

DOC	Fly-Controller Application Tool	VERSION: 1.1	PAGE: 1
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Nuvoton QuadCopter Application Tool

Product No.	Cortex M45x Fly Controller
Function	Description of parameter tuning by application

File Information		
Name	Nuvoton Fly-Controller Application Tool(SC).pdf	
Project	Cortex M45x Application	
Function		
Purpose		
Author	Johnson Shen (T.L Shen)	
Revision History		
Revision	Date	Comments
1.0	15/2/9	Primary
1.1	15/5/6	Add calibration tool and RC display

Release Note:

Revision 1.0 (1st Draft Version)
Revision 1.0 (Append features)

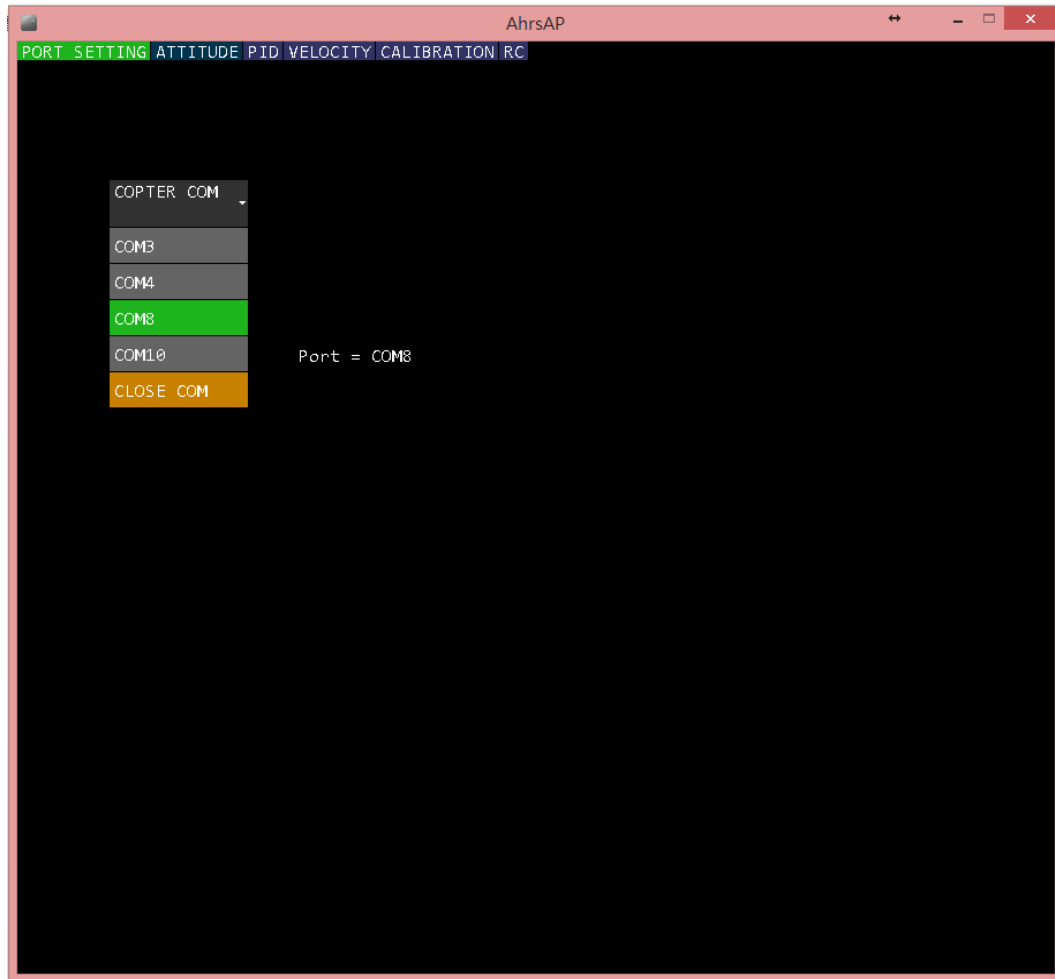
DOC	Fly-Controller Application Tool	VERSION: 1.1	PAGE: 2
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1. Application Tool Description

