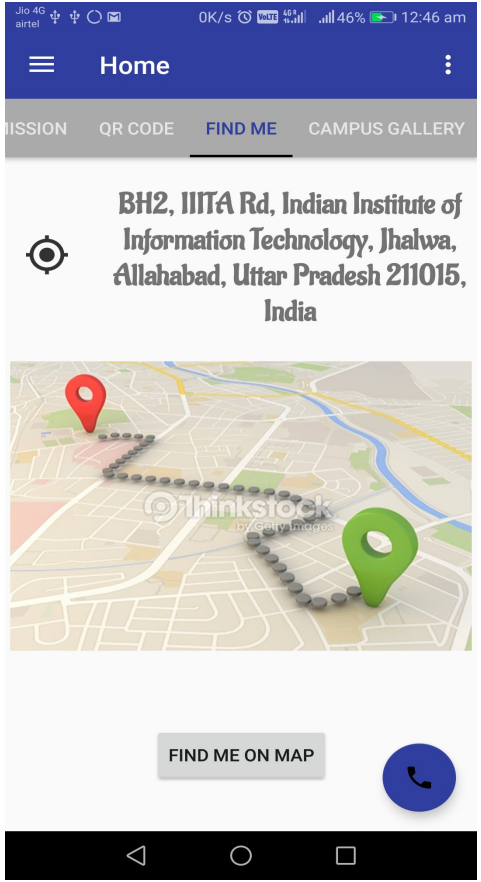
VISITOR ACCESS AUTHORISATION

- Visitor privileges are different for different visitor types.
- The users will be able to see the accesses which are provided to them.
- They can also forward a request to admin to grant them further privileges.
- All they have to do is to double click on the card where they are denied.



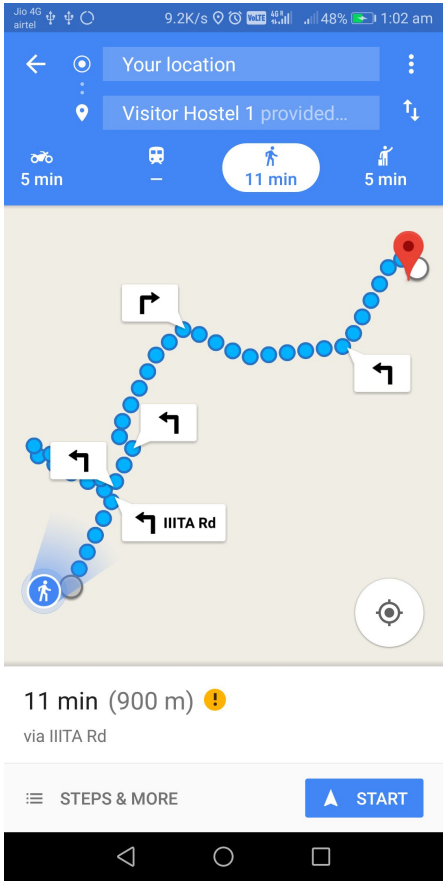
LOCATE YOURSELF

- A visitor can easily locate himself on the map by pressing “FIND ME ON MAP”



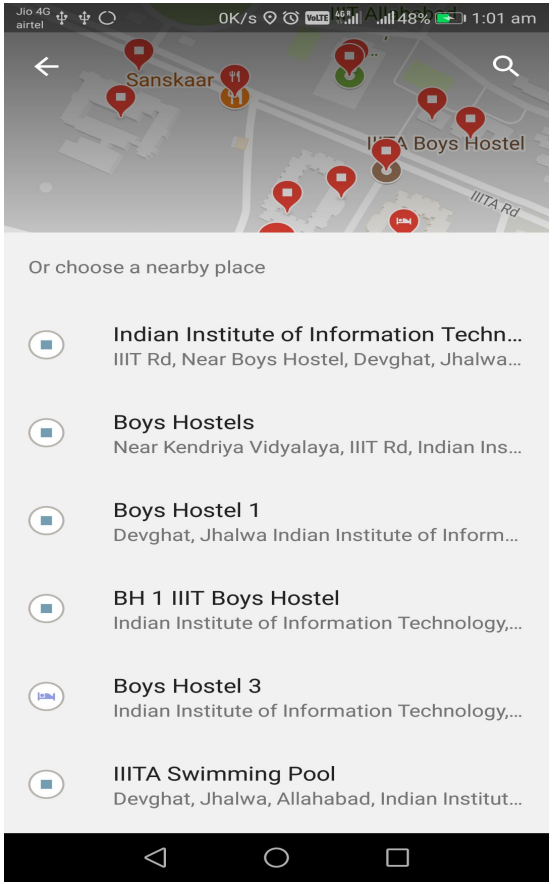
FIND ROUTE WITHIN CAMPUS

- Visitors can find routes within campus through the Maps™ Application.
- The app will be opened via VMS app when required.



