



# ANDROID APP: BICYCLE TRACKING AND INCENTIVIZATION

**Rushikesh Nikam**

Computer Engineering, Savitribai Phule Pune University, Pune, India  
[rushinikam751998@gmail.com](mailto:rushinikam751998@gmail.com)

**Sushrut Patil**

Computer Engineering, Savitribai Phule Pune University, Pune, India  
[sushrut7898@gmail.com](mailto:sushrut7898@gmail.com)

**Sareen Shah**

Computer Engineering, Savitribai Phule Pune University, Pune, India  
[sareen279@gmail.com](mailto:sareen279@gmail.com)

**Roshan Singh**

Computer Engineering, Savitribai Phule Pune University, Pune, India  
[roshansingh322014@gmail.com](mailto:roshansingh322014@gmail.com)

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**Abstract:** This Android application uses the Global Positioning System (GPS) to track down the cycling activity of the user. The system provides the user with his history of cycling routes, time, average speed and distance covered. Also he can have his personalized wall to post different activities and compete with other users by participating in summits. Functionalities like login for users through face book, Google account and leader boards are also included. Incentives are provided to the top performers based on predefined criteria. In order to check if the user is not cheating Image Processing is used to make sure the user is on a bicycle.

**Keywords:** Image Processing; GPS; Google Maps API; Tensor Flow; CNN; GSM;

## INTRODUCTION

This report is on a critical, but neglected mode of transport, i.e., cycling. Cycling is amongst the most sustainable modes of mobility. Having zero dependence on fossil fuels and zero emissions, cycles have zero environmental impact and present an affordable transport option for millions of Indians who cannot afford any form of motorized transport. Despite meeting the mobility needs of millions of Indians and despite its positive social and environmental externalities, cycling in India has not grown in numbers over the last decade. There is an urgent need to arrest the decline in the ownership and use of cycles and give an impetus to the cycle industry.

This Android Application will help people to track their routes and also compete against other users on the application via different summits. Moreover to encourage cycling, incentives will be provided to people depending on different criteria. The application uses the GPS system provided by the smart phones to track the user.

The GPS uses satellites to get the exact location of the phone in terms of longitude and latitude. The smart phone utilizes this coordination and uses them to show the phone's location in a map application. An open source technology with location-based services and free map API is needed to develop a tracking system. It is hoped that this application will draw the attention of people to provide an impetus to this clean and inclusive mode of transport.

### LITERATURE SURVEY

To determine precise location of the object Abid Khan and Ravi Mishra have proposed a tracking unit which is attached to and using GSM modem this information can be transmitted to remote users. This system contains GPS and GSM modems along with an ARM processor that is setup in the vehicle. Through SMS the location of vehicles can be reported. GSM and GPS technologies help to track the vehicle's exact information. Real time control is provided by the SMS system. You can monitor the location from anywhere using this system.

Sagar Tete, Shailesh Sahare, Diksha Likha and Reshma Badalu also stated about a vehicle tracking system using the inbuilt GPS of Smartphone. They used it to get the coordinates of many taxi drivers and send this location to the server. The server then allots a taxi to each request made by the user [2].

Sathe Pooja's paper describes a practical model for routing and tracking of mobile vehicles in a large area outdoor environment based on the GPS and GSM. The supporting device GPS continuously moves with the car and will calculate the coordinates of each position and when required by the owner it can be communicated with the help of GSM modem which is installed in both transmitter and receiver section [3].

From the report of author Rohith Sri Sai, Mukkamala Rella, Sindhusa Veeravalli and Sai Nagesh, we get to know that it is a critical part of many applications such as image search, image auto-annotation and scene understanding, object tracking. Moving object tracking of video image sequences was one of the most difficult tasks. Also the most efficient technique to do the detection is discussed along with its details [4].

### I. PROBLEM DEFINITION

It is targeted that this project will serve as a good motivation for the people to take on bicycle riding as a hobby or for daily commute to office or mundane chores. The trade-off between performance and cost is expected to be optimal for Indian Market. Keeping the above factors in mind, we propose to develop an android application to track your cycling activity and get routes and compete in summits. Following an incremental approach, this prototype is expected to track the riders along their path to destination along with their different parameters in its earlier stages and then moving on to implement leader boards and extending incentives to encourage people to use eco-friendly modes of transport.

Large-scale substitution of motorized private transport by cycling can also reduce noise pollution, improve road safety, and provide recreational value to users. The idea of cash backs has been implemented here for the people to start using this application and, in future, support the main objective of making people use bicycles and reduce pollution levels.

### II. AIMS AND OBJECTIVES

The objectives of this project can be summarized as follows:

Develop a bicycle tracking application that has the ability to:

- i) Get the location of the device using the GPS/GSM of the Smartphone
- ii) Calculate the average speed during the whole trip along with total distance and total time required.
- iii) Post the trip details on the personalized wall.
- iv) Calculate the incentives that the user has earned as per the predefined criteria.
- v) Check using image processing that the user is not cheating.
- vi) Display Leader boards and arrange friendly competitions.

### III. METHODOLOGY

The user first has to login to the application using his email and password. If he is a new user he can sign up using his Google account or face book account. In this way the authenticity of the user is verified with Google or Face book. Even he can opt for email and mobile number signup.

