

PythonPilot™ GPS and Telemetry Plotting

Rev. -
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VERSION HISTORY

Version #	Authored By	Revision Date	Approved By	Approval Date	Reason
-	M. Vogas, D. Haessig	7/4/21			Initial release

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Introduction

This document describes the steps for executing the GPS & Telemetry plotting applications provided with the PiQuad. In addition, it describes the steps to follow to create a map for GPS Trajectory Plotting in a new flight location.

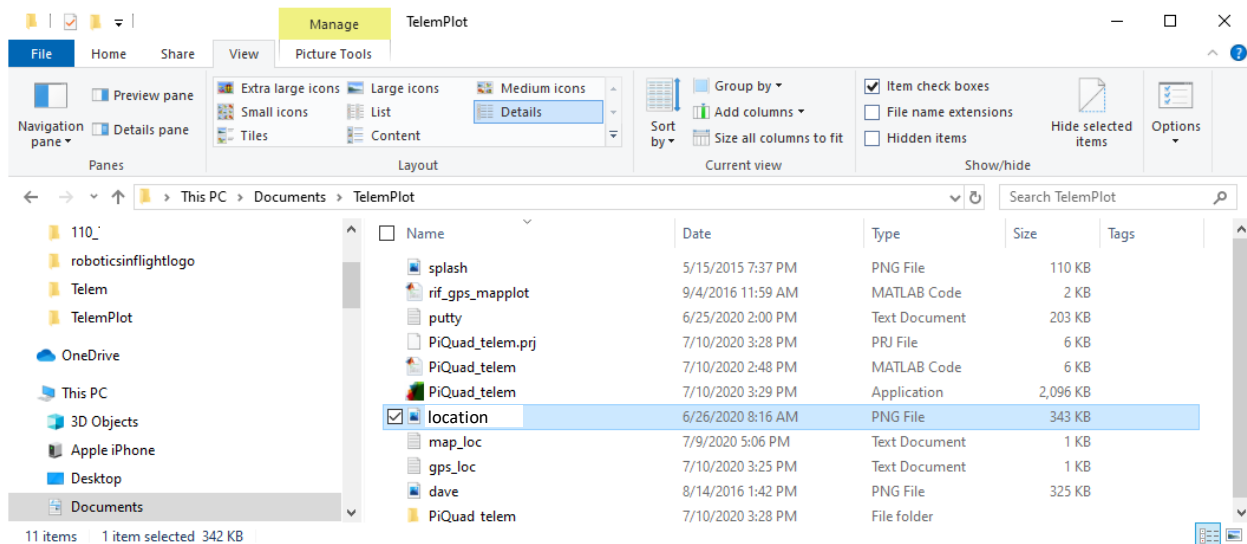
GPS and Telemetry Plotting

In the document “PiQuad Kit Assembly & Test”, there is a description of how to setup PuTTY for writing the PuTTY console data to a log file called ‘putty.log’. Repeating that here:

Start PuTTY. Go to Session->Logging:

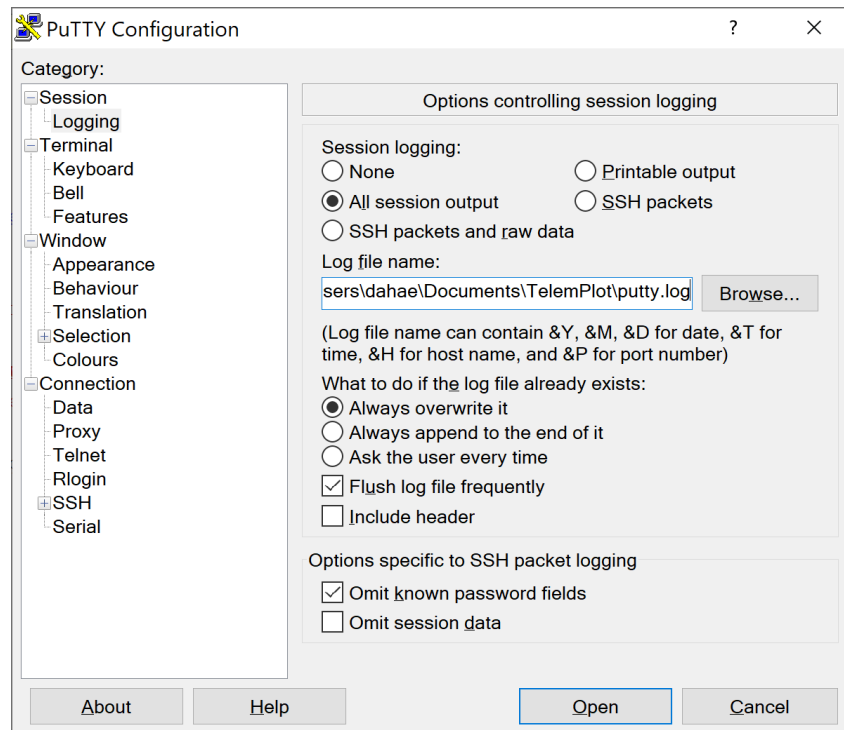
- Session logging: All session output
- Log file name: Enter the location and name of the file to be written
- Save the PuTTY Session file