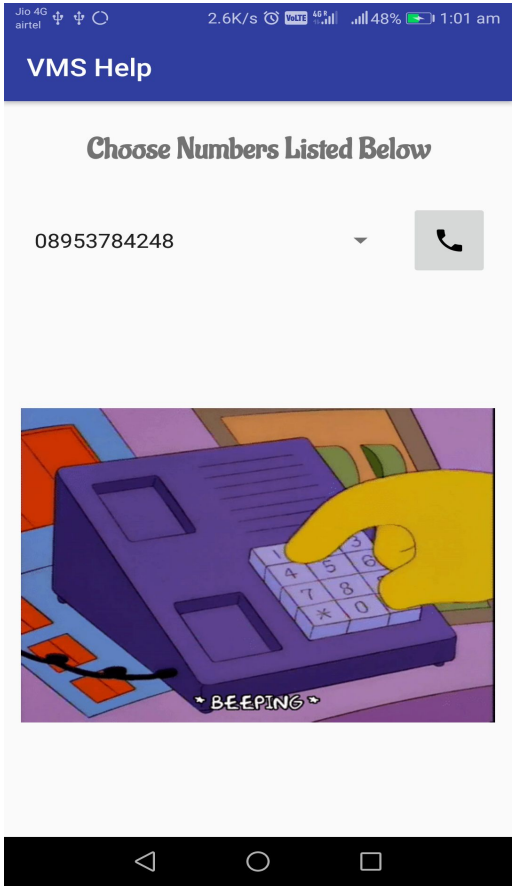
SEE NEARBY PLACES

- Visitors can see nearby places from their current location.
- Nearby places include academic, residential and admin buildings along with restaurants.
- Google has a more general version of this facility.



EMERGENCY HELP SERVICES (SOS)

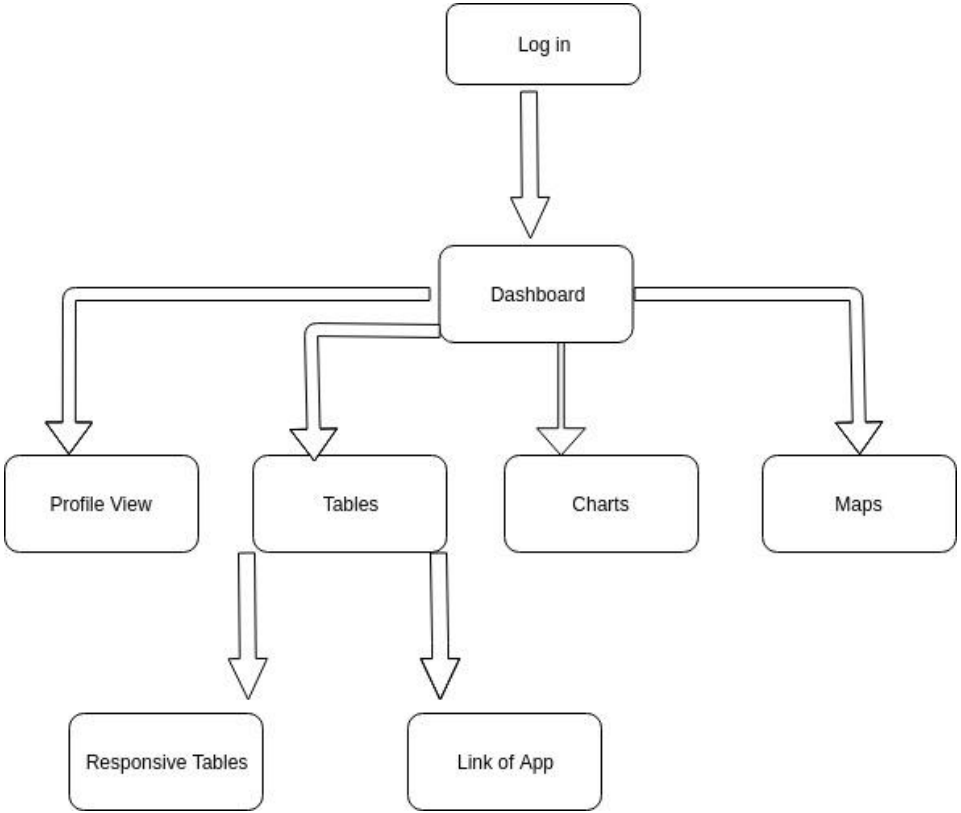
- Calling functionality in case of emergencies has been provided within the app.
- Visitor need not search for the nos at different places.



