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Bike Sharing & Rental System: An Android Application

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Abstract*— Bike sharing systems offer a low cost and environmentally friendly mean of transportation for short travels. It can also be used as a complementary mode to other public transit such as buses, local trains. Bike sharing systems combine the advantages of public and private transportation to better exploit the given transportation infrastructure. This will be an android application which will provide both sharing and rental service. A key aspect of this system is that it does not involve intermediaries between users and bike: reserving, acquiring and releasing a bike are all done automatically through software running on the system of user's smartphone. It will provide bikes for short-term trips on sharing basis and bike on rent. A typical bike-sharing system includes a communal stock of sturdy, low-maintenance bikes distributed over a network of parking stations. From an individual person's point of view, bike-share systems eliminates the inconvenience of bike ownership, the need to find parking places, and the fear of theft. It helps in reducing traffic congestion as number of vehicles on road can be reduced significantly.
Keywords*—transportation infrastructure, android application, short-term trips, stock of sturdy, traffic congestion

I. INTRODUCTION

Bike sharing systems are the key to sustainable mobility. They need to possess adaptation features to answer the different user needs, and must be automated to avoid intermediaries between users and system. It can also be used as a complementary mode to other public transit such as buses, local trains. Each station is a different product, the distance to a station and the bike-availability are main characteristics, and the set of stations with available bikes is the consumer's choice set. This choice is made by the traveller, according to his distance from the different station. The stations that are geographically close and that are likely to be visited successively within the same route in such cases sharing system will be used. Bike-share systems eliminates the inconvenience of bike ownership, the need to find parking places, and the fear of theft. A key aspect of this system is that it does not involve intermediaries between users and bike: reserving, acquiring and releasing a bike are all done automatically through software running on the system of user's smartphones[2]. The paper is organized as follows: Section II is about literature survey. Section III discusses the experimental results. Section IV is about the architecture of an android application and security in this bike sharing and rental system. Section V contains future scope and conclusion.

II. LITERATURE SURVEY

A. First Generation

The bike sharing began in Amsterdam with the first generation of White Bikes (Witte Fietsen). These were ordinary bikes, painted in white and provided free of charge for public use. The principle was that anybody could find a bike, use it and leave it to the next user. But things did not go as expected: bikes were stolen and kept for private use[3].

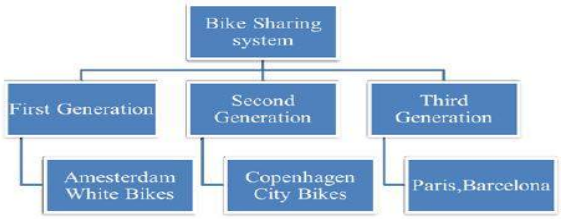


Fig. 1 Bike sharing programs adopted in the countries

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B. Second Generation

The second generation of bike-sharing program was born in Farsø and Grenå, and Nakskov, Denmark, respectively. Although these programs were small, as Nakskov had 26 bikes at 4 stations, the first large scale example of the second generation of bike sharing program was developed in Copenhagen. It was named as city bikes.

C. Third Generation

The third generation of bike-sharing program was born at Portsmouth University, England, by the name of Bikeabout. This third generation became smarter due to technological improvements including electronically-locking racks or bike locks, telecommunication systems, smartcards and fobs, mobile phone access. Fig.1 shows Bike Sharing programs adopted in the countries. In April 2013 there were 535 programs with an estimated fleet of 517.000 bikes and 750 stations, which expanded to 23.600 bikes in a few years. The success of these last programs brought the bike sharing concept to a whole new level. Starting in 2008, bike sharing systems started diffusing also outside Europe, reaching Brazil, Chile, China, New Zealand, South Korea, Taiwan and the U.S. Wuhan and Hangzhou of China are the two largest in the world, with respectively 90000 and 20000 bikes. While outside of China the largest program is Vélib in Paris with around 20000 bicycles and Citi Bike in New York is the largest bike sharing program in the United States with 5000 bikes[8].