- Prepare the Development Environment and Tools
 - Processing – A Java script development environment
 - Processing Download - <https://processing.org/download/>
 - FTDI/UART-BT – Need a host COM port to connect to Nuvoton Fly Controller
- PC Application Tool
 - The Zip file - NvtFly.7z
 - File Path - NvtFly\AhrsAP
 - Project File –EXE:ApplicationTool\AhrsAP.exe, Source:AhrsAP.pde (Java Script)
- Application Tabs
 - PORT SETTING – Choose the COM port of fly controller
 - ATTITUDE – Display the attitude information
 - PID – The parameter of fly stability control, altitude-hold stability control and motor spin display
 - VELOCITY – Display the velocity and altitude information

DOC	Fly-Controller Application Tool	VERSION: 1.1	PAGE: 3
-----	---------------------------------	--------------	---------

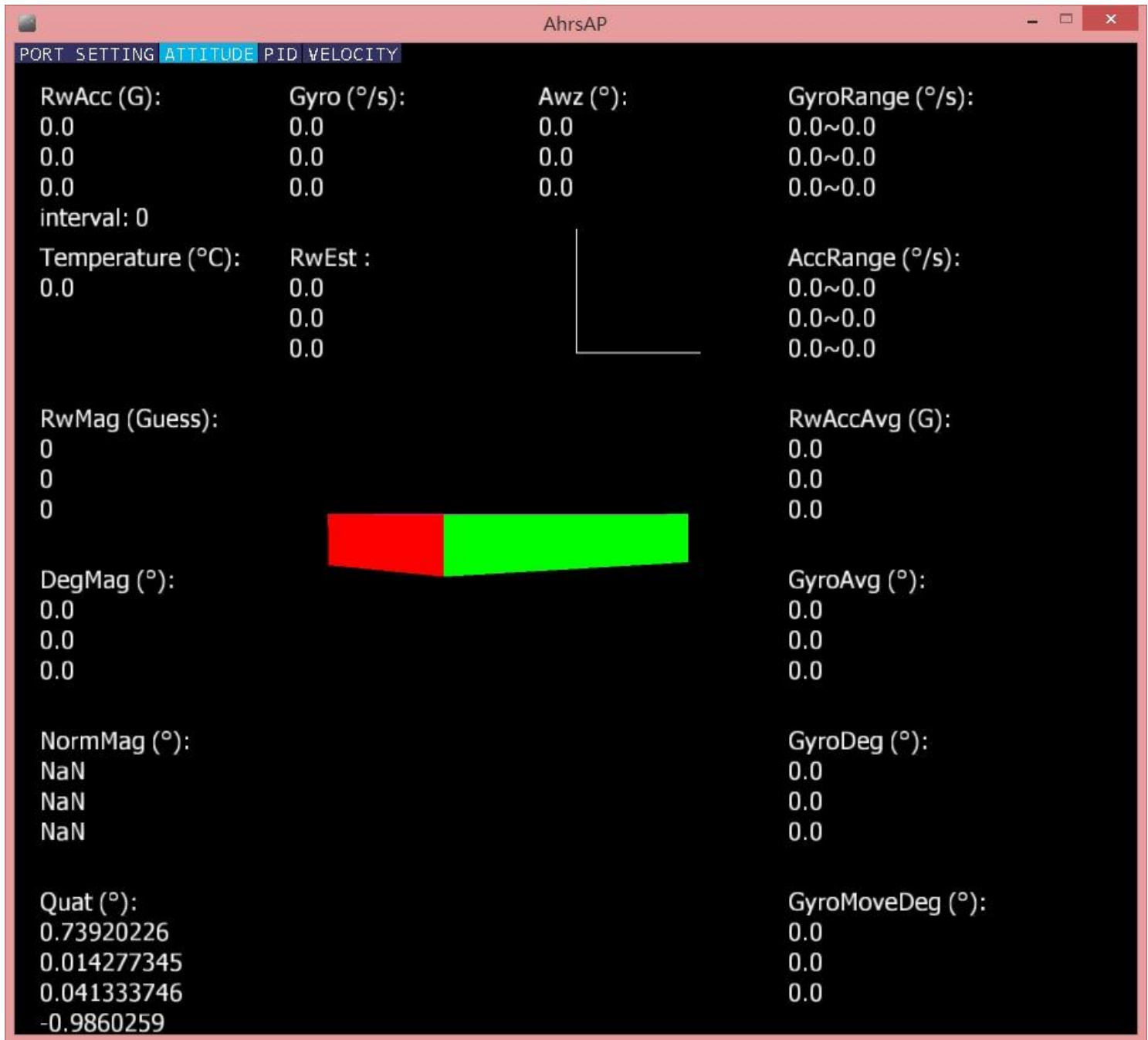
2. Fly Controller COM Select



- Connect the COM port from fly controller and power on fly controller
- If you have UART-BT, connect UART-BT to fly controller first and power on fly controller. Host PC search UART-BT and connect to UART-BT.
- Open the application AhrsAP.exe or AhrsAP.pde (source project)
- Select the fly controller COM port and other control tab shows up when connect OK

DOC	Fly-Controller Application Tool	VERSION: 1.1	PAGE: 4
-----	---------------------------------	--------------	---------

