Wifilapper – Your Endurance Racing Datalogger

Table of Contents

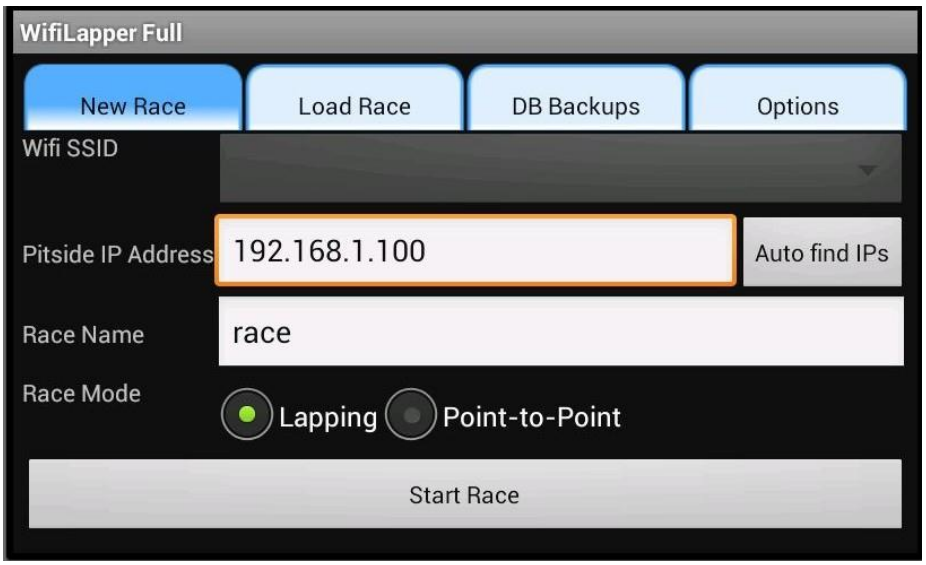
1 Getting Started with Wifilapper

1.1 Installation / Removal

The Wifilapper program is only available for Android devices, and is available for free from the Google Play store. There are 3 different versions available: Lite, Full and Tablet. Since June 2012 WFL has been open source, so download either the Full or Tablet version and install it on your device.

To remove Wifilapper simply open up Settings / Manage Applications and uninstall WFL from your device. You may want to clear the data file from your device prior to uninstalling WFL.

1.2 The Main Screen



The main screen for the WFL program consists of several tabs, each with a different focus.

New Race: Connect to the wifi network, choose the Pitside server for storing lap data, name the race and choose the type of race.

Load Race: Load a previous race and resume it or retransmit it to Pitside. Create a race summary.

DB Backups: You can load a previous database and back up your current database here.

Options: Configure WFL for Test laps, Bluetooth GPS, OBDII scanners, IOIO analog capture boards, how race start/end is calculated, units, etc.

Below the functions available in each tab are described in more detail.

2 New Race

In its simplest form Wifilapper can be used simply to collect lap times. Those lap times will be saved onto your device, and then can be copied/transferred over to a computer for further analysis.

If there is a wireless network available at the track or you are setting up your own then you can have WFL either send lapping data to a computer every time the car comes within range of the network, or it will transmit the results when the car returns back to the pits.

2.1 Connecting to the Wifi Network / Pitside:

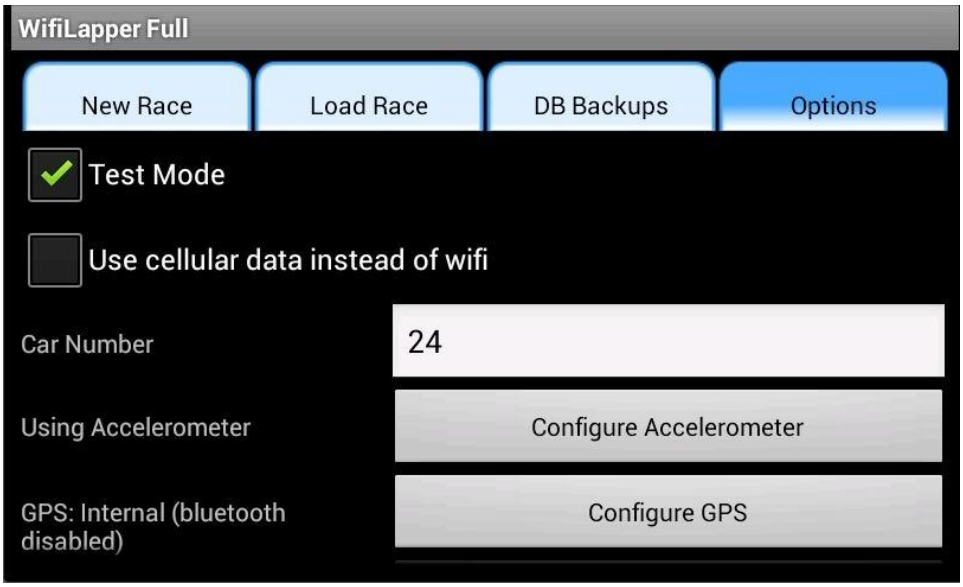
Once a wifi network is set up your device needs to be connected to it. Connect the phone to the router through the android wireless manager and make sure all the security settings are working properly. If the router has internet, try to browse to a webpage to make sure everything is working.

