

Feature Document

DaReX

Revision 1.0



Revision History

Revision	Revision Date	Updates
1.0	24 Jan 2018	Initial version

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INTRODUCTION

DaReX is a beta version release of the parent application DaRe. It is an Android application that is made to interface with the Pedestrian Navigation Sensor MIMU22BLP(X). The Android application runs on all Android devices with Android O.S 5.0 (API Level 21) and above.

MINIMUM REQUIREMENTS

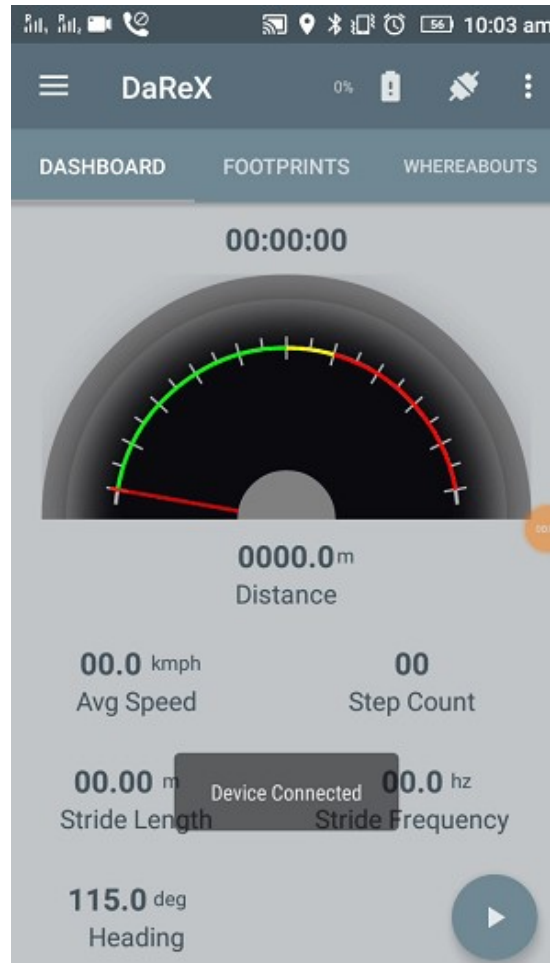
1. Android Lollipop (API Level 21) or above
2. 1 GB of RAM
3. Bluetooth 4.0
4. Magnetometer
5. GPS
6. Camera (Rear Facing)

FEATURES

1. 3 PRIMARY TABS
 - a. DASHBOARD
 - b. FOOTPRINTS
 - c. WHEREABOUTS
2. TOOLBAR WITH OVERFLOW MENU
3. SLIDE NAVIGATION DRAWER
4. PLAY / STOP BUTTON

THE DETAILS OF THE FEATURES

1. DASHBOARD

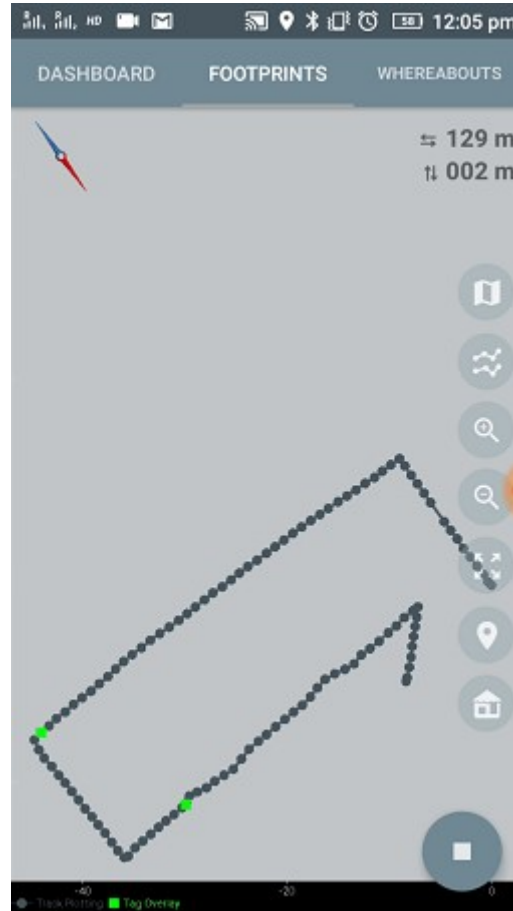


The dashboard is the first tab of the application. It offers user quick information about the data that is being collected by the sensor for PDR (Pedestrian Dead Reckoning).

