DOCUMENTATION

Drifter – Android Navigation Application
Version 1.10

OPSC7312 POE

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Contents

Drifter Overview

Drifter is a GPS navigation application developed for android using the android studio java framework. Drifter utilizes the Mapbox SDK and other related plugins provided on Mapboxes website to drive its mapping and navigation features. For data storage it utilizes firebase online storage services. The development life cycle for this project follows a research, plan, design, build, and evaluate life cycle that can be repeated for further refinements of the application. The following list is an outline of some of the main features that the user can perform with this application :

- **Register User**
- **Login User**
- **Set User Preferences (Imperial/metric measurement units and more)**
- **View Map**
- **Transport Mode determined Map Navigation from point A to B through Tap or Search**
- **Travel time, arrival time and distance estimation**
- **Trip logging**
- **Change Map Style**
- **Voice Guided Navigation**

The above listed features and others not included on the list shall be described in detail later in this document. The application will provide the user with a simple and easy to use graphic user interface that uses a navigation drawer for quick application navigation. The map and navigation tools will be also be visually appealing to ensure easy to understand directions.

Functions List

This list describes the functions that Drifter can perform.

User Registration/Login:

A user will be required to register an account before they can use the application functions. This will allow the user to set personal preferences such as which measurement system they prefer to view navigation in and what map style they would like.

Set User Preferences:

The application allows users to change and save settings to suite their preference such as map style, navigational units of measurement and their default mode of transport through the User Preferences Menu.

Trip Logging:

Through trip logging user's previous trips are tracked by Drifter and the user can view previous trips completed.

Map Styling:

The MapBox SDK contains predefined core styles that can be set to change the appearance of the map. Drifter will take advantage of this feature and allow the user to choose between the following map styles:

- Streets
- Light
- Dark
- Outdoors
- Satellite streets

Location Search to perform navigation:

Drifter will take advantage of the Places plugin which works with the MapBox Geocoding API to allow the user to find points of interest and get more out of their search when using the application search bar to find a destination. Users can access this search through tapping the search icon near the map view. After a user has entered a search phrase, related items will appear beneath the search bar. When the user finds the one, they want they can click on it and this will set a route for navigation.

Calculate best route:

The MapBox SDK has been designed to ensure the fastest route is determined when attempts to set a route destination.

Voice Navigation:

When the user taps the start navigation option, audio will play from their device each time a new navigation instruction appears. This audio describes the next navigation instruction that the user needs to perform. This feature can be muted through the speaker icon that displays during navigation mode.

Set route by tapping map:

A user can set a destination point through tapping an area on the map, this will highlight the path from there current location to the destination point tapped visually on the map. The start navigation button will then appear which will allow them to start navigation services for that route.

Navigation mode:

When a user taps the start navigation button to begin navigation on their desired route, navigation mode is activated. In navigation mode the following details are displayed to the user:

- **Navigation instruction:** This is displayed in the top header of the screen.
- **Estimations:** Estimated time of arrival, time till arrival and distance is displayed at the bottom of the screen.
- **Cancel Trip:** To cancel the trip a user can press the “X” icon displayed at the bottom right of the screen.
- **Mute/unmute voice navigation:** user can tap the speaker icon to perform this.
- **User Reporting:** the icon under the speaker icon can be used to report accidents, closed roads and other map information. This assists Mapbox in maintaining map information that is up to date.

The user’s mode of transport is represented as a blue triangle which will follow the user as they move along their path on the map. “You have arrived” will display in the navigation instruction header when this function has been fulfilled.

Read Me

Project name

Drifter: Android Navigation Application.

Version

1.10

Author

18002054 Dayne Mare

Preconditions before installing/running the application

1. Latest version of Android Studio (4.0.1)
2. If run on an android device, ensure the device is in developer mode and allows USB debugging.
3. Internet connection on device running the application to access online database.
4. Android device or emulator should use an Android API that ranges from 23 – 29.
5. Location on device is turned on.

Application install/run guide

Development Environment

To install and run the application in a development environment these steps need to be followed:

1. Open the project folder “DrifterApp” in android studio and wait till the application has finished syncing.
2. Set an emulator to run the application inside Android studio or connect a USB to your PC and tap allow USB debugging on your device when the dialog pops up.
3. Once a device has been selected, click the run application function in android studio. This will build the project and install the application APK on the device or emulator. If successful, you should now be presented with the applications login screen.

APK

To install and run the application from an APK file these steps need to be followed:

1. Open the folder “APK” and copy the file “drifter_v1.10.apk” onto an android device that meets the Android API Range mentioned above.
2. On the android device, turn location services on and make sure your device is connected to the internet.
3. Navigate to the APK file on the device and tap it to begin the install process.
4. If receive a warning message, tap continue. If asked to permit applications from an unknown source, then do so. Tap install if asked.
5. Once installed. Tap Open if there is a dialog window or tap the application Drifter icon in your android application browser to begin running the app.

Software used for development and testing

- **IDE** - Android Studio
- **Build Tool** – Maven
- **Map Services Tool** – MapBox Sdk
- **Third Party Design Tool** – MikePenz Material Drawer
- **Database Tool** – Firebase

Devices used for development and testing

PC	
OS Name	Microsoft Windows 10 Home
Version	10.0.18363 Build 18363
Other OS Description	Not Available
OS Manufacturer	Microsoft Corporation
System Name	DESKTOP-3F3DGS8
System Manufacturer	HP
System Model	HP Pavilion Notebook
System Typex	64-based PC
System	SKU N9E13UA#ABA
Processor	AMD A10-8700P Radeon R6, 10 Compute Cores 4C+6G, 1800 Mhz, 2 Core(s), 4 Logical Processor(s)
BIOS Version/Date	American Megatrends Inc. F.45, 2017/04/28
SMBIOS Version	2.8
Embedded Controller Version	81.32

BIOS Mode	UEFI
BaseBoard Manufacturer	HP
BaseBoard Product	80B0
BaseBoard Version	81.32
Platform Role	Mobile
Secure Boot State	On
PCR7 Configuration	Elevation Required to View
Windows Directory	C:/WINDOWS
System Directory	C:/WINDOWS/system32
Boot Device	/Device/HarddiskVolume1
Locale	South Africa
Hardware Abstraction Layer	Version = "10.0.18362.752"
User Name	DESKTOP-3F3DGS8¥Dayne
Time Zone	South Africa Standard Time
Installed Physical Memory (RAM)	8,00 GB
Total Physical Memory	7,45 GB

Android Device:	**Google** Pixel 3a
Android version	10
API Level	29

Demonstration Video

Demo Video-1.m4v

Preparing Drifter for Publication

1. **Digitally Signing the Application with a Certificate** – Drifter will be published with a signed certificate to validate the original application author. A signed certificate will also ensure that all future updates can only be received from the original author.

