4.2.2   Menu of Configuration

Menu of Configuration	
Button	Function
Read Config	Reading the current configuration
Calibrate Time	Calibration time of chip

Menu of System	
Button	Function
Reset	Reset to factory setting
Sleep	Sleep function, not available for Bluetooth sensor series
Algorithm	6-axis algorithm or 9-axis
Installation Direction	Vertical or horizontal installation
Instruction Start-up	Instructions sending to start-up the sensor

Menu of Calibrate	
Button	Function
Acceleration	Accelerometer calibration
Magnetic Field	Magnetometer calibration
Reset Height	Reset height data to 0 (only for sensor built-in barometer, including WT901B, WTAHRS2, WTHARS1, HWT901B)
Reset Z-axis Angle	Reset Z-axis angle to 0 degree, not available for WT9011DCL BLE5.0 in 9-axis algorithm
Gyro Auto Calibrate	Auto-calibration of gyroscope

Menu of Range	
Button	Function
Acceleration	Acceleration measurement range (2/4/8/16g/s2)
Gyro	Gyroscope measurement range (250/500/1000/2000 deg/s)
Band Width	Bandwidth range (5/10/20/42/98/188/256Hz)

Menu of Communication	
Button	Function
Output Rate	Return rate selection

4.3   Calibration

Preparation: Ensuring the sensor is "Online".

Calibration on PC software:

It is required to calibrate for the first time usage.

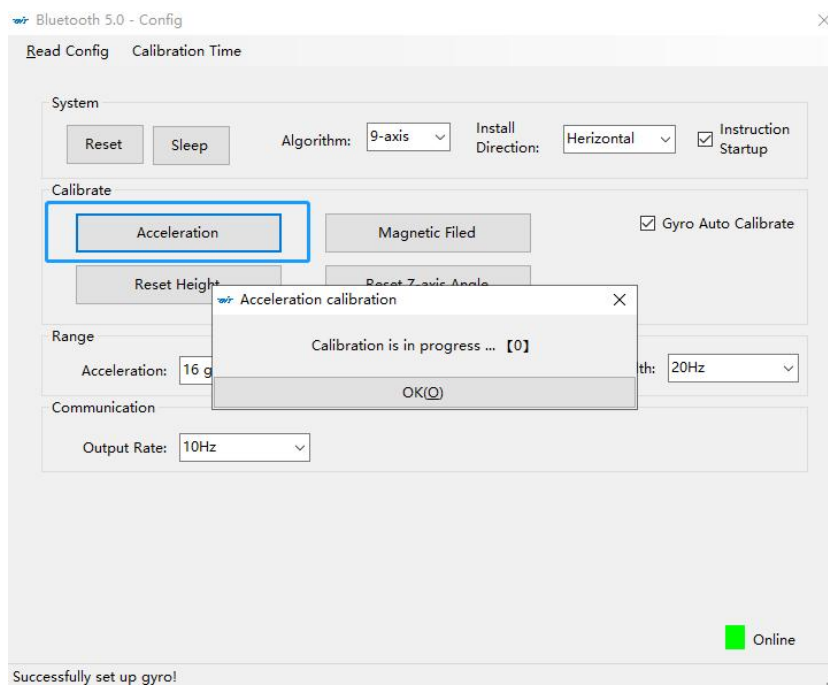### 4.3.1   Accelerometer Calibration

Purpose:

The accelerometer calibration is used to remove the zero bias of the accelerometer. Before calibration, there will be different degrees of bias error. After calibration, the measurement will be accurate.

Methods:

Step 1. Keep the module horizontally stationary

Step 2. Click the acceleration in the "Config" and wait for 5 seconds

Step 3. Calibration done if OK shows

Step 4. Check the result--confirm if there is 1g on Z-axis acceleration

4.3.2 Magnetic Field Calibration

Purpose:

Magnetic calibration is used to remove the zero bias of the magnetic field sensor. Usually, the magnetic field sensor will have a large zero error when it is manufactured. If it is not calibrated, it will bring a large measurement error, which will affect the accuracy of the measurement of the z-axis angle of the heading angle.

Preparation:

1. Sensors should be 20cm away from magnetic and iron and other materials
2. The value of H in magnetic field must be lower than 350.
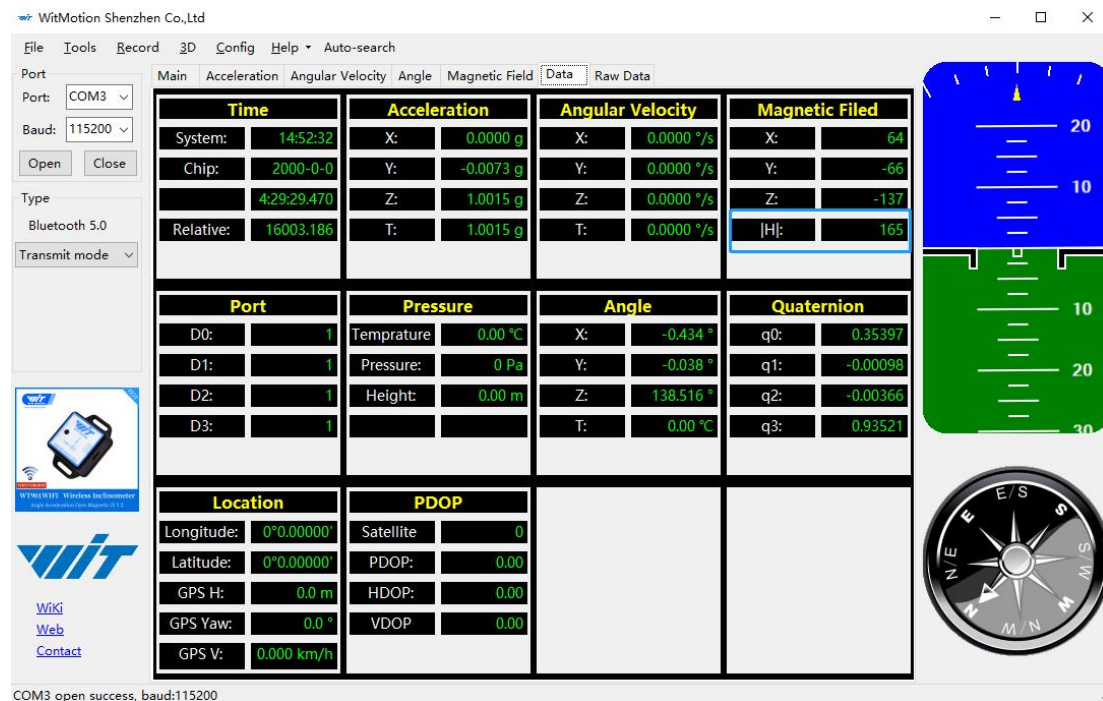
Methods:

Step 1. Open the Config menu.

