

USER MANUAL WT9011DCL-BT5.0

Bluetooth 5.0 Inclinometer Sensor



Tutorial Link



Google Drive

Link to instructions DEMO: WITMOTION Youtube Channel WT9011DCL-BT5.0 Playlist

If you have technical problems or cannot find the information that you need in the provided documents, please contact our support team. Our engineering team is committed to providing the required support necessary to ensure that you are successful with the operation of our AHRS sensors.

Contact

Technical Support Contact Info

Application

- Unmanned/Assisted Driving
- Large-scale farming automated farming
- Safety monitoring for working at heights
- Unmanned aerial vehicle
- Industrial attitude monitoring
- Human motion tracking/capture
- Robot, Automated Guided Transporter
- Pedestrian Navigation
- Truck-mounted Satellite Antenna Equipment



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1 Introduction

The WT9011DCL-BLE5.0 is a multi-sensor device detecting acceleration, angular velocity, angle as well as magnetic filed. The robust housing and the small outline makes it perfectly suitable for industrial retrofit applications such as condition monitoring and predictive maintenance. Configurationuring the device enables the customer to address a broad variety of use cases by interpreting the sensor data by smart algorithms.

WT9011DCL-BLE5.0's scientific name is AHRS IMU sensor. A sensor measures 3-axis angle, angular velocity, acceleration, magnetic field. Its strength lies in the algorithm which can calculate the three-axis angle accurately.

It is employed where the highest measurement accuracy is required. WT9011DCL-BT5.0 offers several advantages over competing sensor:

• Heated for best data availability: new WITMOTION patented zero-bias automatic detection calibration algorithm outperforms traditional accelerometer sensor

• High precision Roll Pitch Yaw (X Y Z axis) Acceleration + Angular Velocity + Angle + Magnetic Field output

• Low cost of ownership: remote diagnostics and lifetime technical support by WITMOTION service team

• Developed tutorial: providing manual, datasheet, demo video, free software for Windows computer, APP for Android smartphones

• WITMOTION sensors have been praised by thousands of engineers as a recommended attitude measurement solution



1.1 Warning Statement

- Putting more than 5 Volt across the sensor wiring of the main power supply can lead to permanent damage to the sensor.
- For proper instrument grounding: use WITMOTION with its original factory-made cable or accessories.
- > Do not access the I2C interface.
- Do not change the baud rate because WitMotion
 Bluetooth sensor's baud rate is fixed.

1.2 LED Status

LED	Status	Remark
Red	Keeping on	Charging (powered by offered Type-C wire)
Green	Flashing once every one second	Standby
	Flashing once every two seconds	Pairing succeeds



2 Instructions of 2023 New Software

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

Below is the new software and universal instruction download link. <u>https://drive.google.com/drive/folders/1dnwmnH7mi4zBpNqDywLz</u> <u>rzsV7BfeKaD9?usp=share_link</u>

	Software Instructions PC software Download PC software DDWD Viteo Connect the sensor Head Division Software (1991)		₹		
	PPF Software Instruc	tions	otion New Softwar		
	~	~ -	-		1.1
d device Main 0/44 CC	ord (.R) Tools (.T) View(.V) interface Data Data list Graph M DM6,9600,50	Help(H) Language (L) Cor ap 3D pose Raw data	rfiguration Con	ifiguration information	- Ō
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3 Use Instructions with PC

Please install the complete tutorial including software, drivers, manual, etc. Link to download software

3.1 PC Connection

PC software is only compatible with Windows system. Link to install the files. <u>Google Drive</u>

3.1.1 Serial Connection

Step 1. Connect the sensor with offered Type-C wire.

(Warm Reminder: If you wanna use a longer cable, it should be a standard Type-C data cable)

Step 2. Install the driver- CH340 Download Link

*How to Install and update the CH340 driver

Click the "Uninstall" button first. Then click on the "Install" button.

🛃 DriverSetup(X64)	- 🗆 ×
Device Driver I	nstall / UnInstall
Select INF	CH341SER.INF ~
INSTALL	WCH.CN USB-SERIAL CH340
UNINSTALL	08/08/2014, 3.4.2014
HELP	



*How to verify your driver is working

1) To check that the CH340 enumerates to a COM port, you can open the device manager. You can click the **Start** or \boxplus (Windows) button and type "*device manager* to quickly search for the application.