Now run WFL. In addition the WFL application needs to be told which wifi network it should connect to. In the "New Race" screen, select your network's SSID (network name) from the drop down box. Wait for a message indicating that the phone is connected to the network.

Click "Auto find IPs" and select your PC's name when it shows up. If you are unsure, you can click "Help->Show IPs" in the PC PitsideConsole program to find out what its IP address is and enter it manually. An IP will look like "192.168.0.1". If WFL shows the PC's IP address in the window, it means that you are successfully connected.

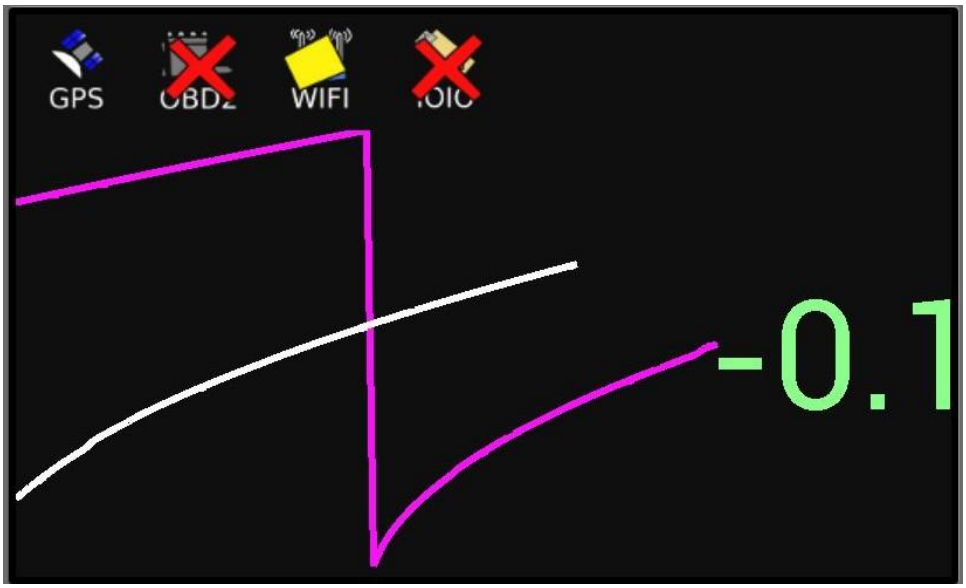
2.2 Running a Test Race:

A good way to test your setup is to run a Test Race using WFL. Click on the OPTIONS tab and check the box for "Test Mode", then click back to the "New Race" tab.