Step 2. Click the "magnetic field" and slowly rotate the sensor 360° around X, Y, Z, 3-axis accordingly.
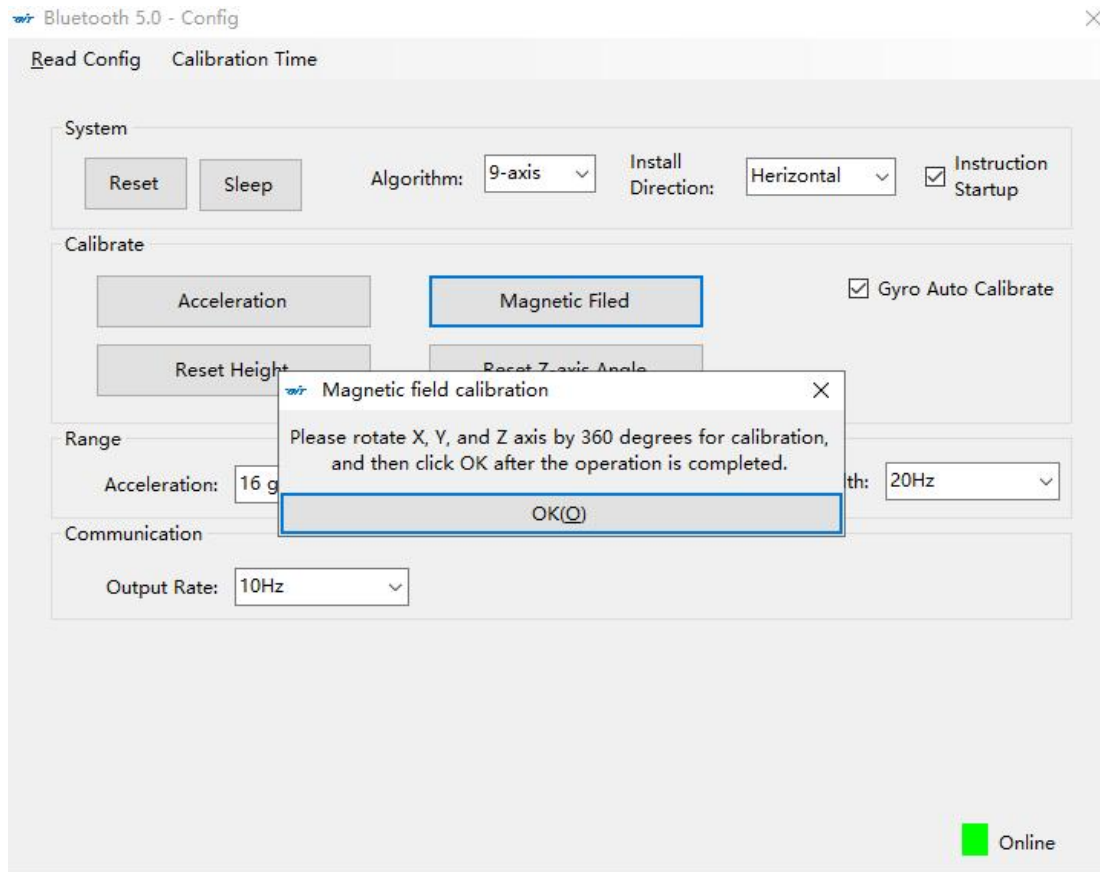
Step 3. Click OK once the calibration done.

Step 4. Place the sensor horizontally stationary and make the Y axis point to the north.

Step 5. Check the data of Z axis angle, it's ok if the value is about 0°.
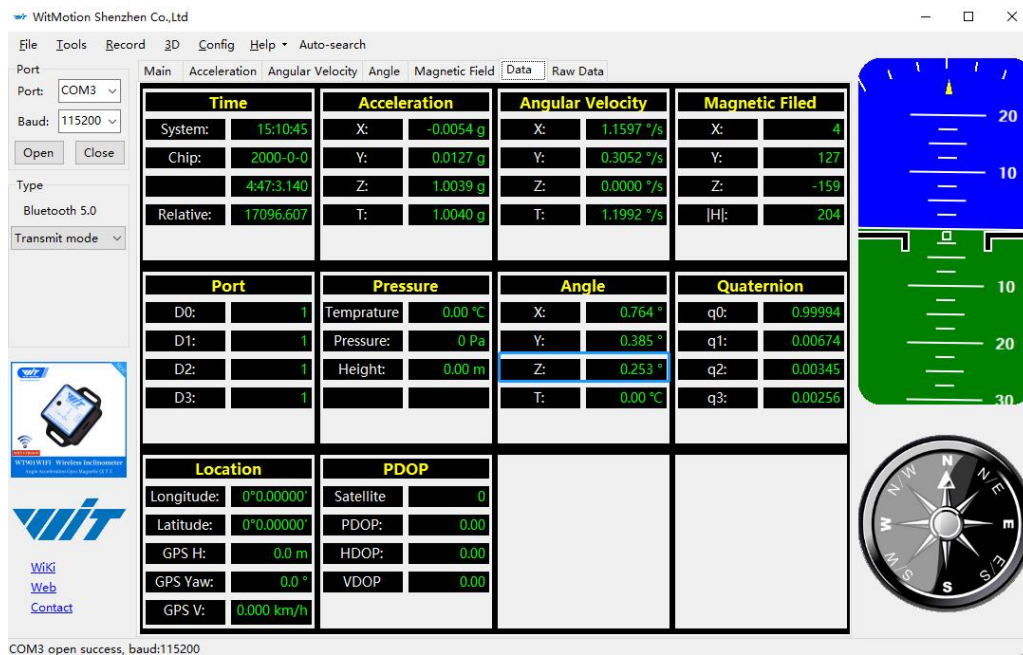
Gyroscope Automatic Calibration

The gyroscope calibration is to calibrate the angular velocity, and the sensor will calibrate automatically.

It is recommended that the automatic calibration of gyroscopes can be inactivated only if the module rotates at a constant speed.

4.3.3   Reset Z-axis Angle

Note：If you want to avoid magnetic interference, you can change the algorithm to

6-axis，function of resetting Z-axis angle can be used.

The z-axis angle is an absolute angle, and it takes the northeast sky as the coordinate system can not be relative to 0 degree.

Z axis to 0 is to make the initial angle of the z axis angle is relative 0 degree. When the module is used before and z - axis drift is large, the z - axis can be calibrated. When the module is powered on, the Z axis will automatically return to 0.

Calibration methods as follow: firstly keep the module static, click the "Reset Z-axis Angle" in the "Config", you will see the angle of the Z axis backs to 0 degree in the "Data".

4.3.4   Reset Height to 0

Only available for the module built-in barometer like WT901B, HWT901B, WTGAHRS1, WTGAHRS2.

4.4   Configuration

4.4.1   Data Recording

There is no memory chip in the sensor module, and the data can be recorded and saved on the computer.
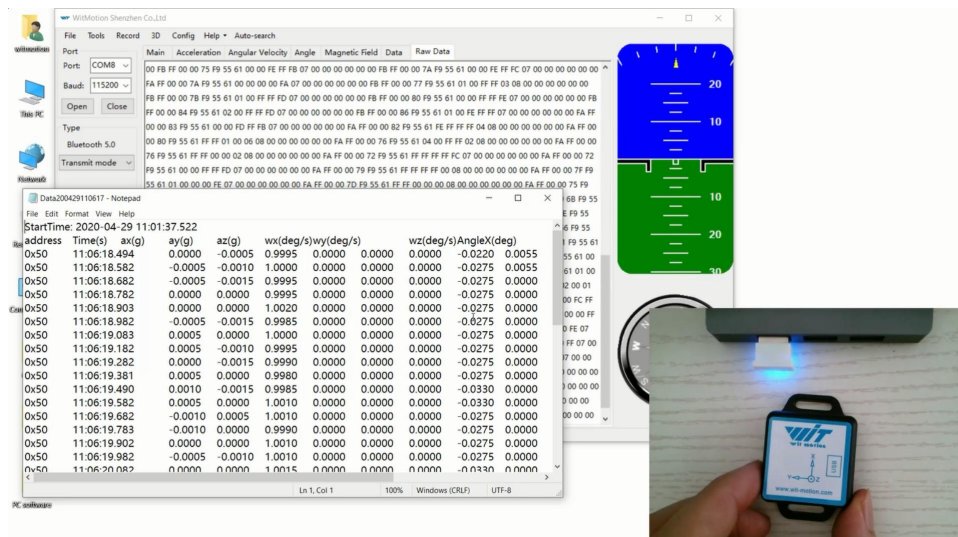

Method is as follows: Click "Record" and "Start" will save the data as a TXT file.

The saved file is in the directory of the upper computer program Data.tsv: the beginning of the file has the value corresponding to the data.

