Software Requirement Specification

For

Bicycle Renting System

Prepared by

Aditya Gupta (2015CSB1003)

Sachin Bijalwan (2015CSB1027)

Vinit Kothawade (2015CSB1039)

Piyush Jain (2015CSB1023)

IIT Ropar

Supervised by

Dr. Balwinder Sodhi

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1 Revision History

Version	Date	Reason

1.0	20 Feb 2019	Initial Document

2 Introduction

2.1 Purpose

The purpose of this document is to present requirements of a Bicycle Renting System (BRS) using simple natural language and UML diagrams. This is a functional description of those features that our BRS provides. A short discussion accompanies each requirement, to add to the background and framework necessary to explain the functionality. It also describes nonfunctional requirements and other factors necessary to provide a complete and comprehensive description of the requirements.

2.2 Document Conventions

This document uses the following conventions

- DB: Database
- BRS: Bicycle Renting System

2.3 Intended Audience and Reading Suggestions

This document is intended for developers, users, mentor, admin, project managers.
The contents of this document can be found in the Table of Contents section of this document.

2.4 Product Scope

Our BRS would allow any IIT Ropar member to rent and lease a bicycle. For renting, each user would have to pay some amount and for leasing each user would be paid some amount(decided by our system). Apart from that it would allow people responsible for maintenance(admins) of bicycles to manage bicycles.

2.5 References

IEEE 830 SRS Template

3 Overall Description

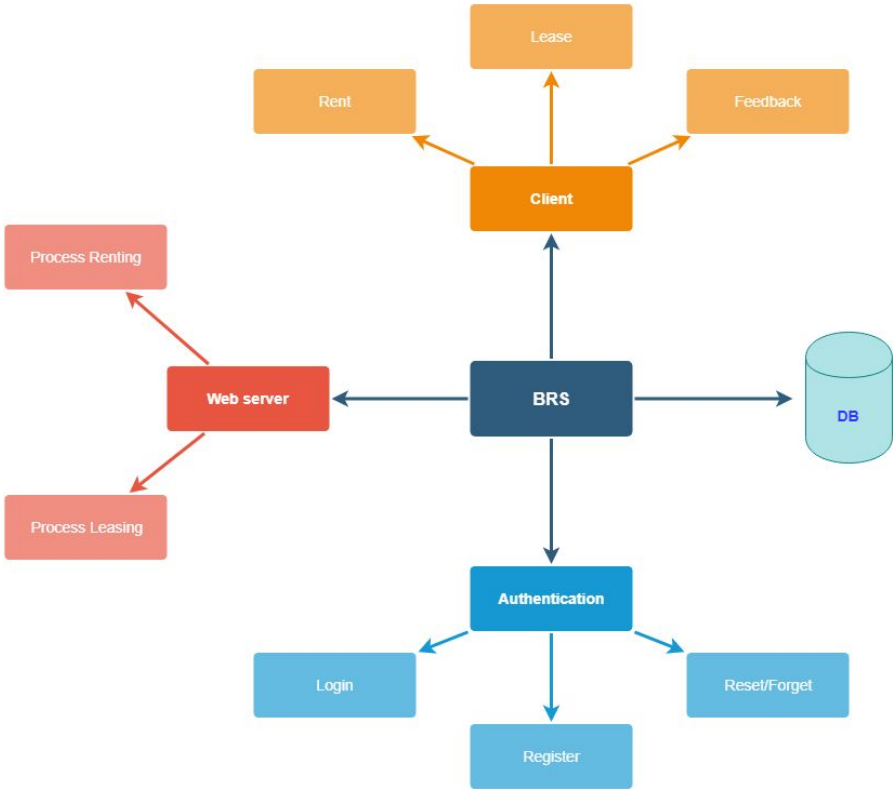
3.1 Product Perspective

Bicycle renting System (BRS) is a platform for IIT Ropar community where people can easily lease their bicycle to others or can rent a bicycle from someone else or from a common pool of

cycles belonging to the system. Bicycles can be rented for free or a fee can be charged as choice of owners.

