­

**USER’S**

**MANUAL**

***Train Trax Android App***

**CPE 658: Software Studio II**

Prepared by: Rashad Madyun

April, 2016

**Revision Sheet**

|  |  |  |
| --- | --- | --- |
| **Release No.** | **Date** | **Revision Description** |
| Rev. 0 | 4/11/16 | User’s Manual Created |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**USER'S MANUAL**

**TABLE OF CONTENTS**

1.0 General Information 4

1.1 Systems Overview 4

2.0 System Summary 4

2.1 System Configuration 4

3.0 GETTING STARTED 4

3.1 Installation 4

3.2 Train Navigation Database 4

3.3 Train Navigation Service 5

4.0 USING the APPLICATION 5

4.1 Settings 5

4.1.1 Edit Database Port Number 5

4.1.1 Edit Service Port Number 5

4.1.2 Edit IP Address 5

4.1.3 Save Settings 5

4.2 Main Menu View 5

4.3 Train Monitor View 6

4.3.1 Track Diagram 7

4.3.2 Track Switches 7

4.3.3 Train Position 8

[Figure 1. Settings Menu TBD 5](#_Toc449295936)

[Figure 2. Main Menu View 6](#_Toc449295937)

[Figure 3. Train Monitor View 7](#_Toc449295938)

[Figure 4. Track Switch icons 7](#_Toc449295939)

[Figure 5. Switch State change from Pass to Bypass mode 8](#_Toc449295940)

[Figure 6. Train Position Icon 8](#_Toc449295941)

# General Information

## 1.1 Systems Overview

The Train Trax application is an Android application that displays a diagram of a train track system including all associated track segments and switches from a pre-load loaded database train coordinate system. The Train Trax application monitors and displays position of trains that are moving on the loaded track diagram. The Train Trax application receives coordinate information about the points located on the track diagram from the Train Navigation Database and then takes that information to build a display of the track diagram. Position updates are received from the Train Navigation Service which are used to display the actual position of the train for a display the track and associated switches. The Train Trax Android application can also control switches on the track when the user selects a switch on the display.

# System Summary

## 2.1 System Configuration

Train Trax operates on mobile devices with Android operating system. It is compatible with Android 6.0 API level 23 and higher versions but may also run on versions below that. The App has been optimized specifically to run on the HP Slate mobile device for the displaying of Train Track information in UAH’s Train Lab. The application requires a connection to Internet in order to connect to the Train Navigation Service and Train Navigation Database, to receive and send data. After installation on an Android device, additional port number and IP configuration is required to ensure that Train Trax can connect to the Train Navigation Service and Train Navigation Database.

# GETTING STARTED

## 3.1 Installation

The App can be installed on your Android device by downloading the .apk file onto the device and selecting it to begin the installation process. Optionally the app will also install if executing the Train Trax Project in Android Studio with the device connected to the computer.

## 3.2 Train Navigation Database

The Train Navigation Database is used by the Train Trax Application to provide it with a layout of the track. The Train Trax takes a list of Adjacent Point, Track Block, Track Switch, and Track point coordinates to compute and display the overall track layout. The specific format required for Train Trax to accept this data is described in the Train Navigation Database ICD. An internet connection is required in order to connect to the Train Navigation Database. Setup of the Train Navigation database is required prior to running the app which includes setting the appropriate port and IP address under the Main Settings window in the Train Trax application.

## 3.3 Train Navigation Service

The Train Navigation Service is used by the Train Trax application to receive position updates and control and update the state of the track switches. Once the application is up and running, the initial state of the track switches will be received from the train navigation service. Any time the user clicks a switch, a state change occurs and that state change is sent to the Train Navigation Service. The Train Navigation service also sends position updates for each train position in the track every second. Setup of the Train Navigation service is required prior to running the app which includes setting the appropriate port and IP address under the Main Settings window in the Train Trax application.

# USING the APPLICATION

## 4.1 Settings

The settings menu shown below in Figure 1, is accessed by clicking on the upper right portion of the ActionBar in the main menu view window. There are three settings that can be controlled for the application which are the Edit Database Port Number, Edit Service Port Number and Edit IP address options. These are required to connect to the Train Navigation Database and Train Navigation Service. There’s also an option to save the settings which if selected will save the settings to a preference file that will be loaded the next time the app is started.