III. EXPERIMENTAL RESULTS

Fig. 2 shows number of bike sharing programs from 1995 to 2015.

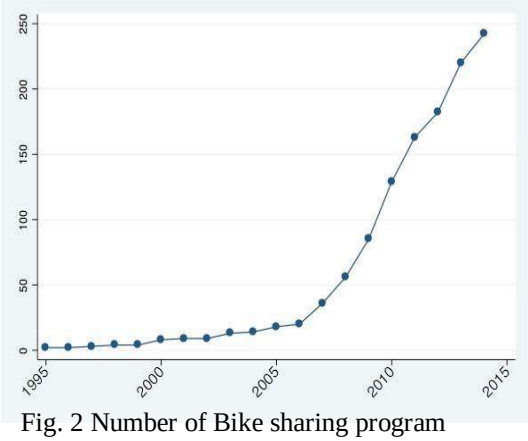


Fig. 2 Number of Bike sharing program

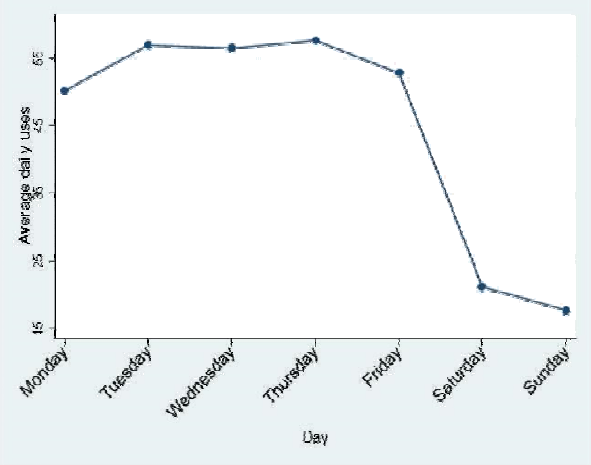


Fig.3 Average daily uses per day of the week

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Fig. 3 shows average daily uses per day of bike sharing system. Also Fig. 4 shows month wise average daily uses of bike sharing system.

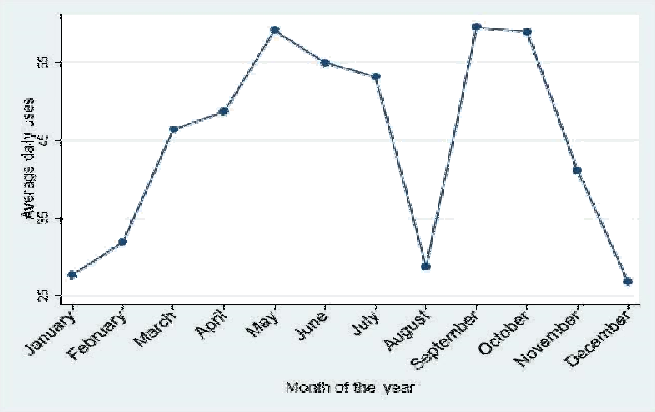


Fig.4 Average daily uses per month

IV. PROPOSED SYSTEM

Fig. 5 shows 'share system' of an android application and fig. 6 shows 'rent system'.