2. **Ensuring the Application has an icon and that the icon is formatted correctly**– Before publishing Drifter, I will ensure the application has a suitable icon that is formatted within the constraints of the Android Application Stores recommended guidelines.

3. **Ensuring the application package name is appropriate** – once distributed an applications package name cannot be modified. Therefore, it is important to ensure Drifter has an appropriate and professional package name before publication.

4. **Configuring Drifter for Release - Check list**
    - "android: debuggable" is removed from the manifest file.
    - Versioning has been set in build.gradle(:app).

```
versionCode 1
versionName "1.10"
```

    - Release version of Drifter has been built and signed.
    - Release version has been tested well.
    - Remote servers and services have been prepared.

- Project Directories have been cleaned up and conform to Android Projects standards.
- Drifter is compatible with a wide range of devices .
- End-user License Agreement and Privacy Policy have been created.

User Manual

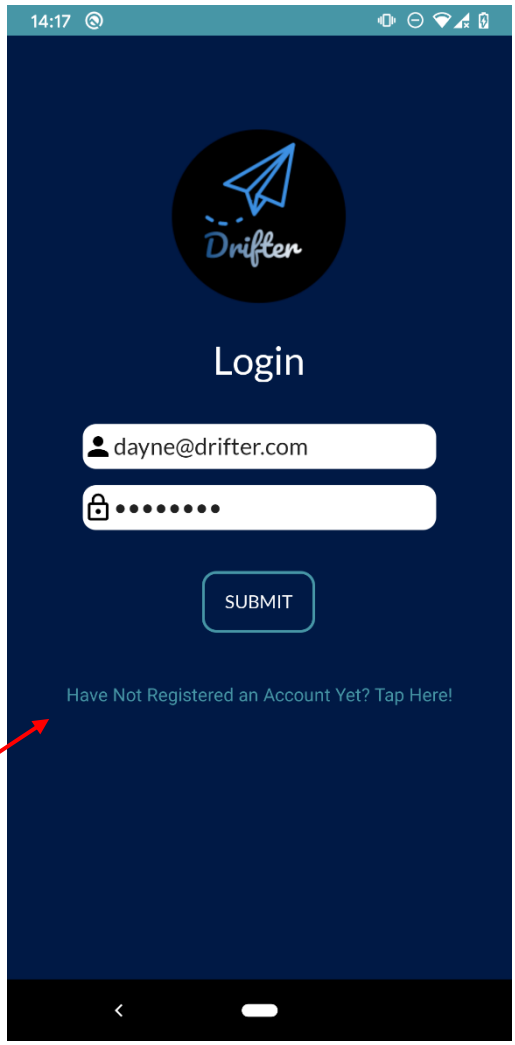
Login Screen

When the user first opens the application, they are presented with the login screen.

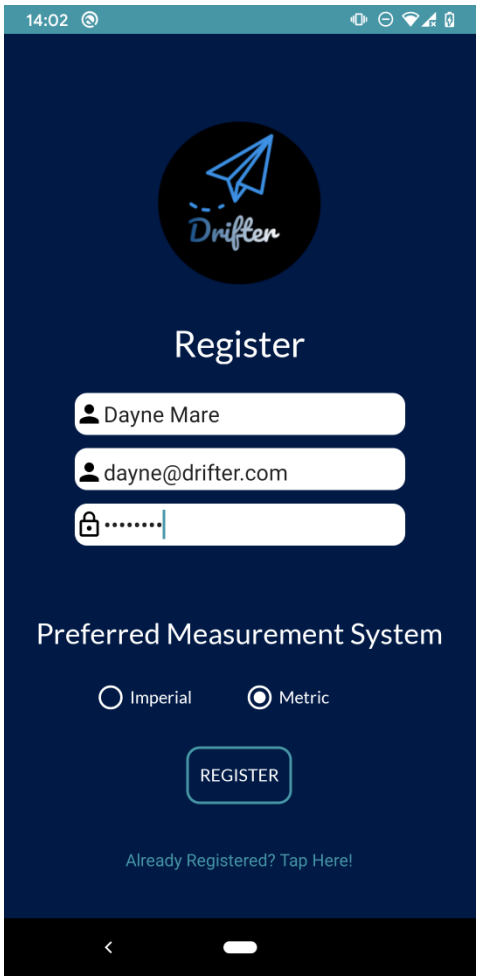
If they have an existing drifter account, they can input the email and password they registered with and tap submit to gain access to the application.

Each user requires an account for them to save user preferences and trip history.

If a user has not yet registered a drifter account, they can tap the link indicated by the arrow . This will direct them to the drifter account registration screen.



Registration Screen



The registration screen allows the user to create a new drifter account. Here the user is required to complete filling in the following fields to successfully complete registration :

- **Full Name (text field)** – The user is required to enter their first name and surname here. Used to display the owner of the accounts name in app. Max Characters is 50.
- **Email Address (text field)** – The user is required to enter their email address here. Used for authentication purposes. The user is required to remember this in order gain access to their account. Max Characters is 50.
- **Password (text field)** – The user is required to enter a password that is no less than 6 characters. Max Characters is 50. The user is required to remember this in order gain access to their account.
- **Preferred Measurement System (radio button)** – The user is required to select their measurement system of choice to be used for map navigation features - Metric(km) or Imperial(Miles).