He is directly directed to the Home Page wherein he can view all his trips he has recorded before along with other details like average speed, total distance, time required for the trip. At the right corner he can see the record button using which he can start recording his new trip. During the recording phase the mobile is to be placed on the handle on the mobile holder provided. The activity and route is recorded using the Google Maps API which is free of cost until some limit. The location is traced using either the GPS or GSM whichever gives a precise location than the other. During the trip the route details are stored in the database. Here the database we use is Firebase which is a cloud-hosted NoSQL database that lets you store and sync data between different users at real time.

It may happen that the user is using some other mode for transport and trying to cheat with us, so for that purpose we are using the camera setup already available in the Smartphone. The camera is instantiated in the background and a picture is clicked and object detection is done using the pre-trained model. To optimize the battery usage of Smartphone the camera clicks a picture only when the current speed becomes 0. If the intended result is not obtained from the model then a warning message is displayed to the user.

If the requirements of the app are not satisfied the trip is stopped immediately. And if the trip is recorded successfully the user has the option to post it on his personal feed. The total distances of each user is calculated and accordingly the winners of the month, week or overall are chosen. The users can also subscribe to get some additional features. When the data in the Firebase database is changed all the mobile devices listening gets the updated data. According to the progress of the user the incentives are calculated and are deposited in his account registered with the application.

#### IV. MODULES

The different modules in the application are:

- A. User Login: The user can login using his email and password. The forgot password option is also present which sends a link to the registered mail to reset password.
- B. User Signup: The user can sign up using Google, face book or email id.
- C. Bicycle Tracking: System will track the location using GPS or GSM.
- D. Plotting Route: The route is plotted using the Directions Service class.
- E. Distance and Speed Calculator: It provides the average speed of the whole trip along with the distance covered.
- F. Leader boards: The user can see his achievements and progress towards his goals
- G. Feed: The user posts his trip details on the feed which he can review later.

#### V. SYSTEM ARCHITECTURE

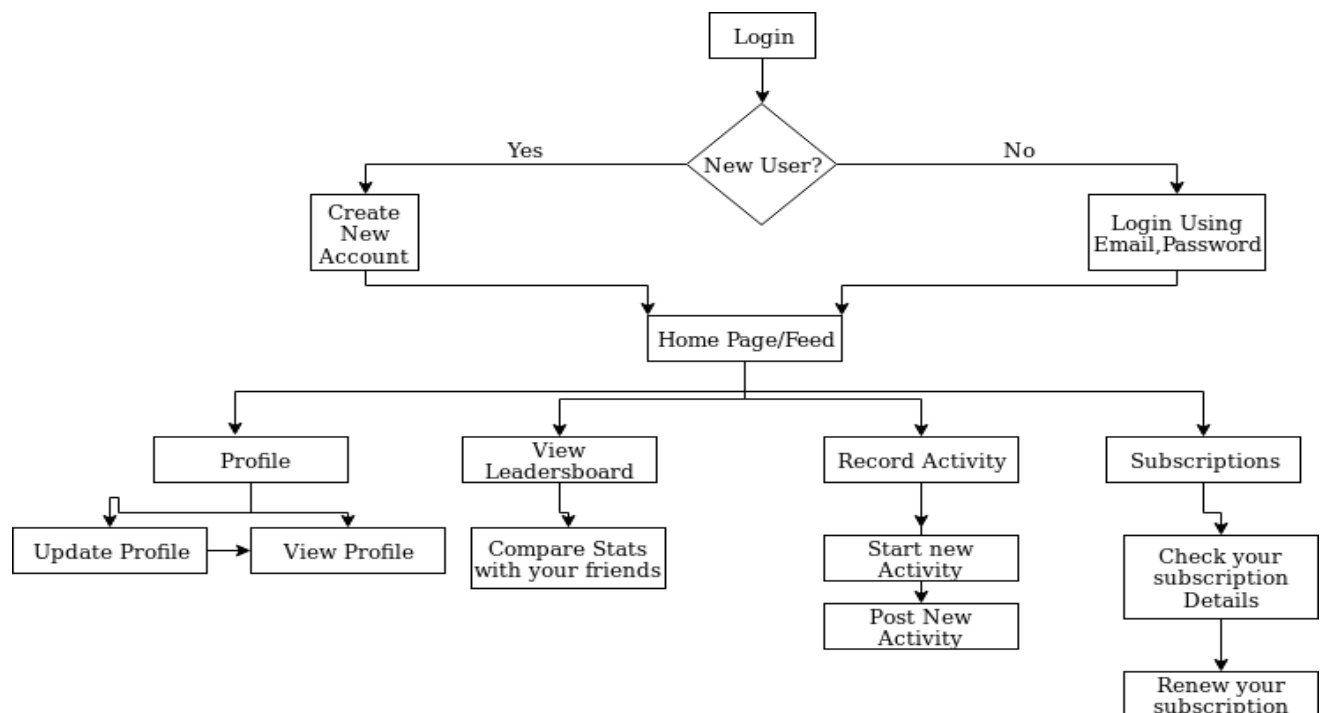


Fig. 1 System Architecture



## VI. CONCLUSION

An application is made which can track the cycling route; calculate speed and distance travelled during the use. The application can be used at a competitive level with features such as leader boards and a points system for trained athletes. This objective has been met successfully. Efforts are also made to increase awareness of cycling and reduce the effects of pollution to go towards a 'better world'.

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