Carpooling Application for Android Focusing on Authentication and Traffic Analysis

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ABSTRACT
The proposed application aims at creating a system which will make ride sharing easier. It is a platform which provides a stable dynamic security system for the users and thwarting any chances of fake accounts being created. The other features include traffic analysis for the shortest route, so that the passengers take the least time to reach their destination; a unique profile for every user to make authentication easier; user rating for every car owner so that it is easy for the users in choosing a safe ride; a timeline is provided at the homepage of the application for ease of use; in-app communication system for easier sharing of personal details after the ride is finalized.

General Terms
Android Application, Social Networking

Keywords
Android, carpooling GPS, ride sharing.

1. INTRODUCTION
Ride sharing, also known as 'Car Pooling'[1] is one of the upcoming trends basically used for sharing vacant seats in the car on a regular basis with individuals commuting on the same route on a regular basis. Ride sharing is usually supported by corporates to provide a means for the employees to reduce the number of vehicles used for commuting from the workplace thereby reducing the traffic and pollution on the roads.

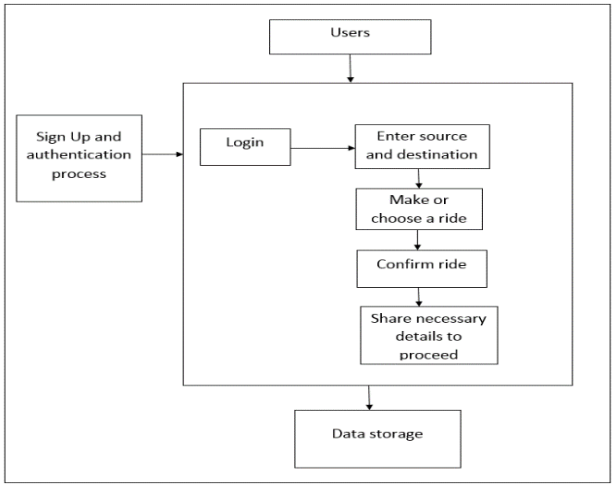


Fig 1: Block diagram of the application

The features of the proposed system are as follows:

- Security: Once the application is installed on an android phone, the user needs to be authenticated for any fake accounts. All the communications are saved and every user needs to provide a valid ID to be able to use the system. If any untoward accident takes place the details of each ride is available at the server to track the supposed culprit if any.
- Car Pooling: The backbone of the application, it allows the users to add a new ride and also search for available rides using the source and the destination.
- Location Analysis: This application will use location provided by the service provider and that will help the driver to pick up other passengers easily. This location will act as a picking point and driver can find the intersection between its route and the user's path. So this will be easy for both user and driver and this will lead to shortest path.
- Traffic Analysis: The application provides a number of routes available to reach the destination considering the traffic conditions, pick-up spots and provides the best rote which would take the least time.
- Communication: Once the participants for a particular ride have been finalized or a single request has been accepted by the car owner, the in-app communication service can be used to finalize the minor details such as pick-up time and spot which is to be mutually decided by the participants.

2. EXISTING SYSTEMS
Following are the systems that already exist and provide similar services. Their features and drawbacks are as follows:

2.1 Toogethr[2]
The features of the existing system called "Toogethr" are as follows:

- No need to register before searching for the offered rides.
- You can look at the other users profile pages without making your own details publicly available
- If the other accepts your ride request, you can share your contact information.
- You can be notified for any new ride that does not preexists.

Drawbacks of the "Toogethr" are:

- The security does not involve authentication of users.

- Lack of feature for choosing between the available routes.
- Limited exposure as it is confined to one platform.
- Non availability of in app messaging.
- Lack of GPS which could be used for efficient tracking of a car currently on the path to destination.

2.2 Carma Carpooling[3]

The features of "Carma Carpooling" are:

- Travelling expenses need to be shared inside the app itself.
- Trip/ride matching is automatic.
- The security of users involve their start and end points.

