

**GO – A Persuasive Mobile Application For Indian Driving Scenario**

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**Abstract** — *Those who have travelled on Indian roads must be familiar with the wrongful driving practices people perform which sometimes lead to major accidents. We did intensive research to find out the key reasons behind this. We figured out that most of the road mishaps take place due to behavioral issues of the drivers. For solving this road traffic problem, we had to majorly focus in bringing behavioral change that is easy to adapt and without the requirement of a drastic change. In this project, we have made a persuasive mobile application with gamification to encourage and motivate people to adapt better driving practices and drive responsibly.*

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**Keywords**-*Indian driving behavior; Persuasive Technology; Gamification; Road traffic and accidents; Persuasive mobile application*

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**I. INTRODUCTION**

According to World Road Statistics 2015 published by International Road Federation, incidence of road accident related deaths were higher in Russian Federation (19) in comparison to India (11), India being the second highest, during the calendar year 2013 when compared by country-wise number of persons killed per 100,000 population [1]. At state level, Tamil Nadu had the highest number of road accidents i.e. 67250 [2]. At city level, Mumbai had the highest number of road accidents (23468) and Delhi had the highest number of deaths (1622) due to road accidents [1]. The government had listed several causes that lead to road accidents. Out of those, 77.1% of road accidents are caused due to the fault of driver and among the remaining percentage, 4.9% accidents are caused due to the fault of passenger. The rest of the factors are external ones. Since the problem is a huge concern reflecting the driving behavior, there is a need to curb it in a manner that minor changes are made to be adapted, that can be accepted easily. In this project, we developed a 'persuasive' mobile application with gamification, to encourage and motivate people to adapt safe driving practices. Mobile is a device that is now-a-days used extensively for navigation purposes. Therefore, we developed our solution around mobile platform so that users find it user-friendly to use and adapt to.

**II. RESEARCH**

We started our research with literature study. The study was done to understand the severity of the problem at country, state/Union Territory and city level. Through the statistics obtained from the literature study, we got to know that 77% of road accidents are caused due to the fault of the driver [1]. We then wanted to know what all wrongful practices by the drivers are leading to the cause of accidents.

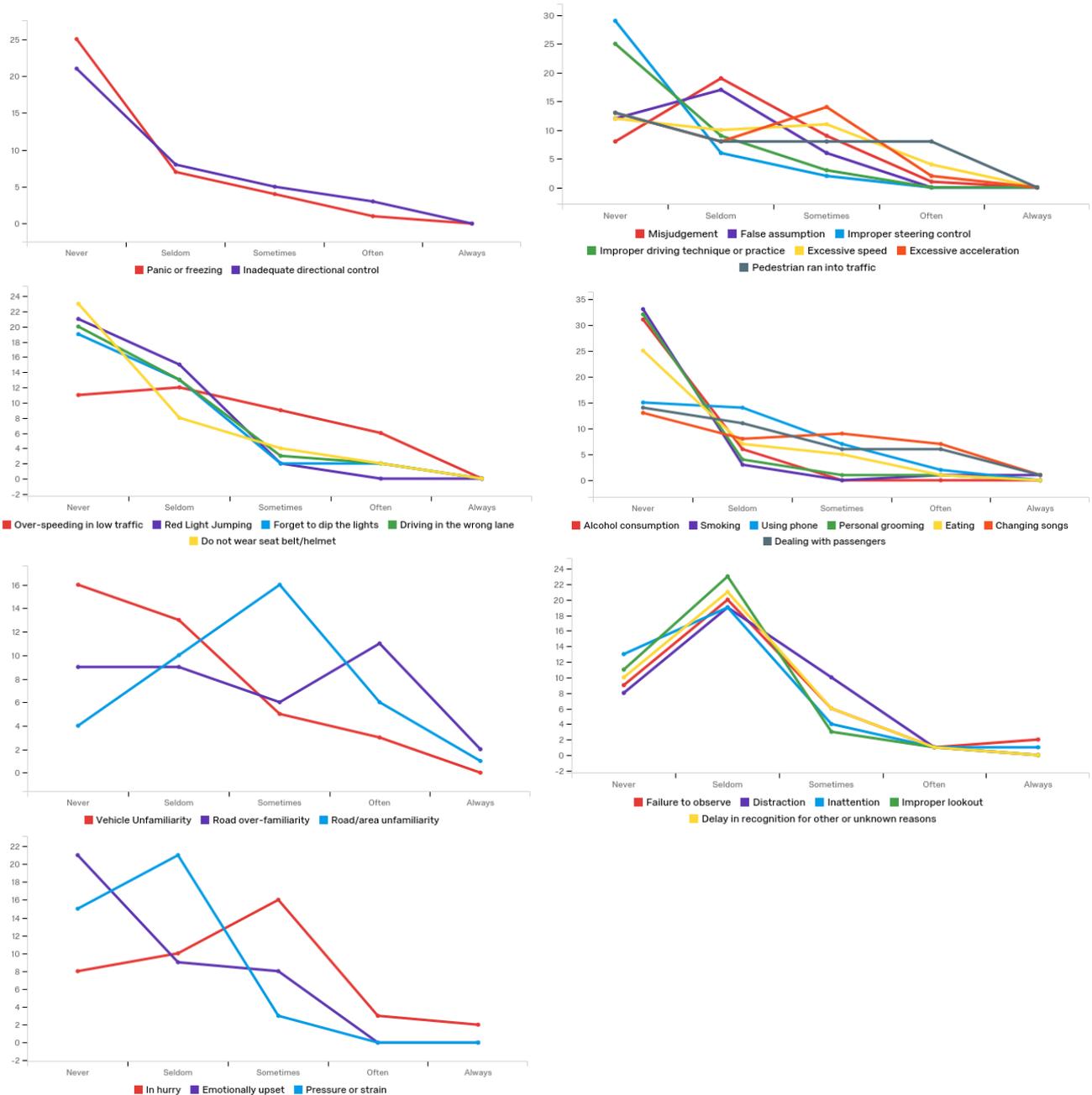
**3.1. Phase I interviews and insights**