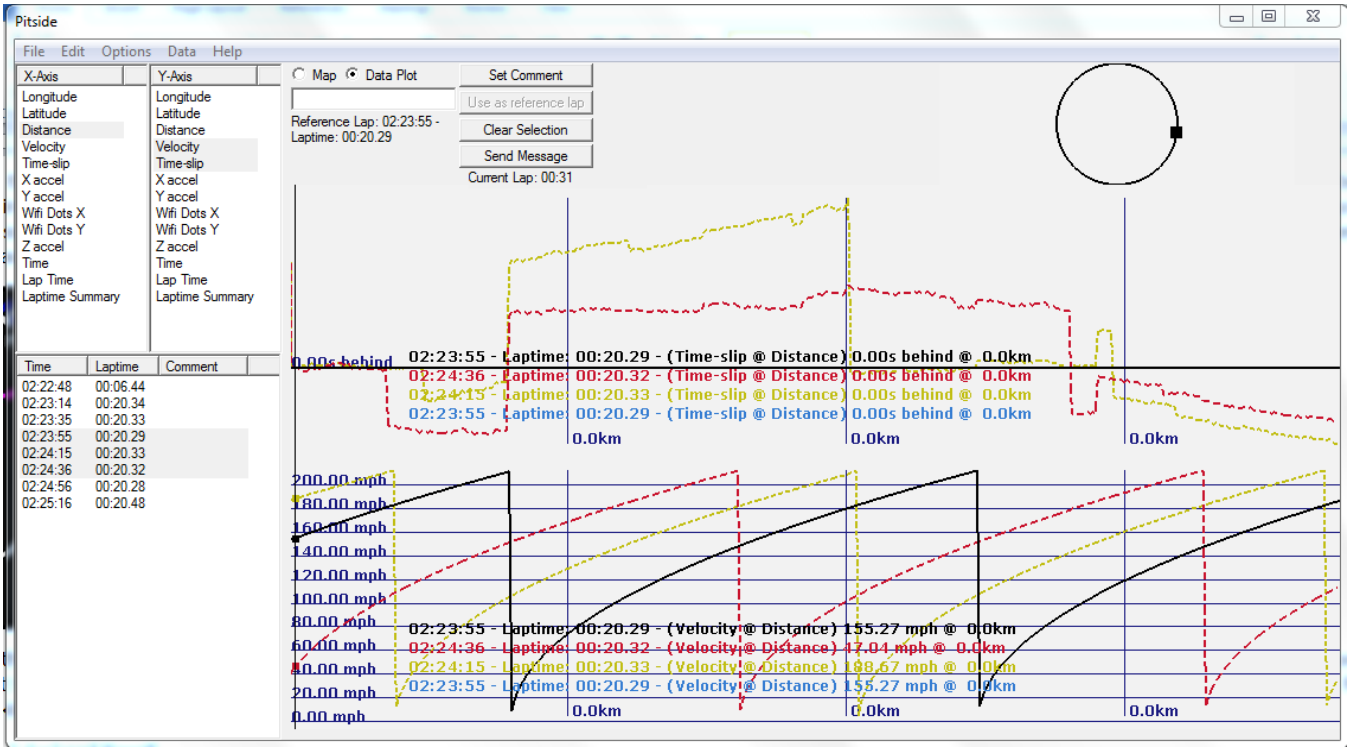


Make sure that you are connected to your desired Wifi network and you have selected your WFL server as above if you are test with PitsideConsole, otherwise just enter in a name for this test race and tap on the "Start Race" button. A message will pop up about the GPS being disabled for Test Races; dismiss this message and you should now see a screen like below:

Tap the screen ONCE to set the location for the START/FINISH line. The Splits option is no longer active within WFL – instead Split Points can be set dynamically from within PitsideConsole. Another message will show telling you to continue until you return to the S/F line again, giving you the distance still to go. Once you have "crossed" the S/F line again, WFL will start displaying real-time lapping data. The first lap displays a Velocity / Time graph, but for all subsequent laps you will also get an Ahead/Behind time differential that is continuously updated.



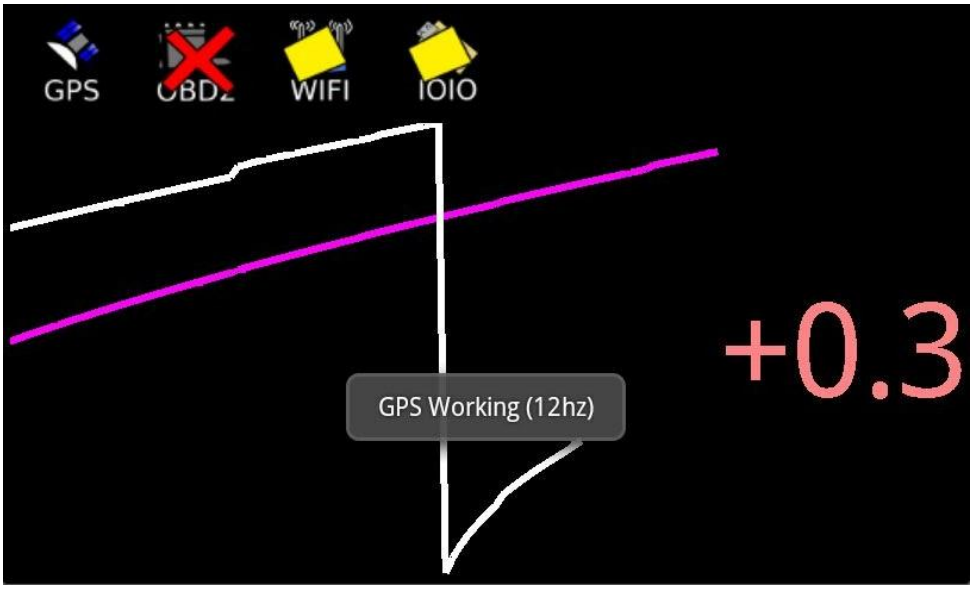
For the Test Race the track is simply a circle and the velocity follows a sawtooth pattern, with laptimes around 20 seconds. If everything is working correctly you should start to see laps populating inside of the PitsideConsole program. Click on a lap, set your Reference lap and test out Pitside Console's analysis features. You phone's IP address will show up just next to the "Y-Axis" menu list "Phone IP: xxx.xxx.xxx.xxx".



Congratulations, your system is working!