Drawbacks of this system are:

- No authentication of users.
- Navigation unavailability.
- Payment is mandatory.

2.3 Carpooling.fr[4]

The features of "Carpooling.fr" are as follows:

- Users can use their Facebook account to create a profile.
- User assessment.
- Direct notification through application.
- Calling can be used to contact other users.

Drawbacks of this system are as follows:

- Profile creation can be faked for mischievous motive.
- No in-app communication is available.
- Navigation options not available.

3. SURVEY

The survey[5] conducted with respect to the application and in comparison with the existing systems yielded the following results:

3.1 Updates expected

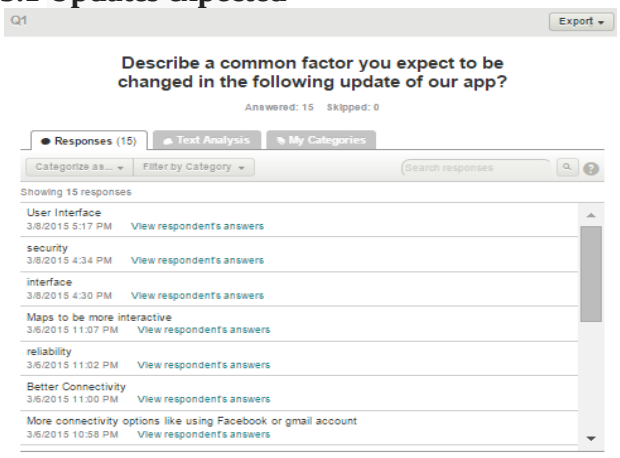


Fig 2: Necessary updates requested.

Analysis of survey: The above survey question was specifically stated to know more about the demands and the expectations of the end user with respect to the application. Every user might have a different approach and view towards the application. For better working of the app, it is necessary to know the expectations of every user. Maximum survey participants expect more development in the interface and the extendibility off the application.

3.2 Usability

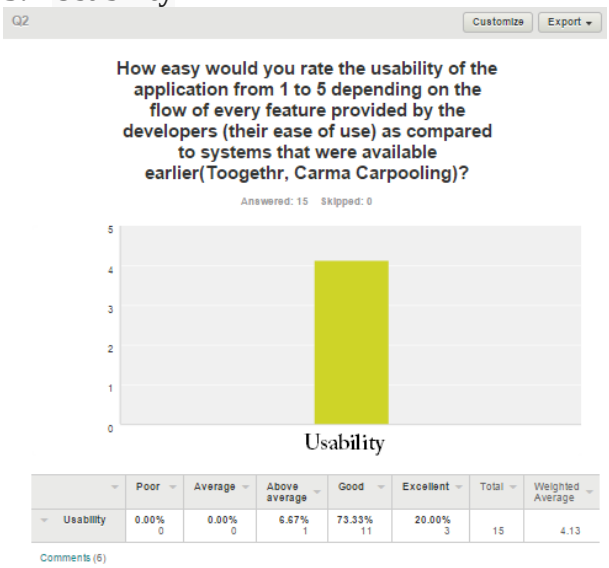


Fig 3: Survey question on Usability

Analysis of survey: Every application on android or any other platform has a particular flow in the features provided within. The previously existing applications had features differently from the current Ride Sharing application. Since the users were exposed to a new set of features, there will be a constraint called "ease of use" in the mind of the developers. The above question asks the users to compare the current application with the previously existing systems with respect to the Usability and the flow of every feature present on the scale of 1 to 5. The reviewing users have given a 'Good' response for the Usability of the app which accounts to 4 units out of total 5.