The Dashboard contains

- a. Speedometer :- To display the instantaneous speed of the user when walking and collecting data using MIMU22BLP(X).
- b. Timer :- Displays the time elapsed in the format HH:mm:ss for the current session.
- c. Distance :- Displays the total distance travelled by the user in the session in meters.
- d. Average speed :- It shows the average speed of the user in kmph.
- e. Step Count :- Displays the number of step counts taken by the user in the session.
- f. Stride Length :- Displays the length of each stride taken by the user, of the foot in which the sensor is connected.
- g. Stride Frequency :- Displays the frequency of the number of steps in hertz.
- h. Heading :- Displays the angle between true North and the current direction in which the device is pointing.

2. FOOTPRINTS



Footprints is the graph plotting canvas, for plotting real time track of the user as he moves with the sensor connected. The data that is connected by the application is plotted real time in 2D on the canvas. The footprints on the graph are marked as points and the each of the footsteps are joined by a connected line hence showing the complete track as the user moves along the path.

The features included in the footprints section are

- a. Tagging
- b. Zoom in, Zoom out and Zoom fit of the track plot
- c. Indoor Outdoor Marker
- d. Adding of Indoor Floor Map

a. TAGGING.

As the user is walking around with the sensors, if he wish to tag any place or object that he sees in his path then the user can do so by clicking on the tag button. On pressing the tag button a dialog box will pop up asking for the name of the object that needs to be tagged and also an option for capturing an image

if the user wants to. On confirmation of the tagged object along with the photograph (if any) by pressing the Ok button, the point in the user's track will be marked tagged. The tagged point is represented by a green color in the track. If at any point the user wishes to see the information of any such tagged point, then he can touch on the green square that has been marked along the track, a dialog box will pop up with the information of the object tagged.

B. Zoom in, zoom out and zoom fit.

The footsteps track graph plotted on the canvas has been provided with an option for zooming in, out and zoom fit to the screen of the cell phone. Specific buttons have been provided for the same in the Footprints Tab. Also it supports two finger pinch zoom and dragging.

C. Indoor Outdoor Marker

The Footprints tab also has a toggle button that acts as an indoor outdoor marker. The user at any time can click on the button to indicate the current scenario in which he is walking ie Indoor or Outdoor. The information is primarily used for logging in the Log file that is generated for each session.

D. Indoor Map

The Footprints page has an option for adding an indoor map. Any JPEG image can be added as an indoor map. The indoor map will be set as the background of the footsteps track plotted. The indoor map can be added by pressing the add map button. One can browse the directory of the cell phone and select the desired jpeg image as the indoor map.

Once the map has been added to the display, the user has to press the set trajectory button to edit the zoom and alignment of the map.

On press of the set trajectory button, the icon toggles between edit map and edit track trajectories.

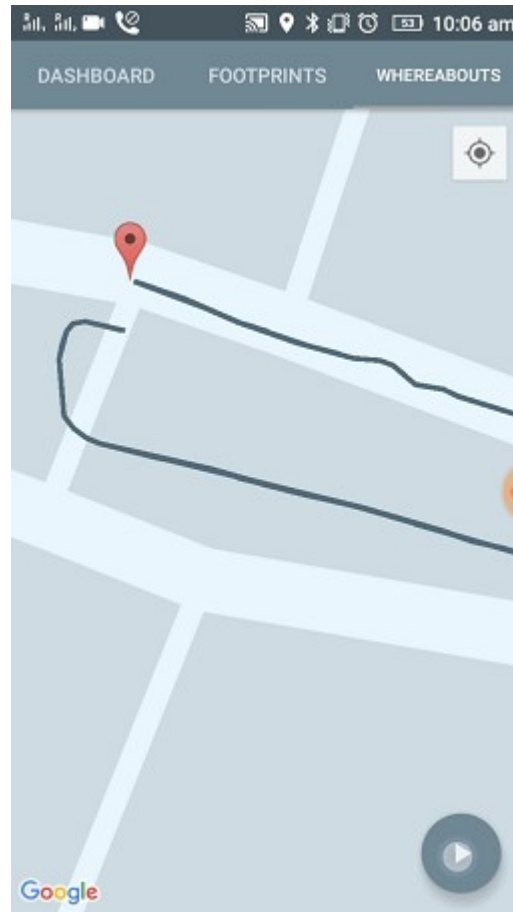
The alignment and the scale have to be set by zooming in and out the map or the track according to the required scale. The alignment has to be set by rotating the map with accordingly.

The map can be zoomed in, out and rotated with two finger pinch and can also be dragged up, down, left and right using one finger drag.

NOTE : The detail instructions on how to use the Indoor Map has been provided in the how to use section.

The Footprints page also contains a small distance meter that displays the distance of the track traversed by the user in meters. It also has a compass needle to show directions of the current movement.