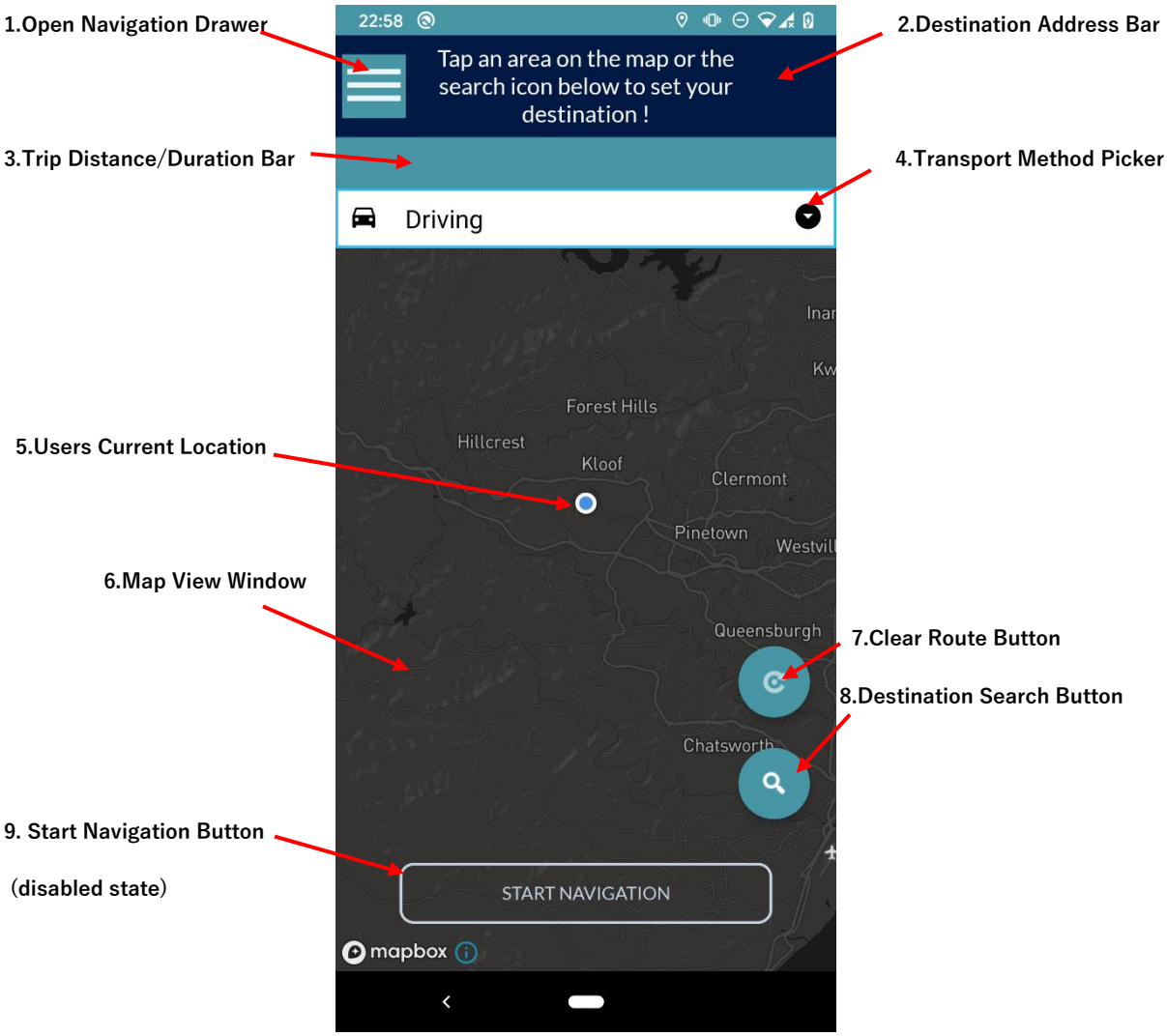
Once all fields are completed the user can proceed to tap the **Register button** to complete registration. This will redirect them to the login screen where they can use the email and password entered during registration to access their account and start using the applications main features.

If the user already has an account and enters the registration screen by mistake, they can use the “Already Registered? Tap Here!” link to return to the login screen.

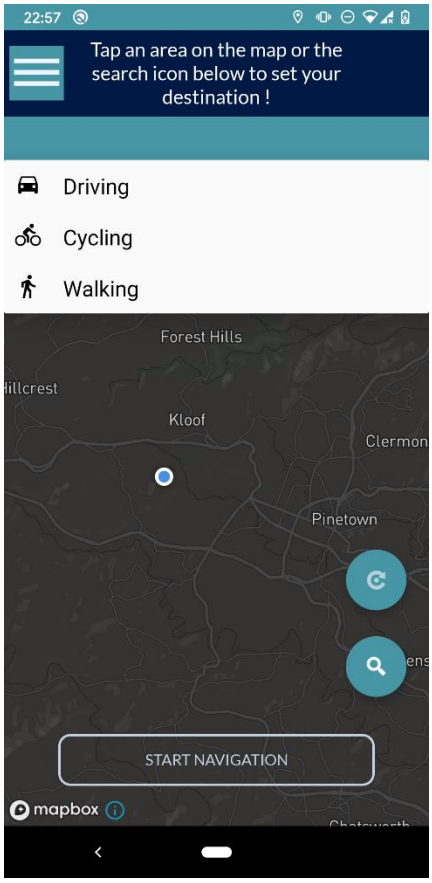
Map View

Once the user has successfully logged-in they will be presented with the **Map View** screen.

The following **Map View Features** indicated by red arrows are described in more detail on the following page.



1. **Open Navigation Button** – The user can tap the hamburger icon to open the applications navigation drawer (see **Navigating the application** section for more details).
2. **Destination Address Bar** – By default this bar displays instructions on how to set the destination location for navigation. Once a user taps an area on the map or searches a location using the search bar feature this bar will display the destinations address.
3. **Trip Distance/Duration Bar** – Once a user has set a destination the trip distance and estimated time from the user's current location will be displayed here.
4. **Transport Method Picker** – The user can set which method of transport they are using – Driving, Cycling or Walking. This will ensure that the best routes are chosen and that calculations are accurate when traveling using a transport method mentioned above.

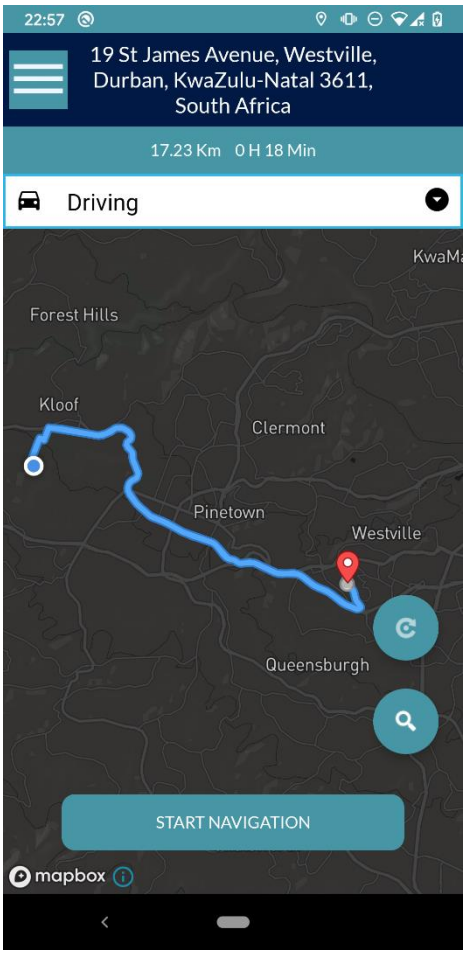


5. **Users Current Location** - The user's current location is displayed as a blue circle on the map.
6. **Map View Window** – This window is where the user will be able to do tasks such as setting and viewing a desired destination route. The user can scroll, zoom, and slide around the map view window to manipulate what parts of the map are visible to them.
7. **Clear Route Button** – The Clear Route Button can be used to remove the current route from the Map View Window. This will also reset the Destination Address Bar and Trip Distance/Duration Bar.
8. **Destination Search Button** – The user can tap the Destination Search Button to set a destination through entering the location name and selecting a matching result. This is demonstrated in more detail later.
9. **Start Navigation Button** – By default the start navigation button is disabled till a user has set a desired destination location via tapping an area on the map or by using the search feature. Once the user has set a destination, this button will become enabled and can be tapped to begin the map navigation view feature.