It is highly recommended that data can be pasted to a Excel file. In this way, all data will be shown in order.

| address	Time(s)	ChipTime	ax(g)	ay(g)	az(g)	wx(deg/s)	wy(deg/s)	wz(deg/s)	AngleX(deg	AngleY(deg	AngleZ(deg)	T(°)	hx	hy	hz
0x50	43:06.4	02:40.4	0.4443	0.1777	-0.8696	3.1738	-0.3662	-29.541	166.0364	-29.2072	120.6299	29.97	0	50	313
0x50	43:06.5	02:40.5	0.02	0.5796	-0.7739	-192.0166	283.9355	-700.2563	142.0532	-24.884	154.8907	30	-29	7	312
0x50	43:06.6	02:40.6	-0.2896	0.8599	-0.5571	-8.2397	-3.7842	-264.5264	124.0741	20.0171	-158.2196	30	-7	-85	291
0x50	43:06.7	02:40.7	-0.771	0.5322	-0.4761	36.0718	43.8232	-226.8677	132.984	41.4514	-138.0872	30	38	-93	289
0x50	43:06.8	02:40.8	-0.5601	0.4233	-0.5562	55.7861	101.9897	274.1699	144.5087	35.5792	-132.4292	30	22	-58	301
0x50	43:06.9	02:40.9	-0.0059	0.5503	-1.0103	139.0991	-32.7759	432.251	141.4929	1.8073	-174.1113	30	-22	-9	308
0x50	43:07.0	02:41.0	0.2656	0.3887	-0.8594	124.3896	7.8735	341.1865	154.6985	-15.5896	157.3077	30.01	-14	46	307
0x50	43:07.1	02:41.1	0.3911	0.1104	-0.8467	40.7715	11.9019	257.1411	177.3303	-25.7684	127.7325	30	0	104	294
0x50	43:07.2	02:41.2	0.3896	0.3022	-0.8994	-90.0879	135.3149	-268.9819	163.4601	-31.9867	128.6829	30.03	-2	67	308
0x50	43:07.3	02:41.3	0.2939	0.9531	-0.2837	-251.5259	48.645	-750.4272	119.0149	-0.3625	-174.1608	30.03	-30	-56	295
0x50	43:07.4	02:41.4	-0.4614	0.7075	-0.3384	-27.3438	-19.4702	-226.9287	112.8021	30.6519	-161.4001	30	33	-122	272
0x50	43:07.5	02:41.5	-0.7988	0.6279	-0.5044	28.0762	81.7261	122.1924	122.0087	39.8035	-151.1389	30	63	-110	275
0x50	43:07.6	02:41.6	-0.2495	0.8135	-0.5327	36.377	5.6763	93.0176	121.8494	15.7214	-161.109	30	12	-108	288
0x50	43:07.7	02:41.7	0.3057	0.7432	-0.5996	74.0356	-0.061	379.7607	126.7603	-11.4478	-176.6711	30.03	-51	-68	295
0x50	43:07.8	02:41.8	0.4922	0.4653	-0.7129	134.7656	24.231	268.9819	145.3656	-32.4756	163.3832	30.02	-83	10	295
0x50	43:07.9	02:41.9	0.4507	0.4272	-0.7871	-186.5234	-36.3159	420.6543	166.2616	-49.1583	130.2924	30.02	-86	71	292
0x50	43:08.0	02:42.0	0.6045	-0.062	-0.8027	37.9028	7.6294	-138.0005	173.4357	-45.8514	118.0206	30.03	-66	75	298
0x50	43:08.1	02:42.1	0.4712	0.6011	-0.5688	-172.6685	-7.1411	-537.6587	137.6312	-31.2396	163.8171	30.03	-78	20	300
0x50	43:08.2	02:42.2	-0.0649	0.873	-0.4028	-115.6616	2.3193	-276.2451	113.6481	4.6417	-169.8761	29.98	-37	-101	283
0x50	43:08.3	02:42.3	-0.4092	0.856	-0.1816	-134.8877	-38.208	-155.7007	99.8822	26.933	-165.943	30.03	32	-166	244
0x50	43:08.4	02:42.4	-0.5171	0.8809	-0.1152	84.1064	0.9155	86.2427	94.8285	33.2666	-167.5415	30.06	72	-186	218
0x50	43:08.5	02:42.5	-0.1782	0.9595	-0.2793	243.2861	29.3579	406.8604	110.7367	13.3429	-169.0686	30.03	29	-156	254

4.4.2 Data Playback

New function: When creating recorded file each time, there will a BIN file created in the folder of record file in path of installed software meanwhile.
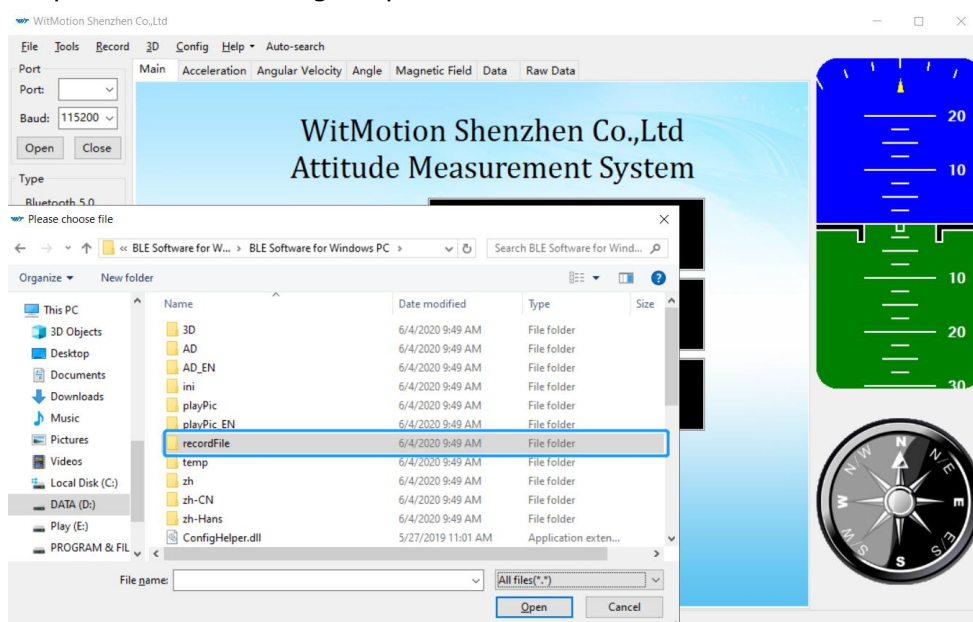
Recorded data playback method:

Step 1: Disconnect the sensor

Step 2: Click "File" Button and then click "Load"
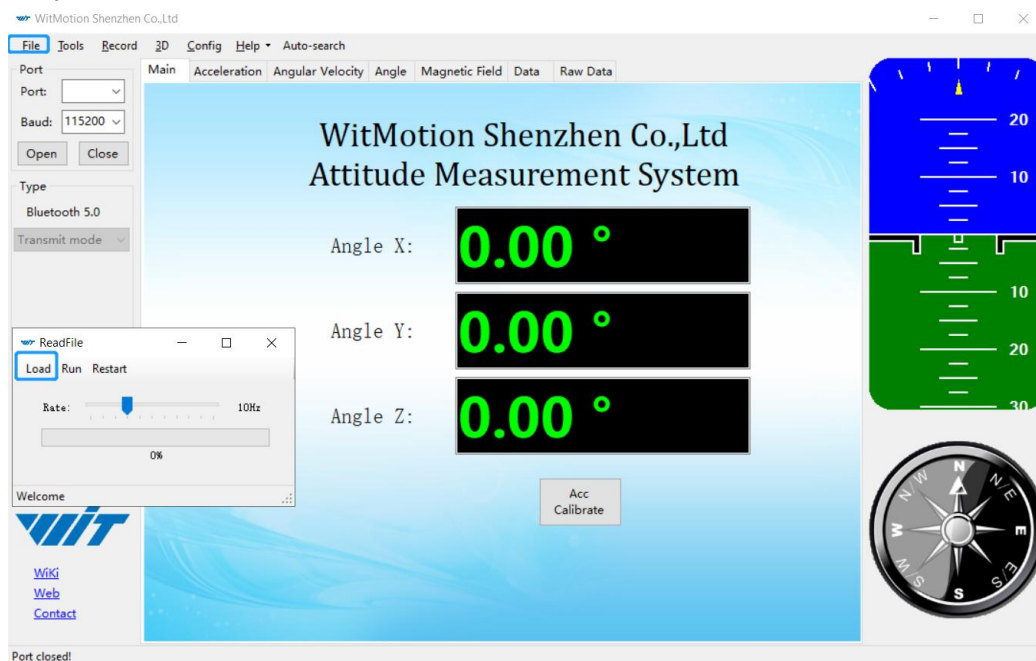
Step 3: Choose the original path of software installation and load the Bin file
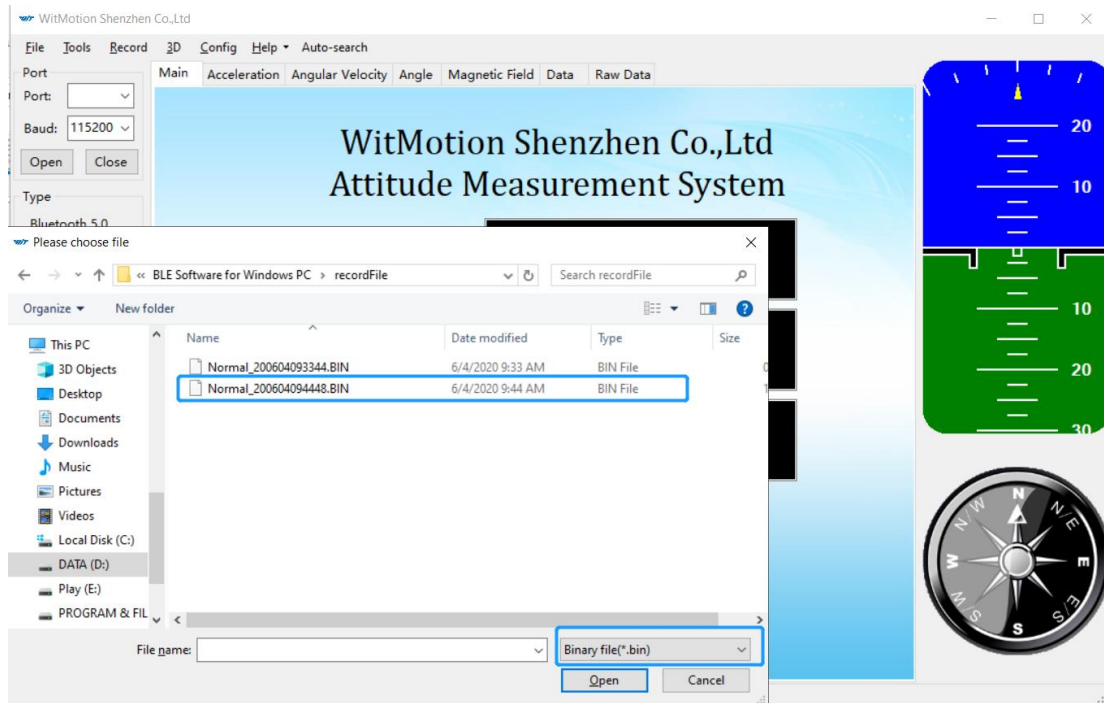
Step 4: Click "Run" and the Binary file will be playback
When playback, the rate can be editable.

4.4.3 Placement Direction

The default installation direction of the module is horizontal. When the module needs to be installed vertically, the vertical installation can be set.

Step 1: Rotate the module 90 degrees around the X-axis

Step 2: Place the sensor 90 degrees vertically

Step 3: Click "Vertical" as install directions on the "Config" menu

4.4.4 Bandwidth

Default bandwidth is 20Hz.
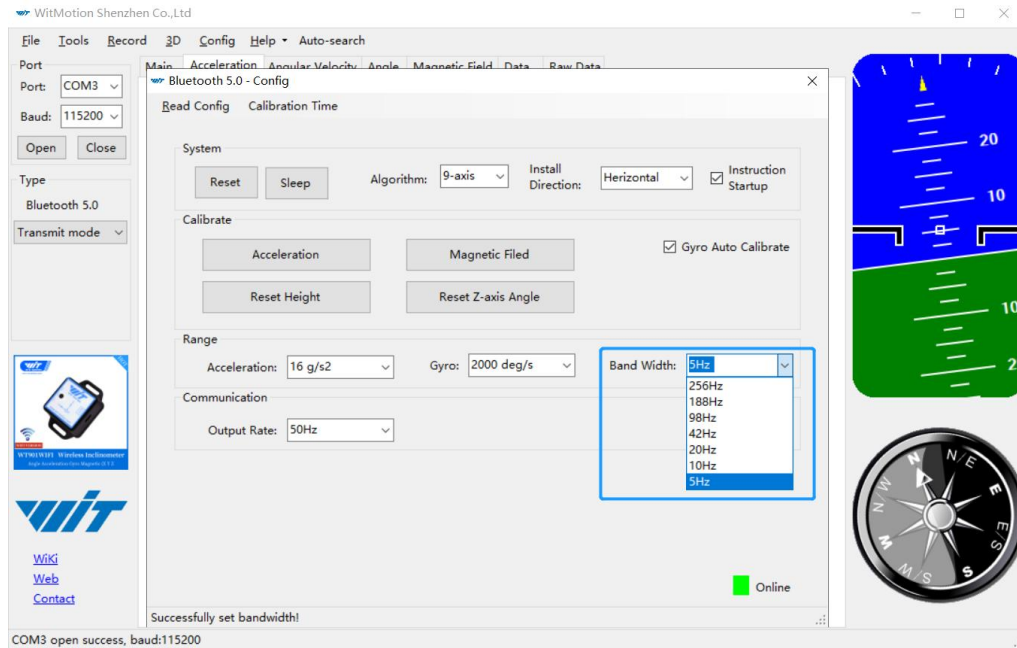
Explanation:

1. The higher rate of bandwidth setting will lead to higher fluctuation in data waveform. Conversely, the lower rate of bandwidth, data will become more fluent.

For example:

Bandwidth as 50Hz, Output rate as 5Hz. The waveform is very steady.
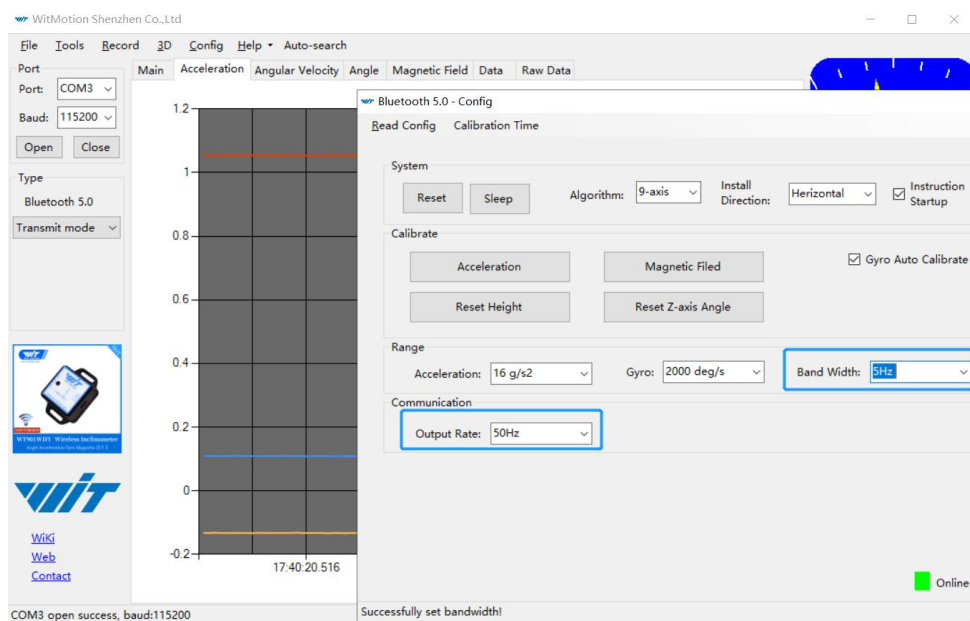
Bandwidth as 256Hz, Output rate as 50Hz. The waveform will show more fluctuation.
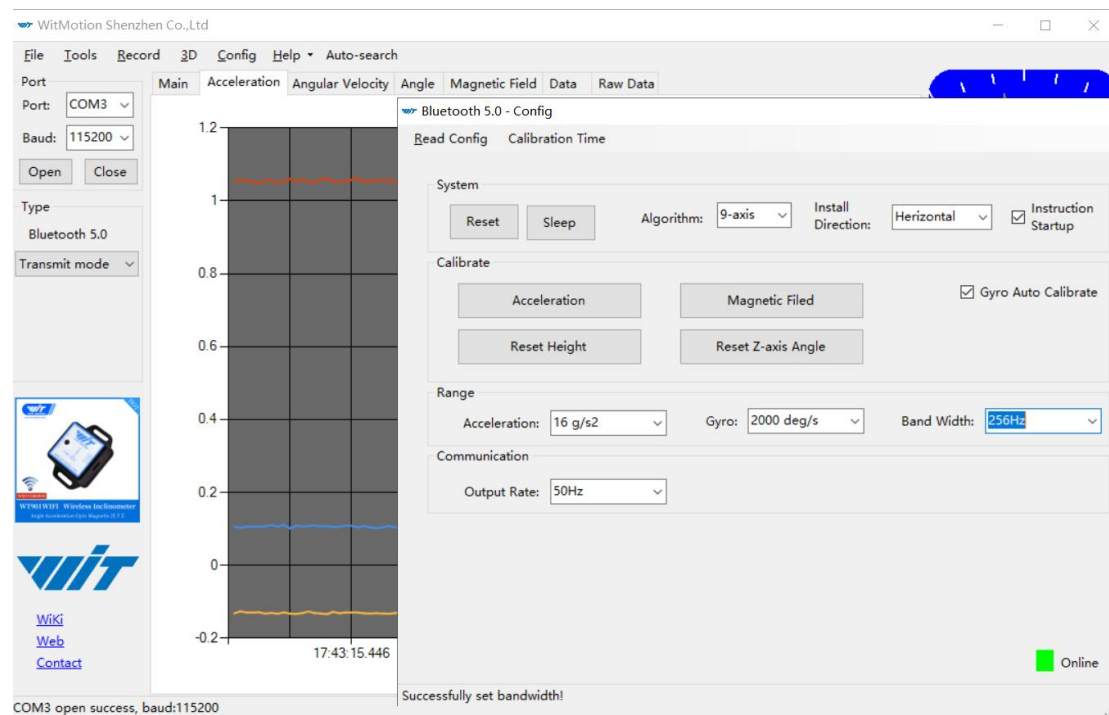
2. The higher rate of bandwidth will solve the data-repeating problem.

