

# Graphical User Interface for Fluid Control Board

## Setup:

1. Connect tube to the pressure source.
2. Plug in the DC power supply to the outlet and connect the DC barrel jack to one of two sockets on the driver boards.

## Startup: (On Lab Computer)

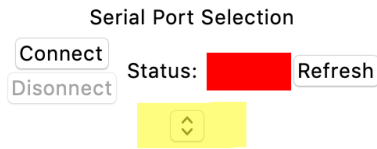
1. Open "Command Prompt" window
  - a. Open Start Menu
  - b. Type "cmd" into search field
  - c. Open "Command Prompt"
2. In the command windows, type in '`cd "Desktop\Fluid Control Board\UI"`' to navigate to the program directory. Then press enter.
3. Type "`dir`" then press enter to list files under the directory.
4. Type in "`cd UI_vx.x`", replace x.x with version number.
5. Ensure the USB cable to Arduino is plugged in.
6. To run the program, type "`python.exe UI.py [optional arguments]`" into the command prompt.
7. Wait till "Fluid Control Board UI" program window is opened.

## Startup: (On Personal Computer)

1. Login to the BU MBL lab drive and navigate to "Quentin Lin/FCB/Python" Folder.
2. Download the latest UI code by directly download the "UI\_v---" folder to the computer.  
  
(For major change in functionality of the code, new version will be created. If you already have the latest version, do not need to re-download)

## Initialization:

1. Find the "Serial Port Selection" section and click on the dropdown (Highlighted below).



2. Find and select the corresponding serial port. If the serial port is not listed, press "Refresh"
3. Press "Connect" to Initialize connection, the "Status" indicator should turn green

## Usage:

1. Channel Name:  
The default channel name is listed as "Channel xx". However, this could be easily modified by simply clicking on the Name field and typing new name. To ensure the changes could be saved, "Enter" has to be pressed after each modification.
2. Maximum Value Limit:  
Under the "Max Val" entry, new channel maximum limit could be set. This will modify the range of the slider and target value of the "Max" button. The limit of this is set in the "VAL\_MAX" variable of the program parameter. The entry only takes numeric input follow by "Enter" to apply the setting
3. Entry Field:  
Value for the channel can be directly entered through this entry. To apply the setting, press "Enter".
4. Min/Max button:  
Set the channel to Minimum or Maximum specified by the Maximum Value Limit.
5. Up/Down button:  
Apply offset to the current channel value. The offset is specified in the program "BTN\_OFFSET" parameter.
6. Status indicator:  
The status of each channel is indicated with color code stated following the "Channel Status Code" section.
7. Save/Load channels setting: (Disabled when board is in operation)  
The Channel Name and Maximum Value Limit could be saved to file. The path and filename could be modified in the Entry field following by "Enter" to apply the setting. To load old parameter, press the load button and a secondary UI will appear showing previous parameter that is present in the designated saved folder.