Map View – Setting Destination – Map Tap

Before setting a destination, the user should set the transport method they are using by tapping an option from the **Transport Mode Picker.**

Drifter allows the user to set a desired destination with 2 methods. The first method requires the user to move around the **Map View Window** through swiping, scrolling, and zooming till they find their desired destination location. Once found, the user can simply tap the area on the map and a route will be drawn from the user's current location to the destination point they just tapped. The destination address will then display in the **Destination Address Bar** at the top of the screen as well as trip duration time and distance in the **Trip Distance/Duration Bar** below that.

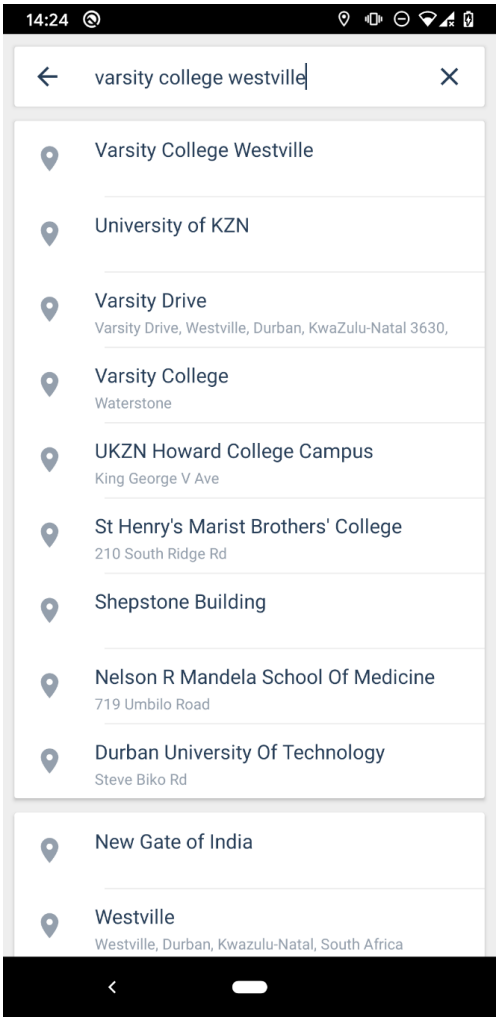


The **Start Navigation Button** will then appear enabled and the user can now click it to begin using the apps **Navigation View** to navigate to their destination.

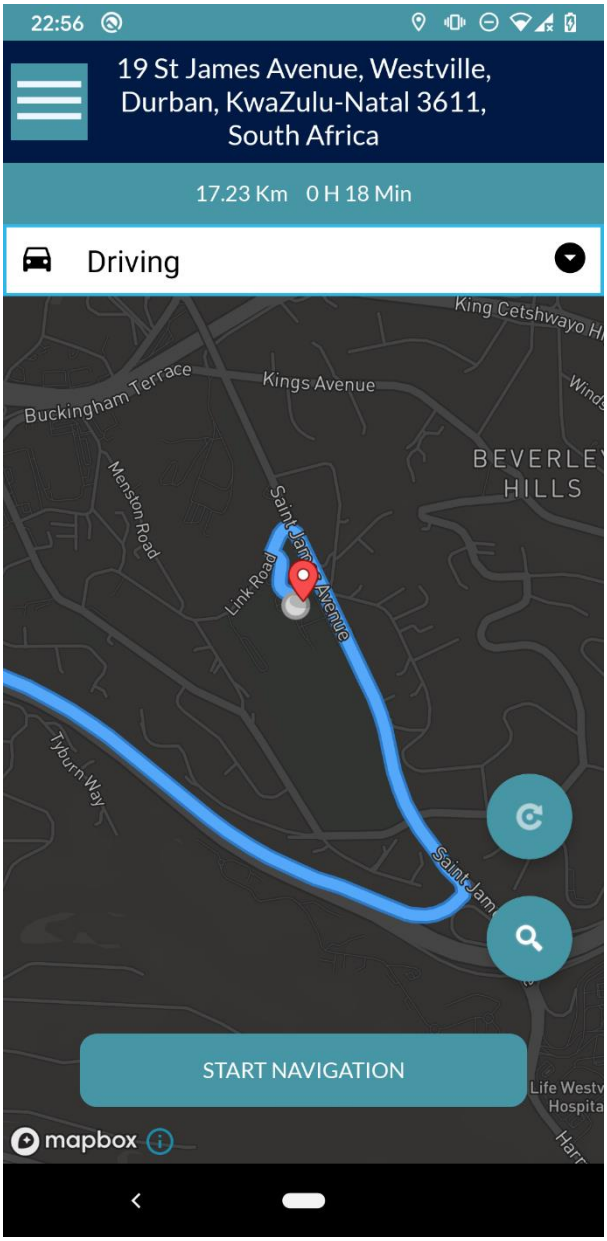
Map View – Setting Destination – Search bar

The second method of setting a destination location is to tap the **Destination Search Button** on the bottom right of the **Map View Window.**

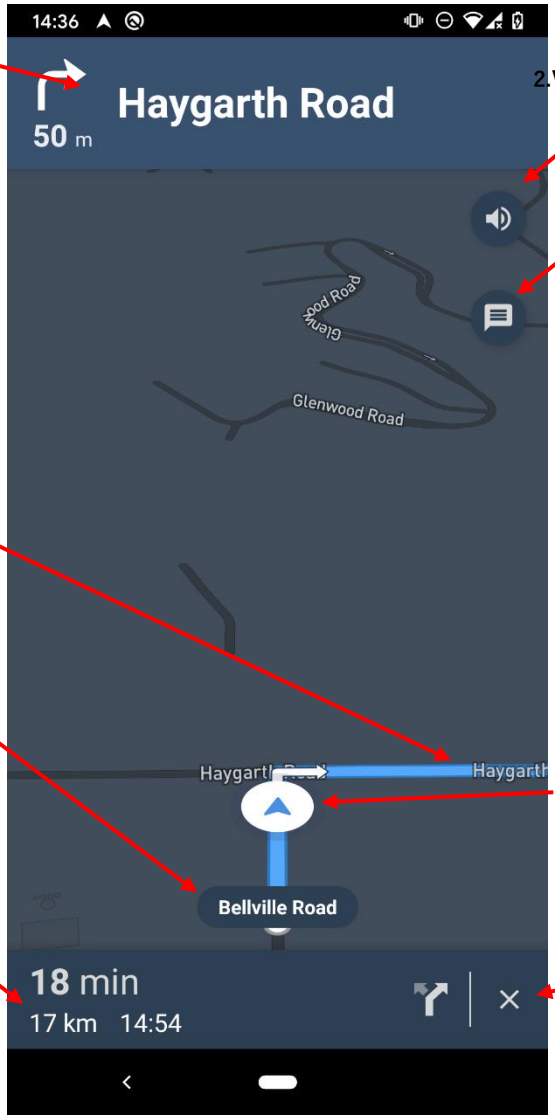
Once tapped the screen shown on the right will open. Here the user can enter a location address to set location destination. Once the user has typed in their desired location, all similar location address matches found will display below the search bar. To set the destination location the user simply must tap one of the results from the list (continues next page).