2.3 Icon Status during a race session

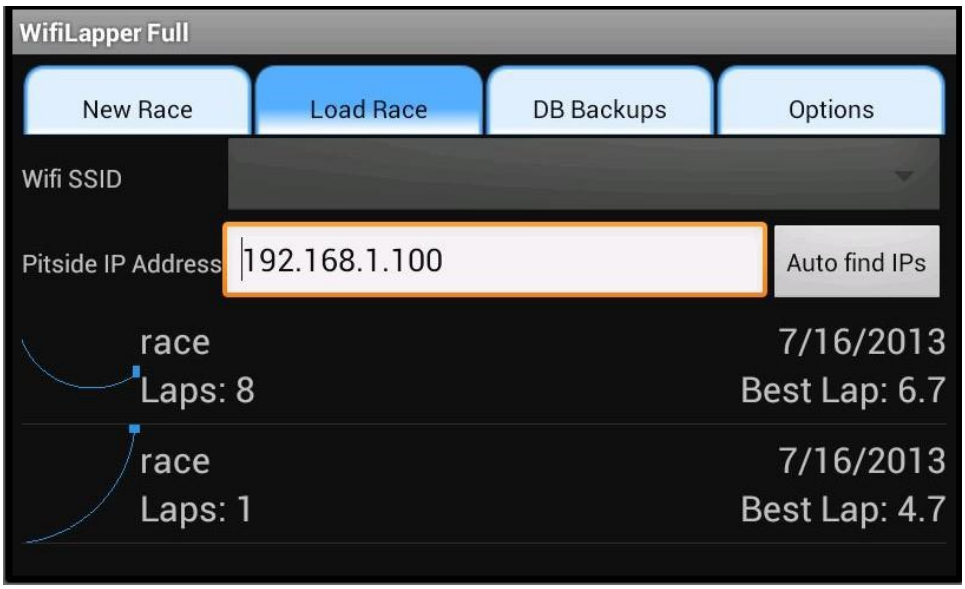
You can check on the status of the items within the WFL by tapping on the icons displayed at the top of the race screen. More detailed information about each will be displayed on the phone, including connect attempts between the Phone and the wireless network and GPS data rate.



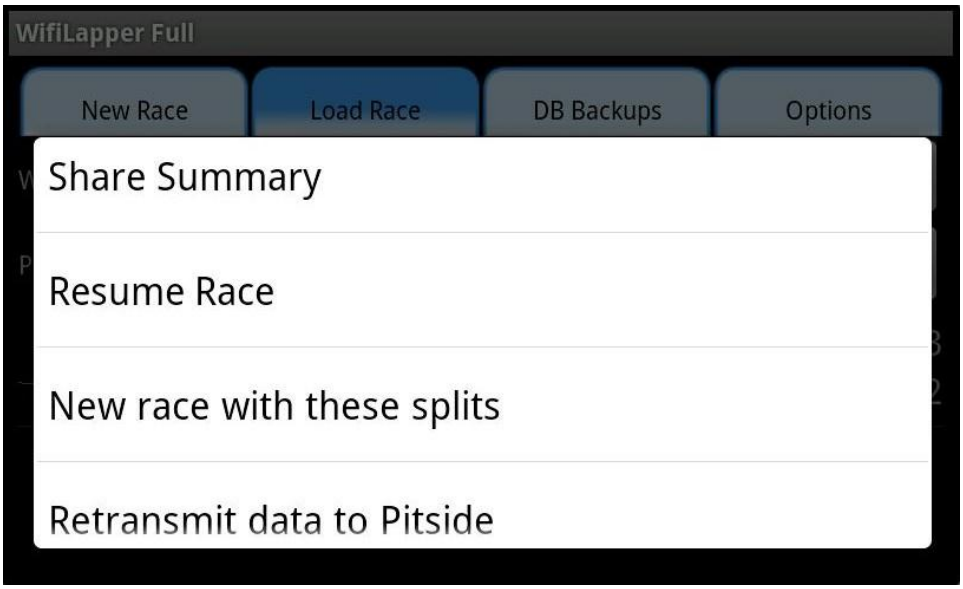
Having a yellow rectangle over an icon indicates that this function is currently not connected or there is some other issue. Click on that icon to see more details. A red "X" over an icon indicates that this function is currently disabled.

3 Load Race

Wifilapper provides the ability to load a previous race, resume it, rename and delete it in addition to some other functions. Tap on the "Load Race" tab and all existing races will show up in a list.



Long tap the desired race and the available options will show up:



Share Summary: WFL will create a summary of the race, including fast lap, a histogram of lap times, traction circle graph and some other information and save this as a JPEG file. You can then email this summary to others.