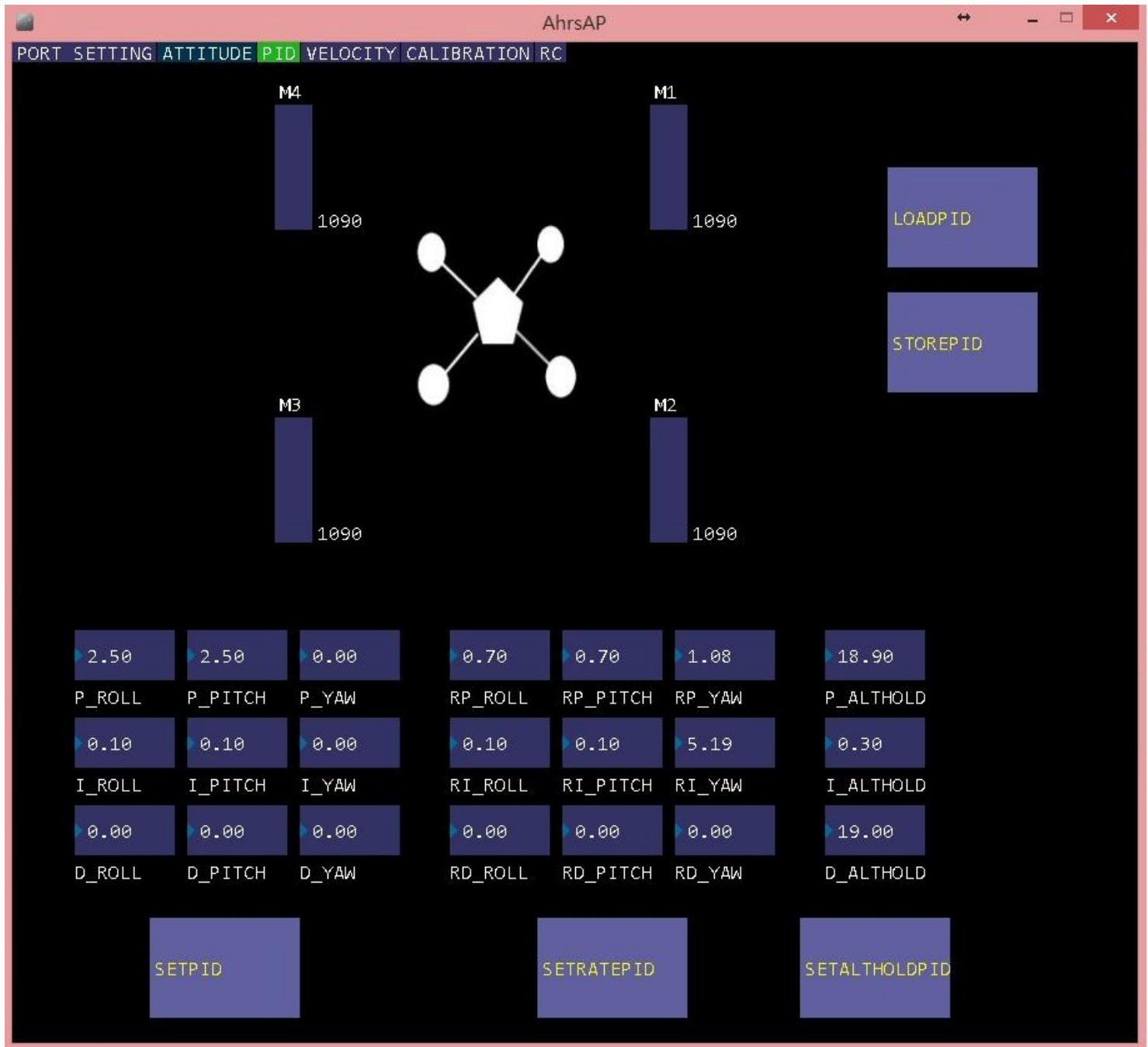
3. Attitude Display



- Display current attitude and quaternion information

DOC	Fly-Controller Application Tool	VERSION:	1.1	PAGE:	5