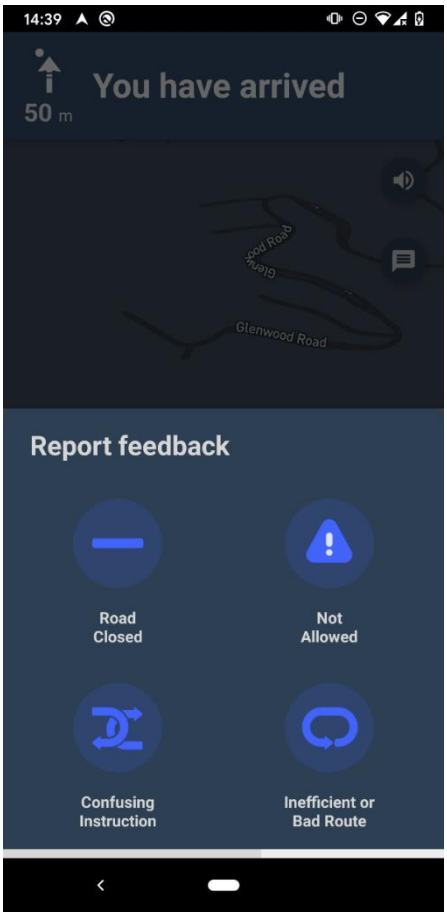
Once the location address has been selected the user will be directed back to the **Map View** screen which will show them the route to the desired destination they chose. The **Start Navigation Button** can then be tapped to begin navigating to the set destination via the applications **Navigation View.**



Navigation View



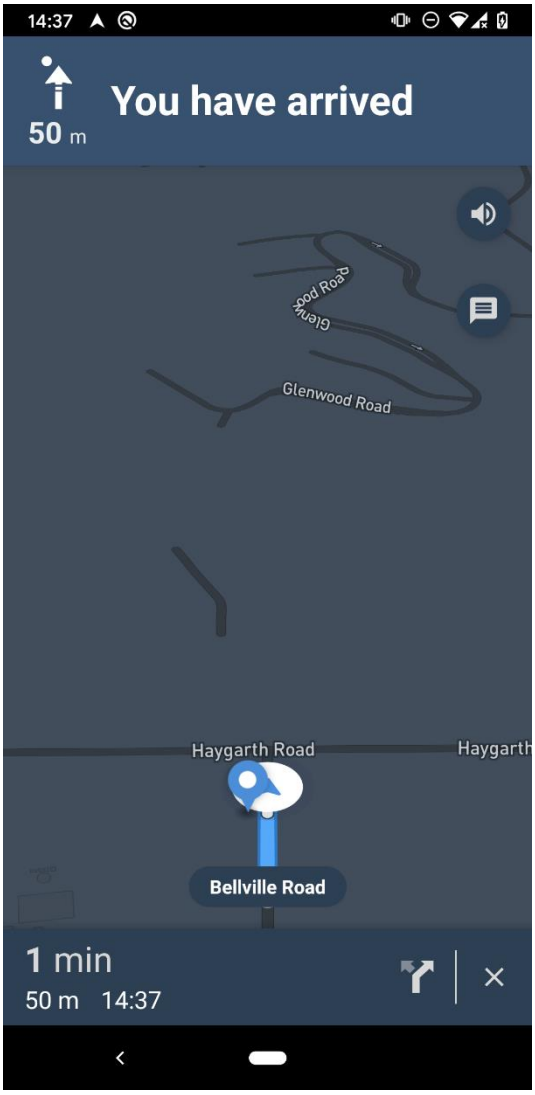
1. **Navigation Instruction Bar** – This bar presents the user with the next upcoming navigation instruction they need to perform to maintain on route to their selected destination. If the user taps on this bar they will be displayed a list of upcoming navigation instructions.
2. **Voice Navigation on/off Button** – While the user is in navigation view the application uses voice navigation so that the user can hear upcoming navigation instructions and keep their eyes on the road while on route to their destination. This Voice Navigation on/off Button allows them to turn this feature on or off.
3. **Report Button** – The report button allows users to give feedback to improve mapbox map services.



4. **Route to Follow** – Users are guided to their destination through following the blue route line. Direction symbols are placed on this line to ensure the user is traveling the right way along the path the route line dictates.

5. **Current Road Name Label** – This label lets the user know what road they are currently traveling on.
6. **Users Current Position** – The user's current position in real time is represented as they travel on the route line by a blue arrow within a white circle.
7. **Trip Information Bar** – This bar shows the user the estimated time of arrival, time left in minutes and distance left to travel till the user reaches their destination.
8. **Cancel Navigation Button** – The cancel navigation button allows the user to cancel using the Navigation View and return to the Map View Screen.

