

1. System Features

1.1 Login/ Register Feature

1.1.1 Description and Priority

Users are required to log in to use the application. They have the choice to either login via a Google account or an existing email account. This feature is of a high priority as everyone who uses the application needs to be logged in to access the application features.

Priority: High (Benefit: 9, Cost: 5, Penalty: 5)

1.1.2 Stimulus/Response Sequences

1.1.2.1 Application will check if user is already logged in

1.1.2.2 If the user is logged in, the application will redirect the user to the <Home Page>. Else, the user will be asked to log in.

1.1.2.3 Users can choose to either log in with a google account or an email registered with Biker-X.

- If the user chooses Google, the application will check if the user's phone is linked to any Google account. If found, a list of detected google accounts will appear for the user to choose his desired google account from.
- If the user chooses Email. If the user is registered before, he can enter his registered email address and password and click the "login" button to login to the application.

1.1.2.4 For first-time users of the application, they can register an account by clicking on the "Register" button. They would be directed to a page to enter their name, email address and password. Subsequently, they will need to verify the registered email account before being able to log in to the application.

1.1.2.5 For users who forget their password, they can click the "Forget Password" button. The application will redirect the users to a page to enter their registered email address. A link will be sent to the email address where the users can reset their password.

1.1.2.6 On initial login, users will be prompted to enable precise or approximate location permission.

1.1.3 Functional Requirements

1.1.3.1 The user must be able to login with their Google or email account.

1.1.3.2 Upon logging in, the application must have a sign out option.

1.2 Request for location permission feature

1.2.1 Description and Priority

First time users will be prompted via a pop up window to allow the system to access their precise or approximate GPS location. Location services will be required to utilise Track Cycling Session and display nearby amenities on Google Maps.

Priority: Medium (Benefit: 9, Cost: 2, Penalty: 7)

1.2.2 Stimulus/Response Sequences

1.2.2.1 After selecting a permission option, the user will see the <Home Page>.

1.2.3 Functional Requirements

1.2.3.1 The application must request first time users for permission before accessing the user's location via GPS.

1.3 Full Map Display Feature

1.3.1 Description and Priority

Users will be able to view the full map including various amenities. Users are able to filter the relevant amenities and locations they would like to display through ticking the dropdown checklist available, and search for a particular location.

Priority: High (Benefit: 9, Cost: 8, Penalty: 9)

1.3.2 Stimulus/Response Sequences

1.3.2.1 After selecting the <View Map> button on the <Home Page> or the 'Map' icon, the user will see the <Full Map Display Page>.

1.3.2.2 User ticks relevant amenities in dropdown list

- Access points
- Bicycle racks
- Bicycle rental shops
- F&B eateries
- Fitness areas
- Playground
- Shelter
- Toilets
- Water coolers

After selecting the relevant filters in the dropdown list, the relevant nearby amenities will be displayed on the <Full Map Display Page>.

1.3.2.3 After searching for specific amenities in the search bar, the map will zoom into that area.

1.3.3 Functional Requirements

1.3.3.1 If location permission is enabled, the application will zoom in and display all the amenities near the user.

1.3.3.2 If location permission is disabled, the application must prompt the user to allow location permission once.

1.3.3.3 If location permission is disabled, the application will display a zoomed-out Singapore map.

1.3.3.4 The application must allow the user to select amenities to be displayed on the map.

1.3.3.5 The application must display the names of amenities.

1.3.3.6 The application must allow the user to search for the names of specific locations.

1.4 Cycling Session Tracking Feature

1.4.1 Description and Priority

The user will be able to track their cycling sessions using this feature. This feature should allow the user the option of pausing and stopping the cycling session after one has been started.

Priority: High (Benefit: 8, Cost: 7, Penalty: 7)

1.4.2 Stimulus/Response Sequence

1.4.2.1 Upon clicking the 'Start' button on <Start Cycling Page>, the user will be led to the <Live Cycling Progress Page>, where the distance travelled, time taken and average speed of the live cycling session will be displayed live.

1.4.2.2 Upon clicking the 'Pause' button, the distance travelled and time taken will be halted.

1.4.2.3 Upon clicking the 'Resume' button, the tracking of distance travelled and time taken will continue.

1.4.2.4 Upon clicking the 'Stop' button, the user will be led to the <Session Summary Page> where the final distance travelled, time taken and nearest bicycle parking racks will be displayed.

1.4.3 Functional Requirements

1.4.3.1 If location permission is not granted, the application must disable the start cycling session function.

1.4.3.2 The user must be able to track their current cycling session.

1.4.3.3 The user must be able to start a cycling session.

1.4.3.4 The user must be able to pause a cycling session.

1.4.3.5 The user must be able to resume a paused cycling session.

1.4.3.6 The user must be able to stop a cycling session.

1.4.3.7 The application must display the current distance travelled by the user in kilometres, to 2 decimal points of accuracy.

1.4.3.8 When the user ends the cycling session, the application must display the locations of nearest bicycle racks from the location where the user ends the cycling session.

1.5 Cycling Route Recommendation Feature

1.5.1 Description and Priority

The application will recommend the top five preset cycling routes on the <Home Page>, sorted in descending order based on user ratings. The application will display all cycling routes on the <Recommendations Page>, sorted in ascending alphabetical order.

Priority: High (Benefit: 9, Cost: 9, Penalty: 7)

1.5.2 Stimulus/Response Sequences

1.5.2.1 The user will be able to see a condensed list of top five recommended cycling routes on the <Home Page>. Upon clicking on the “See all” option, the user will see the <Recommendations Page> with the full list of recommended routes.