Resume Race: This option can be used to resume a race that is currently in progress, or if you have already set up a Start/Finish line for an upcoming race (By say biking around the track with WFL running on your device), you can use Resume to collect the actual lap data without having to set the S/F location again by tapping on the screen.

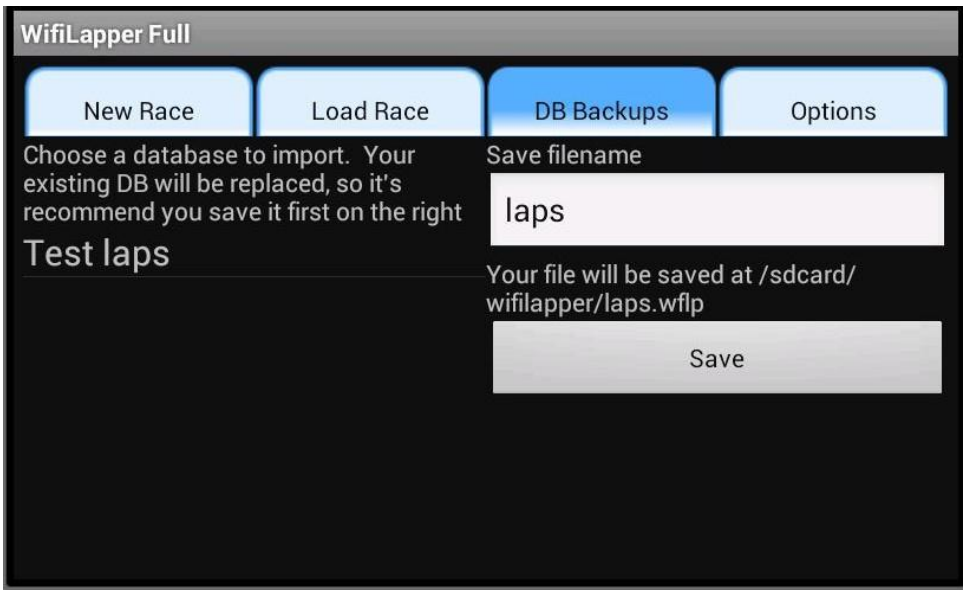
New Race with these splits: Similar to Resume Race only it creates a new race session.

Retransmit data to Pitside: Wifilapper will continue to try to send data to Pitside Console, until more than 30 minutes of lapping data is collected. At this point WFL will drop data from the phone's active memory (but this data is still saved to the flash memory), so if WFL can't connect to Pitside for an extended period of time some data will be "lost" when it does connect next. If you want to get the full database to Pitside Console, choose "Retransmit data to Pitside" and ALL RACE SESSIONS will be resent to Pitside Console over the wifi connection.

Rename / Delete: These are pretty obvious ☺.

4 DB Backups

More than one WFL database can be stored on your device. This tab allows you to save the existing database under your chosen name, and you can also load an older database for saving more race sessions. Setting up a separate database for each racetrack for instance will allow you to keep track of your progress over time.



5 Options

Wifilapper has many options available to allow you to customize what data you want to collect.

5.1 Test Mode:

Choose this mode to have WFL generate its own test laps, to allow you to test connectivity and overall system functionality.

5.2 Use Cellular data instead of Wifi:

As of Version 1.28 WifiLapper supports cellular data plans for transmission. Your device must have cellular service and also a data plan that is available at the track for this to work.

Check this button and WFL will no longer look for a wifi connection before it sends lapping data. Instead, it assumes that there is always a data connection and will send the data to the given IP address.

In order to use this feature Pitside Console needs to be running on a computer and the IP Address is opened up for Port 63939. To access the information, either someone needs to be at that remote computer (or it's set up in the pits using some wifi/cellular plan of its own), or you can HTTP into it using the same IP address. Enter your PC's internet-facing IP (you can get it at whatismyip.com) address into Firefox or Chrome web browser (IE has known issues). In this case you will only be able to access the data through the Web UI, with its currently limited functionality.

The advantage of this setup is that a continuous data connection is available, so you should have zero dropped laps or channels. The disadvantage is that you will need a data plan for each phone running WFL, as well as a cellular connection and data plan in the pits for your computer, if no wifi is available at the track.

5.3 Configure Accelerometer:

This allows you to collect accelerometer data using the internal phone unit, or if you want to reduce the amount of data transmitted over the wifi connection each lap you can choose to disable this.

