AheadXTM Dependable Flying Robot

AheadX Space V3

THE REAL PROPERTY OF THE PROPE

User manual

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AheadX Space is specially designed for SAGI, LEO and TAURUS flight control. It supports serial port and internet data communication. The new generation ground station supports the access to SBUS auxiliary joystick(radio control), game pad joystick and customized game pad to control the flight.

With new Google map that can be used worldwide. It also supports real-time offline map. User can easily switch among road network map, topographic mapand satellite map. It supports one-key take-off and landing. AheadX space with more intelligent route edition function, it can automatically generate the landing route. It also supports block and strip scanning route.

User can also connect AheadX IDS module to share data and realize real-time parameter adjustment for on site and remote assistance operation.

AheadX Space V3 only supports 2.4 and above version firmware.

Operation system: windows 7 and above

Processor: Dual-core 2.0GHz or above

RAM: 4GB or above

Remained space: 2GB or above(To save the log and offline map)

Screen resolution: 1366 * 768 and above, 1920 * 1080 is recommended

Network : Get the map and remote assistance with internet connected (user can also download offline map)

Don't install it in system disk.

Flight control firmware 2.4 and above.

1.Please download the latest version software by contacting AheadX

2.Double-click the software and choose the install location. Please **don't** install it in system disk in case that automatic logging function is limited. Continue clicking "Next" to finish the installation.

🙏 Setup - AheadX Space QuadPlane			
Select Destination Location Where should AheadX Space QuadPlane be installed?	<u>ل</u>		
L Setup will install AheadX Space QuadPlane into the following folder.			
To continue, dick Next. If you would like to select a different folder, clid	Browse.		
D:\Program Files (x86)\AheadX\AheadX Space QuadPlane	Browse		
At least 145.8 MB of free disk space is required.			
(jext >	Cancel		

AheadX space V3 supports automatic authorization.

1.After powered up flight control, connect data link ground unit to PC.

2.Double-click the GS software icon after serial port is recognized. Click "ON" button after flight control is recognized.

3. The ground station will choose the correct aircraft automatically. Click



to synchronize parameters.



HUD displays the attitude, height, speed and some key parameters which is convenient for pilot to know the real-time status.



Yaw/Pitch/Roll	Horizontal : roll angle Vertical : pitch angle	
Speed	Unit: m/s	
Height	Unit: m	

0.0 A Volt2	tage and
current of smart battery 2.AD1: voltage of the complete system, AD2:	servo
Alln 🔊 w Rialto Ave Ex 🕼	
voltage In V Ex V Dir.	1.GPS
signal:Built-in GPS, external GPS 2.Compass: built-in compass, extern	nal
compass 0 0 A 0 RPIMIZ	
Throttle: Display the throttle output offlight control RPM: display the me	easured
Aerial Cnt	The amount
Command Control: None	Display
the control mode and engine status	Display
Hgt. Dev. Side Dev. Circle	
Homing Dis. Target	on: Sido
Dev: laterodeviation: Circle: circles the aircraft has flown	on, olde
Flap State	ay the flap
status 1.Off ;2.Take-off; 3.Landing	
Radarher Columbus Transcontinenta/ Hup Display	y the
altimeter value Parachute Display the	status of

status	meaning	status1	status2	status3	status4
Number Number	Number and positioning	Red	Yellow	Green	Gray
and quality of satellites	quality of GNSS satellites received by flight control	Not positioned	Low quality positioning	High quality positioning	Device not connected or identified
Magnetic	Whether	red	Yellow	Green	Gray
status ma compass the status co da int -e	magnetic compass data has interferenc -e	Magnetic compass is disturbed	Magnetic reference overrun	Magnetic compass is normal	Device not connected or identified



Voyage/endurance: display the total flight range and record single flight time.

Flight status: display the current status, flight mode and the reason why switch the flight mode.

Command: display the command. The command will be displayed in the dialogue box for 5 seconds . User can manually click the box to keep the dialogue box displayed.

Space V3 comes with electric fence function. The drone will return automatically when it is near to the fence.(electric fence disabled when data link cutoff; the drone will automatically return if it is out of the fence when receives data again)



Warning distance: Solid line is the boarder of electric fence, dotted line is warning line. Ground station will send a return command when drone is close to

warning line. Click this icon and move the mouse to the map. Long press left button and move the cursor to edit the fence. Click right button to save the

electric fence. Click this icon to refresh the saved electric fence and centre

displaying.

Before flight check combined manual check and automatic check to help user check before flight and improve reliability.

0	Unchecked
0	Completed
•	Abnormal
8	Error
•	None

Task Register: register the task and operator Manual Check: manually check all components

Sensor Status: automatically judge sensor status

Compass Status: One-key calibration Joystick Status: Display the status of the radio control

Actuator: to check the motor, control surface, parachute.

Fly Preference: automatically download the parameter. Only effective for the current flight if didn't save the parameter.

Protective Function: automatically refresh the protective parameter. Click OK to complete the check. Please adjust parameter in AheadX master software if there is an error of the parameter.

Airspeedometer: check if the value is less than 5m/s in no wind condition. Please continue clicking "Clear" four times if the value is more than 5m/s.

Task Equipment: check if the amount of photography if same with the record in fligt control. Suggest to clear POS data of last time. Continue clicking"Clear POS" to clear POS data.

Throttle& Vibration: For VTOL and fixed wing, click the percentage button in orders, it will collect the vibration value. User should click "Flame out" 4 time to stop the engine.

For hybrid multirotor, user should check the vibration before flight. Click "Collect", it will automatically cllect the data.





Switch flight mode, adjust parameter and data connection ect.



Unavailable: Button in gray color. Can't switch to this mode

Dangerous: Button in red color. It is very dangerous to switch to this mode which may cause collision and other accidents.

Attention: Button in yellow color. Please execute the operation after serious consideration.

Safe: Button in green color. It is able to execute the operation according to your requirement.

*: Carefully consider if you should execute the operation. The command is sent when clicking this button four times within 2 seconds.

Note: In addition to* operation, double click to execute other commands.