Create a folder that will contain the matlab script (PiQuad_telem.m), the map file (e.g. location.png), the file ‘map_loc.txt’ which contains a string defining the name of the map file, and the file ‘gps_loc.txt’ which contains numerical values defining the GPS coordinates of the corners of the map in degrees.



Use this location for writing the file ‘putty.log’ in the Log file name location below.

- Start up PuTTY as described in Chapters 5 and 6 of “Electronics Assembly – Development Environment & Kit Instructions”.
- Set the telemetry output for that containing the Altitude data, keyboard entry ‘6’. Data will be streaming to the PuTTY console



Running with Matlab

- Start Matlab 2018b or later.
- Set the Matlab current directory to point at the location containing 'PiQuad_telem.m'
 - e.g. C:\Users\dahae\Documents\TelemPlot
- Run 'PiQuad_telem' from the Matlab prompt
 - The telemetry plots should begin to update as described on page 19 of "Electronics Assembly – Development Environment & Kit Instructions". Telemetry data is plotted in the time domain figure and on the GPS map.
 - Telemetry plots will not update if the telemetry data is not streaming to the PuTTY console

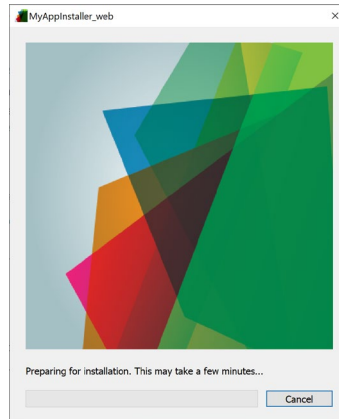
Running with the Matlab-free application – PiQuad_telem.exe

A stand-alone application has been created using the Matlab 'Application Compiler'. The setup requires that you run 'MyAppInstaller_web' while hooked up to the internet. This installs 'Matlab Runtime' on your machine (for free), and installs the application 'PiQuad_telem' on the Start Menu's list of installed programs. This will not be needed and can be uninstalled. Instead we run the application directly from the folder within which we are work, as described below.