For example, if the bandwidth setting is 20Hz, retrieval rate as 50Hz, there will be 5 repeating data.

If you prefer there is no repeating data, it is required to increase the bandwidth more than 50Hz.

4.4.5　6-axis/ 9-axis Algorithm

6-axis algorithm: Z-axis angle is mainly calculated based on angular velocity integral. There will be calculated error on Z-axis angle.

9-axis algorithm: Z-axis angle is mainly calculated and analyzed based on the magnetic field. Z-axis angle will have few drift.

The default algorithm of WT9011DCL is 9-axis. If there is magnetic field interference around installed environment, it is recommended to switch to 6-axis algorithm to detect the angle.

Method:

Step 1: Switch to the"6-axis" algorithm on the "Config" menu.

Step 2: Proceed with the "Accelerometer calibration" and "Reset Z-axis angle" calibration.

After the calibration is completed, it can be used normally.
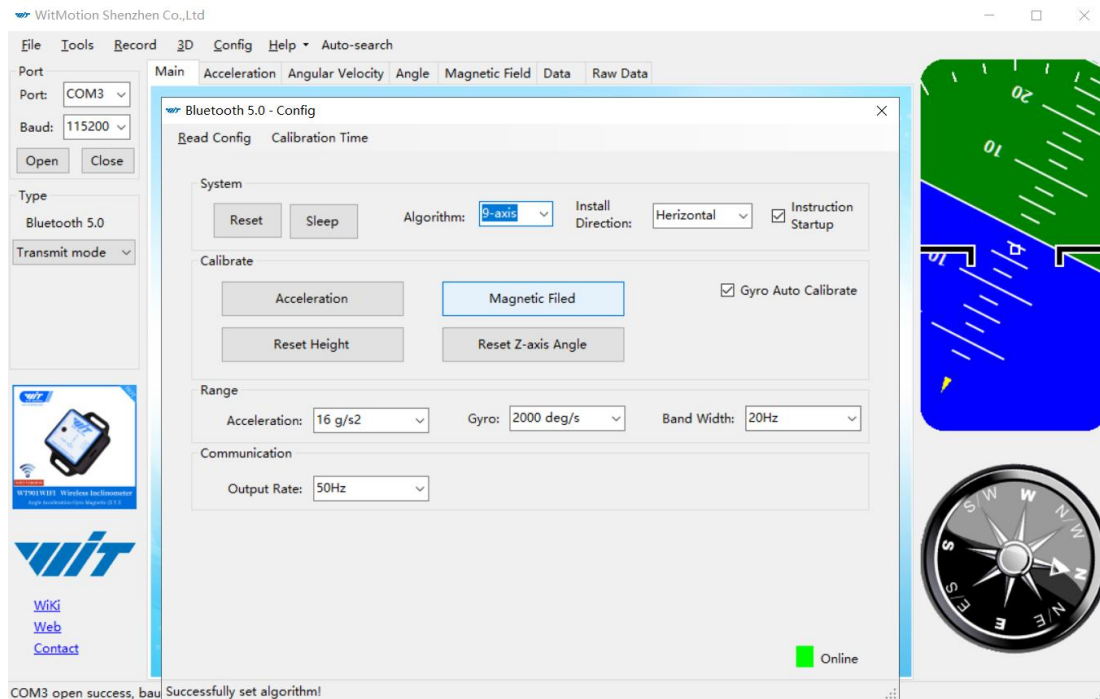
5 Instructions of 2023 New Software

In order to improve the user experience and our customer service, we develop a new version PC software.

Link to check the PC Software connection video demo.
[Video demo](#)

Below is the new software link.
https://drive.google.com/drive/folders/1dnwmnH7mi4zBpNqDywLzrzsV7BfeKaD9?usp=drive_link
Below is the universal instruction download link.
https://drive.google.com/file/d/18OntSUDU1m4vNhcRXvmTeFN1rAK3jcmZ/view?usp=drive_link
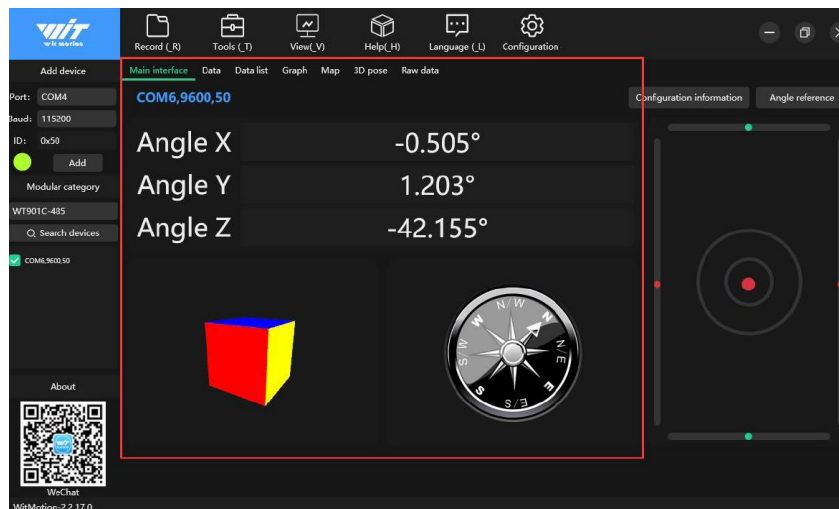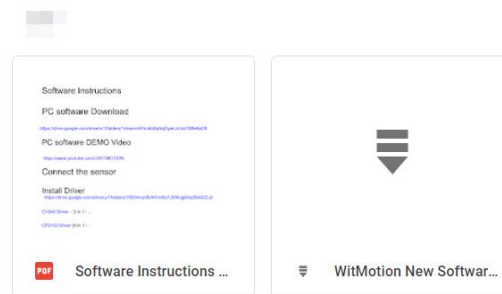
Note:

The 2022 old version software will be reserved for use. You can check "Chapter 3 Use Instructions with PC" for more details.