Figure . Settings Menu

### 4.1.1 Edit Database Port Number

The Port Number is used by the application to set up a client/server connection to the Train Navigation Database.

### 4.1.1 Edit Service Port Number

The Port Number is used by the application to set up a client/server connection to the Train Navigation Service.

### 4.1.2 Edit IP Address

The IP Address is used by the application to set up a client/server connection to the Train Navigation Service and Train Navigation Database.

### 4.1.3 Save Settings

The port and IP settings can be saved for future use at any time by the user by selecting Save Preferences in the settings menu.

## 4.2 Main Menu View

The Main Menu View of the Train Trax application is displayed once the application is started. In this view a diagram of the track is displayed without any switch or train positon information. The settings menu where you can set the Port and IP address for connecting to the Train Navigation Service and Train Navigation Database is accessed from this view. From the Main Menu view selecting the Train Monitor button will enter the application into the Train Monitor mode state. In the event of an error occurs trying to connect to the Train Navigation Database, an error message will be displayed and the option to enter the Train Monitor mode will be inaccessible.

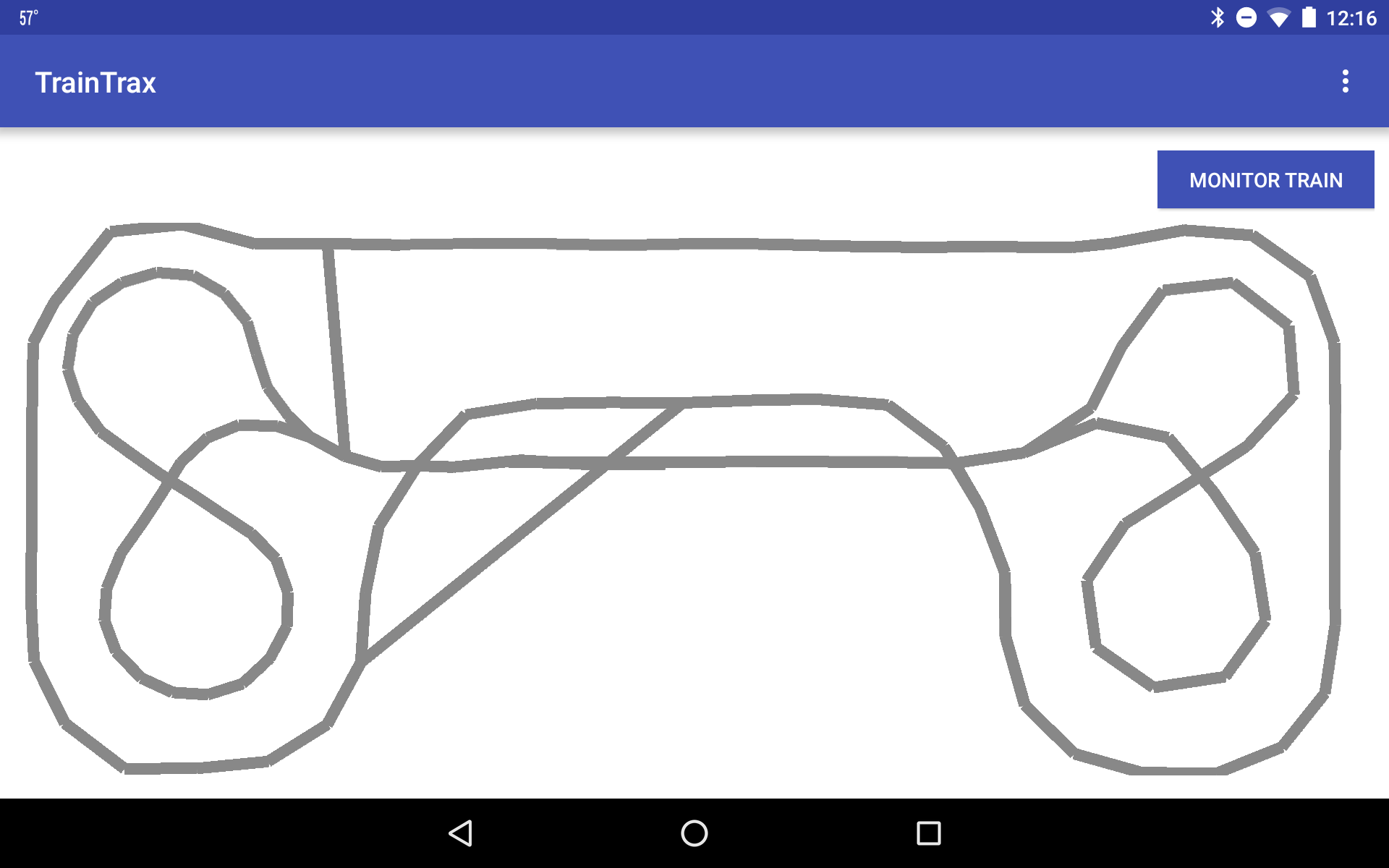


Figure . Main Menu View

## 4.3 Train Monitor View

The Train Monitor View of the Train Trax application is displayed once the Train Monitor button is selected from the Main Menu View. In this view, a diagram of all track coordinates are displayed, switch position and state information is displayed, and the position of each train on the track at the current time is displayed. The Train Monitor View is updated every second as position updates are received from the Train Navigation service. The Monitor View will receive the initial state of the