FEEDBACK & REVIEWS

- Visitors can share their experiences about the institute.
- This will allow for more transparent and visitor-friendly services.

DASHBOARD ROAD MAP



LINKING FIREBASE TO WEB

- Api key is generated from firebase which is to be integrated in the web in the form of script in order to connect the both.

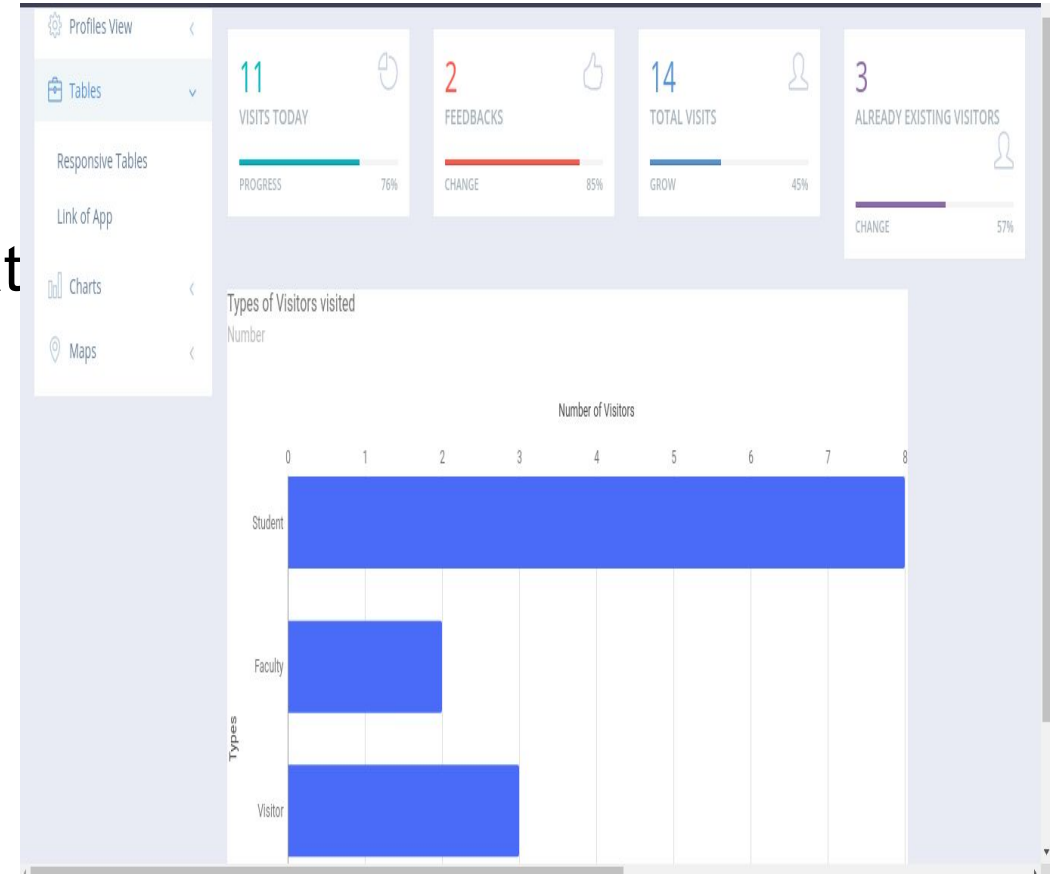
- Information from the database can be retrieved by other script files once the connection is established .

```
var config = {
apiKey: "AIzaSyDl-9uG-4_mfiDI7jzOe89gilEy1zfTqMI",
authDomain: "visitormanagement-8f0ac.firebaseapp.com",
databaseURL: "https://visitormanagement-8f0ac.firebaseio.com",
projectId: "visitormanagement-8f0ac",
storageBucket: "visitormanagement-8f0ac.appspot.com",
messagingSenderId: "1094819864598"
};
firebase.initializeApp(config);

</script>
```