3.3 In-app Chat service

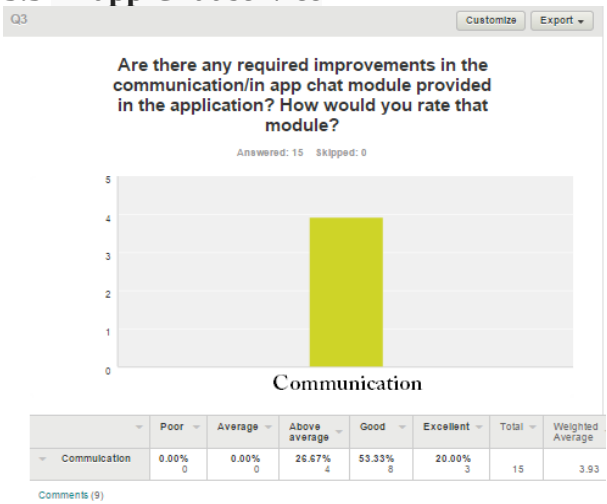


Fig 4: Survey question to review the communication feature.

Analysis of survey: Messaging is the most convenient mode to communicate with each other. The current application has an in-app chat module so that after the ride is confirmed, the users are allowed to share information like personal details including contact details, pick-up points and locations.The survey takers look decently satisfied with the in-app communication module used for exchanging the personal contact information after the 'ride' is finalized.

3.4 Long usage

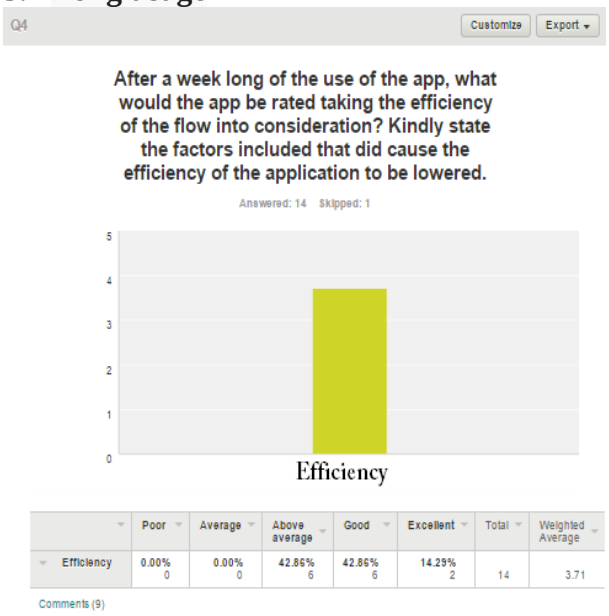


Fig 5: Survey question to review the efficiency of the flow.

Analysis of survey: Efficiency is a parameter which can be affected in various ways. Any fault in any feature will hamper the efficiency of the application altogether. The users were given the Ride Sharing application to use for 1 week so that they have used the app enough to rate it related to Efficiency. In this question there are mixed results, some users are very fine with the way the app is behaving, while the others require more improvements in the efficiency. The developers are working on improvisation on every feature to reduce the complaints related to Efficiency.

3.5 Overall Review

Fig 6: Survey question to deduce the life of the app.

Analysis of survey: Every android application has a particular lifespan after which users prefer using another and an improved version of a similar technology. The above question requests users to state how often they can use the current Ride Sharing application and how comfortable it would be for them to use it during the course of the day. Not every android application is comfortable enough for continuous usage, every user has his own threshold. Considering these constraints, the developers have created the application for maximum possible ease in using it. Given the test results, the application is very comfortable for a daylong use and that no improvements have been requested by the users.

