VISIBLE: Application for Vehicle Visibility and Incident Reporting in Real-Time

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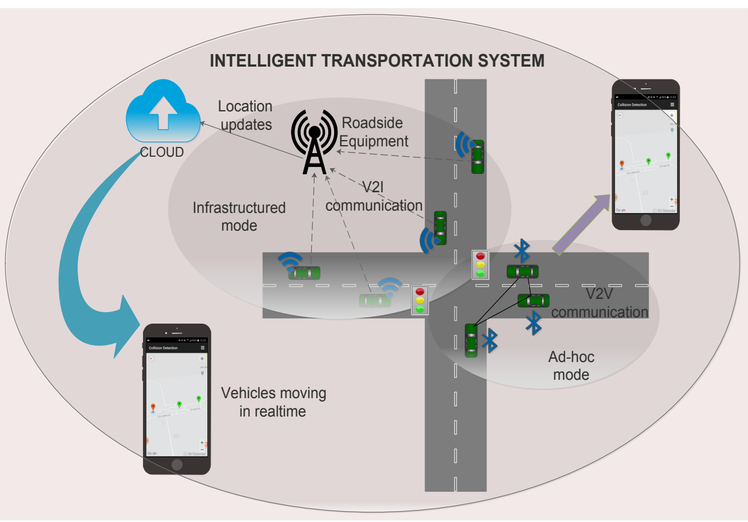
Introduction

- Safety issues in the transportation system are the major concerns.
- V2V/V2I are emerging as an efficient solution for achieving road safety.
- Blind Spots, Intersections, and Ghat Sections are the major accident-prone areas where there is no clear visibility of moving vehicles.
- Internet connectivity is the main concern in areas like ghats.

Objective

- To build a reliable platform that effectively utilizes mobile devices for grasping the traffic situation.
- To develop efficient V2V/V2I communication using cloud technology and P2P.

V2V/V2I Communication



Technologies Used

Conclusion

- We developed a smartphone-based application that can make use of P2P and cloud technology to detect vehicles in the collision domain.
- Future work comprises of audible beeps/alerts if any vehicle comes into danger zone.
- Developing efficient RF (eg. Bluetooth) scanning methods for estimating traffic congestion and speed.

Acknowledgement

This work was supported by M2Smart Project, JST/JICA SATREPS, Japan.