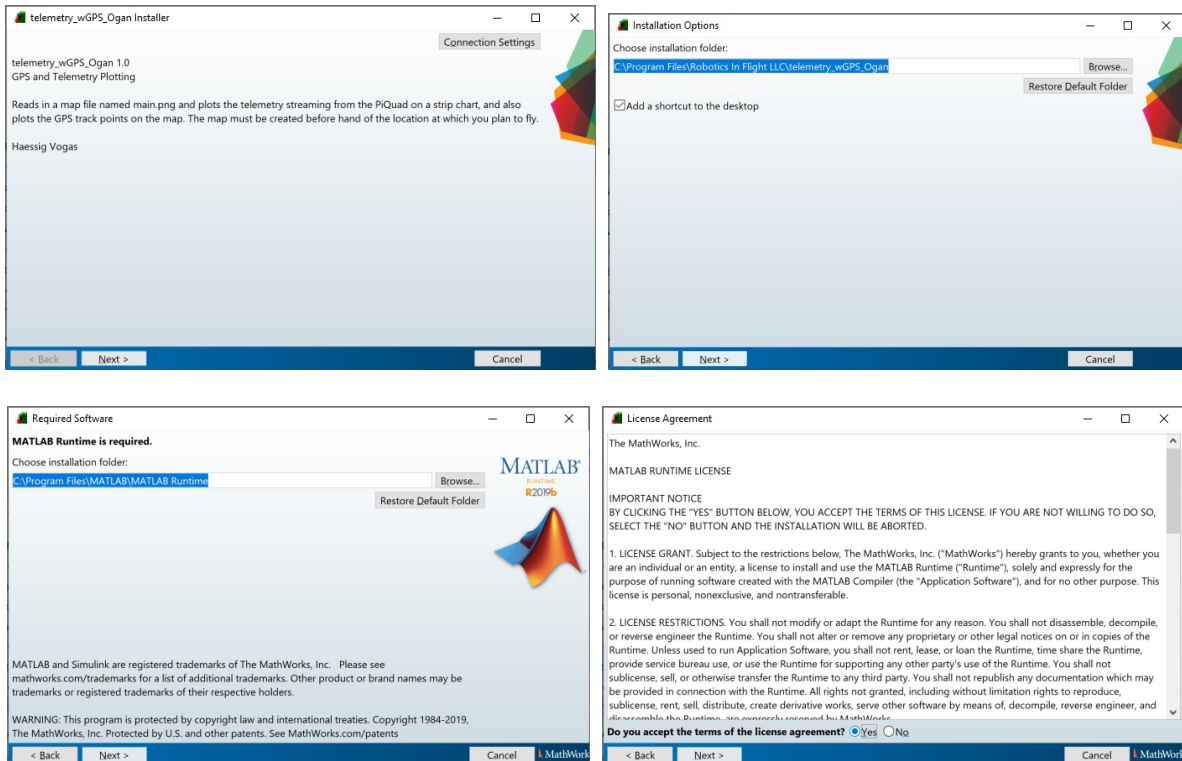
Installation of Matlab Runtime

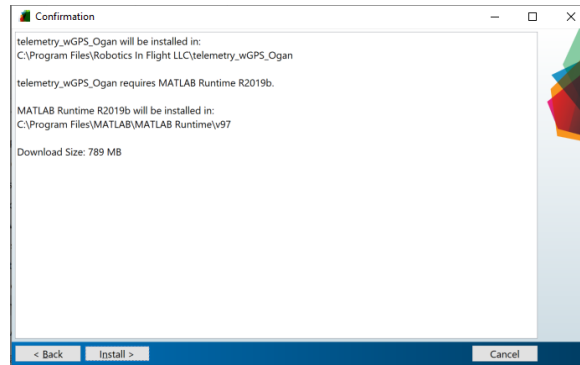
- Create a new folder where you will put the installer and other files
- Unzip the files provided: PiQad_telem.exe, MyAppInstaller_web.exe, splash.png, rif_gps_mapplot.m, PiQuad_telem.m, *mapfile*.png, map_loc.txt, gps_loc.txt, and other map file examples
- Double click to run 'MyAppInstaller_web'.

- You must be connected to the internet. It will begin the installation process and display:



The proceed thru the following 5 screens:





- When done you will have the application available on from the Start Menu under the name 'PiQuad_telem', or you can execute the application that is provided separately and with the same name.
- Go into the file 'map_file_loc' and update the path and filename for the file containing the map:
 - i.e. C:\Users\dahae\Documents\TelemPlot\location.png
- G into the file 'gps_loc.txt' and update the corner locations for the map; i.e. the latitude and longitude coordinates.
 - -90.xxxxxx -90.xxxxxx 32.xxxxxx 32.xxxxxx
- Start the application 'PiQuad_telem.exe' by double clicking on the application contained in the folder also containing the 2 aforementioned files.
 - It will put up the Robotics In Flight logo and start with Figure 1, and then it may stop. If not started, start the PiQuad telemetry (key entry '6') and then Figure 2 will appear
 - If the GPS receiver has acquired and is receiving valid GPS lat, lon, and alt data, the GPS track will be plotted on Figure 2.
 - Make sure the putty.log file is being written to the location from which you started 'PiQuad_telem'. If not, change that in the PuTTY console under 'Sessions → Logging'

Map creation for a new flight location

This section will describe how to modify the matlab program (PiQuad_telem.m) for GPS trajectory plotting at a new location. Specifically, you will be:

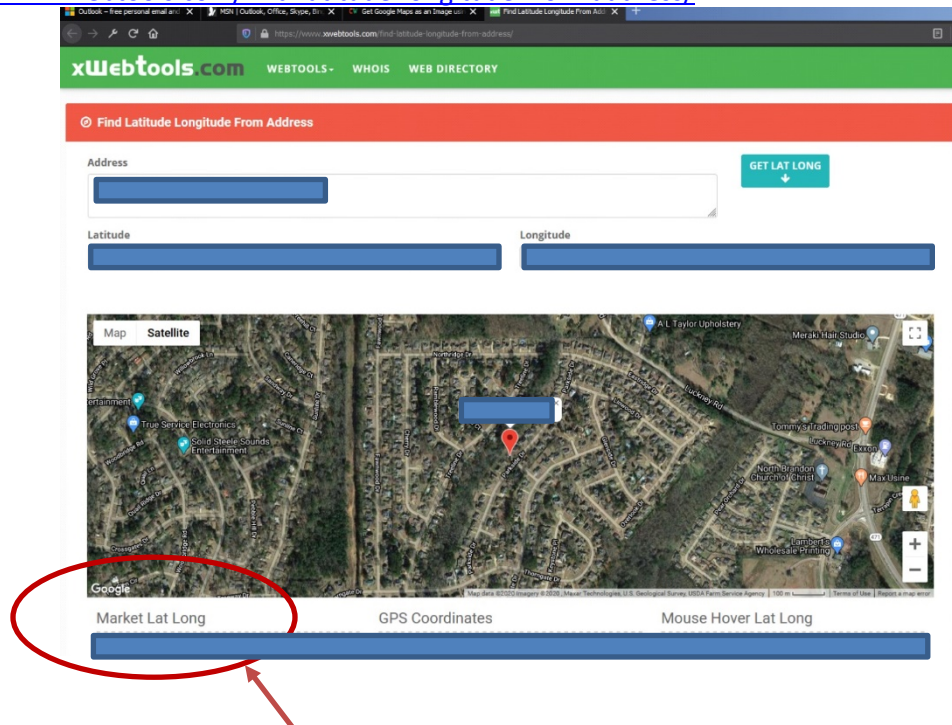
- creating a new 'map.png' file containing a Google aerial picture of the location where you will be flying
- pointing to the file in 'map_loc.txt'
- updating the GPS lat / lon axis range in file 'gps_loc.txt'

Capturing a map file and GPS coordinates

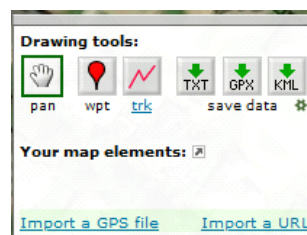
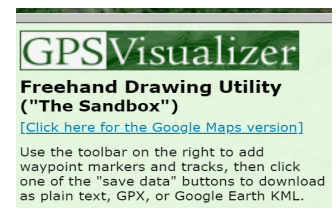
The first step is to get a static map from google, for the desired longitude and latitude where you will be flying. The map must be 640 x 640 pixels.

To find the location in Google maps you need to get a longitude and latitude from an address. This is easily accomplished by using a webtool in the following location:

<https://www.xwebtools.com/find-latitude-longitude-from-address/>



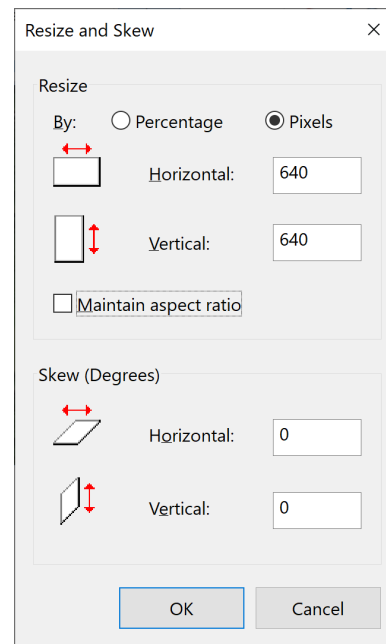
- Drag over and copy the Marker Lat Long.
- To create the map image use the google maps Visualizer:
<https://www.gpsvisualizer.com/draw/>
- Enter the nominal lat and lon values: i.e. 40.123456, -75.123456
- Switch to the Google Maps version
 - It should say Google hybrid in a window top right
- Use the zoom bar on the left (+ or -) to zoom in the area to the desired distance you intend to fly. Recenter the map by hitting 'Go' again.
- If needed, move the map center using the pan button (hand):