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4. PID Parameter Tuning



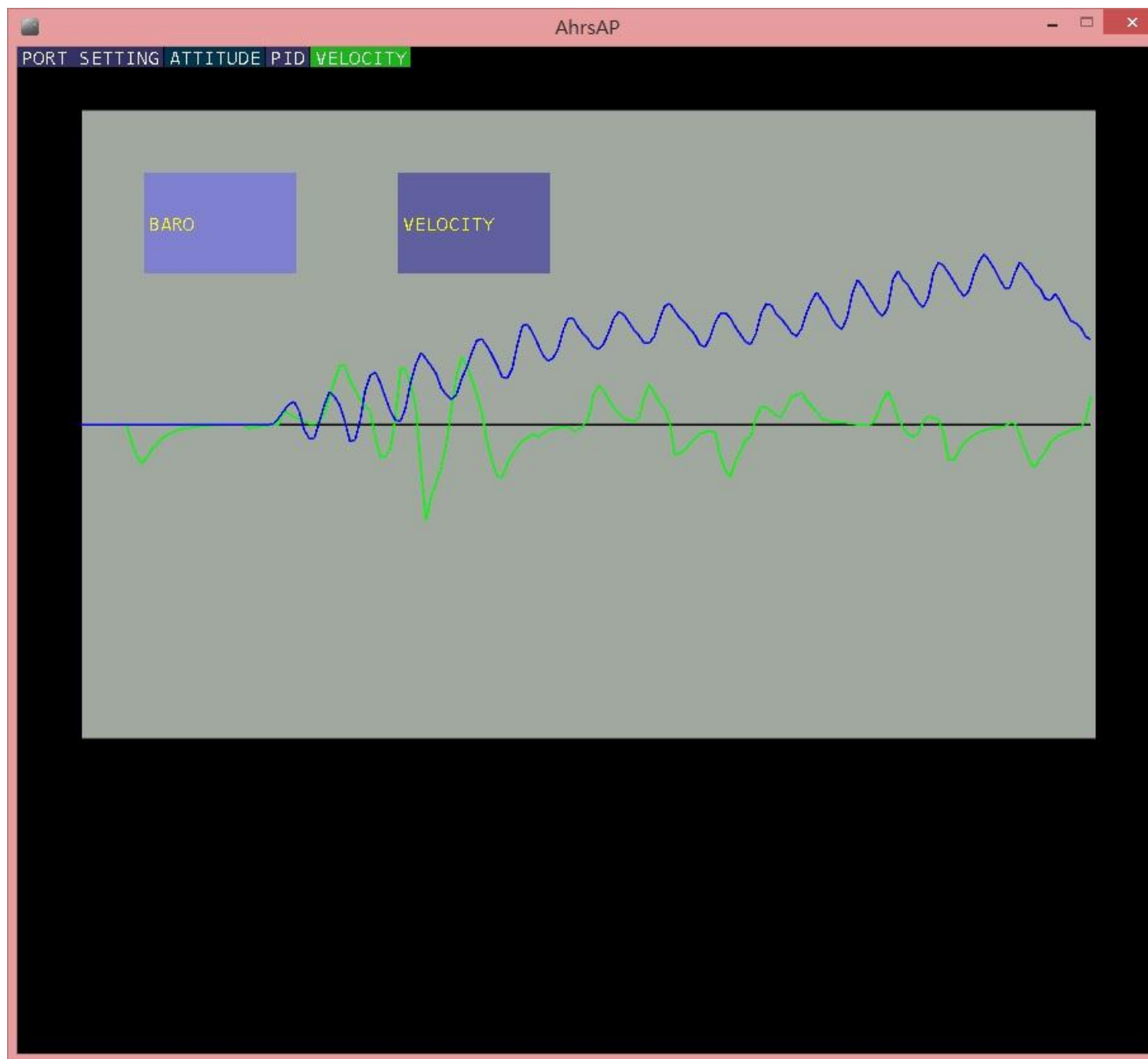
- **SETPID** –Refer to ACC sensor, apply the level PID parameters to compute the motor output