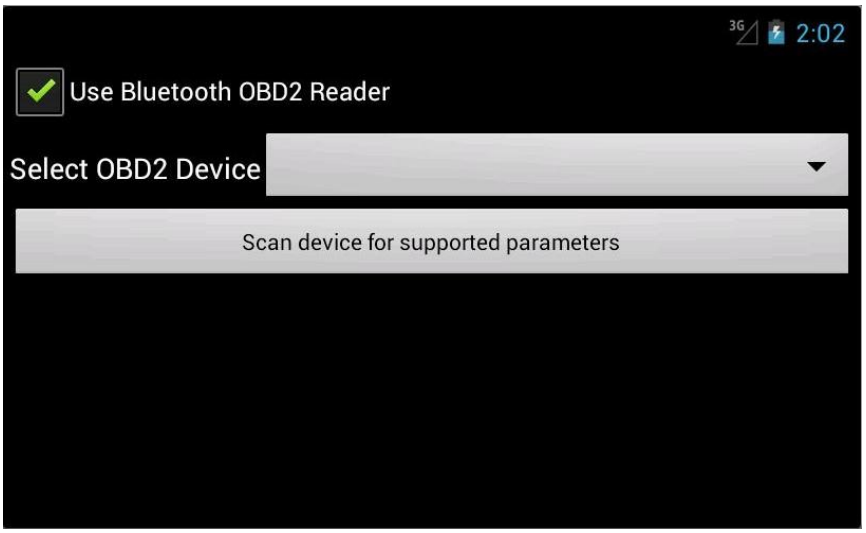
5.4 Configure GPS:

Option to use either the internal GPS (1hz) or if you have already paired an external Bluetooth GPS device such as the QStar you can select that device here.

5.5 Configure OBD2:

If you have installed a compatible Bluetooth OBD2 scanner and have it already paired with your device, you can activate it here and choose which OBD2 information you wish to collect. Remember that the data

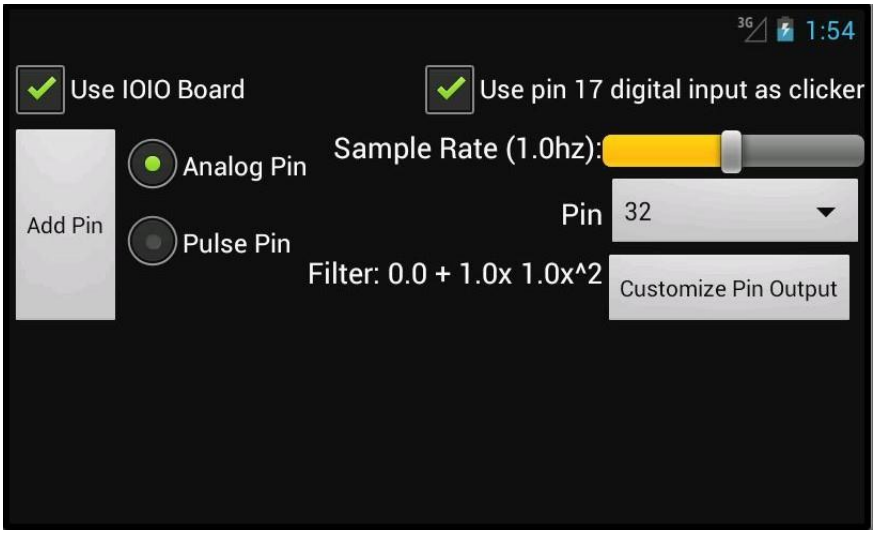
sampling rate will decrease for each channel as you increase the total number of channels you are sampling. It is recommended that no more than 5 or so channels are chosen at one time.



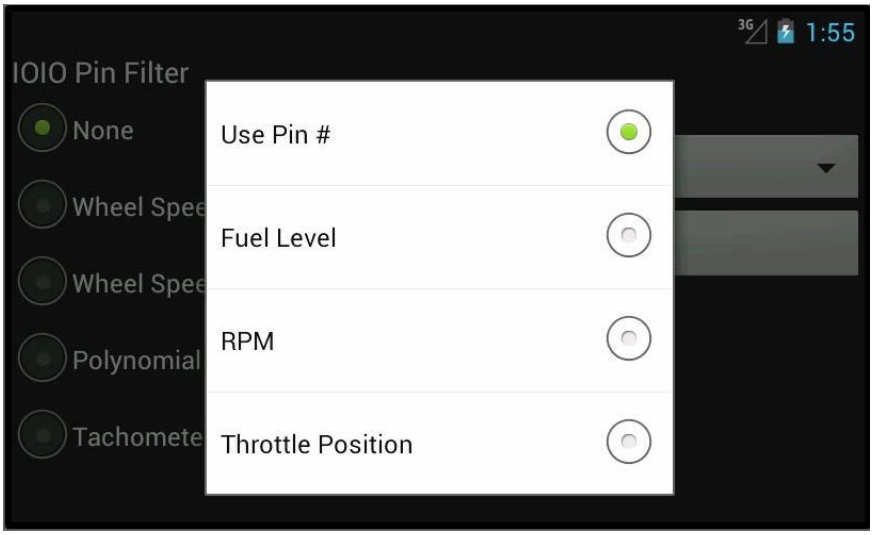
5.6 Configure IOIO:

You can configure WFL for using an analog/digital data interface IOIO board here. Up to 9 data channels can be monitored and transformations for each channel can be entered either inside WFL here, or you can choose to enter those transformations inside of Pitside Console. To use the IOIO board you need to check the box to enable it. If you have wired up Pin 17 to a momentary switch for acknowledging text messages you should check that box to enable this feature. The next step is to set up each IOIO pin within WFL. Only pins #31 through #39 can be used for this, due to the limitations of the IOIO board itself.