Multiple-Connection Instructions

The WT9011DCL can be connected via laptop's Bluetooth. It is required to use the WitMotion New Software. The maximum is up to 4 units in the same time via connection.

PS. It is required to turn on the laptop's Bluetooth.
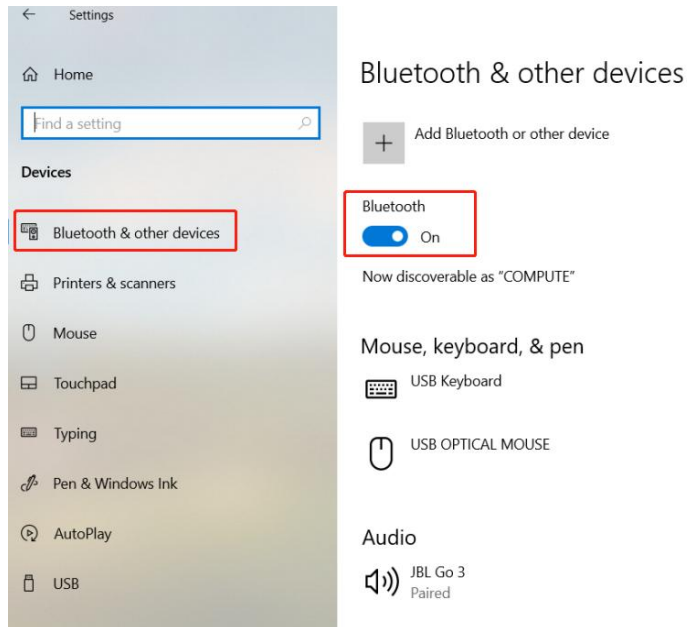
Because Bluetooth is limited, sometimes the data lag when you're using Bluetooth to multi-connect, and the Bluetooth range will be less. Of course, the different phone has a different range.
If you need longer Bluetooth range when multi-connection (up to 30m), please use our BLE 5.0 adapter (refer to the chapter4.1.2 BLE 5.0 Adapter Connection)

6.1 Connection Instructions

1. Install WitMotion New Software.

2. Open the WitMotion New Software and the laptop's Bluetooth.
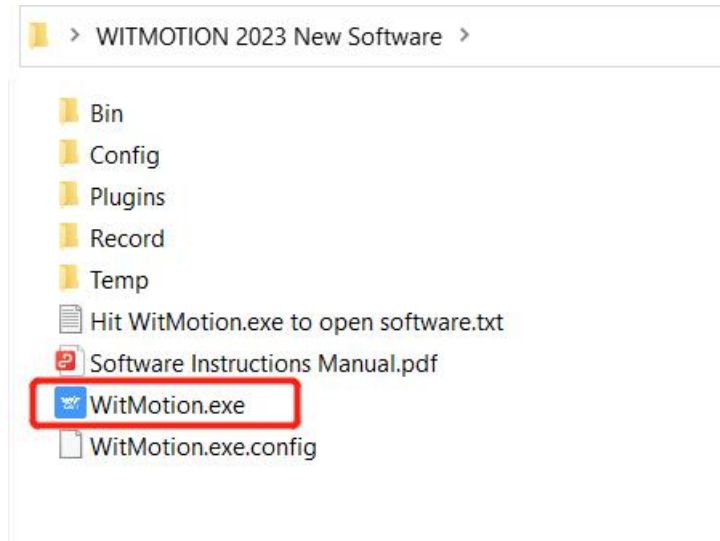
3. Choose module "WT901BLECL5.0".
   The WT9011DCL and the WT901BLECL are the BLE5.0 sensors, you can input the WT901BLECL to connect the WT9011DCL.
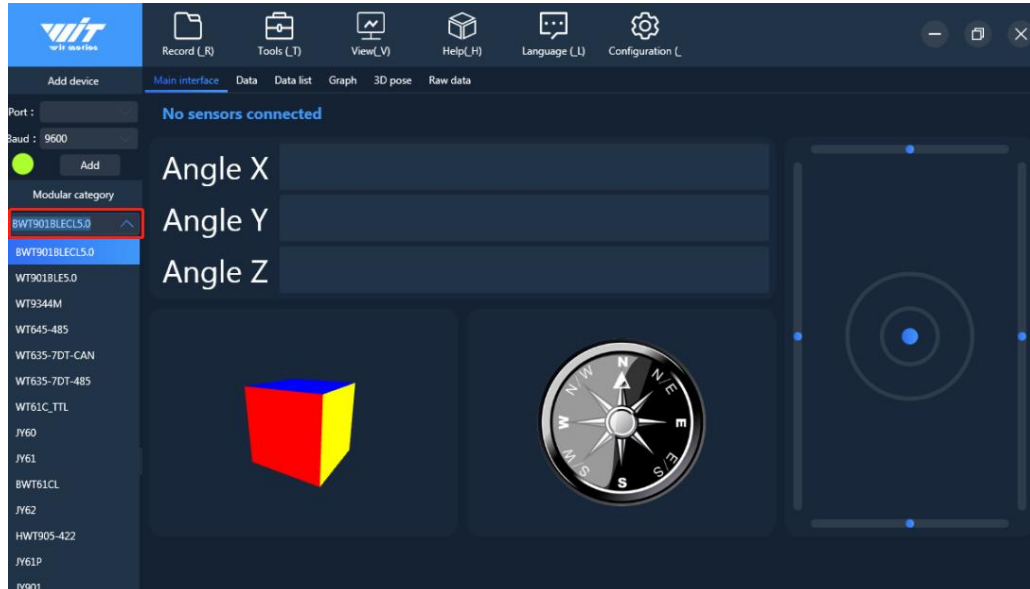
4. Open all sensors.
5. Click "Search devices", the software will auto-search. Once it searches "WT901BLE68", close the pop-up, and then wait for a minute, you can see the data.
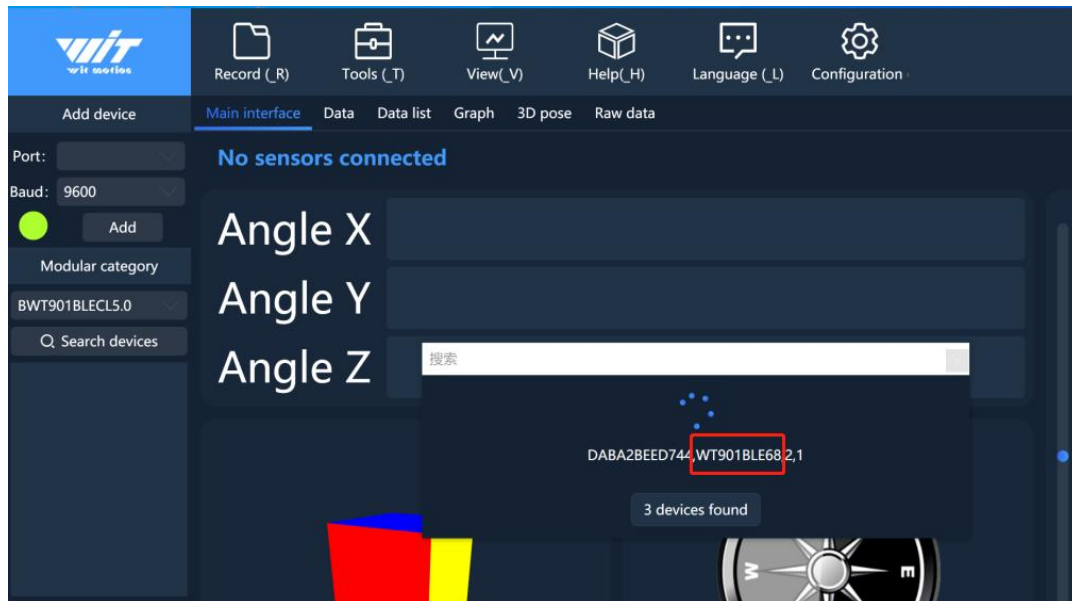
PS: If the interface hasn't show the data, select the device "WT901BLE68".