Standby: Continuously **clicking four times** to standby mode. In this mode, all control surfaces remain neutral position and the throttle at the idle position (minimum value). **Take-off: Double click**the button to take-off. Default setting is home hovering after take-off. Click

Automatic Takeoff - Advanced Optic 🗙
Automatic take-off route
Route 1 WPT 1
Circles
Enter after Home
Run Now
Countdown (20s) execution

route". Double click " run now".

For multi-rotor, double click "Take-off" it will climb to the target height and start hovering.



Note: Space V3.0.61 adds take-off preparation. Double click take-off button, rotors will unlock and spin 3 seconds. Within 3 seconds, click the button to cancel the preparation and enter into standby mode, then click take-off button to automatic takeoff mode(It will not work if directly click standby button, it will still take-off after 3 seconds). It will take-off if no operation within 3 seconds.

Route: Click to set the route number, waypoint number, circles and operation after flew all waypoint. **Double click**"Run now"

Route X
Route 1 WPT Id 1
Cycle 1 Unlimited
Enter after Home
Run Now

Homing: **Double click**"Homing" button to execute the command. Click to set height, speed, radius, orientation, lift mode. Double click "Set".

Homing - Advanced Options		
Height m	300.0	
Speed m/s	26.0	
Radius m	100	
Hover Orient	Clockwise	~
Lift mode	Height Protectio	\sim
"	»	
, iii	"	
Capture Click	on Map Read	Set

Hover Mode - Advanced Options 🗙			
Height m	300.0		
Speed m/s	26.0		
Radius m	100		
Hover Orient	Clockwise	\sim	
Lift mode	Height Protectio	\sim	
«	»	245	
Capture Click	on Map Read	Set	

Hovering: **Double click** "Hovering". The aircraft will hover around the current position and keep the height. User can set the parameters of the hovering position

and double click "Set".

Landing:

Double click landing button. Supports normal and dynamic landing. Aircraft will fly to the landing route with the current height if flight height is higher. Then aircraft will hover and descend before reaching the landing route.

For multi-rotor, aircraft will climb and fly to the landing point if the flight height is lower. On the contrary, it will keep the height to landing point and land.

The navigation point and the hover point data will not be** saved after the flight control is powered off.**

VTOL 1.Click AheadX

, then click "Feature". Enable

"Parachute", Then click "Confirm".

Ahead	🗙 🕼 🚱 🖕
Default Para.	Takeoff/Land Mode
Feature	Normal Landing O Dynamic Landing O Precison Landing
Plugins	Parachute
AI	Parachute
GUI	Flaps
Basic	Start engine
Reset	Start engine Start time(100 ~ 5000ms) 100

2.Continuously **click**"Emergent parcht" **4 times** to open the parachute. Double click"Close Prcht" to close the parachute 3.Top landing :**Double click**"MR Top landing" to execute the command. Home Landing: aircraft will keep the current flight height to landing point and land. **Double click** "Home landing" to execute

		-*-
	Emergent Parcht*	Close Prcht.
	Landing: MR TopLand	Landing: Homing Landing
.9	ALTN MR	ALTN FW

the command.

Fixed wing Please set in the "AheadX master" if your aircraft equipped with parachute. The setting will be synchronized when you start ground station. It will displayed "emergent parcht" and "close parcht".

AheadX Mas	ster FW	0 0		A Depend		
Pacie	Install			Basic Pr	rofile of Flight	_
Dasic	Guide		Use SBUS		No	Ţ
			Stall Speed	m/s	0.0	0~140
Advanced	RC		Cruise Velocity	m/s	0.0 ≑	0~140
			Engine Number		1 🖨	1~2
FW	Aircraft	Tacho	ometer Frequency		1 +	1~100
			Flight Weight	kg	0.00 🗘	0~1000
Magnotic	Yoke	1ax Engir	ne Thrust in Flight	kg	0.00 🗘	0~100
Calibration	Mode		Turn Mode		AIL 🝷	
			Angle of Attack		0.0 🜩	0~45
76-	Control	Inst	alled Angle Wing		0.0 ≑	0~45
Info			TakeOff Mode		C.A.T.O. 🔻	-
	Camera		FallOff Mode		Prcht Land 🔹 🔻	
Telemetry	Control				Download	Upload

Continuously **click**"emergent parcht" **4 times** to open the parachute; **double click**"close prcht" to execute the command.



Multi-rotor Multi-rotor emergency command: vertical landing, top landing, home



Vertical landing: multi-rotor will

try to land vertically at the current position. Doesn't need GNSS signal now. There will be a deviation in case of strong wind. No output and enter standby mode after



landing stably.

Top landing: Need

GNSS signal. Multi-rotor will lock the current latitude and longitude position and start landing. It will finally land at the exact position. It will correct the position in case of strong wind. It will switch to vertical landing if lose GNSS signal. No output and enter standby mode after landing stably.



directly fly to take-off position with flight height. Hover for 3 seconds and land after reached take-off position. It will switch to vertical landing if loss GNSS signal. No output and enter standby mode after landing stably.

Quick home landing



Temporary Route parameter: quickly modify height and velocity when flying waypoint. Only available in waypoint mode. Click"command control", you will see following interface.

Temporar Use Altitu	y Route Parameter Ide	i te i		
Height(m)	200.0	Set	Restore	
Velocity(m/	/s) 25.0	Set	Restore	
				In waypoint

mode, write the temporary height and velocity, then click "Set". The height and velocity will be modified according to the setting and keep it until click "Restore". When click "use altitude", the temporary height is the altitude. Please make sure the altitude you set is safe. It will automatically restore the waypoint parameters when start to fly waypoint.

VTOL(quad plane)Automatic convert: automatically switch to fixed wing mode when execute the command. This command will be effective in multi-rotor altitude, positioning remote control, top landing and home landing mode.

Home Hover				
O Enter Route Mode				
	Route Mode Ceanside			
Route	1 WPT			
Loop	1 Infinite			
Enter after	Home			
Auto convert				

Start engine(VTOL, fixed wing): Click "start engine", then click "confirm". Restart the software, then you can see "start engine " button.



to start the engine. To use it, your engine should be able to be electric started and connect to PWM10. For more detail, please read AheadX master manual.