DASHBOARD

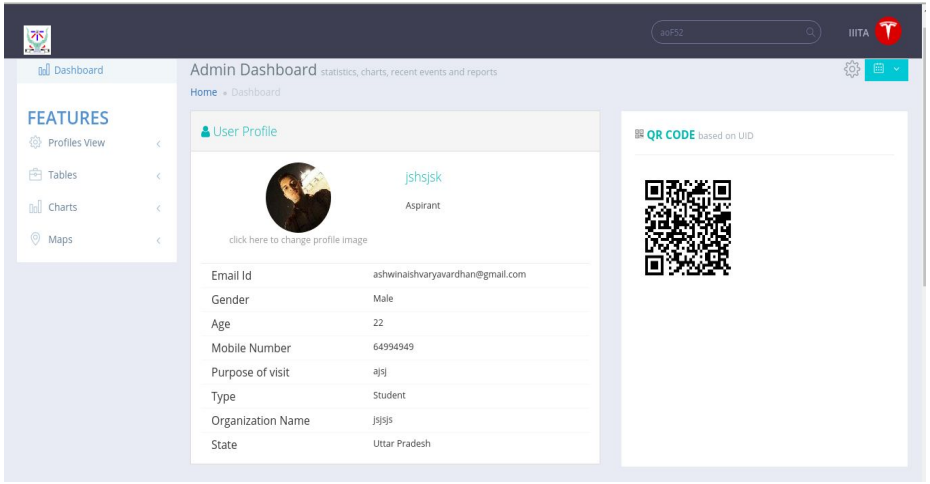
- Admin authorities to monitor and authenticat visitors in real time.
- To visualise various statistical information about visitors.

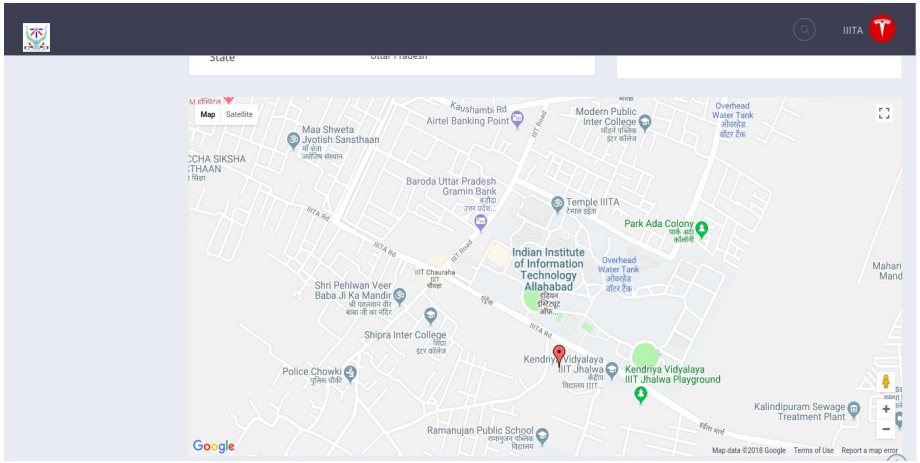


VIEW PROFILE

- User Profile alongside QR code generated to grant permission based on QR code to visitors with their UID.