DOC	Fly-Controller Application Tool	VERSION: 1.1	PAGE: 6
-----	---------------------------------	--------------	---------

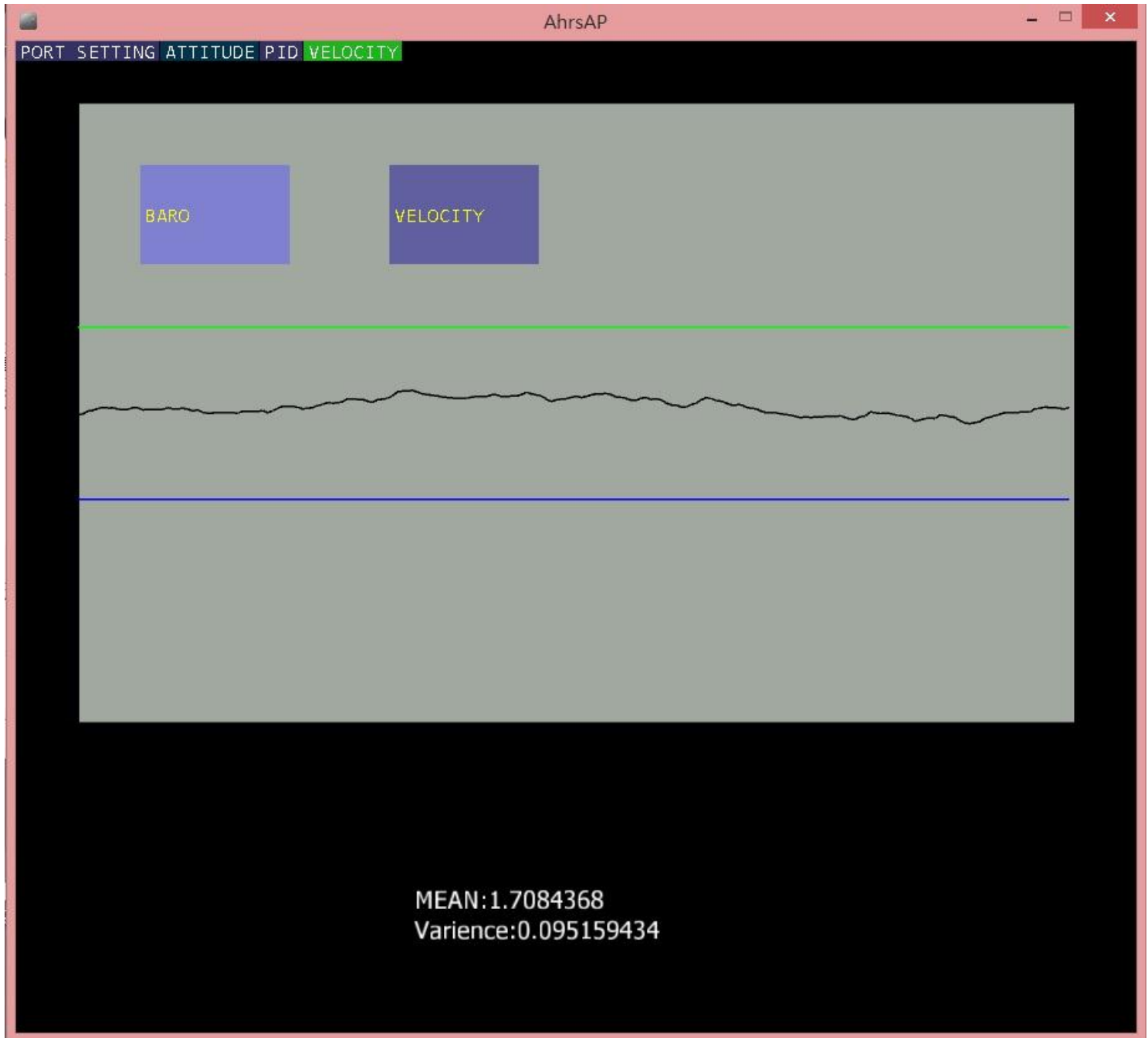
- **SETRATEPID** –Refer to GYRO sensor, apply the rate PID parameters to compute the motor output
- **SETALTHOLD** –Refer to BARO sensor, apply the altitude PID parameters to compute the motor output
- **LOADPID** – Load PID from on board flash
- **SAVEPID** – Store PID to flash
- **M1/M2/M3/M4** –Display the motor power by PID computation.(To observe the motor output, you need to disarm copter first)