3.6 Authentication

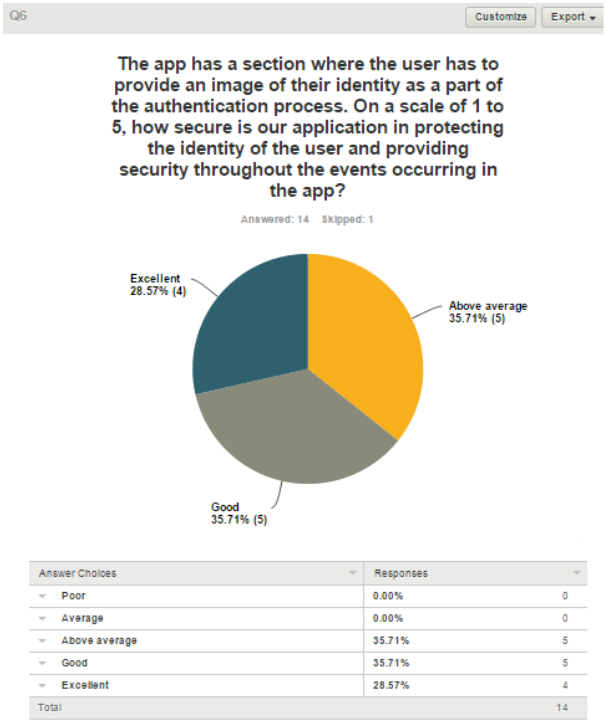
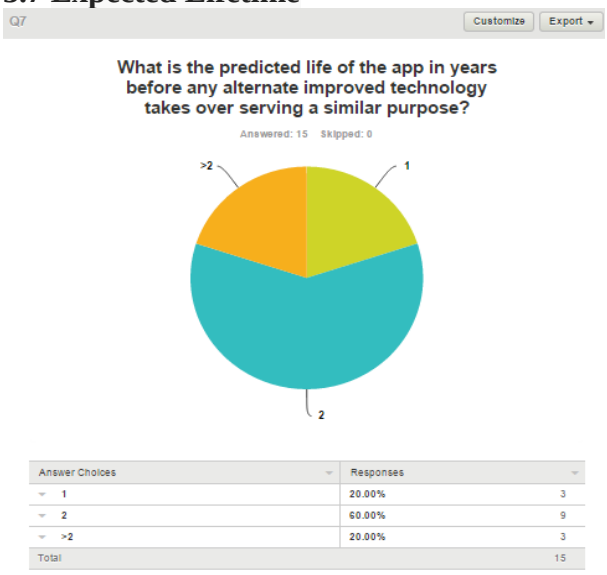


Fig 7: Survey question related to security in the app.

Analysis of survey: Authentication is a major part of any public run application. The authentication module of any application is responsible for protecting the flow of the data taking place during the run-time. In the current Ride Sharing application, the user is expected to provide an image as a part of the authentication process to prove their identity. From the above pie representation, it can be inferred that the authentication process in the application is doing a successful job in maintaining the integrity of the personal information that the users provide.

3.7 Expected Lifetime

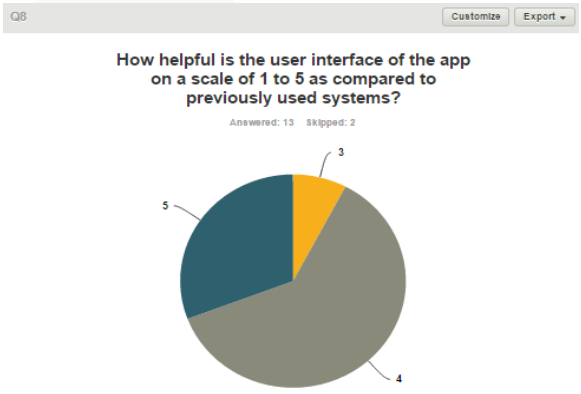


Answer Choices	Responses	
1	20.00%	3
2	60.00%	9
>2	20.00%	3
Total		15

Fig 8: Survey question for expected lifetime of the app.

Analysis of survey: For any developer, the success is marked by how long the application stays without being replaced by any other improvised version or a system.Every application has its predicted lifetime till another more supervised technology comes into competition. The review takers were expected to predict the life of the app in years. Here, maximum users predicted that the app will last for at least 2 years. This is because the proposed system has all the features in one application which the previous existing systems lack.