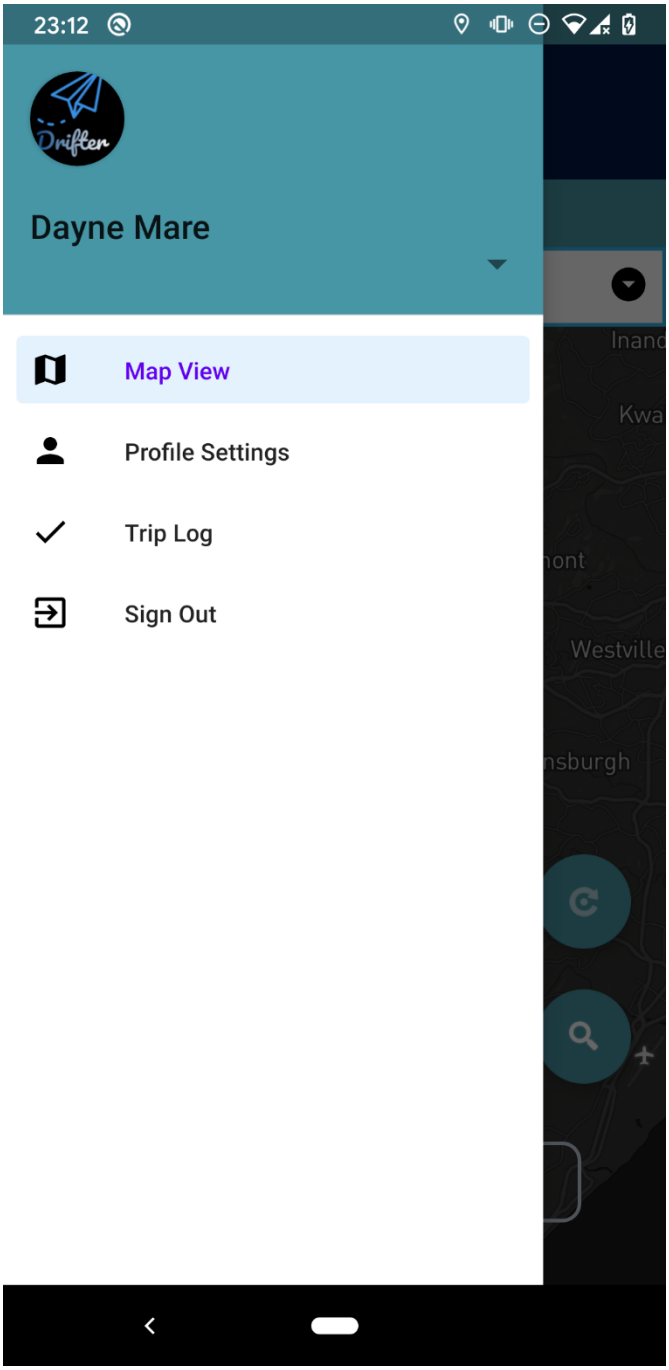
Navigation View – Navigating to your destination point



Once the user has set their desired destination route and tapped the **Start Navigation Button,** they will be directed to the Navigation View screen. The user will be required to follow the instructions displayed by the **Navigation Instruction Bar** till they reach their destination – as an instruction is shown, the voice navigation feature (if turned on) will playback the instruction to the user as audio. The path to the destination is highlighted by a blue line which the user can use to help guide them as well. The message "You have arrived" will be displayed in the **Navigation Instruction Bar** once the user has completed their trip. A blue location marker will display which side of the road the location is on. Once the trip is complete the user can simply press the **Cancel Navigation Button** to return to Map view.

Navigation Drawer - Navigating the application

The **Navigation Drawer** allows the user to navigate to different application features.



At the top of the navigation drawer the current users **Full Name** is displayed. Below that is a list of features the user can navigate to by simply tapping a feature from the list. The features listed are as follows:

Map View – The main application feature that allows the user to set a destination on a map and navigate to it.

Profile Settings – This feature allows the user to change their user's preferences such as full name, preferred measurement system, map style, mode of transport. It also allows them to clear all trip log data.

Trip Log – The Trip Log allows users to view passed trips they have taken in Map View.

Sign Out – This feature allows the user to sign out of their Drifter account.

Profile Settings

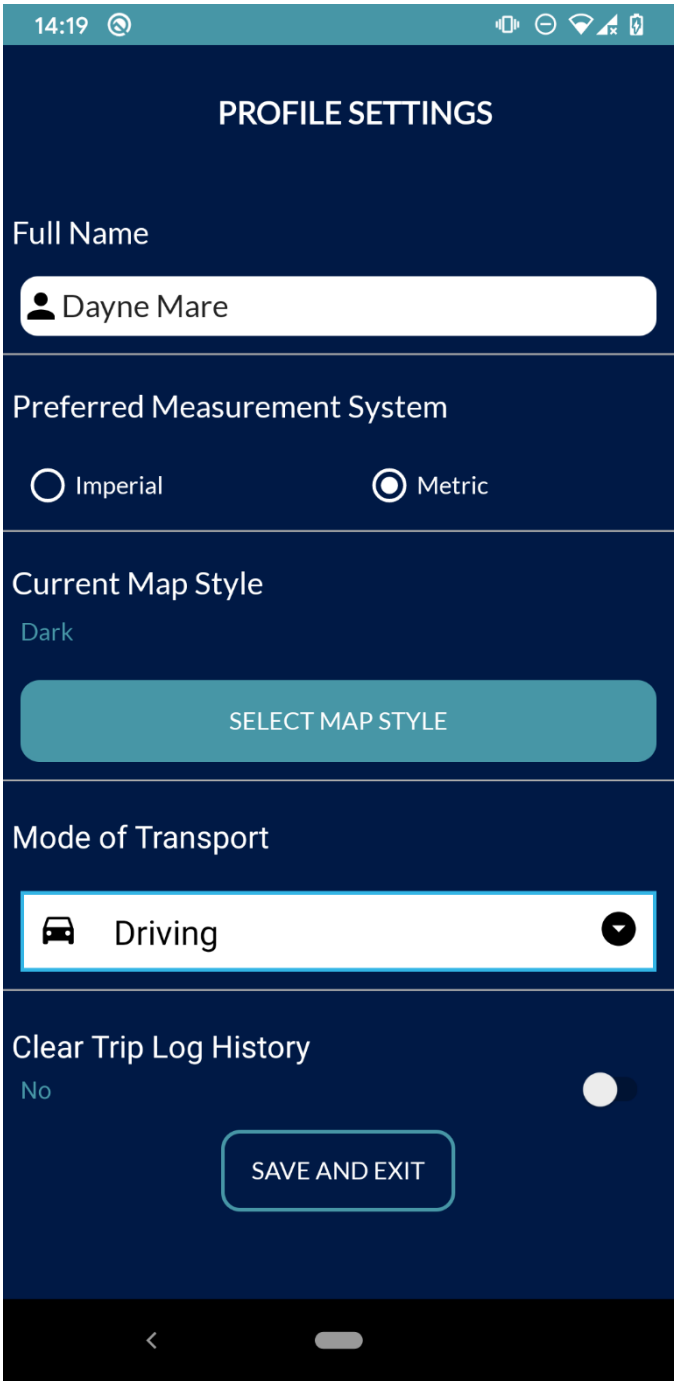
The profile settings screen allows the user to edit their user preferences.

Below is a list and explanation of the settings that the user can change:

Full Name –

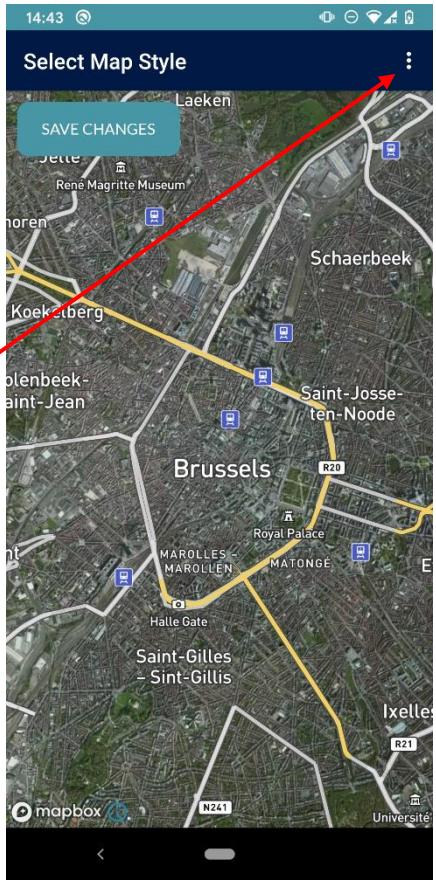
The user can edit their Full Name here by changing the text in the text field.