3.1.1 System Interface

We will make an android app for letting or renting bicycles. Heroku will be used as a server to host the application.



3.1.2 User interface

The app will have very interactive and intuitive interface for users and admins. There will be 2 different interfaces for letting and renting the bicycles where users can find the nearest location where the bicycle can be found for renting. There will another interface for admin where he can reset the location of bicycles or can change the status of bicycles and other administrative tasks.

3.1.3 Hardware Interface

1) Server side : The application will be hosted on heroku server which will always be online and will be listening to coming requests from clients
2) Client side : Users can interact with the server via android application installed on their smartphones.

3.1.4 Software Interface

1) Server side : Host web server will accept all the requests from authorized clients and will return/store required information from/to the Database (PostgreSQL)
2) Client side : An android application through which users can interact with the server for letting or renting bicycles or for administrative purposes.

3.1.5 Communication interfaces

The HTTP protocol will be used for communication between server and client.

3.2 Product Functions

Following major functions would be performed by our product :-

- Users and admin would be able to sign in and login into the system.
- Users would be able to rent or lease a bicycle at a particular parking.
- Decide the fare for renting the bicycle.
- Users would be able to post complaints regarding bicycles.
- Admins would be able to see number of bicycles at different parking places
- Admins would be able to transfer bicycles from one parking place to another.
- Admins would be able to respond to the user complaints.

3.3 User classes and Characteristics

- Renters: The users in this category will be able to rent bicycles using the app by paying, the bicycles could be originally bought plus the ones leased by the leasers.
- Leasers: The users in this category will be able to lease extra bicycles using the app, they would get a certain portion of profit.

3.4 Operating Environment

1. Web server : Jetty
2. Client : client will be an android app which will be developed based on Java
3. Database : PostgreSQL database will be used provided by Heroku

3.5 Design and Implementation Constraints

Number of bicycles available in the system would limit the software's capability.

3.6 User Documentation

User would be provided with an in app documentation/help for guiding them on how to use the app.

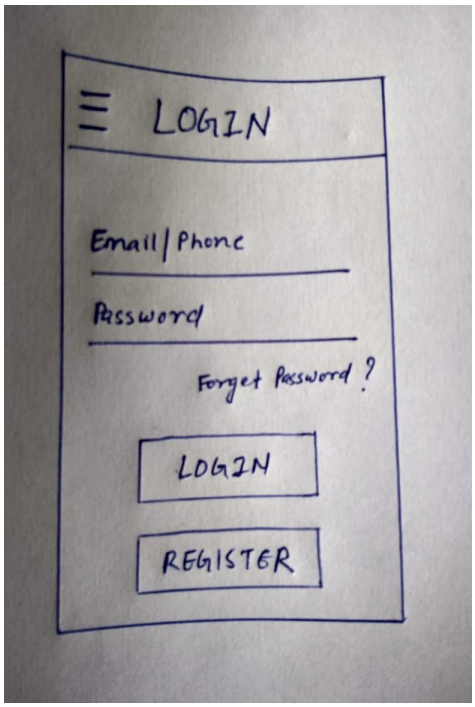
3.7 Assumptions and Dependencies

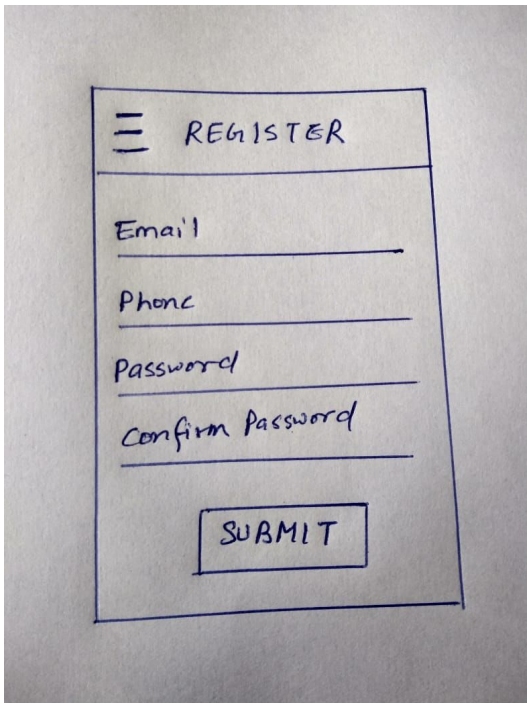
- We assume that users are trustworthy and security of bicycles is a given.
- We assume that users pick bicycles from one stand and leave it at another stand by scanning QR code appropriately.
- We assume that users have GPS enabled at all times during the functioning of the app.