3. WHEREABOUTS



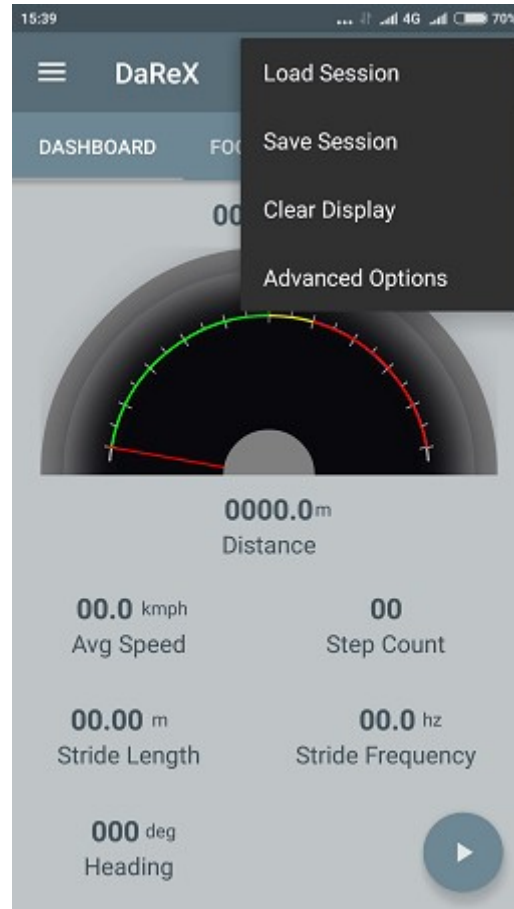
Whereabouts is about the user's present location on Google map, along with the path user traversed as he / she moves with the connected shoe-sensor. The data that is connected by the application is plotted real time in 2D on the Google map. The footprints on the graph are marked as points and each footprint is joined by a connected line, hence showing the complete track as the user moves along the path.

Note that the path is overlaid on the Google map. Fusion with the map (or map matching) has not been performed.

THE TOOLBAR

The DaReX app has the toolbar at the top which contains,

1. The Display Name of the App
2. Battery icon
3. Connect and Disconnect icon
4. Overflow menu with the following options like
 - a. Load Session
 - b. Save Session
 - c. Clear Display
 - d. Advanced Options



Battery Icon

Battery icon indicates the percentage of device's battery backup.

Connect Disconnect Icon

The connect-disconnect icon is used to connect or disconnect the MIMU22BLP(X) sensor from the applications and the smartphone through bluetooth. On pressing the connect icon the app searches for nearby bluetooth devices and shows the available once. Select the MIMU22BLP(X) device to establish a successful connection.

On pressing the connect-disconnect icon when the device is connected, the app will ask for confirmation and then disconnect the device from the app and the smartphone.

Load Session

Load Session is used to load any previously saved sessions using the save option of the app. The Load Session will ask to browse through all the existing saved sessions in the directory “DaReX/Saved Session”. On selecting the session to be loaded, the app will load all the details of that session, like the distance, step count, time, average speed, track of footprints etc.

Save Session

Save Session is used to save an existing session to the device memory. The user can save the session with a name he wants which will be saved in the folder “DaReX/Saved Session” along the with the timestamp.

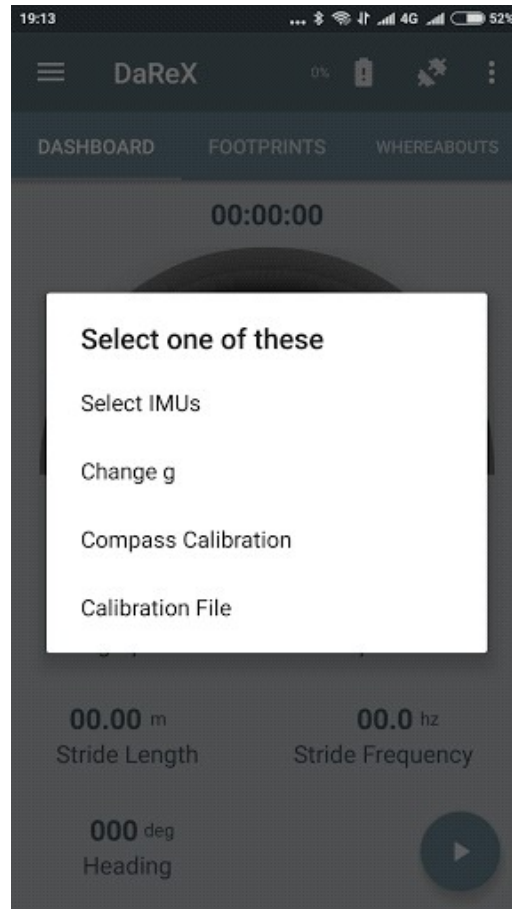
Clear Display

Clear Display is used to clear all displays in all the TABS of the application. It resets all value to 0 and clears all track plotted on both the Footprints TAB and the Whereabouts TAB.