Preferred Measurement System – The user can change what measurement system they would like to see navigation statistics in through tapping either the “Metric” or “Imperial” Radio button (Continues next page).



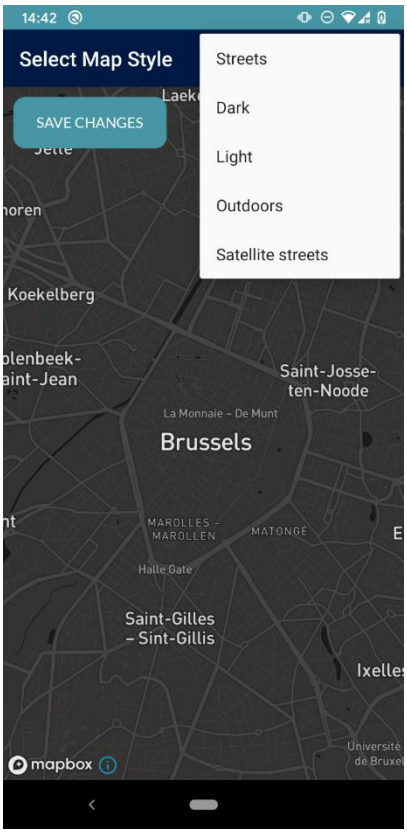
Current Map Style –

The users current map style name is shown here. The user can change their current map view map style by clicking the **Select Map Style Button.** This will direct them to the Select Map Style screen where they can preview a map style before saving it. To select a map style the user can press the 3 vertical dot icon top right of the screen.



Once clicked this will present the user with a list of map style options. To preview a map style the user can tap a map style name from this list. This will load the new style map style in the preview window.

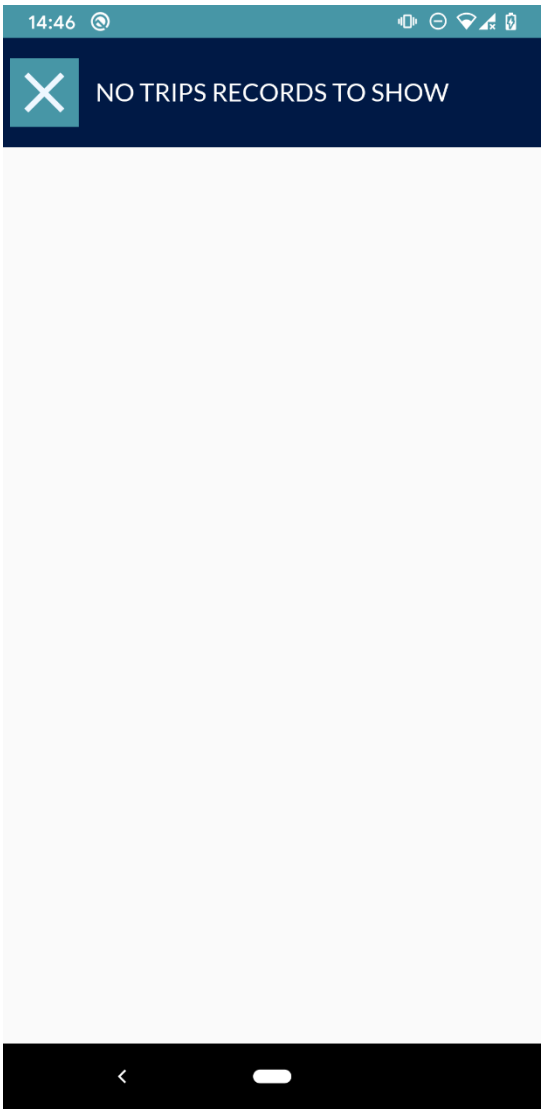
If the user likes the style, they can tap the **Save Changes Button** which will save and set their new map style. This will also direct them back to the Profile Settings screen.



Mode of Transport Picker –

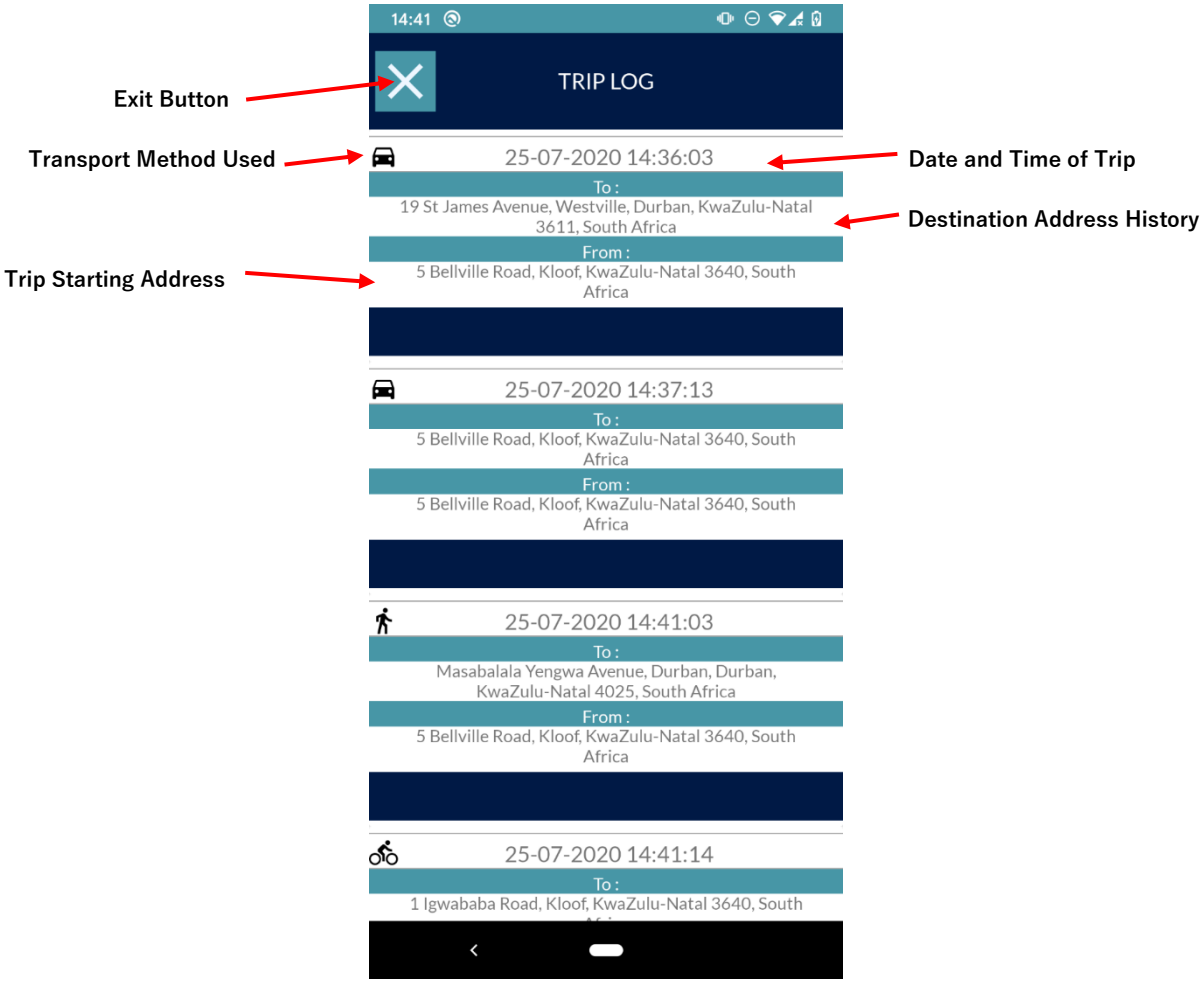
The user can set which method of transport they are using – Driving, Cycling or Walking. This will ensure that the best routes are chosen and that calculations are accurate when traveling using a transport method mentioned above.