4 External Interface Requirements

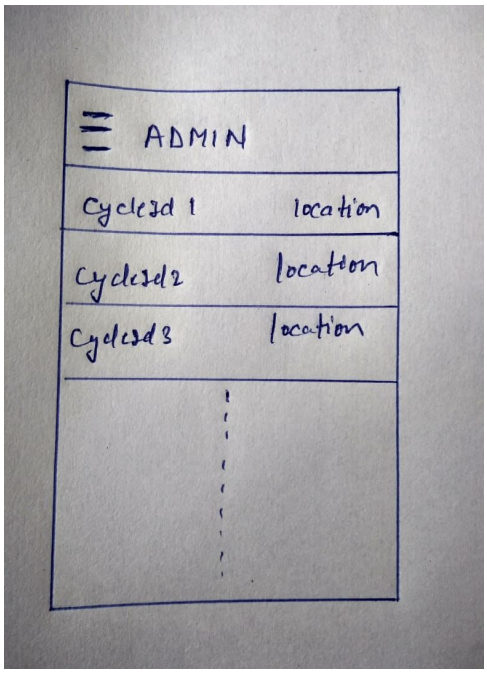
4.1 User Interfaces

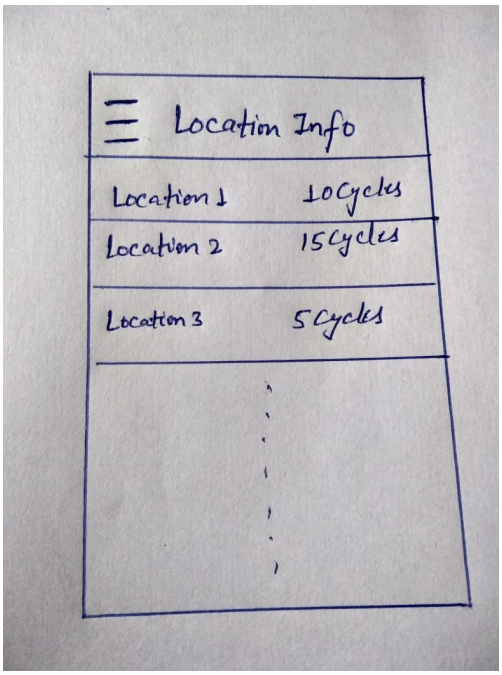
4.1.1 Login/Register UI

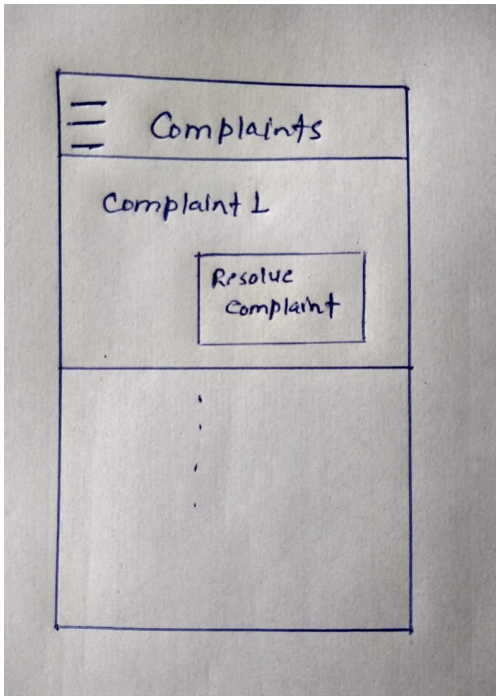


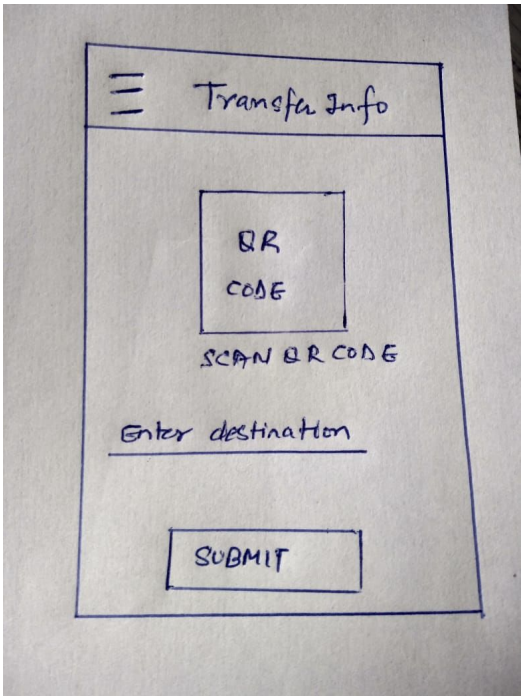


4.1.2 Admin UI

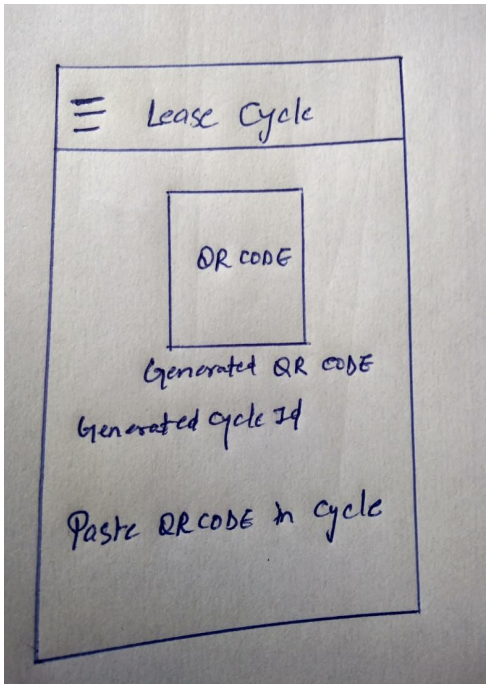

ADMIN
Cycle id 1
location
Cycle id 2
location
Cycle id 3
location

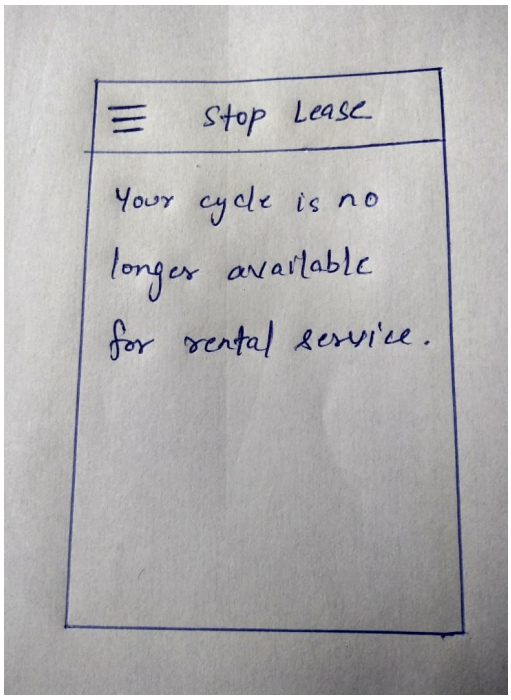

Location Info
Location 1
10 Cycles
Location 2
15 Cycles
Location 3
5 Cycles


Complaints
Complaint 1
Resolve Complaint

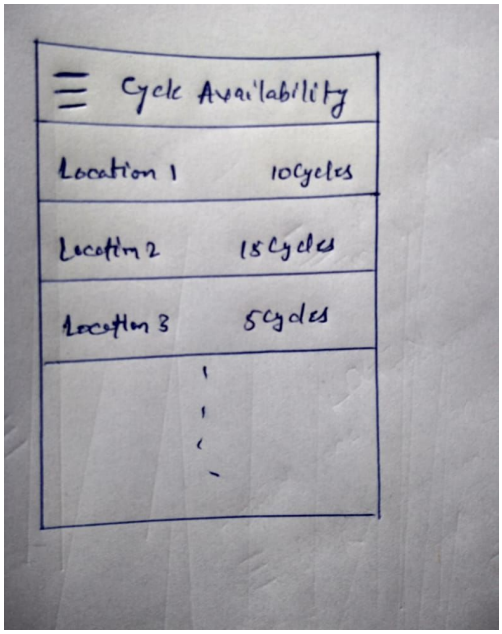

Transfer Info
QR CODE
SCAN QR CODE
Enter destination
SUBMIT

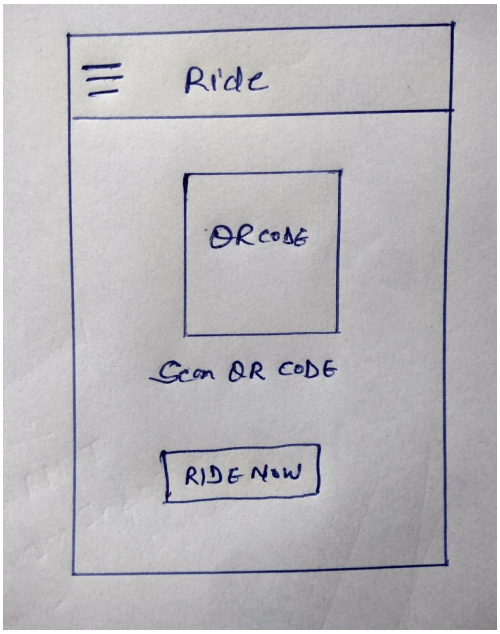
4.1.3 Lease UI

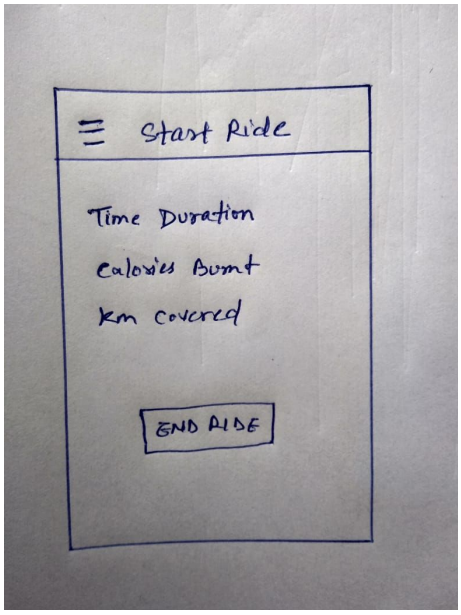


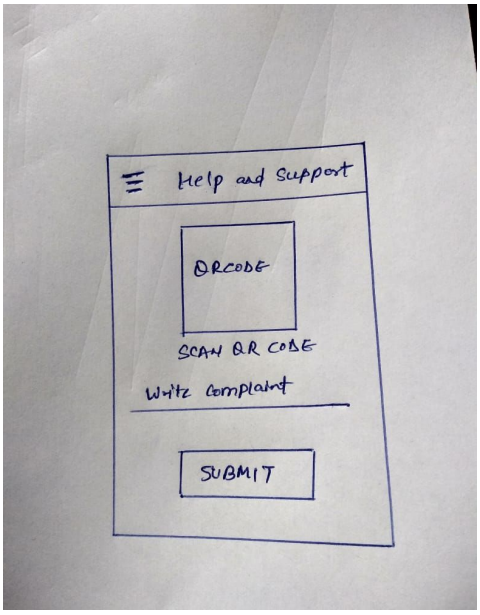


4.1.4 Rental UI









4.2 Hardware Interfaces