From further study, we found the analysis of errors based on Driver Based Questionnaire (DBQ), developed by Reason et al. [3]. The DBQ is essentially an assessment tool designed to identify and classify aberrant driving behaviors into specific categories, which can be utilized by both researchers and industry personnel to investigate drivers' behavior as well as examine the factors associated with crashes and infringements. Reason et al. classified human error into 4 types: Slips, Lapses, Mistakes and Violations (Unintentional or Deliberate). However, it was required to do the same analysis on Indian drivers. We did our research in 6 metropolitan cities of India – Delhi, Kanpur, Kolkata, Bangalore, Pune and Mumbai by means of observation, telephonic interviews, regulating online forms, informal and formal interviews. Based on the study of DBQ, we framed 40 questions for Indian Drivers and conducted it with 34 people of 15-60 age group. These questions were based on the 4 human error types. We tried to figure out how often they performed each type of error while driving based on the options - never, seldom, sometimes, often, always – to choose from. Through the survey, we found that youth often do over-speeding on getting motivated from others on road. People of age more than 30 don't prefer to risk their lives on road as they have responsibilities. People of age more than 30 tend to make lesser mistakes as they have themselves seen or experienced things going adverse on roads due to wrong driving practices.

**3.1.1. Phase II interviews and insights**

Based on the phase I insights, further research was done with 38 people of age group 15 – 30. We redesigned our questionnaire based on human condition states and human direct causes given by Wierwille et al. [4]. This was an online questionnaire with 10 questions in total including age, gender, years of driving experience and remaining questions on

the seven incident causing factors. These factors were mental/emotional, violations, non-driving activities, decision errors, experience/exposure, performance errors and recognition errors.



Through affinity mapping, further insights were obtained. Maximum number of rules are broken under two factors. The first is driving 'in hurry' in unfamiliar route/vehicle and the second factor is driving in hurry in overfamiliar route. Those people who are travelling on the same route since a long time are over-familiar with the route and area. Hence they tend to drive beyond the permitted speed limit. Those people who migrate to new cities for educational, business or service purposes, are less-familiar with the places. Hence, they do not know about the road signs and other road rules of the new city like one way routes, etc.