Engine out(VTOL, fixed wing): click"flame out", then click "confirm". Restart the software, you can see the button. Corresponding to PWM channel of throttle output.

Ahead	HX Rafety Manage
Default Para.	肖家河村 Takeoff/Land Mode
Feature	🔘 Normal Landing 🔘 Dynamic Landing 🛛 🔘 Precison Landing
Plugins	Parachute
AI	
GUI	Flaps
Basic	Start engine
Reset	Start engine Start time(100 ~ 5000ms) 100
青龙桥	Flameout
	Shutdown Gasline Engine Flameout Time(1-60s)

Taxing landing(fixed wing): Choose "Running" under take-off/land mode. Then click "Confirm", restart the software. You can see " taxiing landing" when click "Command Control".

Ahead	x					
Default Para.	Take	off/Land Mod	e			
Feature	O C.A.T.	D. Parachute	🔵 Running		O C.A.T	.O. Precision l
Dhuging	O C.A.T.C	D. Dynamic Land	O C.A.T.O.	Runway Land		
Plugins	🔘 Shoot	Parachute	🔘 Shoot Sli	de	🔘 Shoo	t Precision La
Tempo Use A	orary Rou Ititude	ite Parameter			: Ao	
Height((m) [200.0	s	et Re:	store	
Velocity	/(m/s) [25.0	s	et Re:	store	
Taxiing	g Landing	Route Comr	nand		_	
Height	Corre ().0	Se	et R	ead	
Lateral	Corre ().0	Se	et R	ead	

Height deviation correction: positive number : increase this value (only effective when taxiing landing)

Laterodeviation correction:positive number: right deviation(this value only effective when target point becomes entering point.)

Landing Point (Multi-rotor):

Default landing point is the take-off point. User can change the landing point here. Click "Command Control", then you can change the landing point.

D Landing Point				
Latitude 0.0000000	Longitude	0.0000000		
Height(m) 50.0	Speed(m/	's) 4.0		
Radius(m) 10				
Select by click	Read	Set		

Unknown Auxiliary joystick Yoke Link Voke Link GNC Yoke Config Search Open Gimbal Yoke Search Search Open Gimbal Yoke Search Search Open Data Link Search Search COMI6 Data Link I15200 Search Open GCS Silence Open In Simulate Out Simulate GCS Silence Out Simulate IDS None IDS None UDP Input IP and corresponding port Communicate via a Serial port Select the correct serial port and baud rate Serial port Select the correct serial port and baud rate Communicate via a serial port Serial port None Only support SBUS to USB module Game Pad Serial port None Support game pad such as XBOX		Data Link	
Voke Link GNC Yoke Config Search Open Gimbal Yoke Search Open Data Link Open Search Open Open Search Open Open Open Open Search COM16 IDS Data Replay Remote Service Seearch COM16 IDS Open Open <th></th> <th>Unknown</th> <th>🖕 Auxiliary joystick</th>		Unknown	🖕 Auxiliary joystick
Search COM16 115200 Open GCS Silence In Simulate Out Simulate In Simulate Out Simulate Flight controller dat connection Connection Parameter settings Definition IDS None Work with IDS , connect to the corresponding WiFi UDP Input IP and corresponding port Communicate via UDP Data None Work with the log player playback None Work with the log player Serial port Select the correct serial port and baud rate Communicate via a serial port SBUS joystick Serial port None Only support SBUS to USB module Game Pad Serial port Need to set corresponding function Support game pad such as XBOX	Data Lir O Ser	GNC Yol Searc Gimbal V Searc nk rial Port • UDP • IDS • D	Yoke Link Ke Config th Open Yoke Ch Open Ke Config Copen
Flight controller data connection Connection Parameter settings Definition IDS None Work with IDS , connect to the corresponding WiFi UDP Input IP and corresponding port Communicate via UDP Data None Work with the log player playback Select the correct serial port and baud rate Communicate via a serial port Serial port Select the correct serial port and baud rate Communicate via a serial port Serial port SBUS joystick Select the corresponding function Serial port None Only support SBUS to USB module Serial port Need to set corresponding function Support game pad such as XBOX	GCS S	ilence In Simulate	Out Simulate
Connection Parameter settings Definition IDS None Work with IDS , connect to the corresponding WiFi UDP Input IP and corresponding port Communicate via UDP Data None Work with the log player playback None Work with the log player Serial port Select the correct serial port and baud rate Communicate via a serial port Auxiliary joystick Serial port None Only support SBUS to USB module Game Pad Serial port Need to set corresponding function	0		
UDP Input IP and corresponding port Communicate via UDP Data None Work with the log player playback Select the correct serial port and baud rate Communicate via a serial port Serial port Select the correct serial port and baud rate Communicate via a serial port SBUS joystick Serial port None Only support SBUS to USB module Game Pad Serial port Need to set corresponding function Support game pad such as XBOX	Connection	Flight controller data	a connection
Data playback None Work with the log player Serial port Select the correct serial port and baud rate Communicate via a serial port Auxiliary joystick SBUS joystick Serial port Need to set corresponding function	IDS	Flight controller dat Parameter settings None	a connection Definition Work with IDS , connect to the corresponding WiFi
Serial port Select the correct serial port and baud rate Communicate via a serial port Communicate via a serial port Auxiliary joystick SBUS joystick Serial port Only support SBUS to USB module Game Pad Serial port Need to set corresponding function Support game pad such as XBOX	IDS UDP	Flight controller dat Parameter settings None Input IP and corresponding port	a connection Definition Work with IDS , connect to the corresponding WiFi Communicate via UDP
Auxiliary joystick SBUS joystick Serial port None Only support SBUS to USB module Game Pad Serial port Need to set corresponding function Support game pad such as XBOX	IDS UDP Data playback	Flight controller data Parameter settings None Input IP and corresponding port None	a connection Definition Work with IDS , connect to the corresponding WiFi Communicate via UDP Work with the log player
SBUS joystick Serial port None Only support SBUS to USB module Game Pad Serial port Need to set corresponding function Support game pad such as XBOX	IDS UDP Data playback Serial port	Flight controller dat Parameter settings None Input IP and corresponding port None Select the correct serial port and baud rate	a connection Definition Work with IDS , connect to the corresponding WiFi Communicate via UDP Work with the log player Communicate via a serial port
Serial port None Only support SBUS to USB module Game Pad Game Pad Support game pad such as XBOX	IDS UDP Data playback Serial port	Flight controller data Parameter settings None Input IP and corresponding port None Select the correct serial port and baud rate Auxiliary joy	a connection Definition Work with IDS , connect to the corresponding WiFi Communicate via UDP Work with the log player Communicate via a serial port stick
Game Pad Serial port Need to set corresponding function Support game pad such as XBOX	IDS UDP Data playback Serial port	Flight controller data Parameter settings None Input IP and corresponding port None Select the correct serial port and baud rate Auxiliary joy SBUS joyst	a connection Definition Work with IDS , connect to the corresponding WiFi Communicate via UDP Work with the log player Communicate via a serial port stick
	IDS UDP Data playback Serial port Serial port	Flight controller dat Parameter settings None Input IP and corresponding port None Select the correct serial port and baud rate Auxiliary joy SBUS joyst None	a connection Definition Work with IDS , connect to the corresponding WiFi Communicate via UDP Work with the log player Communicate via a serial port stick ick Only support SBUS to USB module
Custom game pad	IDS UDP Data playback Serial port Serial port Serial port	Flight controller dat Parameter settings None Input IP and corresponding port None Select the correct serial port and baud rate Auxiliary joy SBUS joyst None Game Pa Need to set corresponding function	a connection Definition Work with IDS , connect to the corresponding WiFi Communicate via UDP Work with the log player Communicate via a serial port stick ick Only support SBUS to USB module d Support game pad such as XBOX
Serial port Need to set corresponding function Support custom game pad	IDS UDP Data playback Serial port Serial port Serial port	Flight controller data Parameter settings None Input IP and corresponding port None Select the correct serial port and baud rate Auxiliary joy SBUS joyst None Game Pa Need to set corresponding function Custom game	a connection Definition Work with IDS , connect to the corresponding WiFi Communicate via UDP Work with the log player Communicate via a serial port stick Only support SBUS to USB module d Support game pad such as XBOX e pad