Device Manager	
 View devices and print Change device installa Add a device 	ters Device Manager ttig View and update your hardware's settin
Find and fix problems	with devices
Add a wireless device	to the network
View network comput	ers and devices
Change default setting	gs for media or devices
Start or stop using aut	oplay for all media and devices
Manage audio devices	
Sync with other comp	uters, mobile devices, or network folders
Learn how to use your	storage device to speed up your compute
AutoPlay	
Sound	
See more results	

2) After opening the device manager, you will need to open the Ports (COM & LPT) tree. The CH340 should show up as USB-SERIAL CH340 (COM##).
Depending on your computer, the COM port may show up as a different number.





Step 3. Open the software(Minimu.exe)

Name	Date modified	Туре	Size
📕 3D	11/4/2021 4:06 PM	File folder	
📕 AD	11/4/2021 4:06 PM	File folder	
AD_EN	11/4/2021 4:06 PM	File folder	
📙 data	11/4/2021 4:06 PM	File folder	
📕 ini	11/4/2021 4:06 PM	File folder	
📙 playPic	11/4/2021 4:06 PM	File folder	
📙 playPic_EN	11/4/2021 4:06 PM	File folder	
📙 recordFile	11/4/2021 4:06 PM	File folder	
📙 temp	11/17/2021 9:03 AM	File folder	
📙 zh	11/4/2021 4:06 PM	File folder	
📕 zh-CN	11/4/2021 4:06 PM	File folder	
📙 zh-Hans	11/4/2021 4:06 PM	File folder	
ConfigHelper.dll	5/27/2019 11:01 AM	Application extens	8 KB
DataTypeEnum.dll	11/4/2021 3:16 PM	Application extens	8 KB
DIJavaMethod.dll	11/4/2021 3:09 PM	Application extens	7 KB
HardWareInfo.dll	11/4/2021 3:09 PM	Application extens	8 KB
ISerialPort.dll	11/4/2021 3:16 PM	Application extens	13 KB
🗟 metergroup.dll	6/1/2018 4:20 PM	Application extens	15 KB
* MinilMU.exe	11/17/2021 9:03 AM	Application	2,094 KB





Data will appear after auto-search finishes

Notice: If not successful, please operate manually Choose the com port and baud rate 115200, data will be shown on the software.



3.1.2 BLE 5.0 Adapter Connection

The pairing process of connection may vary from the different operating systems.

*Windows 7 OS computer Please check below link for detailed instructions. BLE 5.0 Adapter working with Win 7 OS

*Windows 10 OS computer Complete Process: Step 1. Insert adapter into the USB port in the beginning

For the first time connection, normally speaking, there will be a pop-up window which indicates the device setting up.(system hint)





Once the system recognizes the device, you can find it on "Bluetooth & other devices" control page

← Settings		- a ×
ය Home	Bluetooth & other devices	
Find a cetting		sound seconds
rind a setung 7	USB Keyboard	Display settings
Devices		More Bluetooth options
Bluetooth & other devices	0	Send or receive files via Bluetooth
员 Printers & scanners	Audio	Get help
① Mouse	Paired	Give feedback
Touchpad	AirPods for Bjoy Paired	
📾 Typing		
Pen & Windows Ink	Other devices	
AutoPlay AutoPlay	Connected to USB 3.0	
Ö USB	nRF52 USB CDC BLE Demo	
	Remove device	
	Show notifications to connect using Swift Pair When selected, you can connect to supported Bluetooth devices quickly when they're close by and in pairing mode.	

Or confirm if there is a port generated in the device manager. (Bluetooth visual port.)



Step 2. Turn on the sensor after blue light of adapter flashes P.S The sensor's LED light will flash quickly. (once per second)





wir motion	Record (R) Tools	(_T) View(_V)	Help(_H)	Language (_L)	Configuration		•	٦	×
Add device	Main interface Data [Data list Graph 3D po	ose Raw data						
Port:	No sensors con	nected							
Baud: 115200 Add Modular category	Angle X						•		
WT901BLE5.0	Angle Y								
Q Search devices	Angle Z								
				M			•		•
About				AL S	s 52		•		
WeChat									
WitMotion 2.2.17.0									

Step 4. Long press the sensor button to start up, turn on the intelligent upper computer, select WT901BLE5.0 for module category, select serial port, the default baud rate is 115200, and then click Add.

After the connection is successful, the upper computer can see the data sent back by the sensor.