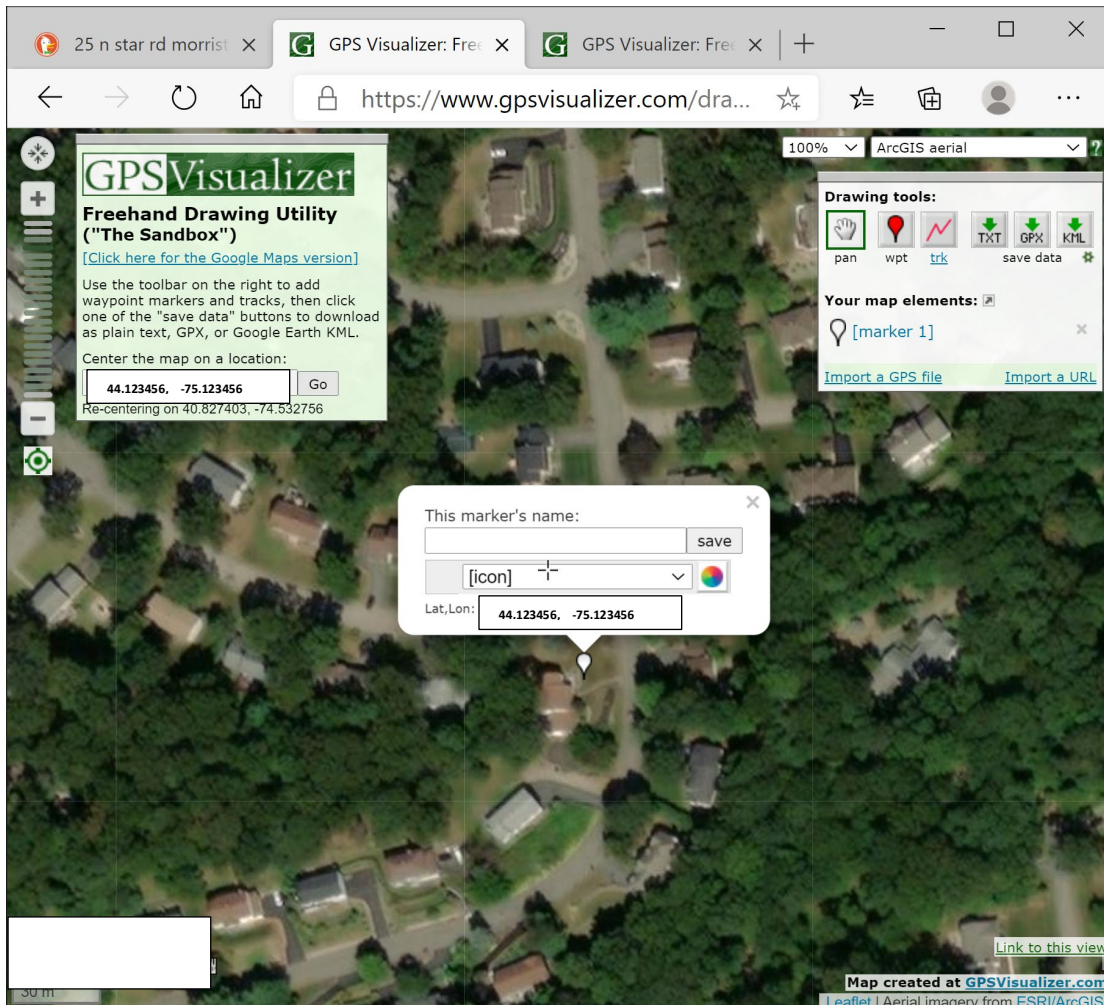
Using the Snipping Tool provided under Windows Accessories, snip a square region which will be the image from which you make the map. For example:



- Copy the image from Snip into the Windows Paint application.
- Select Resize
- Select the Pixels button
- Deselect 'Maintain aspect ratio'
- Change to 640 x 640 pixels
- Save as a PNG file with new name:
 - i.e. mike.png



- Back in the 'gpsvisualizer.com' page drop a red marker at the top left and bottom right corners of the 640x640 map region
 - Here is the top left corner



- Drag over and copy the lat and lon angles and save somewhere:

Here we have

44.826642, -75.537644
44.823885, -75.533471

- Enter these into the file 'gps_loc.txt':
 - -75.537644 -75.533471 44.826642 44.823885