Connect the receiver to PC via SBUS to USB module. Search the corresponding serial port and connect. Joystick icon become green. **Dead Zone Setting Application:** There will be excursion of the outputafter a long-term use, which may cause multi-rotor can not hover at the fixed point in GPS mode.

Make sure auxiliary joystick has been connected and recognized. Centre joysticks corresponding to 1~4 Channels. (Pitch, roll, throttle, yaw)

Right click and check if the output value of pitch, roll and yaw are 0 and throttle output is 50%. Otherwise, there was excursion existed.



Multiply the Pitch, roll, yaw value by 2 and input the value in following panel. (Current throttle value is -50%)There will be no excursion anymore. Supports to record 3 plans at the same time.

GNC Yoke	Yoke Link X Config	
Search	Open	
Gimbal Yoke	A starter	
Search	Open	
SBUS Yoke Confi	g	×
Dead Zone	Name Plan 1	
	Roll 0 Pitch 0	
向阳新村	Yaw 0 官碾房 Throttle 0	
1	Input Range: 0-10 四槐居	STAR
N CON	Plan 1	Use
红门村	Plan 2	Use
	Plan 3	Use





download the route: Upload and download the new route and it will replace the

original route. Flight control will not fly according to the modification immediately when operator is editing the working waypoint. Operator should send a new



command to run the new route.

()	\oplus \ominus	\$₹ ◆	-	iii ii
1 1 50	.0m 🗥 4m/s	⊃ 10m	*	T 1
Height Velocity Lift Mode	m 50.0 € m/s 4 €	Height Type Radius r	Relative Hei	2
Turn Mode	e Co-Ordinatic 💌	Hover Time	s 3	3A DE
Action Task No	O No Action	ction 🔘	Take Photo	4
Latitude 3	4.0914781	Lngitude -1	17.2418880	5
	OK	FI	y to	\prec
2 <u>1</u> 50	.0m 🗥4m/s	▶10m	*	6
3 <u>⊺</u> 50	.0m 14m/s	> 10m	*	
4 <u>I</u> 50	.0m 🗥4m/s	≫ 10m	*	►
5 <u>T</u> 50	.0m 14m/s	⊅ 10m	⋆	► 8
6 <u>I</u> 50	.0m 🗥4m/s	≫ 10m	*	►⊣
7 <u>I</u> 50	.0m 🗥4m/s	⊅ 10m	⋆	▶ 9
8 <u>I</u> 50	.0m 🗥4m/s	≫ 10m	*	
EST tota EST tota	voyage: 10.32 km duration: 00:42:59) Min height: 9 Min velocity	50.0 m ^{E Ora}	show Rd
		₽ ₫.	lh	
\bigcirc		0%	•	
ltem	Content and meaning	ng		
Lift mode 1	✓ Immediate lift			
Lift mode 2	⊀ Ramp lift			
Lift mode 3	Priority hoven	ring: first climb t	o the target heigh	it and then fly t
Lift mode 4	Priority target	:: Go to the targ ht if flight height is	et point in immed not corresponding	liate lifting mode

Lift mode 5	Hovering protection: Adjust height in immediate lifting mode when flight height is lower. Start hovering and climbing after reached target waypoint. Start hovering and descending if current height is higher after reached target waypoint.		
Action	Single shoot: It will take photo when aircraft reaches the radius of the waypoint		
	Equal distance shoot(interval: meter)		
Task	Equal time shoot(interval: Second)		
	Stop shooting		
	I The target height of the waypoint, unit "m"		
Height	Relative height: Relative to the height of the take-off point		
	Altitude: Relative to sea level.		
Velocity	Target speed, unit "m/s". The measurement source from differential pressure airspeedometer.		
Radiu	➢ Effective radius, unit "m".		
Latitude/ Longitude	A geographic coordinate system based on WGS84.		
Batch operat	tion		
Item	Content		
Batch adju	Directly modify all waypoint parameters for this route. The input value is the modified value.		
Incremental a	djustment lincrementally modify all waypoint height, speed, radius, positive number means increasing the value, negative number means decreasing		
Othe	Reversed order. Route is generated in a reversed order.		
Onli			
8			
О Ва	atch Adjust 🕘 Incream Adjust 🕒 Other 1		
Hei	ght m <mark>0 </mark>		
Velo	ocity m/s 0 📑 Set Lift Mode Immediate 💌 Set 📕		
Rad	ius m 0 🜩 Set Task No Action 💌 Set 3		
Hei	ght P m 10 😫 Set		
Import and e	xport the route Import the route Save the		
current route.	After finished the edit, user can save the route and apply for the		
same model a	aircraft.		
文件名(N): examp	le-1 V		
保存类型(T): Route files(*.csv)			