Each cycle should have a QR code attached to the bicycle. This QR code would be used to rent, track and for leasing them. Any person in the system can use his smartphone camera to scan the QR code. GPS would be used to track the users who are renting the bicycles.

4.3 Software Interfaces

- Heroku container-based cloud Platform as a Service (PaaS) - provides server, database, operating system.
- Java Dropwizard framework (v1.3.8) for for developing ops-friendly, high-performance, RESTful web services.
- Java Development Kit (JDK 8) for android application development.
- Android Studio (3.3 January 2019)

4.4 Communications Interfaces

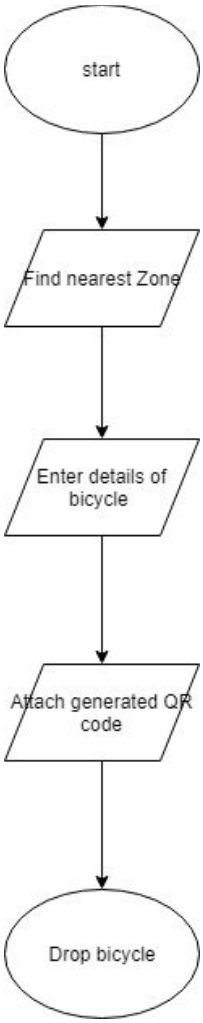
1. HTTP protocol will be used for the communication between client and server.
2. Domain Message Authentication Reporting & Conformance (DMARC) will be used for email authentication

5 System Features

5.1 Lease a bicycle

5.1.1 Description and Priority