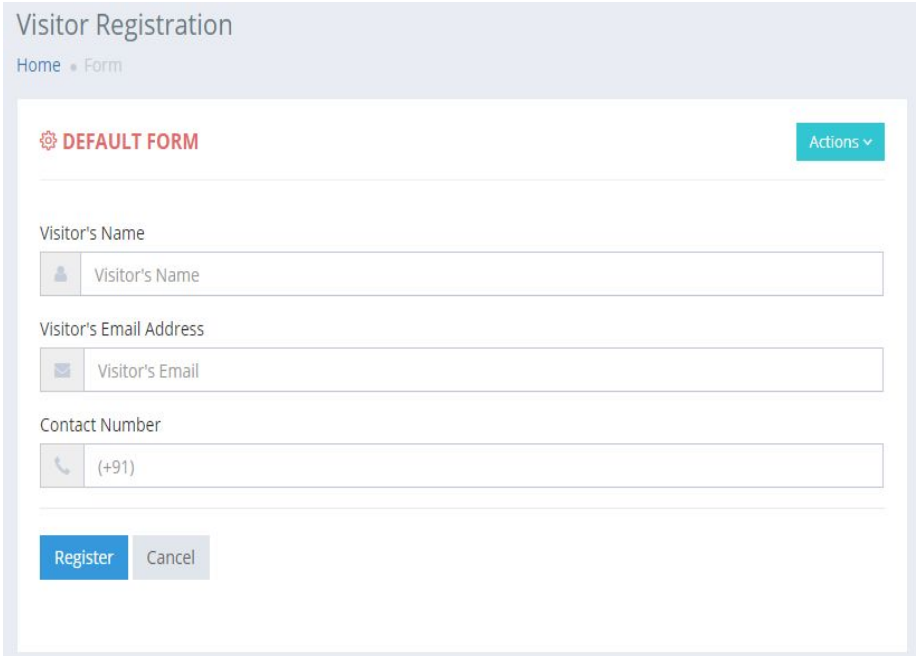
- Map to show the last updated location of visitors.





FORM FOR NEW USER

- Once the visitor Comes into the campus he has to give his details at the main gate.
- The information provided by the visitor is used to send the link of android application



SENDING APPLICATION LINK

- Once the visitor is done with providing information at the main Gate
- The application link is sent on provided mail id.
- The API used for Email Sending is provided by EmailJS.
- Initially The following Script is added in the header of Visitor Form page

```
<script type="text/javascript" src="https://cdn.emailjs.com/dist/email.min.js"></script>
<script type="text/javascript">
    (function(){
        emailjs.init("user_7uLg1jJAuKpqhIMtWtFwd");
    })();

</script>
```

SENDING APPLICATION LINK

- The Following script is added in the Action of Register button which sends the Automatic Email to the Mail Address provided by the visitor.

```
<script>

    function myfunction(){
        var xtream = document.getElementById('inputEmail').value;
        emailjs.send("gmail","install",{mail: xtream, notes: "Check this out!"});

        window.alert("Email Successfully sent");
    }


</script>
<button type="button" class="btn default">Cancel</button>
```

ADMIN ACCESS CONTROL

- Places are reserved and some are restricted according to type of visitor.
- The visitor can ask for permission to access some restricted area through its app and that will be recorded in the database.
- The Admin will be notified in the table. Its in his hands now to grant access to the visitor or not (if the reason is viable).

LIVE VISITOR TRACKING

- Visitors Locations are updated in real time on maps in dashboard with marker for individual person

- The location information sent by app to firebase are shown on User location map on dashboard