	А	В	С	D	E	F	G	Н
1	Latitude	Longitude	Height(m)	Velocity(m	Radius(m)	Parameter		
2	34.10846	-117.259	300	26	167	00-00-00-	00-00-01-	00-00
3	34.10818	-117.204	300	26	167	01-00-00-	00-00-02-	00-00
4	34.09176	-117.212	300	26	167	21-00-00-	00-00-04-	00-00
5	34.08629	-117.232	300	26	167	41-00-00-	00-00-06-	00-00
6	34.08238	-117.197	300	26	167	61-00-00-	00-00-00-	00-00
7								
8								
9								

Edit the file name and save as "CSV" file after selecting the directory. User can check or edit it in excel.

Elevation Checking In order to avoid crash or collision in some environment, it is

 \bigotimes necessary to check the flight height after editing the route. Click .Then click "Select the reference take-off point" on the map to select take-off point after finished editing the route.



Click"Check

elevation", it will automatically compare the flight height with altitude of the reference take-off point. All analytical data convert to altitude.

Aerial survey parameter Click



to set aerial survey parameter. Automatically get flight parameter after connected flight control. User can also click"Get flight parameter".

Block aerial survey

Angle: default is north-south scanning.

Extended route: turning transition to make sure the aircraft will fly stably and accurately to the next section.

Enter point: it will generate the enter point after scanning route is generated.



Band aerial survey

Enter point: it will generate the enter point after scanned route is generated.

Wind resistance: default value is 1.0. Need to increase this value in strong wind environment

Assisted Turning point: It will not generate assisted turning point if the value is 0. Assisted turning point generated when value is 180. Default value is 180°.

Return: It will generate a return route along with the scanning area when the scanning routes are odd numbers.

Aerial Survey Parameter Flight Parameter Cruise Speed(m Turn Radius(m) Get flight params Max Roll 198m Area Scan Band Scan Angle(°) 💿 Default 🔵 Manua Extand(1.0 ~ 20.0s) 1.0 Default m Enter Point ● A ● B ● C ● D Hide Select Camera Please select Direct Vertical O Horizontal 😤 Map Scale Please select Ground Resolution(m) O Height Height Reference 🔵 Alt Head Overlap(%) 80 Lateral Overlap(% 60 +Height(m) Lines Space(m Cruise Speed(m/ Spacer(m) Preview

Camera parameter Select the camera from the menu or manually add a camera. **Orientation**: select installation position, horizontal or vertical.

Landing route should be composed of 6 waypoint. Landing Route is divided into 4 sections: transition, adjustment, switch and landing. **Adjustment**: Aircraft will make a turn and adjust the direction for entering the switch section. **Switch**: The last landing point is the switch point. It will switch to multi-rotor flight mode. **Landing**: After switching to landing section, aircraft will automatically fly to the landing point and hover for 3 seconds and start landing.(15meter to the ground, descending with 1.5m/s; 5-15m to ground, gradually descending to 0.5m/s; Under 5m, with 0.5m/s.) After landed, it will stop power output and enter standby mode.

Automatically Generate the Landing Route Capture the coordinate of current position, click on map. Make sure the flight direction and height. Upload the landing route.



Waypoint 1 and 2: Go around&Assisted waypoint. Only effective when failed to land. Waypoint 3: Entering point. Waypoint 4: adjustment point. To adjust direction, height and attitude. Waypoint 5: Switch point. Switch to multi-rotor mode.

Alternate landing point Alternate landing point for emergent condition. Operator should make sure the landing area is safe before flight. AheadX Space version: V3.0.70 and above



Flight control Firmware version: V2.10.2 and above.

Edit alternate landing point After flight control well connected, edit landing route

and then edit alternate landing point. Click **Select** the alternate landing point on the map. Modify its properties by clicking the waypoint if already collected its



Height: Default is the altitude where you click when there is altitude data existed.

Otherwise, default is the height of the waypoint. $\ensuremath{\textbf{Velocity}}$: waypoint velocity

Radius: waypoint radius Safety height: Fixed wing converts to multi-rotor.

	Lan	ding route				
	1	Auto gener	ate			
	1	<u></u> 1 80.0m	11.20	ōm/s	≫ 167m	•
	2	<u></u> 1 80.0m	11-26	ōm/s	≫ 167m	►
	3	<u></u> 1 80.0m	11.20	ōm/s	≫ 167m	•
	4	<u></u> 1 50.0m	11-26	ōm/s	≫ 167m	•
	5	<u></u> 1 40.0m	11.20	ōm/s	≫ 167m	•
	6	<u></u> 30.0 m	(1,20	ōm/s	≫ 167m	•
	ES ES	T total voya T total dura	ge: 339 M tion: 00 M	in height: i in velocity:	30.0 m 26m/s 🖸	$\mathbf{\hat{b}}$
	ALT	N Waypoint	t			
	Í	Θ				
	1	1 328.0m	1 26m/s	≫ 46m	n ≁⊂	•
	2	1 329.0m	1.26m/s	≫ 46m	*	►
	3	1 332.0m	/// 26m/s	≫ 46m	*	•
	4	1 333.0m	1.26m/s	≫ 46m	*	•
			Co			
	Ħ	非 者		8	Fairway	y Dr
Default 50m.			Blvc	0%	٩	٢

Manually* Landing: Mutirotor and fixed wing



Command 1: MR

: double click"ALTN MR", the drone will fly to the nearest alternate and land in multi-rotor mode. FW : double click"ALTN FW", the drone will fly to the nearest alternate in fixed wing mode and automatically convert to multi-rotor after reaching the alternate point. **Command 2**: Right click the alternate waypoint. MR: Select" ALT MR" and confirm. The drone will fly to the selected alternate in multi-rotor mode.