Step 5. Data will appear once the auto-search finished LED status: The LED light of sensor will flash slowly. (once every two seconds.) The adapter's LED light will remain still.



3.2 Calibration

Preparation: Ensuring the sensor is "Online".

Calibration on PC software:

It is required to calibrate for the first time usage.

3.2.1 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 "Configuration" and wait for 5 seconds

Step 3. Calibration done if OK shows

Sensor Configuration		
System Default	Accelerometer Calibration	× ?
Acceleration M Range Accleration: 2 g/s2	Calibration success!	ro Auto Calibrate 🥐
Comunicate Baud Rate: 100Hz	100 %	Change ?
Read Configuration Completed		online



Step 4. Check the resultco	nfirm if there is 1g on Z-axis acceleration
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THE SALE	Record (_R)	Tools ()	D) View(] vi	Help(_H)	Language (_L)	Configuration	o ×
Add device	Main interface	Data Da	ta list Graph	3D pose	Raw data			
Port: COM4	WT9018	LE67(E80	BED5C883	8)			Pa	use reception
Baud: 115200	Ťie		Accolor	ration	Ano		Ŵr.	
Add 📃	System time:	13:54:50	X	0 a	Ang X:		x. (1)	0.005 *
Modular category	Chip date:	0-0-0	Y	-0.001 g	Y:	0°/s	Y:	0.033 *
WT9018LE5.0	Chip time:	0:0:0.0	Z:	1 g	Z:	-0.366 */:	Z:	-89.72 °
Q Search devices	Version:	10055.1.2	a :	1.000 g	w:	0.409 °/s		
WT901BLE67(E8CBED5C8838)								
	Magnet	tic field	Press	ure		Port	Quat	emion
WTXDC9ACF5E3261)	X:	-87.442 u	Temperature	28.4 °C	D0:		q0:	0.7088
	Υ:	16.367 ul	Pressure: :	0 Pa	D1:		q1:	0.00018
	Z:	-79.025 u	Height:	0.00 m	D2:		q2:	0.00021
	h :	118.991 c	Voltage:		D3:		q3:	-0.70532
About	Loca	tion	PDC	OP				
	Longitude:	0*0.0000(Number sate	0				
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	GPS height:	0.0 m	Horizontal ac	0.00				
新 <u>年</u> (第	GPS heading	0.0 *	Vertical accur	0.00				
WeChat	GPS ground :	0.000 km						
WitMotion-22170								



3.2.2 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.

	wit soutios	Record (_R)	Tools (_T)	View(_V)	Help(_H)	Language	(_L) Configurat	ion	ð X	
	Add device	Main interface	Data Data	ist Graph 3D	pose Raw data	a				
Port:	COM4	WT901BI	LE67(E8CB	ED5C8838)					Pause reception	
Baud:	115200	T		Accolor	ation	Angular	volocity			
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м	odular category	Chip date:	0-0-0	×: v.	0.007 g	v.	-0 122 °/s	v.	-0.681 °	
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Q	Search devices	t croiteini		1-1.		11.				
V wts	01BLE67(E8CBED5C8838)									
		Magnetic field		Pressure		Po	ort	Quat	ernion	
UTW	(DC9ACF5E3261)	X:	-58.692 uT	Temperature:	28.09 ℃	D0:		q0:	0.54028	
		Y:	-26.592 uT	Pressure: :	0 Pa	D1:		q1:	-0.00388	
		7:	-78.983 uT	Height:	0.00 m	D2:		q2:	-0.0051	
		h :	101.932 uT	Voltage:		D3:		q3:	-0.8414	
				1						
		Loca	tion	PDC)P					
	About	Longitude:	0°0.00000′	Number satelli						
	1755331ml	Latitude:	0°0.00000′	Location accur	0.00					
		GPS height:	0.0 m	Horizontal acci	0.00					
- 59		GPS heading:	0.0 °	Vertical accura	0.00					
新生活		GPS ground sp	0.000 km/l							
	2023.5.24									
WitM	otion-2.2.17.0									

Methods:

Step 1. Open the Configuration menu.

Step 2. Click the "magnetic field" and slowly rotate the sensor 360° around X,

Y, Z, 3-axis accordingly.