### III. THE PROPOSED APPLICATION

#### Understanding Persuasive Technology

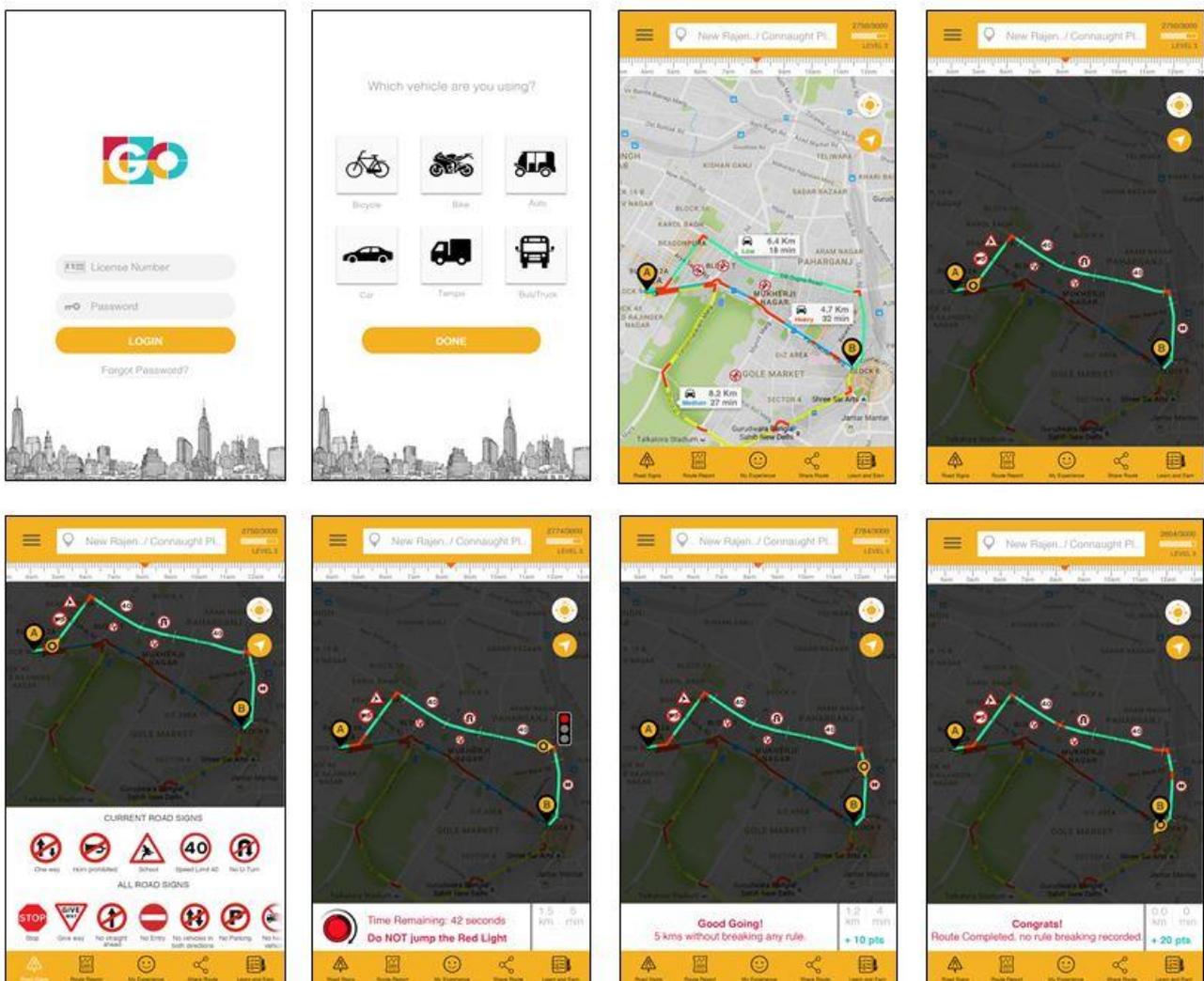
Human interactions are reducing drastically with time. People are interacting more with devices these days. Hence, for the task of persuasion the computers and mobile devices are becoming the preferred platform. B.J Fogg had proposed

Functional Triad in persuasive technology[6]. This states the three ways in which computers can interact and respond to human beings which are tools, media and social actors. In 1996 Fogg had coined the term Captology which stands for Computers As Persuasive Technologies [7]. As people are spending more and more time with computers and mobiles, it is believed that these devices have a high capability in bringing change in human behavior. It always requires a good combination of three factors, motivation, ability and trigger to attain a certain target behavior.