FW: Select" ALT FW" and confirm. The drone will fly to the selected alternate in

AL	TN Waypoint			
4	▶ ⊖			
1	<u>I</u> 328.0m € 26m/s	≫ 46m	≁	•
2	<u>I</u> 329.0m € 26m/s	≫ 46m	≁	•
3	<u>I</u> 332.0m € 26m/s	≫ 46m	≁	►
4	1 333.0m 126m/s	∂ 46m	.⊀⊂	•

fixed wing mode.

Command 3: Double click"Run to the alternate", it will fly to the selected alternate in fixed wing mode. When arrives at alternate landing point, it will convert to multirotor. **Protection**: It will trigger the protective function in low voltage protection, engine-out protection and crash protection mode. The aircraft will fly to the nearest alternate and land automatically. User should trigger this function in AheadX master software, "Advanced"--"Alternate".

Height adjustment

1.Aircraft will climb immediately if the flight height is lower than the sum of height of alternate point and safety height when diverting. On the contrary, aircraft will keep the current height and fly to alternate point.

2.Pay close attention if there is any risk when there is a big difference between the height of alternate point and take-off point, or meet a complicated landing condition.

3.Aircraft will not climb in order to keep the attitude and velocity when engine-out. It will fly to landing point in multi-rotor mode if flight height is lower than the sum of the height of alternate point and safety height.

It supports Runway, catapult parachute, and catapult runway landing. It is able to extend hand-launched and stall landing via adjusting parameters.

Transition waypoint: Aircraft directly fly to the entering point if the flight height is same with the height of landing route when executing parachute or runway landing. If flight height is higher, aircraft will fly to transition point and hover to descend . If flight height is lower, aircraft will climb when flying to transition waypoint. It will directly fly to landing route and enter the entering point if the flight height reached the landing height when arrived at transition point.

Automatic generation 1.Select"C.A.T.O Parachute" or "Running" according to your requirement. Then confirm

Ahea	ЧX	~	afety Manage	C		
Default Para.		Takeoff/Land M	ode			
Feature		C.A.T.O. Parachute	🔘 Running		🔘 C.A.T.O. Pr	ecision l
Plugins	ute 🔘	C.A.T.O. Dynamic Lar	nd 🔘 C.A.T.O. Runw	/ay Land		
riugins		Shoot Parachute	🔘 Shoot Slide		O Shoot Prec	ision La

2.Capture the coordinate of current position, click on map. Make sure the orientation and height. Upload the landing route.

	Landing route	Planning Landing Route
	Auto generate	Read Planning Parameter
*		Parchute Point Latitude Longitu Capture Click on Map Clear Landing Route Height: 50 🔅 m
Ċ)		Flying Direction: Clockwise
К		Create Clear* Quit

C.A.T.O parachute landing waypoint instruction: The 10th route is landing route when set parachute landing. There must be 5 waypoint. waypoint 1 and 2 : Assistant waypoint. Only effective when failed to land. waypoint 3: Entering point. Waypoint 4: adjustment point. To adjust direction, height and attitude. Waypoint 5: Open parachute.It will open the parachute when aircraft reached the radius of this waypoint.

Running landing waypoint instruction: After selecting"Running takeoff/landing", this route will be both take-off route and landing route. There must 8 waypoint. Waypoint 1: Starting point Waypoint 2: Destination. Waypoint 3: Go around point. Waypoint 4 and 5: assisted point. Waypoint 6: entering point Waypoint 7: decision point. Waypoint 8: Gliding point.



It will load the default parameters of waypoint, home waypoint and command mode when start the AheadX space. The radius and velocity of the waypoint and home waypoint will be updated if user synchronizes flight control parameters before starting the ground station software.

Ahead	XL	
Default Para.	Waypoint	
Feature	Height(-10000.0 ~ 10000.0m)	300.0
Plugins	Speed(0.0 ~ 500.0m/s)	20.0
AI	Radius(0 ~ 3000m)	98
GUI	Home WPT	
Basic	Height(-10000.0 ~ 10000.0m)	300.0
Reset	Speed(0.0 ~ 500.0m/s)	20.0
7	Radius(0 ~ 3000m)	98 💸 in
	Hover	Clockwise
	Lift/Fall Mode	Height Protection
	Command Mode	
	Height Correction(m)0.0	Lateral Correction(m)0.0
	Height(m) 200.0	Speed(m/s) 25.0
(t)		Confirm Cancel

Take-off/Landing mode, parachute and engine settings will updated to FC if user synchronize parameters before starting the software.

Change the uplink frequency: The frequency will increase to 20HZ

Multi-rotor checking: check the rotation time.

Ahead	Safety Manag	
Default Para.	Takeoff/Land Mode	
Feature	🔘 Normal Landing 🔘 Dynamic Landing 🛛 🔘 Precison	Landing
Plugins	Parachute	
AI	Flaps	
GUI	Flaps	
Basic Reset	Start engine Start time(100 ~ 5000ms) 100	
	w Flameout	
	Shutdown Gasline Engine Flameout Time(1-60s)	
	Change Upload Frequency	
	Improve the frequency of upload on RC mode	
	MR Check and College	
1	Confirm	Cancel

User can freely choose to enable the plugin. Custom service is available according to user's requirement. User needs to restart the software after enabling or disabling the plugin



Audio Alarm Aircraft voltage(AD1): Level 2--serious warning Servo voltage(AD2): minimum value warning Air speed: safe range. Invalid when value is 0 Pitch: Pitch angle (negative value), climb angle(Positive angle).Invalid when value is 0 Roll: Invalid when value is 0 **Listener**: select Listener to connect AheadX Listener.