→ Bluetooth 5.0 - Config	×
Read Config Calibration Time	
System	
Reset Sleep Algorithm: 9-axis	✓ Install Direction: Herizontal ✓ ✓ Instruction Startup
Calibrate	
Acceleration Magn	etic Filed 🗹 Gyro Auto Calibrate
Reset Height	avis Analo
Rance Please rotate X V and Z avis	hy 360 degrees for calibration
Acceleration: 16 g	the operation is completed.
Communication	< <u>(0)</u>
Output Rate: 10Hz	
	Online
- MagCal	×
charXZ	chartYZ
200	200
0	0
-200	-200
400	400
-600 -440 -240 -40	-600
charXY	Calibrate Method: Ellipse fitting
400	Current Value Offset Range
200	X: -274 X: -174 X: 267
	Y: 109 Y: -30 Y: 267
0	Z: 41 Z: -162 Z: 267
	[H]: 298
-200	View operating instructions End Read Write
-400	calibration Parameters Parameters
-440 -240 -40	axis respectively



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°.



3.2.3 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.

3.2.4 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 "Configuration", you will see the angle of the Z axis backs to 0 degree in the "Data".

3.2.5 Reset Height to 0

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



3.3 Configuration

3.3.1 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 Record" then "End Record" 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.



vit saotios	Record (R) Tools (_T) View(_V) I	Help(H) Language (L	Configuration	- 0 ×
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Baud: 115200	Angle Y	-2.7	758°		
Add	–	100			
Modular category	Angle /	138	955°		
WT901BLE5.0	Record complete p	rompt			
Q. Search devices	👩 Data Reco	rd, data recorded in PC Record	folder, excuse me whether	• (() 🔶 🔸
WTJ(DC9ACF5E3261)	to open th	e Record folder			
		Ves No			
About					
			MIN		
WeCnat WitMotion-2.2.17.0					记录文件中
名称	^	修改日期	类型	大小	
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WT901BLE5.0	1671118602648.play	2022/12/15 15			
		y 2022/12/15/15	:37 PLAY 文件	2,817 KB	
回 W1901BLE5.0	_1671118602648_1	2022/12/15 15	:37 PLAY 文件 :37 XLS 工作录	2,817 KB 615 KB	
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It is highly recommended that data can be pasted to a Excel file. In this way, all data will be shown in order.