This feature enables a user to give a bicycle on rent for a short span of time. When a user presses lease button he/she will have to fill the details of the bicycle like serial number and model and then he/she be notified the nearest location where he/she can drop a bicycle. After reaching the location user should drop bicycle and press DROP button after turning on GPS of the device. The application will automatically save the initial location and details of the bicycle in the database. In user history tab, the owner can check the history of the bicycle - the details of person who used their bicycle, the start time/end time of the ride, locations of the bicycle at different times.
The priority of the feature the HIGH.



5.1.2 Stimulus/Response Sequences

This feature will be invoked when the user presses the Lease button on Home page of the application. As a response a form will be displayed asking the details of the bicycle and after filling the form nearest location where bicycle can be dropped will be notified to the user.

5.1.3 Functional Requirements

1. Location tracking using GPS : The precise location of the user will be required to let him/her know the nearest zone from where they can lease the bicycles. In case there is some error the application will display all the locations in the campus where bicycles are available.

2. QR scanner : A QR code scanning software will be required to scan and get details of the bicycle registered by the user. In case there is some error in this scanner user will be asked to manually enter serial number of the bicycle written on back side of the bicycle.

3. Host web server : A web server will be required to always be online in order to find the nearest zone of the user using coordinates of the user and coordinates of all the zones retrieved from the database. In case the server does not respond then the application will ask the user to park the bicycle in the zone nearest to his destination which he knows.