To change the font, color, language, time zone, unit and map

Ahead	dX 🙁 🕫 🥀 🎼 🖕
Online ^{ra.}	Color Scheme
Feature	Dark
Plugins	Font Size
AI	Select: Normal
GUI	Panel Size Preference
Basic	Normal
Reset	

Ahead		DOSEVELT R Safety Manage	
Default Para.			
Feature	English (United States)		
Plugins	GPS Time		
AI	(UTC+08:00) Beijing, Cho	ngqing, hong kong, Urumqi 🛛 🗸 🗸	
GUI	Units Type		
Basic	O Metric Units	🔾 British Units 🛛 🔘 Custom	
Reset	Length units	Meter(m)	
	Big Length units	Kilometer(km)	
	Speed units	Meter per second(m/s)	
	Lifting Speed units	Meter per second(m/s)	
	Angular units	Degree(°)	
	Temperature units	Celsius(°C) V	
	Area units	Square meter(m²)	
	Lng & Lat display mode	Degree(±deg.dddddd) 🗸 🗸	
	CenterPoint		
	Map center	Latitude 34.0873952	
		Longitude -117.2486772	
	Vongitude and latitude	e correcting in China mainland	
1 ch		215	
		Confirm Cancel	

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Right click on the map to find these functions

Video windows: Support standard rtsp input. **Estimated wind speed**: Calculate actual wind speed and direction. theoretical value only for reference.

Display the key parameters, assist for data analysis.

Pitch output: Joystick--arrow points upward means push the joystick. Multi-rotor and fixed wing:arrow points upward means head down Throttle output: For VTOL, the throttle value on the left is for fixed wing Content in white color: current measured value.

Content in yellow color: target value



User can control the equipment which supports PWM/SBUS signal(such as gimbal camera) via data link.

VTOL&Fixed Wing : Sbus output: 11~16CH. User needs to programme to 9-16CH if using a SBUS to PWM converter.

MR flight control: Sbus output: 1~16CH.



User can set the travel in AheadX Master

AheadX Mas	ster MR] [0	AheadX Dependable Flying Robot	Help *	
Basic	Guide _		SBUS Engine Position Adjusting Number 1 🚔 1~16		Parachute Cha	nnel Parameter
Advanced	Control Allocation		Max Mid Min	0	Mid [Min] Direction]	0 € 0~2500 0 € 0~2500 • 0~2500
MR	Aircraft		Direction Unload	Forward • 0 • 0~2048	Unload	0 🗘 0~2500
Magnetic Calibration	Yoke Mode			Download Upload	Down	oad Upload

Task servo configuration Right clip on the map, find application servo preference. Double click "Group 1" to change the name, for example change to Camera. Click "+" to add a task servo.

Servo Pr	eference								×
9									
Group									
Group	name:								
Group Group Group Group) 1) 2) 3) 4								•
Name	Servo 1	Servo 2	Servo 3	Servo 4	Servo 5	Servo 6	Show	Group	Remark
						H			
<									>
Create	+	- M	oveup	ovedow	File	a	a	d From F	ave As Fi

Double click"Empty" to set the value 100 or -100(according to the direction). Select"Camera". Then click"create" to save the configuration.

Se	ervo Prefe	erence								×
F	Group —									
	Group na Camera	me:								^
	Group 2 Group 3									
	Group 4	_	_	_	_	_		_		~
L										
	Name	Servo 1	Servo 2	Servo 3	Servo 4	Servo 5	Servo 6	Show	Group	Remar
1		Empty	Empty	Empty	Empty	Empty	Empty	Yes	Cam	
<										>
	Create	+	- Mov	eup love	edow File	•	5	ad F	rom F a	ve As Fi

Click"FW manual RC" 4 times to execute the command. Double click other buttons to execute commands. Select mode 1 or mode 2 will not change the real control mode. Will only change the display style.



One-key compass calibration(Quick calibration): Need to do quick calibration when there are following conditions:

1.Current take-off point is far away from last take-off point(usually 100km).We suggest to do this quick calibration before each flight.

2.Compass Issues yellow alarm and indicates magnetic reference overrun.

Declination: user can click on the map to get the information of the declination. Click"set" to upload it. User can read the current declination information by clicking "Read".

Declination will not be displayed when connect flight control and aircraft is well positioned. Please do quick calibration if need to modify the declination

0						×
Magnetic Sensor	Command	dundant Manag		Barstow-Bak		
		Quick Calibration				
ty llvd	Community Blvd			Communi	ty Blvd	
Magnetic Declin	atic <mark>0.0</mark>		÷	Read	Set	
Latitude		Longitude		SelectPos	Query	
(SET V						



User needs to register and log in AheadX Galaxy system to realize remote monitoring and control.

It will display the register interface when first start the ground station software. User can click the link at the bottom to register or find your password.



After log in, right click on the map, you will see following interface.

to refresh the key. Tell the key to remote operator , then request connection



Slide to right to allow on-site operator to control the drone..The onsite operator can not send a command via ground station, but radio control data and PPK/RTK data can be uploaded.

Find ZDLogPlayer.exe under AheadX Space installation directory. Open the log file.



Right click to find "Data transmit".

Local port for ground unit. FCs port for flight control. User should choose "Forward" in AheadX Master first.

AheadX Ma	ster FW	@ ?	Ahe	e Flying Robot		Help 🔹
Basic		<u>ه</u>	NC SerialPort Fe	ature Preference		
	Crash Protection	COM2 RX	Disable	•		
Advanced	Datal ink	COM2 TA	1200	1200~256000		
	Protection	COM4 RX	RS2	-		
FW	GPS Lost	COM4 TX	RS1	▼		
	Protection	COM5 R	Disable	1200~230000		
Magnetic Calibration	Flameout	СОМ5 ТУ	Forward	-]	
	Protection	COM5 BaudRate	1200 🗘	1200~256000		
Info	Endurance			Download	Jpload	
	Protection					
Telemetry	GNC COM Feature					
	Dynamic					
	Recovery	•				
Task lo	ad data	pass-through				×
Datas	ource 1					
			500			
Local	port	Z	FCS po FCS po	ort	Open	
Baud	rate 1	15200 ~	GNCP	ort5 🔻		
⊢ Datas	ource 2					
	_	、			_	
Local	port		FCS po	ort	Open	
Baud	rate 1	15200 ~	GNCF	Port4 🔻	open	
		Update lo	ocal port	list		

Right click on the map to find RTK data trans plugin.