DOC	Fly-Controller Application Tool	VERSION: 1.1	PAGE: 7
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5. Speed and Altitude Information



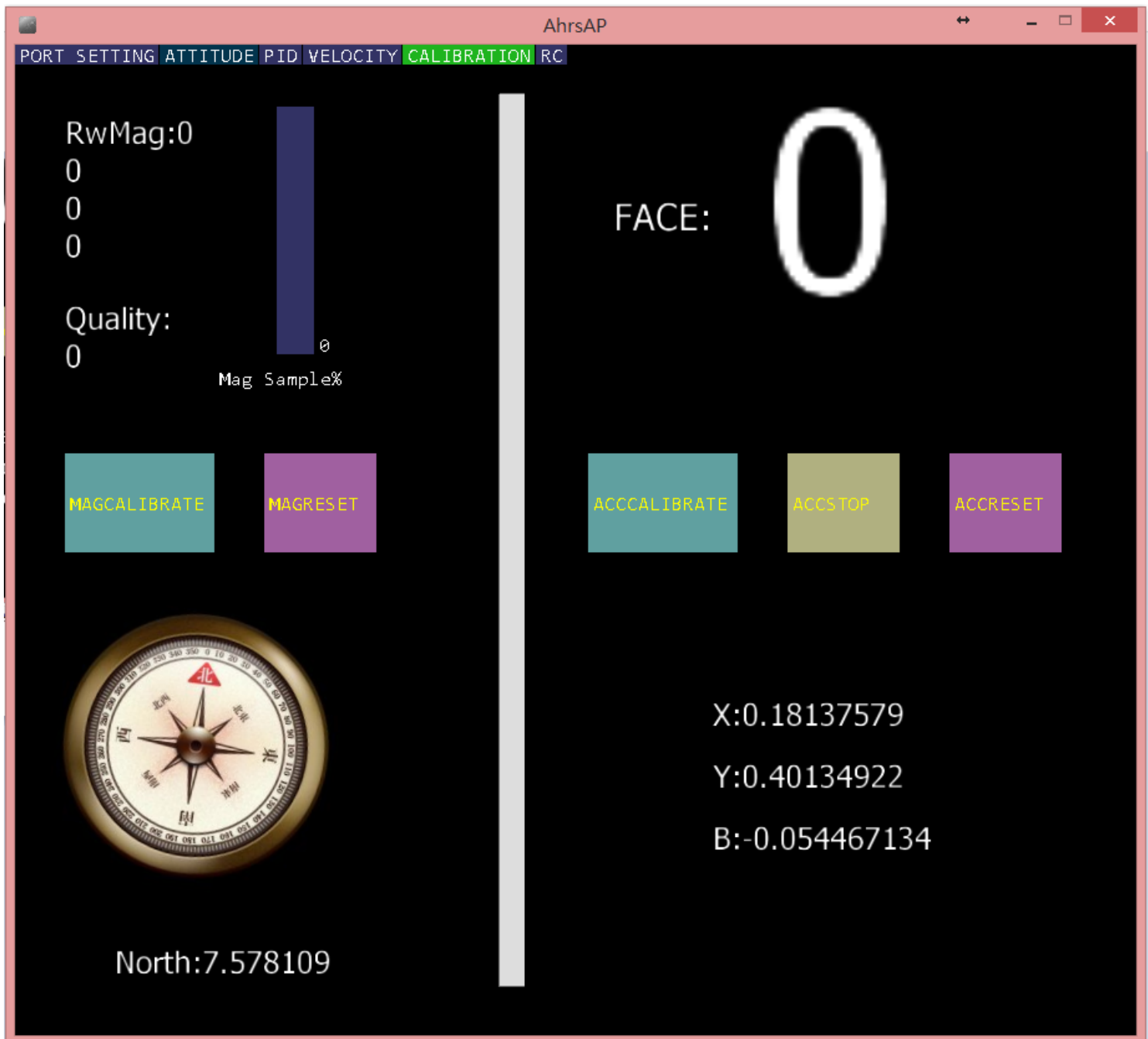
- **VELOCITY** – Current velocity computed by ACC (blue line), and current velocity computed by BARO (green line)