4	Α	В	C	D	E	F	G	Н		J	K	L	M	N	0	Р	Q	R	S	T
1	Tine	Sensor	AcceleratA	cceleratA	ccelerat	Angular 🗤	Angular vA	ngular v	Angle X('A	Angle Y(1	Angle Z('	Magnetic J	Magnetic	Magnetic	Temperati	Quaternic	Quaternic	Quaterni	Quaternio	ns 3()
2	15:36:42	CON4	0.045	0.125	-1.019	0	0	0	173.123	-2.609	126.606	36.4	22.275	52.242	28.53	-0.00656	-0.44952	-0.8909	-0.06375	
3	15:36:42	VT901BLE€	0.046	0.121	-1.016	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
4	15:36:42	¥T901BLE€	0.047	0.122	-1.023	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
5	15:36:42	WT901BLE6	0.049	0.12	-1.013	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
6	15:36:42	¥T901BLE€	0.044	0.125	-1.016	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
7	15:36:42	CON4	0.047	0.121	-1.012	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06375	
8	15:36:42	COH4	0.049	0.121	-1.025	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06375	
9	15:36:42	COH4	0.047	0.122	-1.011	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06375	
10	15:36:42	VT901BLE6	0.048	0.124	-1.013	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
11	15:36:42	VT901BLE6	0.042	0.122	-1.014	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
12	15:36:42	VT901BLE6	0.049	0.123	-1.019	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
13	15:36:42	¥T901BLE€	0.046	0.125	-1.016	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
14	15:36:42	COH4	0.046	0.125	-1.018	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06375	
15	15:36:42	CON4	0.047	0.123	-1.013	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06375	
16	15:36:42	COH4	0.045	0.125	-1.016	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06375	
17	15:36:42	COH4	0.048	0.122	-1.021	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06375	
18	15:36:42	COH4	0.049	0.125	-1.013	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06375	
19	15:36:42	COH4	0.051	0.121	-1.009	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06375	
20	15:36:42	VT901BLE6	0.045	0.121	-1.017	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
21	15:36:42	VT901BLE6	0.047	0.121	-1.012	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
22	15:36:42	VT901BLE6	0.049	0.121	-1.025	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
23	15:36:42	VT901BLE6	0.047	0.122	-1.011	0	0	0	173.123	-2.609	126,606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
24	15:36:42	CON4	0.049	0.124	-1.02	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06375	
25	15:36:42	CON4	0.044	0.125	-1.013	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00656	-0.44952	-0.8909	-0.06375	
26	15:36:42	COH4	0.045	0.122	-1.023	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00659	-0.44952	-0.8909	-0.06375	
27	15:36:42	CON4	0.046	0.123	-1.017	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00659	-0.44952	-0.8909	-0.06375	
28	15:36:42	COH4	0.046	0.123	-1.014	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00659	-0.44952	-0.8909	-0.06375	
29	15:36:42	VT901BLE6	0.046	0.125	-1.018	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
30	15:36:42	VT901BLE6	0.047	0,123	-1.013	0	0	0	173.123	-2.609	126,606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
31	15:36:42	VT901BLE6	0.045	0.125	-1.016	0	0	0	173.123	-2.609	126.606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
32	15:36:42	VT901BLE6	0.048	0,122	-1.021	0	0	0	173.123	-2.609	126,606	36.417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
33	15:36:42	COH4	0.043	0.121	-1.013	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00659	-0.44952	-0.8909	-0.06375	
34	15:36:42	COH4	0.049	0.124	-1.016	0	0	0	173.123	-2.609	126,606	36.275	22.258	52, 292	28.53	-0.00659	-0.44952	-0.8909	-0.06375	
35	15:36:42	CON4	0.046	0.121	-1.019	0	0	0	173.123	-2.609	126,606	36.275	22.258	52, 292	28.53	-0.00659	-0.44952	-0.8909	-0.06375	
36	15:36:42	CON4	0.048	0.122	-1.019	0	0	0	173.123	-2.609	126.606	36.275	22.258	52.292	28.53	-0.00659	-0.44952	-0.8909	-0.06375	
37	15:36:42	COH4	0.046	0.123	-1.012	0	0	0	173,123	-2.609	126,606	36, 275	22, 258	52, 292	28, 53	-0.00659	-0.44952	-0.8909	-0.06375	
38	15:36:42	VT901BLE6	0.049	0.125	-1.013	0	0	0	173.123	-2.609	126,606	36, 417	22, 383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
39	15:36:42	VT901BLE6	0,051	0.121	-1.009	0	0	0	173,123	-2.609	126,606	36, 417	22, 383	52.2	28, 34	-0.00656	-0.44952	-0.8909	-0.06378	
40	15:36:42	VT901BLE6	0.049	0.124	-1.02	0	0	0	173.123	-2.609	126,606	36, 417	22, 383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
41	15:36:42	VT901BLE6	0.044	0.125	-1.013	0	0	0	173,123	-2,609	126,606	36, 417	22.383	52.2	28.34	-0.00656	-0.44952	-0.8909	-0.06378	
42	15:36:42	CON4	0.047	0.124	-1.022	0	0	0	173.123	-2.609	126,606	36, 275	22, 258	52, 292	28.53	-0.00659	-0.44952	-0.8909	-0.06375	
43	15:36:40	CON4	0.046	0,119	-1.014	0	0	0	173, 123	-2,609	126,606	36, 275	22, 258	52, 292	28, 53	-0.00659	-0, 44952	-0.8909	-0,06375	
44	15:36:42	CON4	0.048	0.126	-1.02	ů	ů	Ŭ	173,123	-2.609	126,606	36, 275	22, 258	52, 292	28.53	-0.00659	-0.44952	-0.8909	-0.06375	
		WT901	BLE5 0 167111	8602648 1	+	-	-									4				

. S



3.3.2 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 "Record" Button and then click "Play file playback"