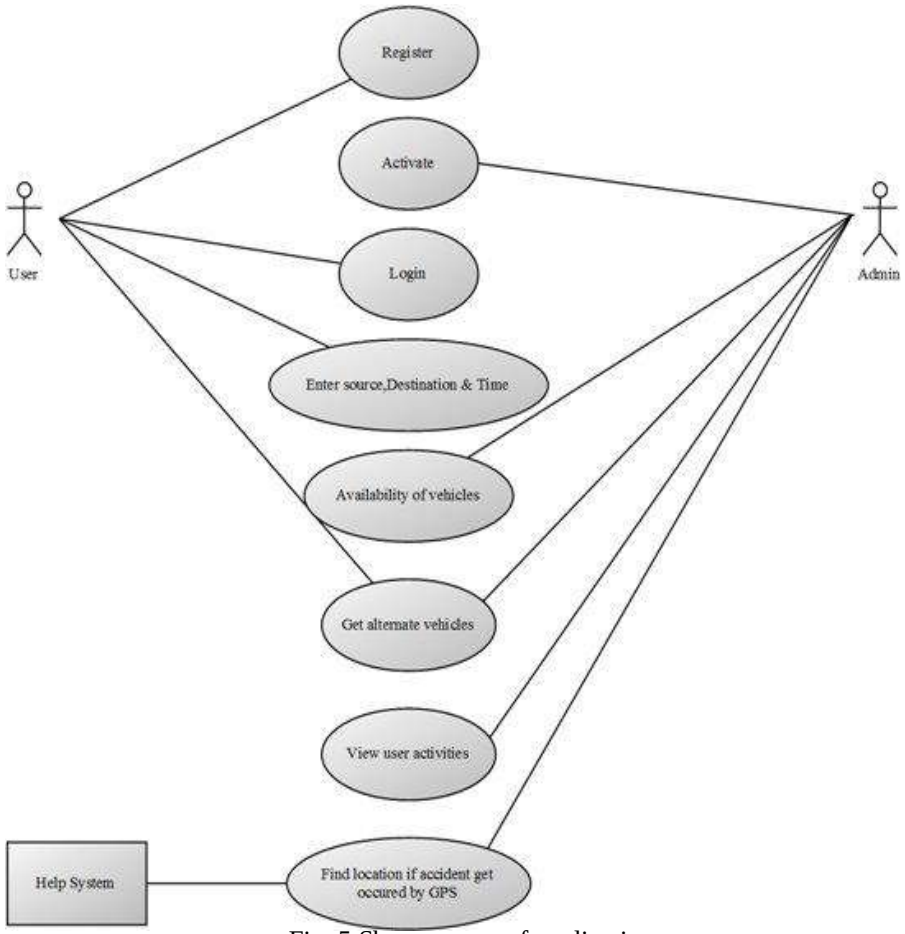


Fig. 5 Share system of application

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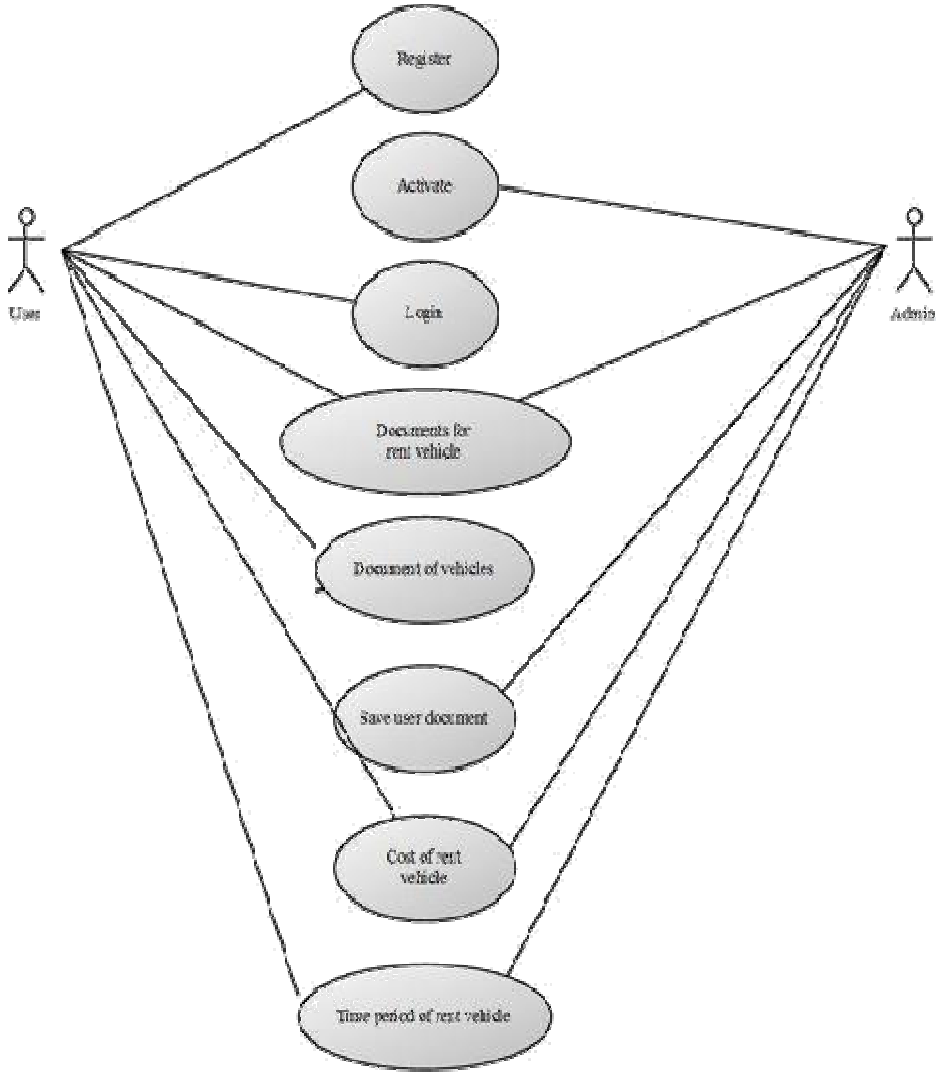