First, open AheadX master, choose"Local RTK", then restart flight control. DG1 RTK indicator blinked, connect the serial port. The arrow will become green after connected successfully.

AheadX Ma	ster FW		AheadX Dependable Flying Robot	Help *
Basic	Crash	G	NC SerialPort Feature Preference	-
	Protection	COM2 KX	Disable	•
Advanced	DataLink	COM2 BaudRate	1200 1200~256000	
	Protection	COM4 RX	RS2	•
FW	GPS Lost	COM4 TX	RS1	•
	Protection	COM5 RX	1200 T 1200~230000	-
Magnetic Calibration	Flameout	COM5 TX	Local RTK	• •
campración	Protection	COM5 BaudRate	1200 1200~256000	
Info	Endurance Protection		Download	Upload
Telemetry	GNC COM			
	Feature			
	Dynamic			
	Recovery	•		
				<u>~~</u>
(Chihiro		CORS	BaseStation Serial
For t pleas	he range se refer t	and accuracy o the official de	of Chihiro's servi escription of Chil	
Lat				GetPoint
Long				
Port	8	001	•	
Sour	ce R	TCM30.66	~	Get Source List
3001		1000_00		Get source List
User				Login
Key				Login
				~
			シ シ シ シ	

V3.					
Aheac	X		Gafety Manage		<u> </u>
Default Para.					
Feature					
Plugins	Use	Name	File Name	Version	D
AI	1	HUD Panel	AxHudPlugin.apd	1.0.7	Display aircr
GUI					
Basic					
Reset					
		_			
	Ext	ra functions			
	Туре 🕻	Gimbal			
	Use	Name	File Name	Version	D
	1	Gimbal Video	AxGimbalWiredVideoPlugin.apd	1.0.13	Diplay video
and the second s					
				onfirm	Cancel

Click"AheadX-- Plugin-- Extra function -- Gimbal video-- Confirm. Restart Space V3.

This plugin can collect the HDMI or SDI video via the acquisition card. AheadX Sirius ingrates various gimbal camera protocol. User can buy it to work with different gimbal cameras.

Flight control firmware version: QP 2.22.1 and above, MR2.10.0 and above.

Effective when automatically landing(eg. Multirotor home landing, top landing)

Click these blue buttons to adjust the position. Click orange button to clear the adjustment.



Click keyboard to make the adjustment by keyboard

Flight control version: 2.9.3 and above. Download upgrade software to upgrade flight control to the latest version. Ground station software: 3.0.74 and above. Hardware: AheadX MR flight control, Crucis.

Select"Tethered" in ground station software.



After selected **Tethered** flight mode, the take-off and home command will change to Tethered after restart the ground station software. The aircraft will take-off and follow the mobile platform. User can adjust the flight height and direction with joystick when hovering.



Settings in AheadX master. Use beacon, the aircraft will follow the moving platform .

Enable"dynamic landing",the aircraft will fly pointing at the direction of the moving platform when landing

AheadX Ma	ster MR		Help *	
Basic	Fliter Voltage	Align Yaw with Dynamic Landing Align Yaw Enabled Download Upload		
Advanced	DataLink Protection	FollowMe Parameter		
MR	GPS Lost Protection	I-Height Upper Limit m 1.00 ‡ 1~200		
Calibration	Endurance Protection			
Info	Crash Protection			
Telemetry	Feature Dynamic			
	Recovery	-		

To adjust the flight height with joystick in tethered mode. **Min relative height**:** can not descend with joystick when reached this min value. Max relative height**: can not climb with joystick when reached this max value.

AheadX Ma	ster MR	TM	Help *	— ×
7	4 🚽	Dependable Flying Recot		
	Fliter	Align Yaw with Dynamic Landing		
Basic	Voltage	Align Yaw Disabled 👻		
	Tonage	下載 上传		
Advanced	DataLink			
	Protection	FollowMe Parameter		
MR	GPS Lost	el-Height Lower Limit m 1.00 € 1~200		
	Protection	H-Height Upper Limit m 1.00 - 1~200		
Magnetic	F 4	Download Upload		
Calibration	Protection			
Info	Crash Protection			
Telemetry	GNC COM			
	reature			
	Dynamic			
N	Recovery	_		

Low voltage protection

AheadX Ma	ster MR	- M	Help *	>
7	4 🚽	Dependable Flying Robot		
	Fliter	Power Protection	Rapid-Landing with Low Power III	
Basic		Power I % 0.00 🗘 0~100	Rapid Landing Disabled 🔻	
	Voltage	Power II % 0.00 🗘 0~100	Landing Velocity m/s	
Advanced		AD1 I V 0.00 🗘 -1~58		
	DataLink	AD1 II V 0.00 🗘 -1~58	Download Upload	
	Protection	AD2 II V 0.00 🗘 -1~58		
MR	GPS Lost	DelayTime I s 0.0 🔹 0~50		
	Protection	DelayTime II s 0.0 🔹 0~50		
Magnetic	P	Download Upload		
Calibration	Protection			
Info	Crash			
	Protection	Low III Power Protection Parameters		
.	GNC COM	Power Protection % 0.00 -1~100		
relemetry	Feature	Voltage Protection V 0.00 -1~58		
		Hold Time s 0.0 🗘 0~50		
	Dynamic			
	Recovery	Download Upload		

Enable rapid landing, aircraft starts to land with the set landing velocity.

Initial Test

Upgrade flight control and ground station software to the specific version. Install ground station software, AheadX master and Crucis.

Take-off: The aircraft change its attitude based on the moving platform. The initial test should follow the following steps.

1. Take-off on a stationary platform. The platform starts moving gradually after the drone took off.

2.Try to take-off on a moving platform if the performance is good. Gradually speed up the movement and check the status. Stop the test if there is any abnormal performance.

3.Aircraft will follow the speed and direction of the moving platform after took off. It will adjust the direction when the direction is changing(eg. Make a turn). The aircraft will not follow the platform if switching to Home mode.

4.Suggest landing on a stationary platform and then on a moving platform. The aircraft will point at the platform if user already made the setting in AheadX master.