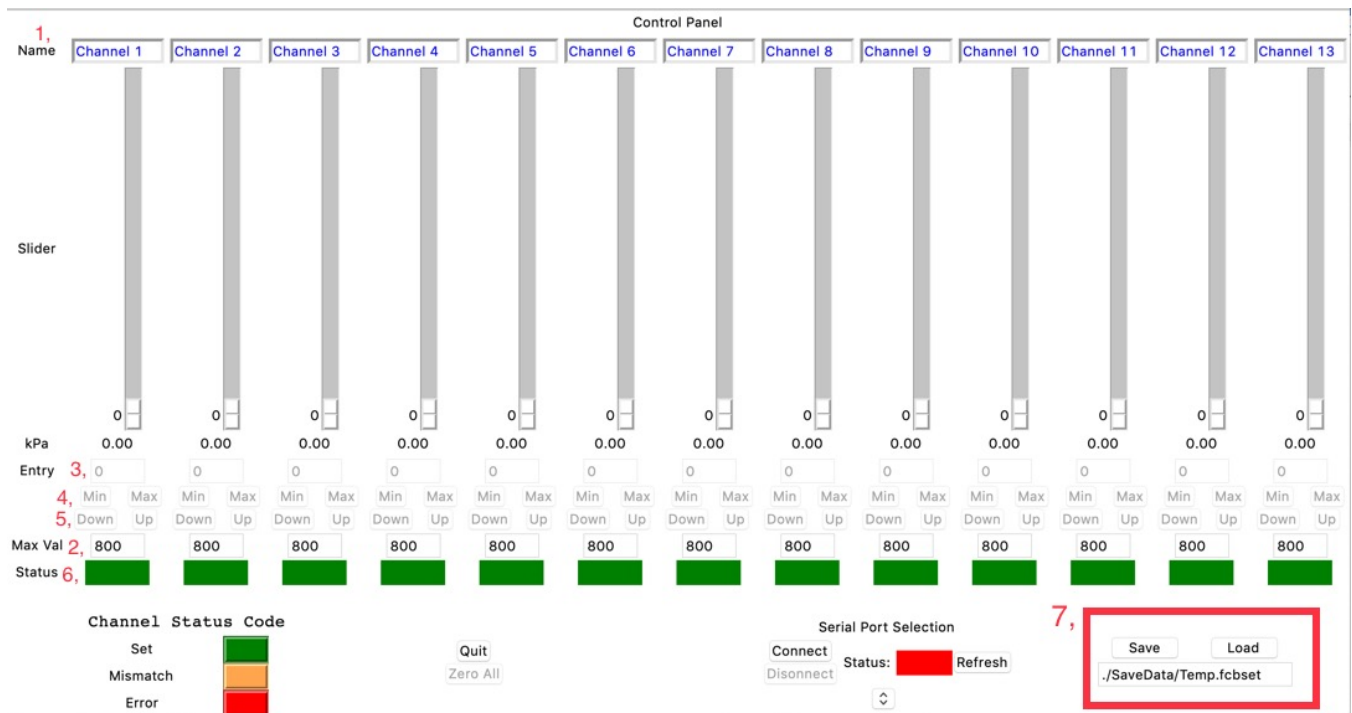


Figure 1: Main UI Windows (number labeled the corresponding UI elements)

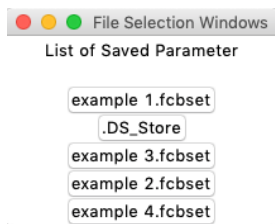


Figure 2: Parameter Loading UI Windows

## Additional Setting: (Command-Line Arguments)

Usage: UI.py [options] <arg1> ...

### Options:

--version	show program's version number and exit
-h, --help	show this help message and exit
-v	Increase verbosity
-q	Suppress output
-n NCHANNEL, --n-channel=NCHANNEL	Set number of channels
-m VALMAX, --max=VALMAX	Set maximum pressure
-l, --list-serial	Print out list of serial ports

## Additional Setting: (Under “UI.py”)

- Enabling/Disabling vacuum:  
The setting can be modified from the parameter of the main script Under the parameter name “VACUM\_ENABLE”.
- Changing absolute max:  
Maximum pressure allowed across all channels could be changed via modifying the “VAL\_MAX” parameter.
- Up/Down button offset:  
“BTN\_OFFSET” control the amount of offset applied to each time of the button press. Modified here for faster or slower offset.
- Parameter save path:  
The save path of the parameter file can be modified at, “DEFAULT\_SAVE\_PATH”. The variable should point to the parent directory of where you wish the file to be saved at. If no folder is present, the program will generate one.
- Mixing sensors:  
If higher pressure range is needed. In the lab there are 2 additional sensors with range to 100psi can be replaced simply by swapping. The pin position is the same with the sensor being orientation insensitive. However, the sensor mount can be fragile, so extra care is needed in the demounting and mount process. E changed to True  
To account for the change in pressure range, “SENSOR\_MIX” parameter should be changed to True and follow the direction of the comment for “SENSOR\_RANGE” parameter.
- Number of channels:  
Total number of the channels showed on the UI can be modified from the parameter “N\_CHANNEL”.