The challenge was to fuse Persuasive Technology with the design problem and come up with a solution. For that we had to find out the appropriate motivating factors and triggers. We have considered few scenarios where the application can be used to persuade the user in driving carefully.

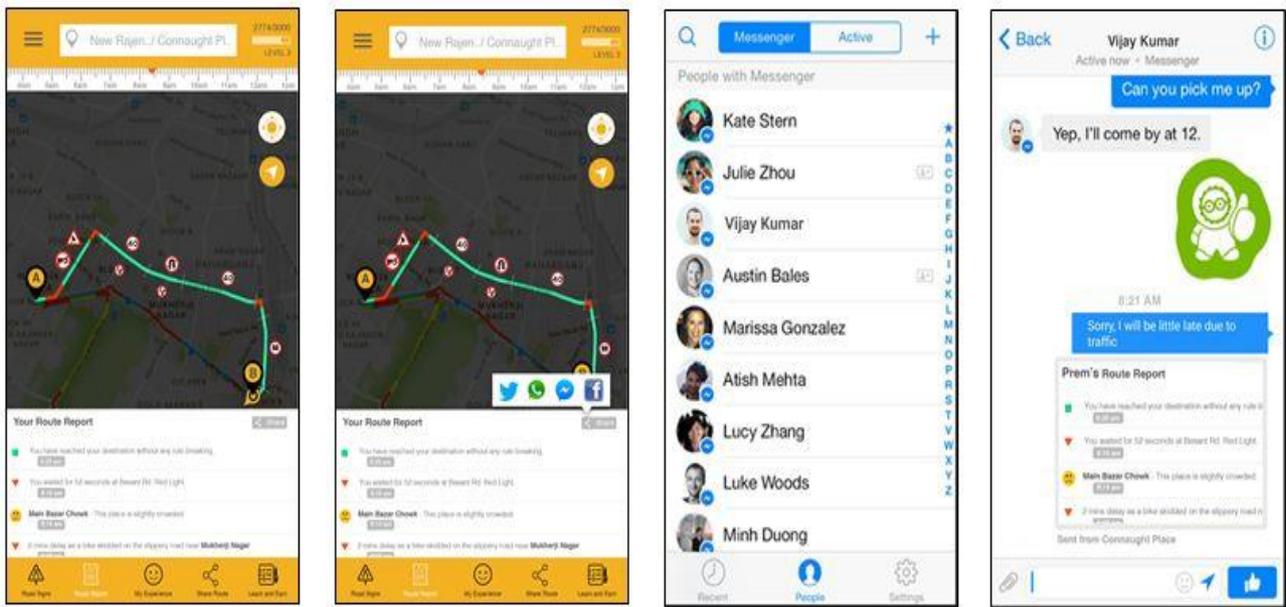
### Scenario 1

A person who is new to the city is going out for office. He is unaware of the city's traffic conditions and roads. In our application, there is a time scale given on the top of the map. The user can slide it and check the predicted traffic information. This feature will be of great help for people who are new to a city. The app suggests multiple routes to the user along with the information like, road traffic, estimated travel time. When the person starts on a route, the app shows all the road signs on it. There is an option at the bottom called 'Road Signs'. On clicking that, it shows the meaning of every sign on the route. This is helpful in case the person couldn't recall the meaning of some road sign. A new person can get the information about the one way roads in the city as one ways turn out to be a huge problem for migrants in metros. It keeps on sending motivating messages along with points, to acknowledge that the user has not broken any rule. Before any red light or any road sign appears, the app gives a prior notification. to the user. It gives live countdown at the red lights. For completing a route without breaking any traffic rule, it gives you points to keep you motivated.