Step 3: Choose the original path of software installation and load the Bin file



** 打开		-l.				×
← → * ↑	< Think a	> 下载 > 维特智能上位机-1669364526083	(1) → Record	✓ ✓ ⑦ 0 	ord"	م
组织 ▼ 新建文件	夹				≣≡ ▼ Ⅲ	?
🔹 快速访问	1 名	称 ^	修改日期 ~	类型	大小	
		WT901BLE5.0_1671118602648.play	2022/12/15 15:37	PLAY 文件	2,817 KB	
🖕 WPS云盘		WT901BLE5.0_1671118760725.play	2022/12/15 15:39	PLAY 文件	599 KB	
lange - Pers	, Ľ] WT901BLE5.0_1671118772882.play	2022/12/15 15:40	PLAY 文件	3,987 KB	
_] WT901BLE5.0_1671119712348.play	2022/12/15 15:55	PLAY 文件	1 KB	
💻 此电脑] WT901BLE5.0_1671180135478.play	2022/12/16 8:42	PLAY 文件	1 KB	
🧊 3D 对象						
📑 视频						
▶ 图片						
🔮 文档						
👆 下载						
🎝 音乐						
三 桌面						
🏪 Windows (C:)						
🔿 网络	~					
ź	文件名(<u>N</u>):	WT901BLE5.0_1671118602648.play		~ play文件		~
				打开(2) 取消	i

Step 4: Click "Run" and the Binary file will be playback When playback, the rate can be editable.

💌 Data playba	_							
Playback files:	C:\Users\Think\De	64526083 (1)\R	Select					
Playback rate:	back rate:							
Playback spee		0 %		0				
The playback fil	e is loaded and rea	dy for playback						



3.3.3 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 "Configuration" menu

Sensor Configuration	×
System Default Algrithm: Axis 9 Vinstallation Instruction Direction: Vertical Vistartup	0
Calibrate Acceleration Magnetic Filed Reset Z-axis Angle Gyro Auto Calibrate	?
Range Accleration: 2 g/s2 ∨ Gyro: 250 deg/s ∨ Band Width: 20 Hz ∨	2
Comunicate Baud Rate: 10Hz V Device Name: WT 901BLE67 Change	2
onlir	ıe
Setting installation direction succeeded!	



3.3.4 Bandwidth

Default bandwidth is 20Hz.

Sensor Configuration

	Algrithm: Axis s	Direction:	startup	
Calibrate				
Acceleration	Magnetic Filed	Reset Z-axis Angle	Gyro Auto Calibra	ate
Range Accleration: 2 g/s	2 v Gyro: 250	deg/s v Band Width: 20 256 188	Hz V Hz	
Comunicate Baud Rate: 10Hz	~	98 98 Device Name: WT 20 10	Hz Hz Hz Change	; (

×

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:

Band Width as 5Hz, Baud Rate as 5Hz. The waveform is very steady.



or Configuration				
System Default	Algrithm: Axis 9	 Installation Direction: 	Vertical ∨ ☑ Inst	truction ?
Calibrate Acceleration	Magnetic Filed	Reset Z-axis Angle		🗌 Gyro Auto Calibrate 🤗
Range Accleration: 2 g/s2	∽ Gyro: 250	deg/s ∨ Band Widt	h: 5 Hz ~	?
Comunicate Baud Rate: 50Hz	~	Device Name:	WT 901BLE67	Change
L				
n the return rate succeeded.				online

Band Width as 256Hz, Baud Rate as 50Hz. The waveform will show more fluctuation.

Sensor Configuration	x
System Default Algrithm: Axis 9 Installation Vertical Instruction Instruction ?	
Calibrate Acceleration Magnetic Filed Reset Z-axis Angle Gyro Auto Calibrate ?	
Range Accleration: 2 g/s2 ~ Gyro: 250 deg/s ~ Band Width: 256 Hz ~	
Comunicate Baud Rate: 50Hz Change Change Change	
online	
Successfully set bandwidth!	:

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.



3.3.5 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-BT5.0 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 "Axis 6" algrithm on the "Configuration" menu.

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

After the calibration is completed, it can be used normally.

Sensor Configuration	×
System Default Algrithm: Axis 6 Installation Vertical Instruction Instruction <th< td=""><td></td></th<>	
Calibrate Acceleration Magnetic Filed Reset Z-axis Angle	
Range Accleration: 16 g/s2 ~ Gyro: 2000 deg/s ~ Band Width: 20 Hz ~	
Comunicate Baud Rate: 50Hz V Device Name: WT 901BLE67 Change ?	
online	
Successfully set Z-axis angle to zero	.::



4 Use Instructions with Android Phone

For APP Configuration introduction, please referring to the Chapter 2.2

4.1 **APP Installation**

Install the APK file, give permission of Location and Storage

wit soties		S			
WitMotion All permissions	5 ∨	WitMot Installation su	ion uccessful		
SEARCH IN APPGALLER	RY	PERMISSIONS			
INSTALL		Storage			
CANCEL		Location	All the time >		

2022v APP download link WITMOTION 2023v New Android APP

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Name	\downarrow	Owner	Last modified	File size		
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2	Matlab Sample Code	me	Nov 6, 2021 me	-		
2	Manual & Datasheet (Document)	me	Aug 12, 2021 me	-		
	Apps	me	Dec 17, 2021 me	-		

About Android APP:

1. It is required to allow for application positioning (Always allowed), and turn on the positioning function and Bluetooth

Note: Paired devices can be searched without turning on positioning, but according to Google's requirements, if APP installed on a higher version of Android (6.0) mobile phone is paired with a Bluetooth device, positioning must be allowed when using Bluetooth at the same time.