Clear Trip Log History – This allows the user to clear their Trip Log History data and start from zero entries if they flick the switch from "No" to "Yes". See the **Trip Log** section for further details on this feature.



****Important** Saving Changes** – To ensure all changes are saved and set the user is required to tap the **Save and Exit Button.** This button can also be used to exit profile settings.

Trip Log

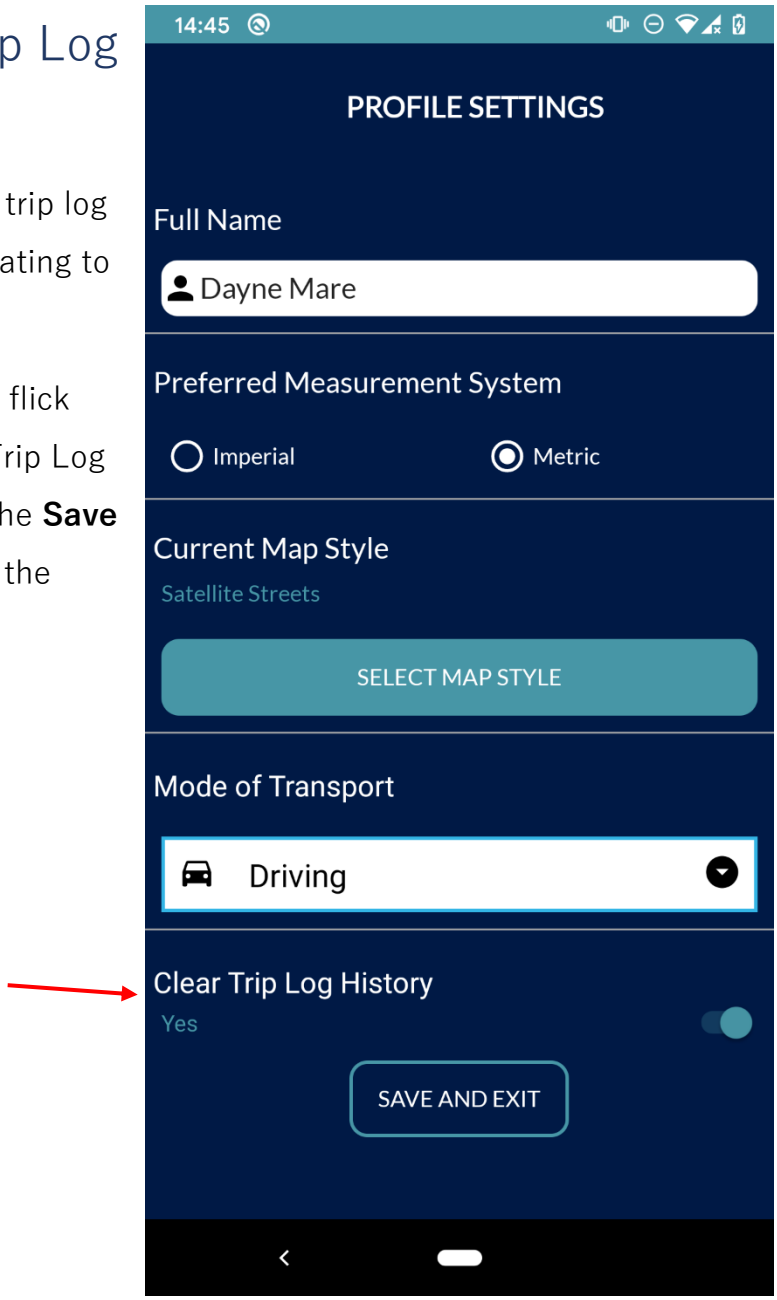


The Trip Log Screen allows the users to view their previous trips taken. If there are many logs the user can swipe up and down to scroll through the trip log list. The diagram above explains each property of a logged trip.

Trip Log – Clear Trip Log History

If the user wishes to clear all trip log data, they can do so by navigating to the Profile Settings Feature.

Once there the user needs to flick the switch under the “Clear Trip Log History” Label and then tap the **Save and Exit Button** to complete the process.



Data Listing

Firebase authentication is used for registration and login data of users. Firestore is used to store all other application data like trip logs and user preference setting.

Data Identifier	Collection Name	Default Value	Java Data	Firebase Database (NoSql)	Nullable	Length
User_Id(UID)	Authentication/ User Preferences	n/a	String	Text	False	Max
User_Email	Authentication/ User Preferences	n/a	String	Text	False	50
User_Password	Authentication	n/a	String	Hashed Text	False	50
User_FullName	User Preferences	n/a	String	Text	False	50
Transport_Mode	User Preferences	“Driving”	String	Text	True	Max
Measurement_System	User Preferences	n/a	String	Text	False	Max
Map_Style	User Preferences	“Dark”	String	Text	True	Max
dateTime	Trip Log	n/a	String	Text	False	Max
destLatitude	Trip Log	n/a	String	Text	False	Max
dateLongitude	Trip Log	n/a	String	Text	False	Max
destinationLocation	Trip Log	n/a	String	Text	False	Max
startingLocation	Trip Log	n/a	String	Text	False	Max
transportMethod	Trip Log	n/a	String	Text	False	Max

Use Case Diagram