- Markers are updated as soon as the longitude and latitude value changes

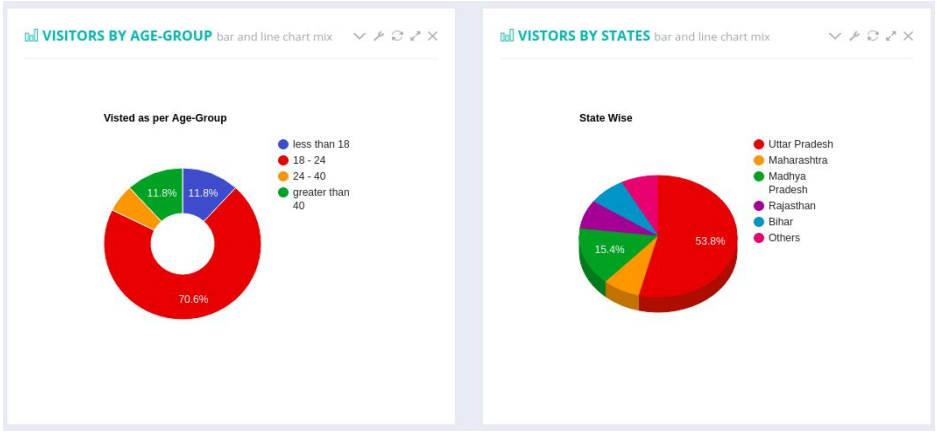
REAL TIME VISITOR LOCATION

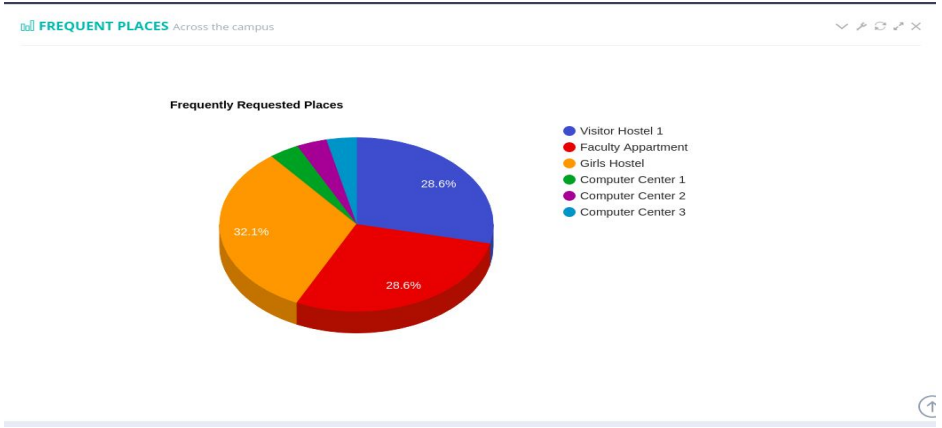
REAL TIME VISITOR LOCATION

DATA VISUALIZATION

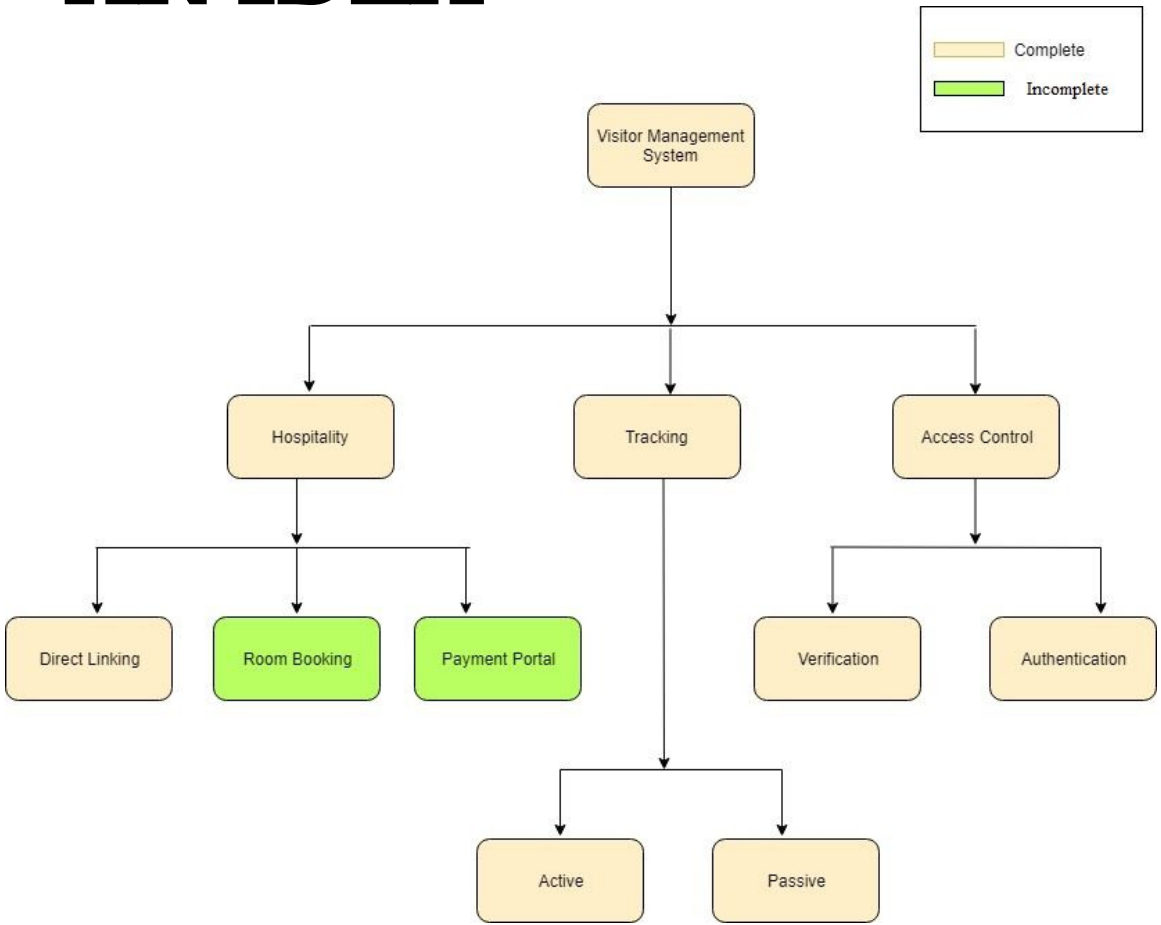
- Admin Dashboard is providing the facility of Data Visualization.