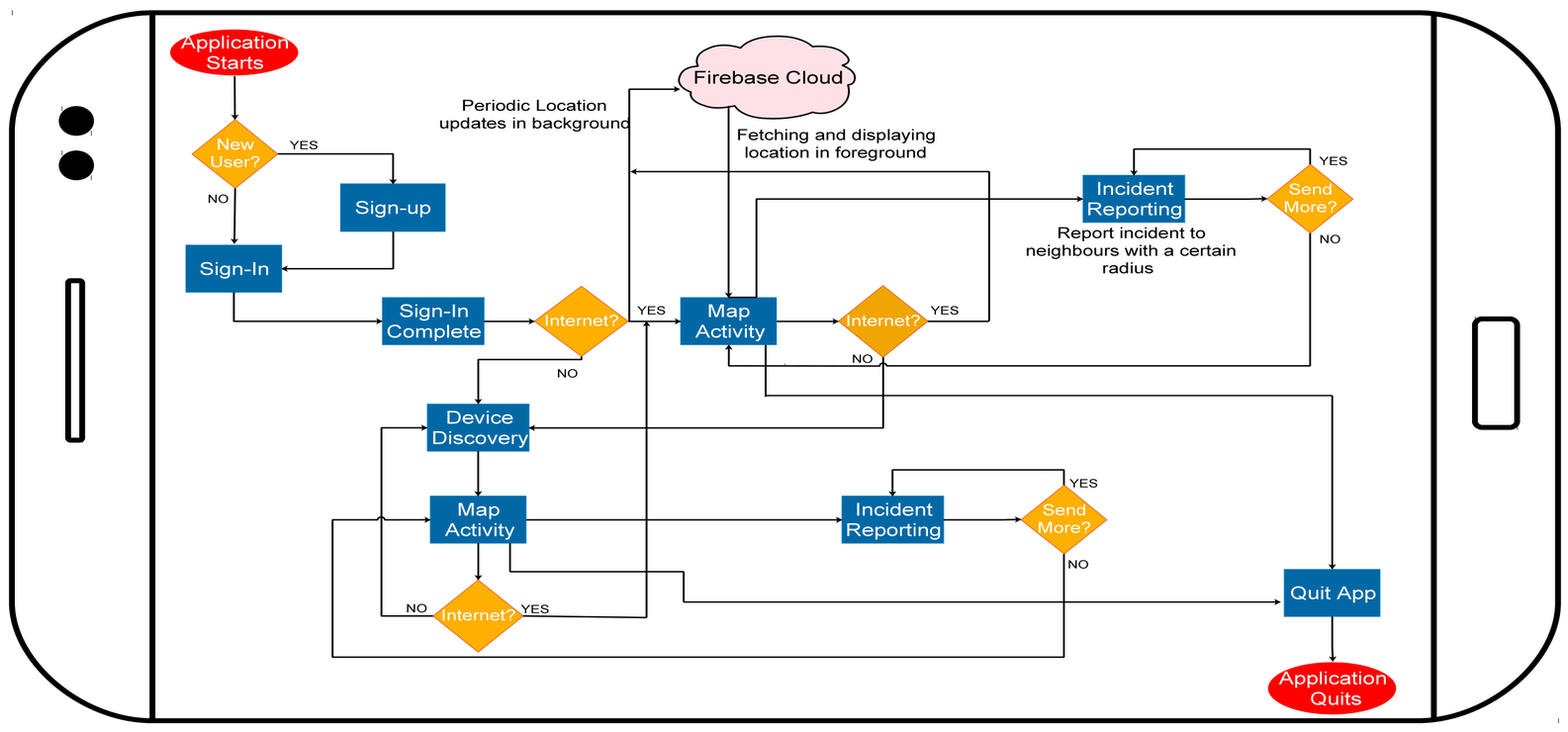
Application Features

1. Real-time visibility of neighbouring vehicles in the collision domain.
2. Incident Reporting within a certain radius.
3. App has two modes, Cloud and P2P.
4. Application automatically switches from cloud mode to P2P mode when there is no Internet.

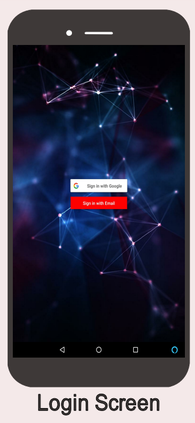
Cloud vs Adhoc Mode

P2P Mode	Cloud Mode
Range is <80m	No bound on range
Unreliable due to link breakage	More reliable
More time to discover presence of neighbour	Less discovery time
More discovery time but less data sharing time	More time to share data i.e. cloud latency
Multihoping	Direct Information sharing using centralized cloud