5.1.4 Use Case Scenario

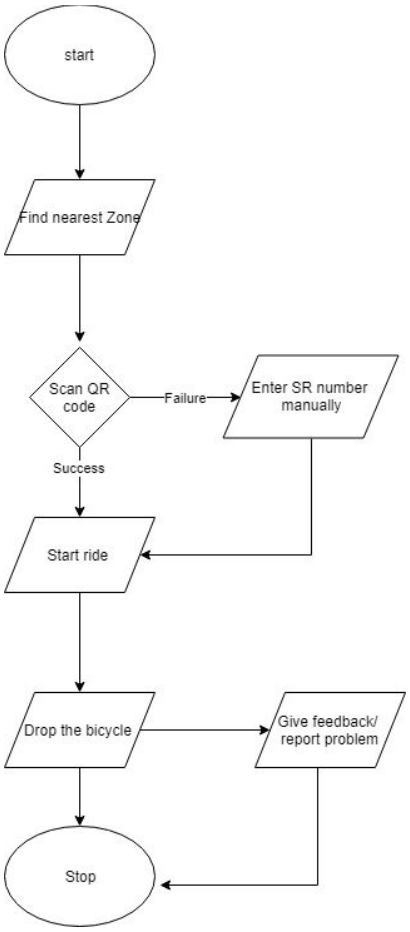
Purpose	To give a bicycle on rent
User	User with an existing profile (registered)
Input Data	Serial number of cycle and details, Initial location of the bicycle
Output Data	Information stored in database
Invariants	User information
Pre-Conditions	User is registered and want to add his bicycle to let list.
Post-Conditions	The bicycle of the user is added to the available pool of cycles to let.
Basic Flow	Details of the bicycle and initial location of it is

	entered by the user and the given information is stored in the database
Alternative Flow	NA

5.2 Rent a bicycle

5.2.1 Description and Priority

This feature enables a user to rent a bicycle on rent for desired amount of time. User would first check for the nearest bicycle stand through the app which would locate it using GPS. User would then choose a bicycle for renting after inspecting them and then would be required to scan the QR code of the bicycle and the bicycle stand. He would then be able to rent the bicycle and after using it user can leave it at another stand near to user's destination where he would again scan the bicycle's QR code and the destination stand's QR code. He would then be notified of the amount of money that is chargeable for the duration. User can also report a problem in the bicycle if any. Priority of this feature will be HIGH.



5.2.2 Stimulus/Response Sequences

This feature will be invoked when the user scans QR code of the bicycle and starting stand, then pressing the Rent button on Home page of the application. As a response the server will be notified of the this action. Similar action will happen at the destination.

5.2.3 Functional Requirements

Same as 5.1.3

5.2.4 Use case scenario

Purpose	To rent a bicycle
User	User with an existing profile (registered)
Input Data	QR code of user's choosed bicycle and stand; also user's location at both starting and destination position.
Output Data	Amount of money charged
Invariants	User information
Pre-Conditions	User is registered and is using the app with GPS enabled.
Post-Conditions	User has been notified of the amount of money charged.
Basic Flow	The distance between the two locations is calculated and used for further calculations. Also the bicycle is marked as being used during the process.
Alternative Flow	NA

5.3 Login/Register

5.3.1 Description and Priority

This feature would allow a new user to register into the system and allow current user to login into the system. The major priority here would be given to the security. A OTP would be mailed

to the user when registering in order to verify that user registering into the system is having the same gmail account. Apart from that in order to login into the app user would have to use the password which he had entered while registering into the system.

5.3.2 Stimulus/Response Sequences

Whenever a new user opens the app or a user is not logged in into the app, this feature would be presented to him. Response would be either he would be logged in or register into the app or he would be notified that he has entered wrong password or email address.

5.3.3 Functional Requirements

- Password should be at least 6 characters long, have at least two out of Uppercase letters, small case letter, digit or special characters.
- Only an iitrpr gmail account could be used to register/login into the system.

5.3.4 Use case scenario

Purpose	Register into the system
User	User
Input Data	Iitrpr email address with otp and password
Output Data	User is registered successfully or wrong credentials
Invariants	
Pre-Conditions	Have a iitrpr gmail account with the OTP
Post-Conditions	User is registered in the system
Basic Flow	User would enter mail account, then he would be asked to enter OTP and password for his account
Alternative Flow	NA

Purpose	Login into the system
User	User/Admin

Input Data	Iitrpr email address with password
Output Data	User is logged in successfully or wrong credentials
Invariants	
Pre-Conditions	Have a iitrpr gmail account with correct password
Post-Conditions	User is logged in the system
Basic Flow	User would enter mail account and password, then he would be logged in into the system.
Alternative Flow	If user enters wrong credentials then error message will appear