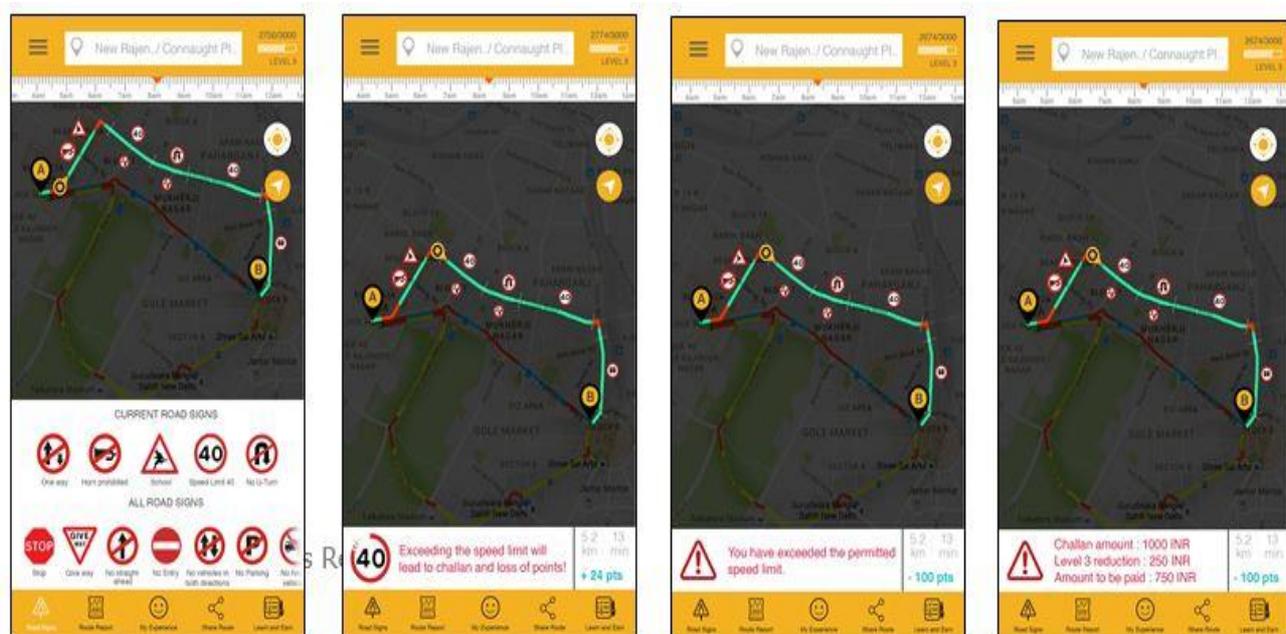
### Scenario 2

For completing a route without breaking any traffic rule, it gives you points to keep you motivated. The application generates an automatic route report. In that it keeps on updating all the recent events on the route. At any point of time, the user can forward it to anybody. For example, the user can forward it to the boss through mail, in case he is getting late due to intensive and unexpected traffic. Thus, there is no need to fear about getting late as the instant proof can be provided. This can reduce the chances of rash driving under peer pressure.