Noted: In standby mode, the sensor flashes quickly. Once the sensor was connected successfully, the blue light will start flashing slowly.
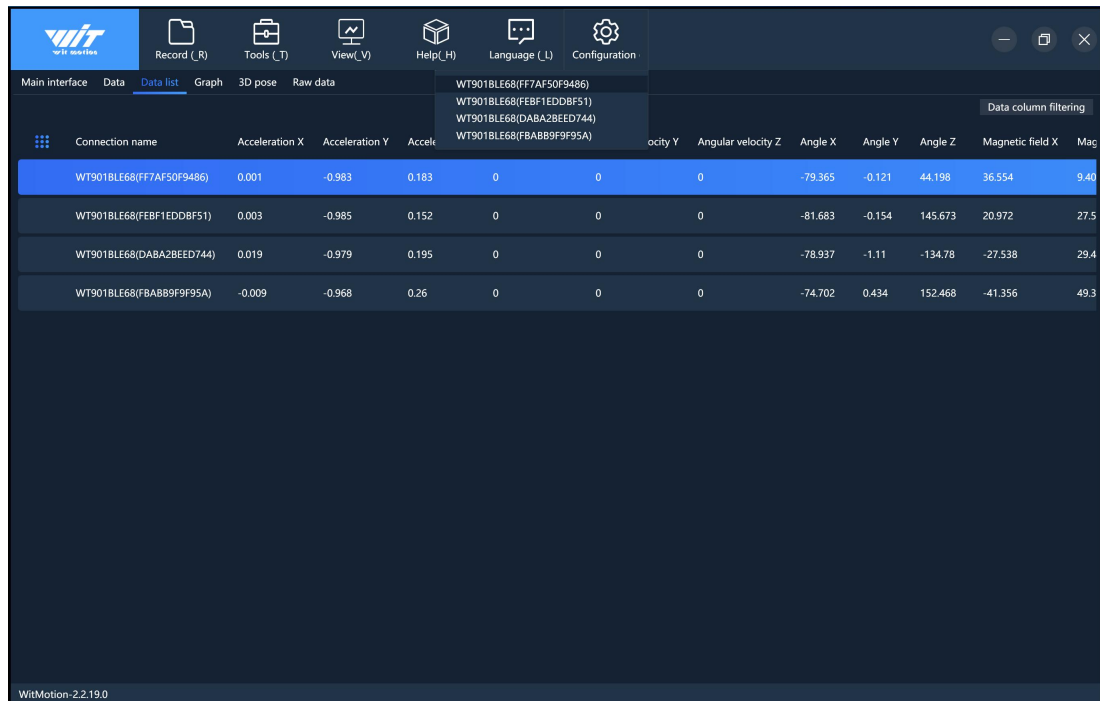
5.1 Software Setting

For software introduction including button and functions setting, please referring to the below link.
https://drive.google.com/file/d/18OntSUDU1m4vNhcRXvmTeFN1rAK3jcmZ/view?usp=share_link

5.1.1 Data Configuration
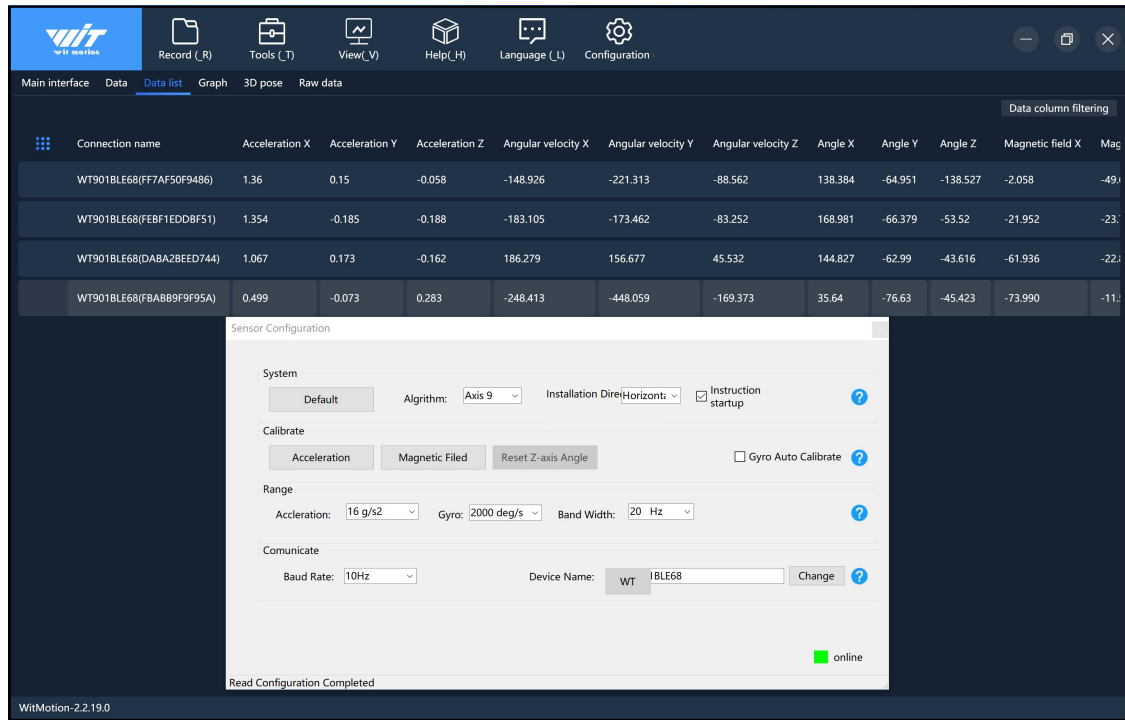
Click the corresponding sensor, you can configure the individual sensor separately, record and so on.

Step 1. Click the config as you request.

Step 2. The software will auto-save the config.

5.1.2 Calibrate

It is the similar with the method of the calibration of the standard PC software.

If you don't how to config the parameter, please click " question mark".
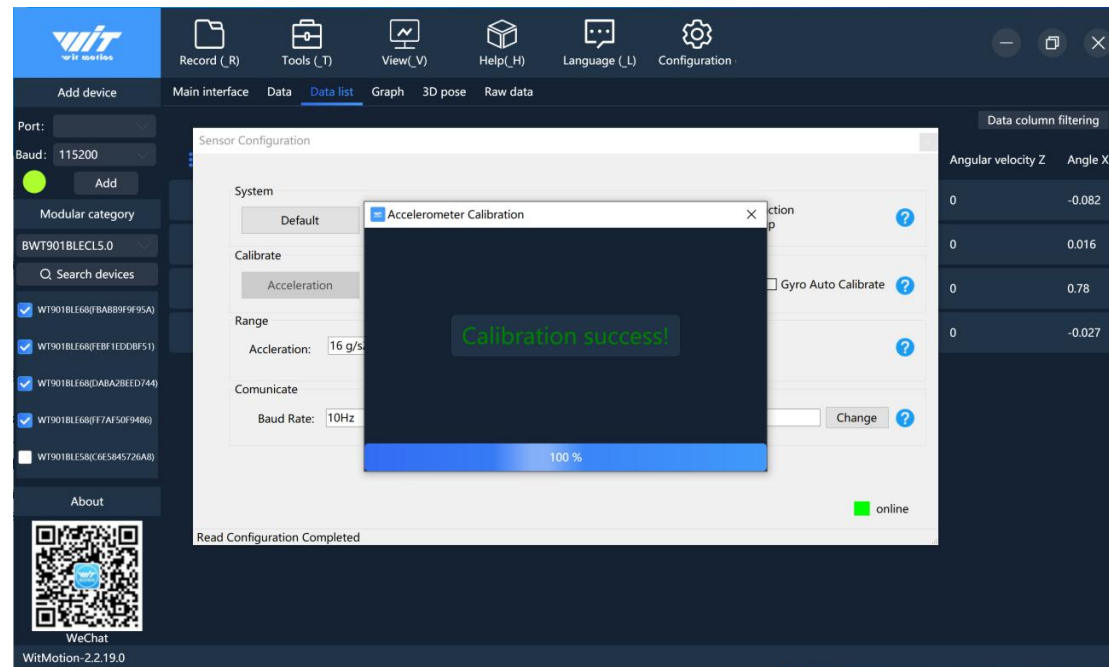
5.1.3 Device name Edition

Step 1. Modify your device name.