- Showing various statistics related to the visitors. New Visitors, Visitor type, frequently Visited locations





VMS – AN IDEA


Complete
Incomplete
Visitor Management System
Hospitality
Tracking
Access Control
Direct Linking
Room Booking
Payment Portal
Verification
Authentication
Active
Passive

BENEFITS

- A complete dataset of all visitors in digital form will be available, for research purposes.

- Such utility apps will exhibit our state-of-the art tech expertise among the visitors, which will attract more laureates and recruiters.

- It will make easier for the outsiders to visit different places inside the campus.

- Visitors don’t have to worry about losing their way, or their phones anymore.

BENEFITS

- On-call services mean that visitor gets more relaxed and gets a better experience.
- It provides better security as there are different privileges to different kind of visitors.
- This ensures that the visitors are only allowed to those places for which they have access.
- Optimisation of resource allocation can be done.

ALTERNATE/EXTENDED USES

- Our project can act as a base for a plethora of projects.
- Female students' location can be tracked both inside and outside the campus by the institute for security reasons.
- Similarly, all students, staff and faculty can also be monitored, if required. [Violation of privacy?]
- Can be simply deployed at buildings for access authorisation.

ALTERNATE/EXTENDED USES

- Can fix appointments with the faculty members with ease.
- Provision of such codes to all male students so as to reduce time and effort required at the pocket gate and main gate in checking the ID cards.
- Visitor count prediction can be done by applying ML on the data obtained over the years.
- QR code mapping can be performed during exams.

DRAWBACKS

- General problem of QR code - lack of encryption
  - Counterfeiting can be done easily.

- A visitor can use someone else's smartphone for false authorisation.

- Precise tracking when the app is killed is only possible on android versions 6.x (M) and below, due to google's updated policies.

- A student visitor can borrow/steal a student's id card and roam around unnoticed.

COUNTERING THEM

PROBLEM	*SOLUTION*	*SOLVED?*
● Counterfeiting and false authorisation	● Guards and trained staff shall be placed at every checkpoint who will authorise the person and verify the QR via scanners.	✔□
● Identity theft and impersonation	● Only guards can verify that	✔□
● Background tracking	● Unfortunately, nothing can be done	✘

FUTURE SCOPE

- Integration with PayTM, Tez, BHIM and other wallets can be provided, for hassle-free payments.
- Chat services can be added besides existing calling feature.
- Security of female students can be enhanced, both within as well as outside the campus.
- Students can focus more while giving exams if QR mapping is implemented.
- A feature to fix appointments with faculty, doctors can be added.
- We intend to develop a finished product soon and launch it on play store.

CONCLUSION

OBJECTIVE	*ACHIEVEMENT*	*ADD-ONS*
● Developing a utility application for visitors. ● Keep track of their movements within the campus. ● Admin dashboard to control access and visualise data of all visitors. ● Digital record of visitors.	● App developed. In alpha testing mode. ● Done, with facility of tracking them outside as well. ● Developed as desired. ● Record generated.	✔☐ ✔☐ ✖ ✖

THANK YOU