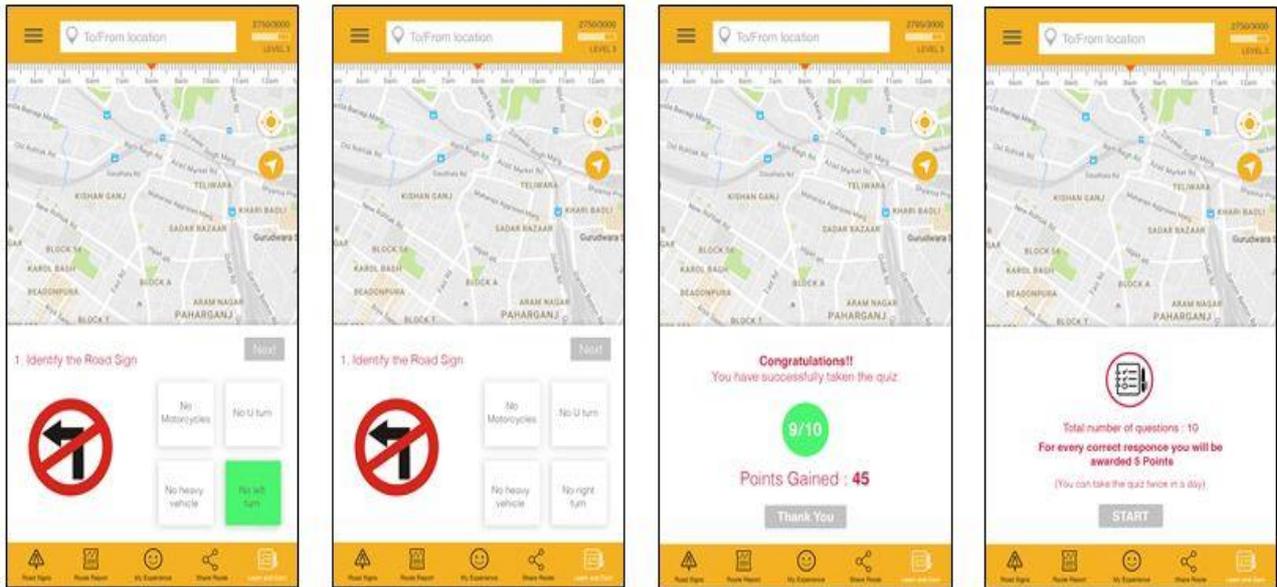
### Scenario 3

The system will give prior warnings and notification to the user for not breaking the rule. But if that too doesn't work the user will have to pay the challan amount to the traffic police through the app. But, if he has earned some level, he will get some reductions on the challan amount but simultaneously his level will fall. Before exceeding the speed limit the app alerts the user. In case of any distraction, the alert will help the driver to get back on track. The message box shows all the details about the challan. It gives him the reduction in challan due of his achieved level and the net amount to be paid. In case the user breaks any rule, Points are deducted and the challan notice pops up.



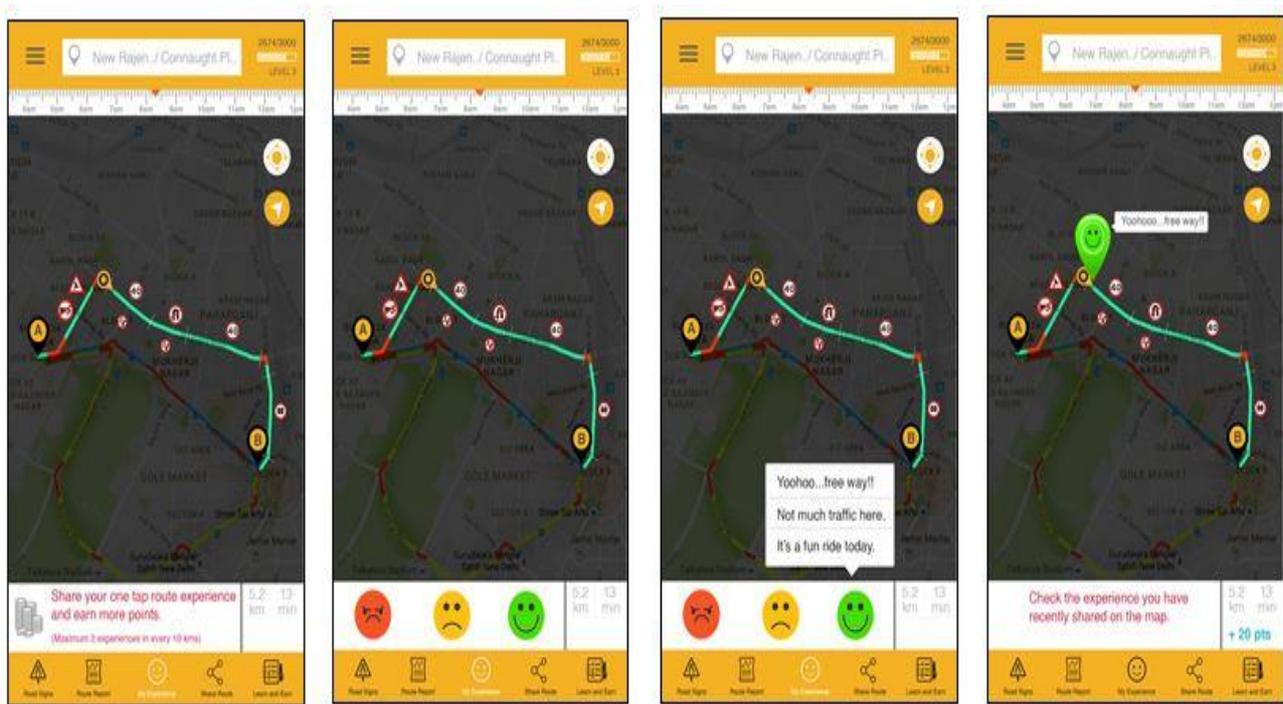
#### Scenario 4

The application has a quiz that will help the user in brushing up his knowledge about traffic from time to time. Points play the role of incentive which will motivate the user to play the quiz again and again. This way he can also learn more traffic signs and rules.