Fig. 6:- Rent system of application

A. Security

Security of customers is very important aspect in the bike sharing and rental system. Following fig. 7, tells more about security handling in this system.

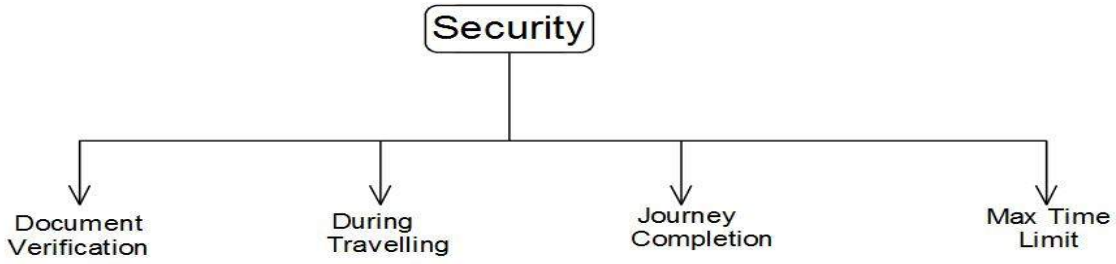


Fig. 7 Security in android application

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1) Documents Verification: Documents of both user and provider will be verified such as pan card, driving licence, mobile number by sending OTP on mobile.

2) During Travelling

Gender Problem

In sharing, only male with male & female with female will be allowed.

B. Accident Problem

There will be an emergency button provided in an application, by pressing that button, Customer/Driver will send message to Admin, Relative, Ambulance, Police, Bike Provider for help system. The location will be tracke with the help of gps.

1) External Attacks. When max time limit expires, then admin will message to user and driver if he doesn't get response, then he will wait for some time, after crossing time limit he will message to police for mishappening.
2) Journey Completion: After completion of ride, both driver and customer will click on "Submit" button at the same time, and that notification will go to admin.
3) Max Time Limit: There will be time limit for every journey. If any journey does not conclude within specified time limit. Then admin will call to driver and user to know about the situation.

V. CONCLUSION & FUTURE SCOPE

A. Conclusion

The optimal distribution of bike sharing stations should first of all cover the stops of medium/long range transportation modes. We can say that most of the station is visible, the more effective is the location. Indeed visibility from five of the included attractors have positive influence (i.e. tram and bus, metro and train stops, theatre). It will be better to place bike sharing stations where their visibility is maximized[8].

B. Future Scope

If we want to maximize the use of bike sharing system, the lead agency needs to have the support of stakeholders and partners. These stakeholders may be including:

Local municipality (funding and space).