1.5.2.2 Upon clicking on any recommended routes, the user will see the <Start Cycling Page> showing the selected route.

1.5.2.3 Upon clicking the “Stop” button on the <Live Cycling Progress Page>, the user will see the <Session Summary Page>, and will be able to rate the cycling session using a scale of 1 to 5.

1.5.3 Functional Requirements

1.5.3.1 The application must display a list of top five recommended preset bicycle routes, sorted based on user ratings.

1.5.3.2 The application must display the user ratings of each cycling route.

1.5.3.3 The user must be able to select a preset cycling route to start a new cycling session on.

1.5.3.4 If a cycling route is selected, the application must navigate to the <Start Cycling Page> and display the suggested route.

1.5.3.5 At the end of a cycling session of a preset bicycle route, the user must be able to rate the route out of 5 stars.

1.6 Cycling History Feature

1.6.1 Description and Priority

The user is able to track the history of their cycling sessions.

Priority: High (Benefit: 9, Cost: 7, Penalty: 7)

1.6.2 Stimulus/Response Sequences

Upon clicking the 'Cycling History' icon, the user will be navigated to the <Cycling History Page>. For each cycling session, the particular day's distance and average speed will be displayed.

1.6.3 Functional Requirements

1.6.3.1 The application must display the date and time of past cycling session

1.6.3.2 The application must display the distance travelled for each past cycling session in kilometres, to two decimal points of accuracy.

1.6.3.3 The application must display the speed of each past cycling session in kilometres per hour, to two decimal points of accuracy.

1.7 Shared Forum Feature

1.7.1 Description and Priority

The user is able to share messages and connect with like minded individuals through a shared forum.

Priority: Medium (Benefit: 4, Cost: 2, Penalty: 3)

1.7.2 Stimulus/Response Sequences

Upon clicking on the 'chat' icon, the user will be led to the <Chat Forum Page>. There, the user can see posts made by other users on the forum.

Users can click on the chat box to type and click the 'send' button to post their message.

1.7.3 Functional Requirements

1.7.3.1 The user must be able to post messages on a shared forum.

1.7.3.2 The application must be able to save messages posted to the database.

1.7.3.3 The application must display the associated user's name on each message.

1.7.3.4 The application must display the time at which each message was sent, in a 24 hour format.

1.8 Weather Forecast Feature

1.8.1 Description and Priority

Using data of the 2h weather forecast from data.gov.sg weather API, the application displays Singapore's general 2 hour weather forecast.

Priority: Low (Benefit: 2, Penalty: 2, Cost: 3).

Priority is low as this is only an additional feature for the user to check the weather before deciding if he should embark on a cycling session. All other features of the application will work and are able to be used by the user even if the weather icon is not present.

1.8.2 Stimulus/Response Sequences

Upon entering or refreshing the <Home Page>, a weather icon will be displayed based on the current 2 hour weather forecast. The weather forecast icon will be updated automatically every 2 hours.

1.8.3 Functional Requirements

1.8.3.1 The application must be able to display and update the current weather forecast every 2 hours.

1.9 Set, Edit and Track Goals Feature

1.9.1 Description and Priority

Users can input their monthly cycling distance goals and monthly cycling duration (time) goals.

Priority: Medium (Benefit: 4, Penalty: 2, Cost: 3).

Priority is medium as it depends on the user's profile and preference. New cyclists and cyclists cycling for leisure may most likely not set cycling goals. However, users like cycling enthusiasts or competitive cyclists may most likely set cycling goals.

1.9.2 Stimulus/Response Sequences

1.9.2.1 Upon clicking on the 'Edit goal' button on the <Cycling History Page> or the 'View Goals' button on the <Home Page>, the user will be led to the <Goal Tracking Page> where the user can input his monthly cycling distance goals or monthly cycling duration (time) goals. There is also a progress bar to indicate to the user how much of his monthly cycling distance goal is achieved.

1.9.2.2 Once the user fills in the monthly cycling distance or time goal, he clicks the "Submit" button. The new monthly distance goal and time goal will be updated live on the user interface. The progress bar will also be updated.

1.9.3 Functional Requirements

1.9.3.1 The application must allow the user to edit the goal.

1.9.3.2 For the monthly distance goal, the application must show the updated display of the monthly distance goal set by the user (in km, rounded off to the nearest whole number) when the user selects the "submit" button.

1.9.3.3 For the monthly time goal, the application must show the updated display of the monthly time goal set by the user (in hours, rounded off to the nearest whole number) when the user selects the "submit" button.

2. Nonfunctional Requirements

2.1 Performance Requirements

2.1.1 The application must be compatible with phones running on Android 5.0 and above.

2.1.2 The application must be able to continue a cycling session in the background.

2.1.2.1 The application must be able to track the user's location in the background

2.1.3 The application must fetch cycling route data within 2s when the user requests cycling route suggestions.

2.2 Safety Requirements

2.2.1 The application must not require user interaction during a cycling session.

2.3 Security Requirements

- 2.3.1 The application must not access the user's location without their permission.
- 2.3.2 Users should not be able to view other users' cycling sessions.

2.4 Software Quality Attributes

- 2.4.1 90% of first-time users must be able to start a cycling session within 2 minutes of starting to use the system.

2.5 Business Rules

- 2.5.1 Each user must provide Google or email login credentials to create an account

- 2.5.1.1 An email is considered valid when the user enters the 2-factor authentication code sent to their email into our app.