Application Flow Diagram

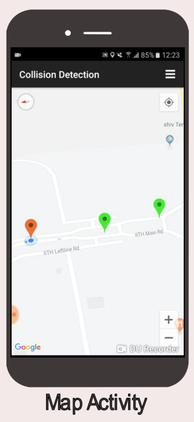


Application Screens



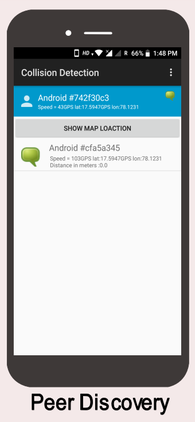
Login Screen

New users can register using Google or Email Sign-In methods



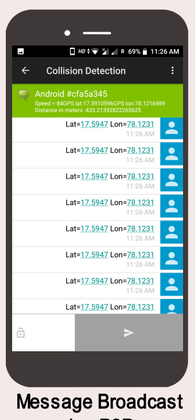
Map Activity

Green markers shows the real-time location of neighbouring vehicles



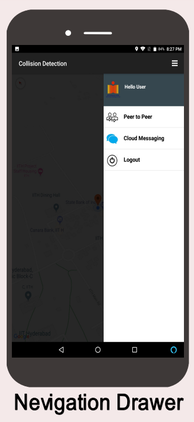
Peer Discovery

Activity to show connected peers and a button to display location on map



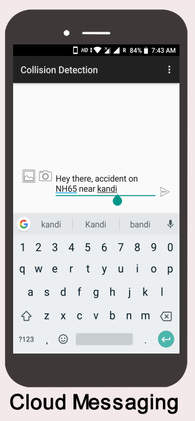
Message Broadcast using P2P

In case of no Internet, location is sent to peers and displayed on map



Nevigation Drawer

Nevigation drawer to switch among different activities of application



Cloud Messaging

Share message within certain radius i.e Incident Reporting

Results and Analysis

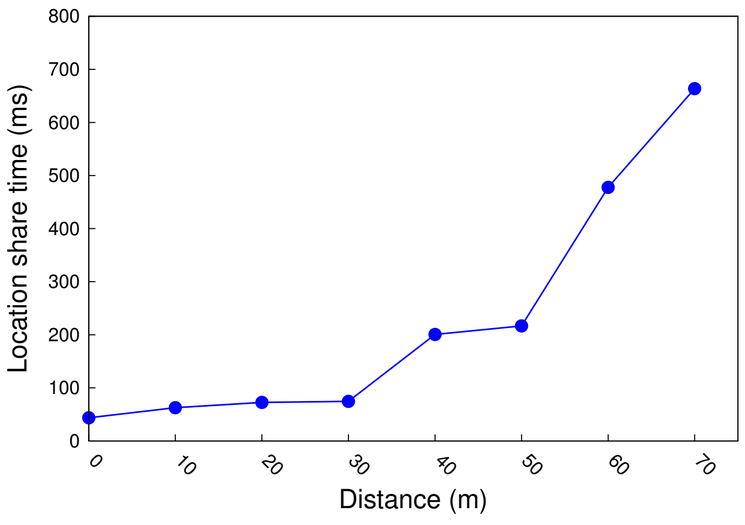


Figure 1: Location share time vs Distance

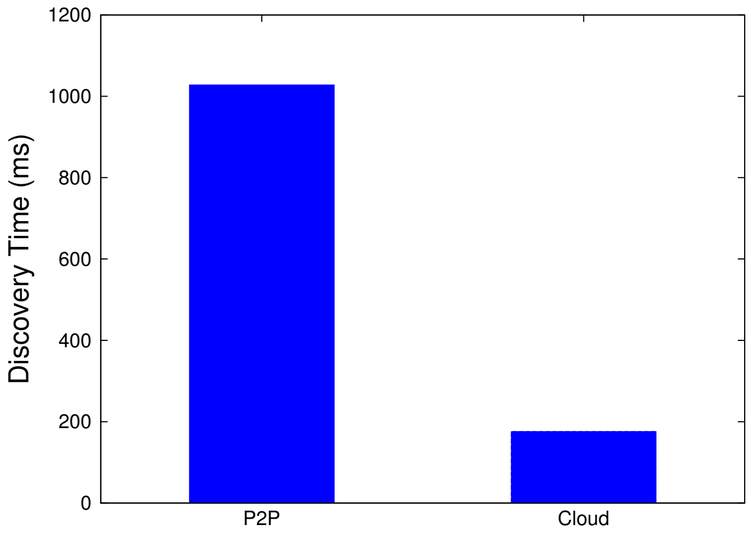


Figure 2: Device Discovery Time

- Fig. 1 shows that time taken to share location to peers in P2P mode increases with increase in inter-node distance.
- Clock of both sender and receiver in P2P is synced using Network Time Protocol (NTP).
- Discovery time is the time taken to discover the presence of neighbour and display its location on the map.