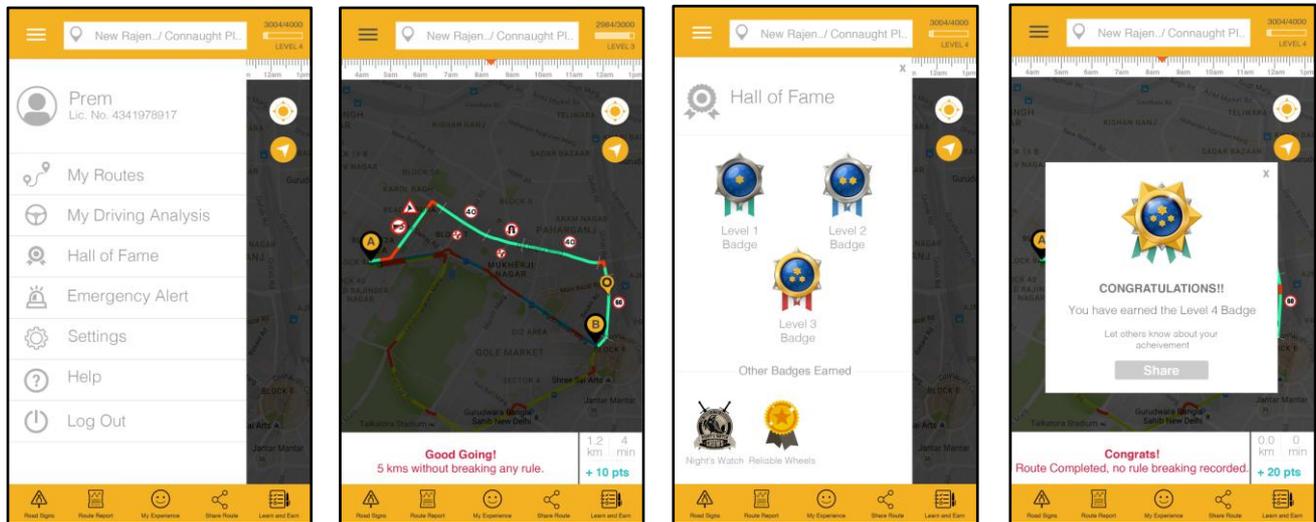
#### Scenario 5

This application has a feature of posting real time experiences. When you are travelling on a route you get the option of expressing your view about the route's condition. This will help other users who just started or about to start on that route to plan in advance. The person using the app can share his/her experience. There are three types of emoticons, happy sad and angry for expressing a smooth, medium and heavy traffic respectively. The emoticon can be sent along with a descriptive message. The user gets points on sharing the experience and hence guiding the other users on the route.



### Scenario 6

The entire gamification in the app works on two things, Points and Badges. For every kilometer of distance the user covers without breaking any traffic rule, he gets some points. For rule breaking his points are deducted. For every 1000 points, he gets a badge. He can post his achievement on social media. This depicts how reliable and safe his driving skills are. Special badges are provided for special tasks (e.g. Night's Watch Badge for safe driving at night, Helper Badge for providing instant help to someone on road, etc.).



### IV. CONCLUSION

Every year a high number of road accidents is recorded in Indian metro cities. Through two iterations of literature study, interviews and insights, we found that wrongful driving practices, especially over-speeding, is majorly done by the youth of age group 15 to 30 years. The main reason derived is 'in hurry', be it on less familiar or over-familiar routes/areas. To motivate these people to follow traffic rules and drive safely, we propose the design of a 'persuasive' mobile application. The application predicts the traffic on the possible routes to your destination, based on previous analysis. It provides live traffic status along with real-time notification of road signs appearing on the road. The user can share the route traffic status with others to kill the fear of facing consequences of getting late. A person can also share his/her experience of route traffic to guide others. Each of such actions fetches the user points which further gives monetary incentives. Our goal is thus, to motivate people through gamification, by providing points for rightful driving practices. This is done to bring gradual behavioral change of not breaking traffic rules under any pressure. We try to persuade people to drive better and stay safe on roads.

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