track switches from the Train Navigation Service upon startup. From there on, anytime the user selects a switch, the state will be changed and the view is updated and Train Trax sends the updated state change back to the Train Navigation Service. The Train Monitor View includes a legend at the bottom of the screen describing what the colors and symbols mean in the view.



Figure . Train Monitor View

### 4.3.1 Track Diagram

The track diagram displayed on the Monitor Train view includes all components of the track including, switches, trains, and points. The points are received from the navigation database upon startup and used to draw a diagram of the track. The track layout is drawn in green and red, the green symbolizing the path of the track that is allowable by a switch, and red indicating an incorrect path controlled by the track switch.

### 4.3.2 Track Switches

The track switches icons will be a square box that says Switch. The boxes will be colored black when in pass mode and red when in bypass mode.

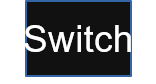


Figure . Track Switch icons

Each switch should initially be in pass (closed) and will toggle to bypass (open) when selected. When the switch is selected the active path of the track diagram will change to reflect the new path controlled by the switch

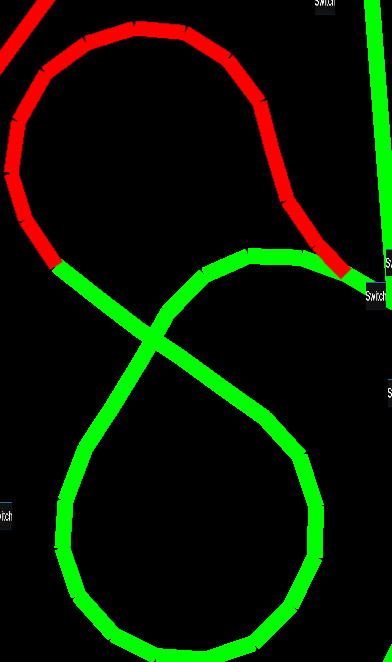
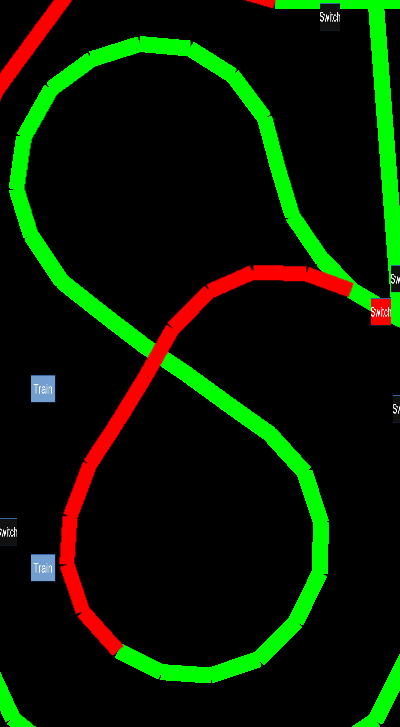


Figure . Switch State change from Pass to Bypass mode

### 4.3.3 Train Position

The train position icons displayed in the Monitor View will be a square box that says Switch. The boxes will be colored blue with white text. An example of the icon is shown in Figure 6. The speed of the train will at that position will also be displayed in a text box right below the train icon. If a train that was moving comes to a stop, an alert will pop up letting the monitor know that the train has stopped.



Figure . Train Position Icon