2. After turning on Bluetooth, it takes about one minute to search for authorization to find Bluetooth.



4.2 Connection

Step 1. Install the APK file, give permission of Location and Storage Step 2. Open APP and choose "BLE 5.0 Series"



Step 3: Turn on the sensor and scan the device Note: The device will show as "WT901BLE"+"MAC address"

BLE Device Scan 💥 stop_scan	ı
WT901BLE56 RSSI:-83 0F477580-3876-C0BE-51A6-BE58B4FFFF36	
WT901BLE57 RSSI:-82 27F62869-ABDF-C19B-410F-885B165229A4	
WT901BLE58 RSSI:-93 CE86FB50-BFFC-E6B5-18E2-36A8CE1C42FA	



Step 4. When pairing is done, the blue LED light of the sensor will flash and keep about one second



After a few seconds, the data will show automatically



4.3 Calibration

4.3.1 Acceleration Calibration

- Step 1. Keep the module horizontally stationary
- Step 2. Click the "Calibration" menu
- Step 3. Click the "Acceleration Calibration" and wait for 3 seconds

Step 5. Check the result--confirm if there is 1g on Z-axis acceleration





4.3.2 Magnetic Field Calibration

- Step 1. Click the "Calibration" menu
- Step 2. Click the "Magnetic calibration" button
- Step 3. Slowly rotate the module 360° around X, Y, Z, 3-axis accordingly
- Step 4. After rotation, click "Finish"

Config	BLE56		Config	BLE56		
Acc Cali	ANGLE		Acc Cali	ANGLE		
Acc Cali L		EQ: 🎹	Acc Cali L		EQ: 🎹	
Acc Cali R		40	Acc Cali R		200	
MagCali	1	20	Finish		100	
Rate	AA		Rate		0	
Factory Reset	Appla	-40 60	Factory Reset		-100	
Change name	V 1.6 8.9 9.3	Angles chart 9.6 10.0	Change name	216 210 2	Angles chart -200	
DFU	2 -58.75' -9.52' -46.94' 0.00°		DFU Calibrating, kindl	₂z 0.07° 0.04° -163.02° 0.00° ORD		

Check the result: The Z-axis angle will have less drift than before. Notice: If there is drift of Z-axis, please stay away from the objective that can create magnetic field interference.



5 Use Instructions with iPhone

The new version of iOS APP has been launched. There will be many function coming out soon in future. The existing function of history recording is in instructions at present.

Your understanding would be highly appreciated.

5.1 How to Install

Step 1. Search "WITMOTION" on iOS App Store Install the APP



5.2 How to setup

Step 1. Turn on the sensor and then click "Scan"



Sensor device ID will be recognized as WT901BLE+number The second column is its SSID number.



4:50		ul Ŷ 🗖	
Stop	Device Scan	About	
This Device Use this device's se	nsor data		
WT901BLE67 DA6091AE-7AB9-1D5F-4E46-3F667895BC6C			



Step 2. Select the device and the data will be online Demo: angle data curve







5.3 How to Configurationure

For menu setting and its introduction including button and functions setting, please referring to the Chapter 2.2.

Click the button of "SET" the menu will jump out automatically.





5.3.1 Rename

Click rename and you can edit its name. The name will be fixed with WT + Name you input.





5.4 Data Recording

The data can be easily recorded by simply press the button of record. The recorded file can be txt format at present. You can send the record file to the computer and then paste the data to an excel file for intuitive reviewing. P.S If you meet any problem, please reach our team at support@wit-motion.com



If you phone comes with txt reader, the recorded file can be easily opened. A txt recorder like Micro Software.

https://drive.google.com/file/d/1p60oc0WuK4ENURePBLdHU6D9CQ1LoLKD/vi ew?usp=sharing