- **BARO** – Display current altitude in meter(black line),the upper 1 meter(green line) and the lower 1 meter(blue line). Mean/Variance display the current stability of BARO meter. If the weather is unstable ($\text{Variance} > 0.15$), the copter altitude hold performance may also unstable.

DOC	Fly-Controller Application Tool	VERSION: 1.1	PAGE: 9
-----	---------------------------------	--------------	---------

6. Mag and ACC Calibration



- **Factory Default and Calibration**

DOC	Fly-Controller Application Tool	VERSION: 1.1	PAGE: 10
-----	---------------------------------	--------------	----------

- **Nuvoton Fly Controller has been calibrated before shipment**
- **Calibration data has been saved in flash**
- **You need redo calibration only if you found the fly controller on your copter has below issues:**
 - ◆ Put copter head to North, and the North degree report < -10 or > 10 .
You need to redo Mag calibration
 - ◆ Put copter on flat table, rotate copter and check degree 0, 90, 180 and 270. If X or Y report degree < -1 or > 1 , you need to redo ACC calibration.

● **MAG Calibration**

- **Press "MAGCALIBRATE" to start mag calibration**
- **User rotate the copter in any direction until "Mag Sample%" to 100**
- **Quality – display the result of mag calibration, less than 20 is good and you need re-calibrate mag if Quality > 20**
- **North – display the degree bias from North. A well calibrated mag should less than 10 degree from north.**

● **ACC Calibration**

- **Press "ACCCALIBRATE" can sample one face of ACC information. There are 6 faces of a fly object need to be sampled for a complete ACC calibration.**

DOC	Fly-Controller Application Tool	VERSION: 1.1	PAGE: 11
-----	---------------------------------	--------------	----------

- Put fly object flat, the "Face: 0" means 0 is the current face to be sample and press "ACCCALIBRATE" button.
 - The number change from 0 to 1 by observing "Face:1" means face 0 sampling done and will sample face 1.
 - Rotate 90 degree of fly object and press button again to sample face 1
 - Repeat above steps until all six faces are sampled and back to number round to 0 again("Face:0") means calibration complete.
 - You can observe the degree of axis X: and Y: for the quality judgment. You can rotate the fly object horizontally and check the degree of X and Y at the same time. If they are always less than 1 degree than the calibration is good, otherwise you may need redo the calibration again.
- **BARO information**
 - "B: altitude" display current altitude from barometer in meter.
 - The altitude should be in -2 ~ +2 meter, otherwise the barometer may not healthy.

DOC	Fly-Controller Application Tool	VERSION: 1.1	PAGE: 12
-----	---------------------------------	--------------	----------

7. RC Channel Information



- There are six channel from THR ~ AUX2 and the range is from 1000 ~2000
- The AltHold(AUX1) display the status of the altitude hold state.

DOC	Fly-Controller Application Tool	VERSION: 1.1	PAGE: 13
-----	---------------------------------	--------------	----------

AUX1<1500 is OFF and >1500 is ON

- **The Mode (AUX2) display the state of cuurent fly mode (Attitude/Mag/Head-free). AUX2 <1333 is in attitude mode, 1333~1666 is in Mag mode and >1666 is in Head-free mode.**
- **Battery: Battery state in %**
- **RSSI: 2.4G RF 0(bad)~3(best)**
- **Use 2.4G: 2.4G RF Module connect**
- **RC Connect: RC channel is in active state**
- **Armed: Arm state**
- **Fly Mode: Aggressive fly state**
- **RC Matching: Radio matching progressing state**
- **Auto Landing: Copter landing state**