# Instruction Manual
# Programmable Flight Controller

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https://github.com/Brendoncamm/SYP/edit/master/Documents/Instruction%20Manual/InstructionMa

# Contents

**Abstract**

The following instruction manual provides information regarding the design and usage of the flight controller. The required packages, libraries, installation procedures are outlined in the documentation. The function libraries provided are discussed in detail to ensure clarification.

# 1 GUI

This section gives the user instructions on how to make use of the functionalities the GUI has to offer as well as outlines how to add additional functionality if desired. It begins by explaining the required software and libraries the user must have installed in order to use the GUI. The functionality of the pushbuttons on the GUI will be explained, the section will finish off with where to find helpful resources for QtCreator, PyQt5 and the other libraries used.

## 1.1 Required Software

The following is a list of the required software needed to run the GUI:

- QtDesigner (Included in QtCreator5.6)

- Python3

If your system does not have QtDesigner installed follow these steps:

1. Open your preferred browser and navigate to: https://www.qt.io/qt5-6/ and click "Download"

2. On the next page select "In-house deployment, private use, or student use" and click "Get Started"

3. On the next page select "No" and click "Get Started"

4. On the next page select "No" and click "Get Started"

5. On the next page select "Desktop/multiscreen application" and click "Get Started"

6. You should now be on a entirely different page outlining the Commerical and Open Source versions of Qt scroll down and select "Get your open source package"

7. On the next page click "Download Now" to download the installer

8. Once you have downloaded the installer run it

9. With the installer now running click "Next"

10. Enter your Qt account information, if you do not already have a Qt account you can make one within the installer enter this information and then click "Next"

11. You should now be on the Setup page on the installer click "Next"

12. Browse for an installation folder or click "Next" to use the default one provided, ensure the "Associate common file types with QtCreator" box is selected

13. On the next page click "Deselect All" at the bottom of the page and then select "Qt5.6" and "Tools" from the list. then click "Next"

14. On the next page select "I agree" and then click "Next"

15. On the next page click "Next"

16. Finally, click "Install"

If your system does not have Python3 installed follow these steps:

1. Open your preferred browser and navigate to https://www.python.org/downloads/

2. Click on "Python 3.x" where x is the version number. The version number is irrelevant as long as the first number is 3.

3. Scroll to the bottom of the page to "Files" and select the appropriate version for your operating system. For example, I am using a 64bit Windows OS I would click on "Windows x86-64 executable installer". Click on this to download the installer. Once it is downloaded run the installer

4. On the installer, click "Customize installation"

5. On the next page ensure every box is checked

6. On the next page ensure the following boxes are checked: "Associate files with Python", "Create shortcuts for installed applications", "Add Python to environment variables" and "Precompile standard library". Once this is done click "Install"

Once you have successfully installed QtCreator and Python3 you must install the following libraries using the "pip" command. This is done through the command window, open the command window and type, for example: "pip install PyQt5", this will install the latest version of PyQt5. Follow this process for each of the libraries listed below.

- PyQt5

- pyqtgraph

- numpy

- sip

## 1.2  Basic Functionality

This section outlines the functionality of the GUI. To switch pages simply click on the name of the page in the list on the right hand side of the GUI. The following sections outline the functionality of the pushbuttons on each of the two pages.

### 1.2.1  Home

- **Start**: Initializes communications between the Base Station and Raspberry Pi

- **Finish**: Closes the GUI

### 1.2.2  Controller

- **Update Axis**: Update the joystick Yaw, Pitch, Roll and Thrust inputs

- **Update Host**: Update the Host PC Name

- **Update Port**: Update the port number for the socket

- **Manual Control**: Initialize the PS4 controller to send manual control inputs

- **Update Connection**: Updates the Host and Port at the same time, upon completing this a new connection will be established using the new information

To see which definition is called when each of these buttons are clicked see the GUI code in Appendix A.

## 1.3  Additional Resources

If the user would like to add any additional functionality many excellent online resources exsist to aid them through the process. Below are some of the best that were used extensively when developing the GUI. They are broken down into QtCreator resources, PyQt5 Resources and Library resources.

### 1.3.1  QtCreator Resources

- The best resource for QtDesigner is the one provided by Qt. This can be found at http://doc.qt.io/qt-5/qtdesigner-manual.html

3

### 1.3.2  PyQt5 Resources

- A very nice video series describing many different aspects of PyQt is provided by sentdex on YouTube. The tutorial is based on PyQt4 but the principal is still valid, the only thing to remember is that when they use the "QtGui" class in PyQt4 we use "QtWidgets" in PyQt5. To find these videos go to YouTube and type in "sentdex PyQt".

- The reference guide for PyQt5 can be found at http://pyqt.sourceforge.net/Docs/PyQt5/

### 1.3.3  Library and general Python Resources

- For additional information regarding pygqtgraph (the library that allows for live plotting) visit http://www.pyqtgraph.org/documentation/

- For additional information regarding anything else you're interested in for Python visit https://docs.python.org/3/library/index.html.