3.8 User Interface

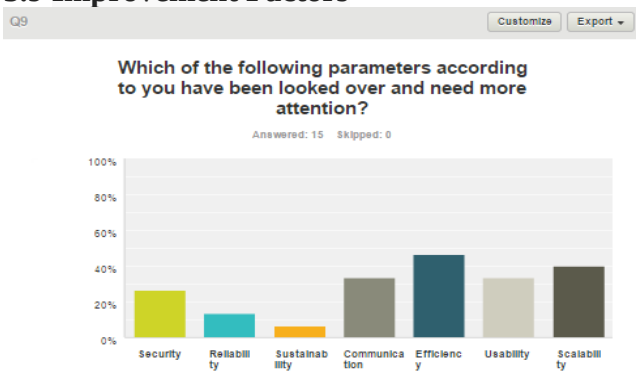


Answer Choices	Responses	
1	0.00%	0
2	0.00%	0
3	7.69%	1
4	61.54%	8
5	30.77%	4
Total		13

Fig9: Survey question for user interface.

Analysis of survey: The user interface, commonly known as the UI of an application helps make it easier for a user to understand the features provided. The user interface guides the user through each and every step ranging from signing up to the application to choosing the source and destination and view the map. The above pie charts show that the user interface, as compared to the previous existing systems is more helpful and easy to use. The application being a straight line design, it's easy for the user to understand it.

3.9 Improvement Factors

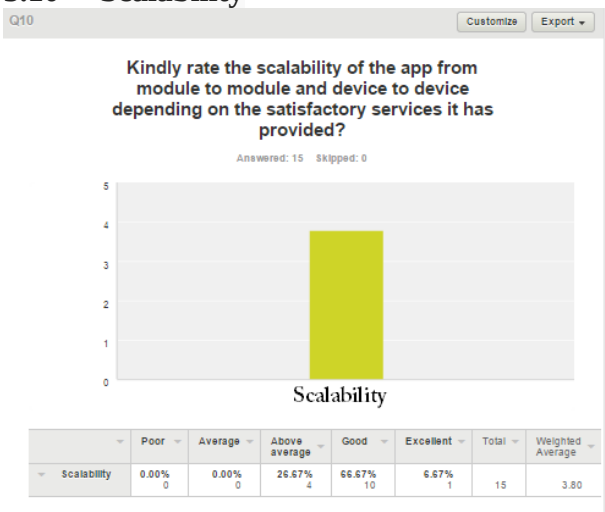


Answer Choices	Responses	
Security	26.67%	4
Reliability	13.33%	2
Sustainability	6.67%	1
Communication	33.33%	5
Efficiency	46.67%	7
Usability	33.33%	5
Scalability	40.00%	6
Total Respondents: 15		

Fig 10: Survey question requesting review on the parameters.

Analysis of survey: A developer does not always know the requirements of the user. Requirements differ from user to user. The question above was framed with the intent of knowing the improvements in various parameters covered in the current application. From the above observations, the survey takers expect the developers to improve on the 'Efficiency' and the 'Scalability' of the app. Some also need improvisations in the 'Communication' feature provided in the app.

3.10 Scalability



	Poor	Average	Above average	Good	Excellent	Total	Weighted Average
Scalability	0.00% 0	0.00% 0	26.67% 4	66.67% 10	6.67% 1	15	3.80

Fig 11: Survey question for scalability of the app.

Analysis of survey: Scalability refers to the extendibility of the features and how long will it serve the purpose. It also concerns with the ability of the system to handle the growing amount of workload or pressure, like the increasing amount of users at one point of time. As seen in the previous question, the users require more developments in the 'Scalability' of the application.

4. CONCLUSION

The application brings together all the features which are needed to make sure that the services provided by it are secure and efficient. The existing systems lacked some of the features which this application overcomes and it is evident from the survey which is based on the parameters used for inferring the application's quality. The application will further be developed for different platforms other than Android such as iOS and Windows as every user prefers their own choice of operating system. The authentication system will be further developed for complex images using the image processing techniques.

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