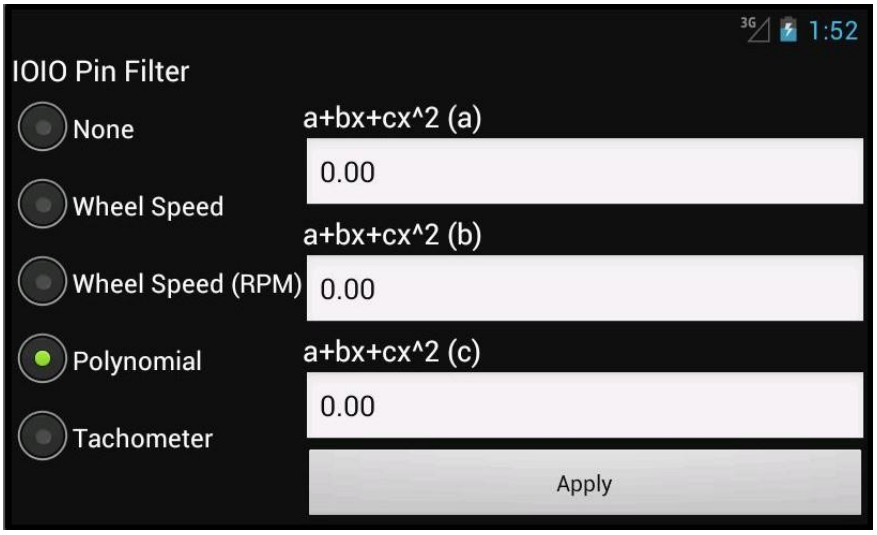
First, pick a sampling rate for the chosen pin (#32 in the case below). For a long race and a data channel that is not expected to change much over time (such as coolant temperature or oil pressure) pick a low sampling rate (~0.5hz). For dynamic data channels such as RPM you will want to pick a higher sampling rate such as 1-2hz. The largest database that we have found using WFL and a IOIO board is in the 100-200MB range, so that should give you an idea of what capacity of memory you will need on your device when using these sampling rates.



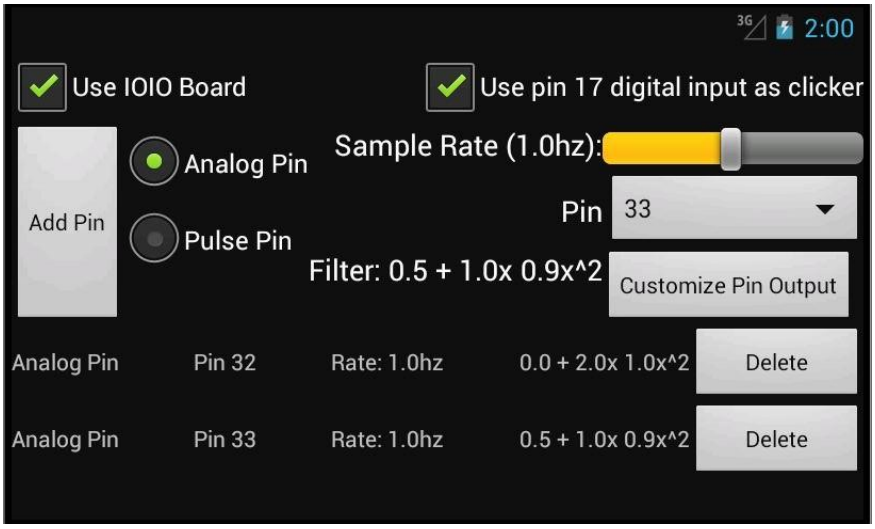
To assign a name to the data channel / pin #, tap on the "Custom Pin Output. Many options for channel names are provided here, but you can simply use the Pin # itself if desired (default).



After choosing a name, choose the transformation option that you want and fill out the necessary fields for the transformation and hit "Apply".



Once all fields are filled out ***<u>be sure to tap the "Add Pin" box</u>***. The transformation should now show up at the bottom of the screen.



Do the same for all remaining IOIO pins you have wired into your car.