Advanced Options

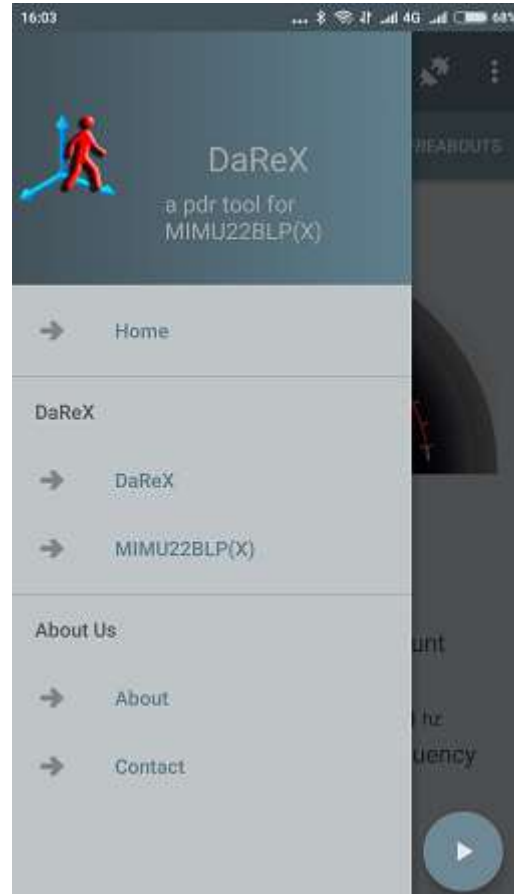
Advanced options contains the below option to select the number of IMUs to be used. The user can select the IMUs that he or she wishes to use for the session.

- a. Select IMUs
- b. Change g
- c. Compass Calibration
- d. Calibration File



THE SLIDE NAVIGATION DRAWER

The **SLIDE NAVIGATION DRAWER** to the left side of the app contains options such as



Home, MIMU22BLP(X), Inertial Elements, About and Contact. These are informative Tabs that can be accessed through the drawer.

THE PLAY / STOP BUTTON

The play / stop button is a floating action button that is present on the primary tabs. It is used to start and stop the session once the sensors are connected.

HOW TO USE

BASIC SETUP

On launching the application, provide the required permissions, like bluetooth, GPS etc. (NOTE: For Android 6.0 you need to enable GPS to discover bluetooth devices)

Press the connect-disconnect icon on the toolbar to start searching for bluetooth devices. Ensure that the MIMU22BLP(X) sensor is powered on and is well within the range of the smartphone (10 meters). On

finding the MIMU22BLP(X) in the list of discovered bluetooth devices, select the MIMU22BLP(X) to connect.

On successful connection, your smartphone will vibrate and the connect-disconnect icon will change to “connected icon” to indicate that the device has been connected.

Press the start button to start the session. As you start walking now you will notice that the DATA will be available on the **DASHBOARD** and the track will be made in the **FOOTPRINTS TAB**.

You can add a custom floor plan if you wish to the **FOOTPRINTS TAB**. To add any JPEG image as a floor plan/map, browse and select any jpeg image from the add map button.

Once the map is loaded onto the screen, select the set trajectory button to edit the zoom and alignment of the map. To figure out the proper scale and alignment it is advised that you start the sensor and walk for a particular distance minimum of 5 steps, between two known points on the map. Once the distance has been walked between the two known points, now align the track on the same position on the map, through zoom in, out or rotating the map or track accordingly.

DaReX has the option to continue the session at any later point in time. The session can be saved if needed to the phone memory and can be loaded anytime later. When loading a session and pressing the start button, it asks for continue or restart option. The restart will clear all existing details on the current tabs of the app and the continue feature will continue the session from where it was last left.

CONCLUSION

DaReX is an application aimed at helping users to interface MIMU22BLP(X) sensors. The aim of DaReX is to give the user a fair understanding about the unlimited possibilities of the MIMU22BLP(X). Since the applications of MIMU22BLP(X) are wide, the tailor made applications for user specific needs can be made with richer features and more integration of functionalities. DaReX is just an attempt to give a glimpse of what can be done with MIMU22BLP(X). We believe that with MIMU22BLP(X) we have marked a trail in the untrodden path of inertial foot mounted pedestrian navigation.

For more information please contact us at darex@inertiaelements.com or visit our website www.inertiaelements.com/support.html