Due to the integrated WitMotion algorithm and settings, the device name will always start with "WT".

Step 2. Input the name you prefer. Then click the "Save Config".
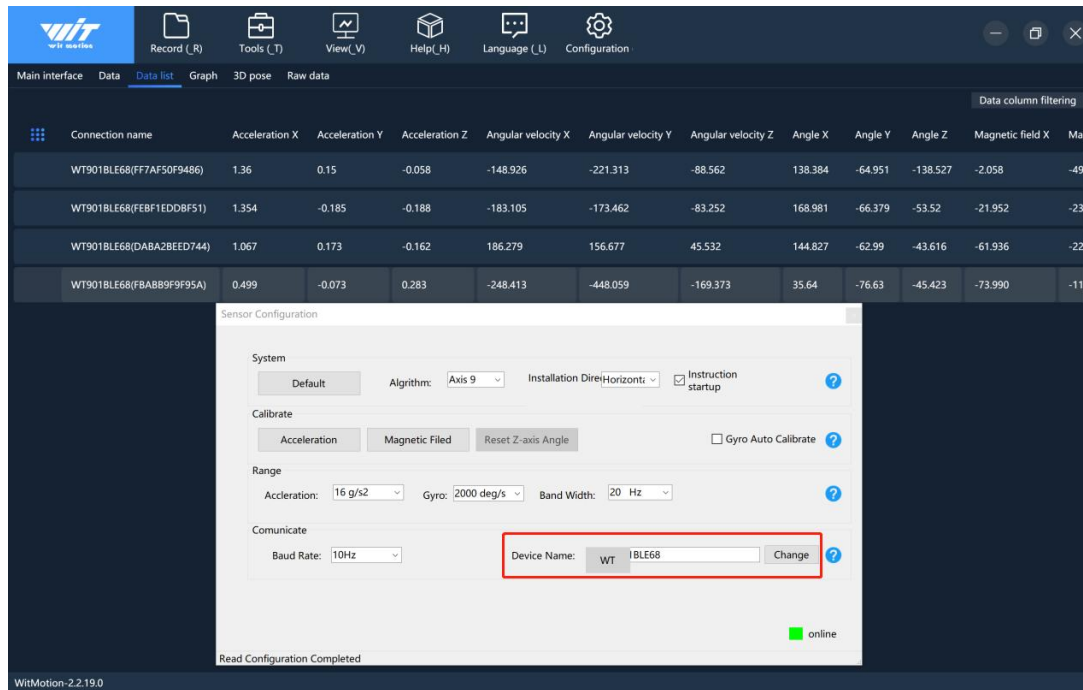
5.1.4 Curve Display

There are various choices on the data details, such as acceleration, angle data and so on.

Demo 1:

You can switch views as you like.

Demo 2:

5.1.5 Data Recording

Step 1. Click "Record".

Step 2. Click "Stop".

Step 3. Extract the recorded file.

Step 4. Paste all the recorded data packet to a Excel file for intuitive reviewing.

Name	Date modified	Type	Size
BWT901BLECL5.0_1682518006073.bin	4/26/2023 2:06 PM	BIN File	44 KB
BWT901BLECL5.0_1682518006073.play	4/26/2023 2:06 PM	PLAY File	1,008 KB
BWT901BLECL5.0_1682518006073_1.csv	4/26/2023 2:06 PM	XLS 工作表	340 KB
BWT901BLECL5.0_1682518006073_1.txt	4/26/2023 2:06 PM	Text Document	302 KB

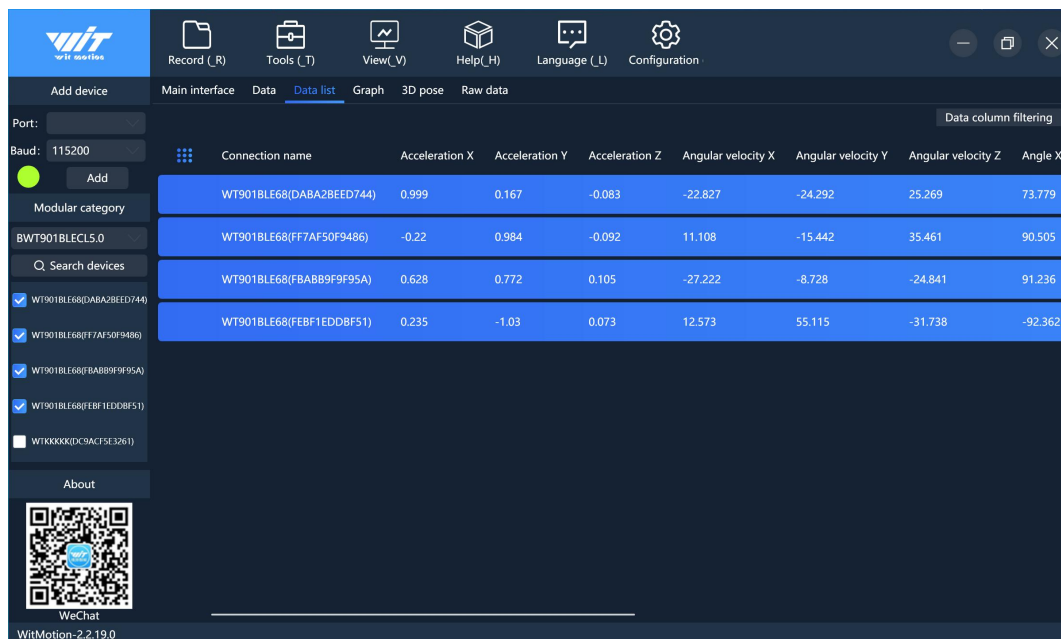| Time	Device nam	Accelerati	Accelerati	Accelerati	Angular ve	Angular ve	Angular ve	Angle X(°	Angle Y(°	Angle Z(°	Magnetic f	Magnetic f	Magnetic f	Temperatu	Quaternior	Quaternior	Quaternior	Quaternions 3()
14:06:46.	WT901BLE67	0.204	-0.882	0.478	2.014	-0.61	-0.916	-62.056	-11.673	-177.627	-15.467	-78.825	-210.442		0.03482	0.09781	-0.51102	0.85321
14:06:46.	WT112233 (F	0.049	0.396	-0.928	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.049	0.396	-0.928	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.05	0.396	-0.928	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.05	0.396	-0.929	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.05	0.396	-0.929	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.05	0.396	-0.929	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.049	0.396	-0.929	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.049	0.396	-0.928	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT115 (C68E	-0.026	0.029	1.018	0	0	0	1.67	1.439	83.979	33.124	2.744	-29.89		0.74319	0.00241	0.0191	0.66873
14:06:46.	WT112233 (F	0.049	0.396	-0.928	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.049	0.396	-0.928	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.048	0.396	-0.928	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.048	0.395	-0.929	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.048	0.395	-0.929	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.048	0.395	-0.929	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.049	0.395	-0.929	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT901BLE67	0.2	-0.885	0.471	4.639	-0.793	-1.282	-62.084	-11.667	-177.627	-15.467	-78.825	-210.442		0.03482	0.09781	-0.51102	0.85321
14:06:46.	WT112233 (F	0.049	0.395	-0.929	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.049	0.395	-0.929	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.049	0.395	-0.929	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.049	0.395	-0.929	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.049	0.395	-0.929	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT112233 (F	0.049	0.395	-0.929	0	0	0	156.945	-2.791	124.014	71.375	65.017	-35.075		0.07269	0.46402	0.86261	0.18756
14:06:46.	WT115 (C68E	-0.026	0.03	1.018	0	0	0	1.67	1.439	83.979	33.124	2.744	-29.89		0.74319	0.00241	0.0191	0.66873
14:06:46.	WT901BLE67	0.203	-0.892	0.46	2.502	-0.061	-0.366	-62.155	-11.635	-177.627	-15.467	-78.825	-210.442		0.03482	0.09781	-0.51102	0.85321