If you need to change a pin assignment or transformation value, first tap on the "Delete" box for that pin. This will delete that pin/transformation assignment, but loads all of the current transformation value information into the edit fields. Re-add the pin/transformation by editing these values.

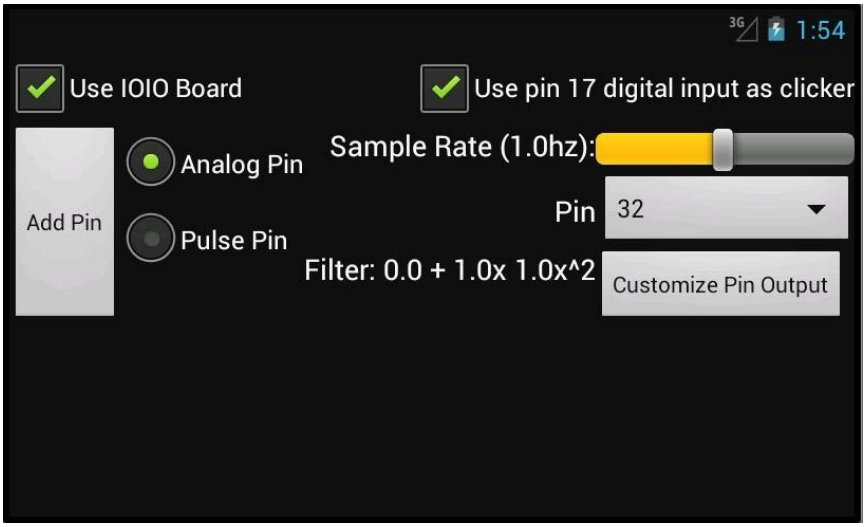
5.7 Configure Point to Point:

Choose which options you wish for what determines Start / Finish for a given P-t-P lap. These options are primarily for Autocross type races.

5.8 Configure Communications:

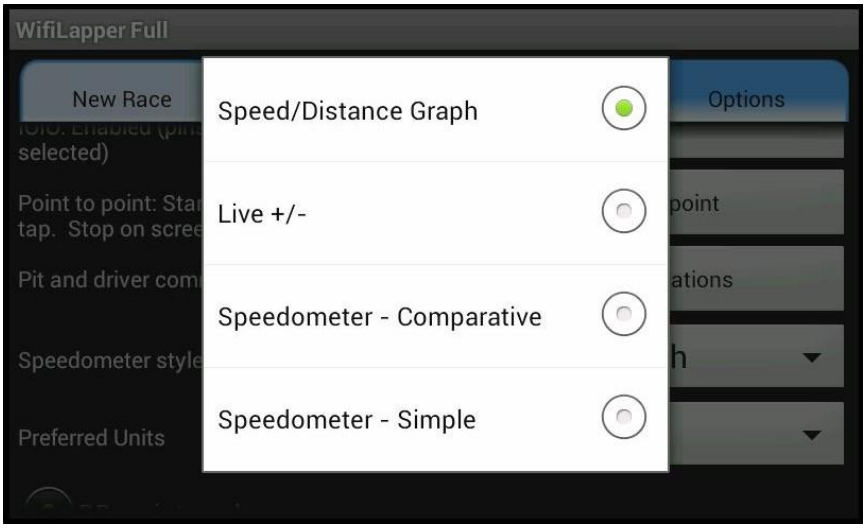
Configure a secure messaging system for Pit-to-Car transmissions. Here you can set up an individual prefix for all text messages that come into the phone while WFL is running. Only those with the "Privacy Prefix" you have set will show up on the WFL screen. If the racer taps the screen you can have the phone send an acknowledgement back to the texting phone.

If an IOIO board is set up on the device a switch can be configured on Pin 17 to do this, rather than requiring the driver to tap the screen.



5.9 Speed/Distance Graph:

There are several ways to display information about your current lap on your device, with the default view being the Speed/Distance Graph.



Live +/- will only display the amount of time ahead or behind your current lap is compared to your best lap.
Speedometer – Comparative displays your current speed and your best lap's speed at the same point, both numerically.
Speedometer – Simple displays your current speed numerically.

5.10 Units:

Choose your desired units for the velocity display: MPH, KPH or meters/second. The current version of WFL has a bug where the units

displayed on the main Options page doesn't refresh to what you may have chosen in the dialog. Don't worry about this as your choice was saved correctly.

5.11 Database Storage options:

Choose where on your device you want to store your WFL lap time databases, either on your phone's internal memory or on an external SD card.

6 Additional Help

For additional information on using Wifilapper be sure to check out the Wifilapper FAQ and main page: https://sites.google.com/site/wifilapper/. Tips and details on setting up peripherals, router location suggestions and general troubleshooting can be found both there and on the Wifilapper community forum: http://wifilapper.freeforums.org/