Purpose	To reset the password
User	User/Admin
Input Data	Iitrpr email address with otp and new password
Output Data	Password is changed successfully
Invariants	
Pre-Conditions	Have a iitrpr gmail account with the OTP
Post-Conditions	Password is changed in the system
Basic Flow	User would enter mail account, then he would be asked to enter the OTP if he is a registered user and then enter a new password
Alternative Flow	NA

5.4 Administrative Tasks

5.4.1 Description and Priority

This feature will allow admin to correct/change the location of bicycles and make the corresponding changes to the database. This feature will also allow the admit to report / resolve the problems in bicycles. Priority of this feature will be LOW.

5.4.2 Stimulus/Response Sequences

This feature will be invoked when the admin logs in to the application with admin credentials. As a response an interface where the admin can change the location of the bicycle or can report/ resolve problems in the bicycle will appear.

5.4.3 Use case scenario

Purpose	To change the location of the bicycle
User	Admin
Input Data	Serial number of the cycle and new location of the cycle.
Output Data	New location will be updated in the database
Invariants	Other details of the bicycle
Pre-Conditions	Location of the bicycle in the database is incorrect.
Post-Conditions	Location of the bicycle in the database is correct.
Basic Flow	The admin will enter the serial number of the bicycle and new location of the bicycle and it will be updated in the database.
Alternative Flow	NA

Purpose	To report a problem in the bicycle
User	Admin

Input Data	Serial number of the cycle and new problem details if the cycle.
Output Data	details will be updated in the database and that cycle will not appear in the pool of bicycles to be rented until the problem is resolved.
Invariants	Other details of the bicycle
Pre-Conditions	There is some problem with a bicycle.
Post-Conditions	The problem is stored the database.
Basic Flow	The admin will enter the serial number of the bicycle and problem in the bicycle and it will be updated in the database.
Alternative Flow	NA

Purpose	To resolve a problem in the bicycle
User	Admin
Input Data	Serial number of the cycle and problem id.
Output Data	details will be updated in the database and that cycle will again appear in the pool of bicycles to be rented.
Invariants	Other details of the bicycle
Pre-Conditions	Some problem was reported in a bicycle.
Post-Conditions	The problem is resolved and updated in the database.
Basic Flow	The admin will enter the serial number of the bicycle and will select the problem in the bicycle which was resolved and it will be updated in the database.
Alternative Flow	NA

6 Other Non-functional Requirements

6.1 Performance Requirements

- Certain times of day would have more number of users who rent bicycles as compared to average number.
- For 4 hours at most in a month our heroku server would be down.

6.2 Safety Requirements

- Users should check the bicycles for their condition before renting and provide feedback for the bicycles if any damage happens to the bicycle.
- The user must be responsible for his own safety while driving the bicycle and must follow general traffic rules that mandate the user environment.
- Users must take care of the bicycles and prevent any damage to the bicycle or the QR code.

6.3 Security Requirements

- Email authentication will be used to identify user identity.
- Only iitrpr.ac.in domain emails will be allowed

6.4 Software Quality Attributes

Software should be secure in terms of user information, correct in estimating location of bicycles, user friendly, reliable and robust.

6.5 Business Rules

- Renters must have registered email id with iitrpr.ac.in domain and thereafter only can rent a bicycle using the app.
- Leasers must have registered email id, and verified bicycles before they can lease bicycles through the app.

7 Other Requirements

1. An initial pool of bicycles will be required.
2. Permanent QR code plates for cycles.

8 Appendix A: Analysis Models

Data flow diagrams, class diagrams, state-transition diagrams and entity-relationship diagrams will be decided (see Appendix B)

9 Appendix B: To Be Determined List

- Data flow diagrams
- Class diagrams
- State transition diagrams
- Entity-relationship diagrams