Public transit operators.

User association, other groups (e.g. vehicle sharing companies[15].

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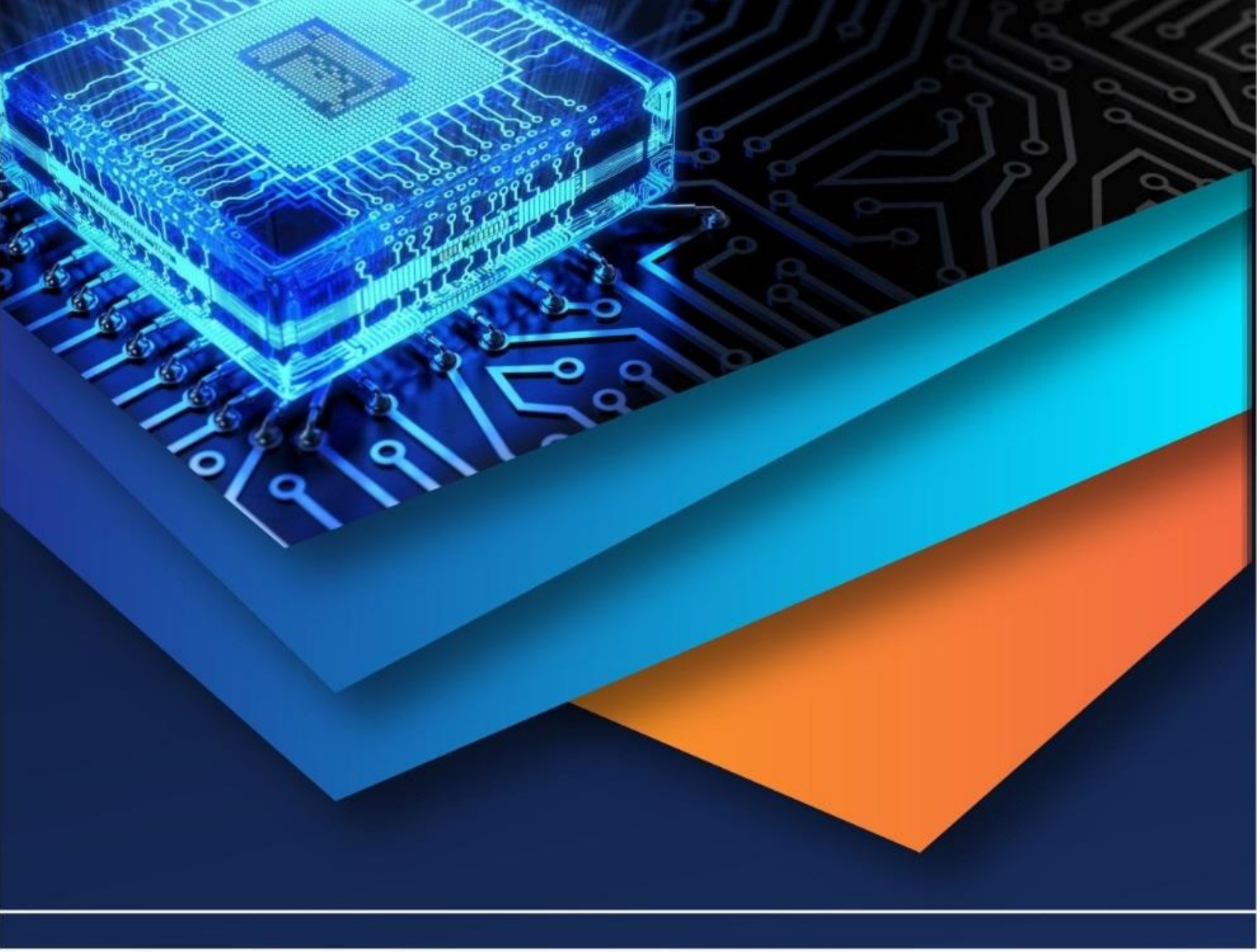
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