



Transnational Meeting no. 5 Sisak (Croatia)

Mission planning

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Mission planning – Flight mode

Automated missions works, when you set AUTO mode in ArduPilot. In Mission Planner set switch to two modes: Auto and Loiter.

When you don't want to fly in auto mode its good to have alt hold and stabilize mode.

(Before flight check the settings)



Mission planning – First automatic mission

To check the auto mode try to do very simple mission in shape of square.

First automatic mission: only waypoints without start and landing. Operator starts the dron and changes flight mode in the air. After the mission operator lands.



Mission planning – Regular automatic mission

Dron will fly without participation of men.

Mission should contain: taking off, flight, coming back and landing.

Operator only puts throttle up and dron starts.

Dron should be placed in home position (check on the map)



Mission planning

Use Mission Planner to plan flight.

It is not necessary to connect drone to computer. It works off-line



STEP 1: Check units length [m] and speed [m/s]

Menu config/tunning

Mission Planner 1.3.48 build 1.1.6330.31130

FLIGHT DATA FLIGHT PLAN INITIAL SETUP **CONFIG/TUNING** HELP DONATE

Planner

Video Device [Dropdown] Start Stop Enable HUD Overlay

Video Format [Dropdown]

OSD Color [ActiveBorder] [Dropdown]

Speech Enable Speech

UI Language [Polski] [Dropdown]

Joystick [Joystick Setup]

Dist Units [Meters] [Dropdown]

Speed Units [meters_per_second] [Dropdown] NOTE: The Configuration Tab will NOT display these units, as those are raw values.

Telemetry Rates Attitude [4] [Dropdown] Position [2] [Dropdown] Mode/Status [2] [Dropdown] RC [2] [Dropdown] Sensor [2] [Dropdown]

APM Reset Reset APM on USB Connect

Track Length [200] [Spinner] Dist to Home Display in Flightdata

Waypoints Load Waypoints on connect?

HUD GDI+ (old type)

Map Follow Map is rotated to follow the plane

Log Path C:\Users\Virginia\Documents\Mission Planner\Vlogs [Browse]

Theme [BurntKemit] [Dropdown] Custom

Layout [Basic] [Dropdown]

[Start/Stop Vario]

Password Protect Config Show Airports ADSB

OptOut Anon Stats Beta Updates No RC Receiver TFR's



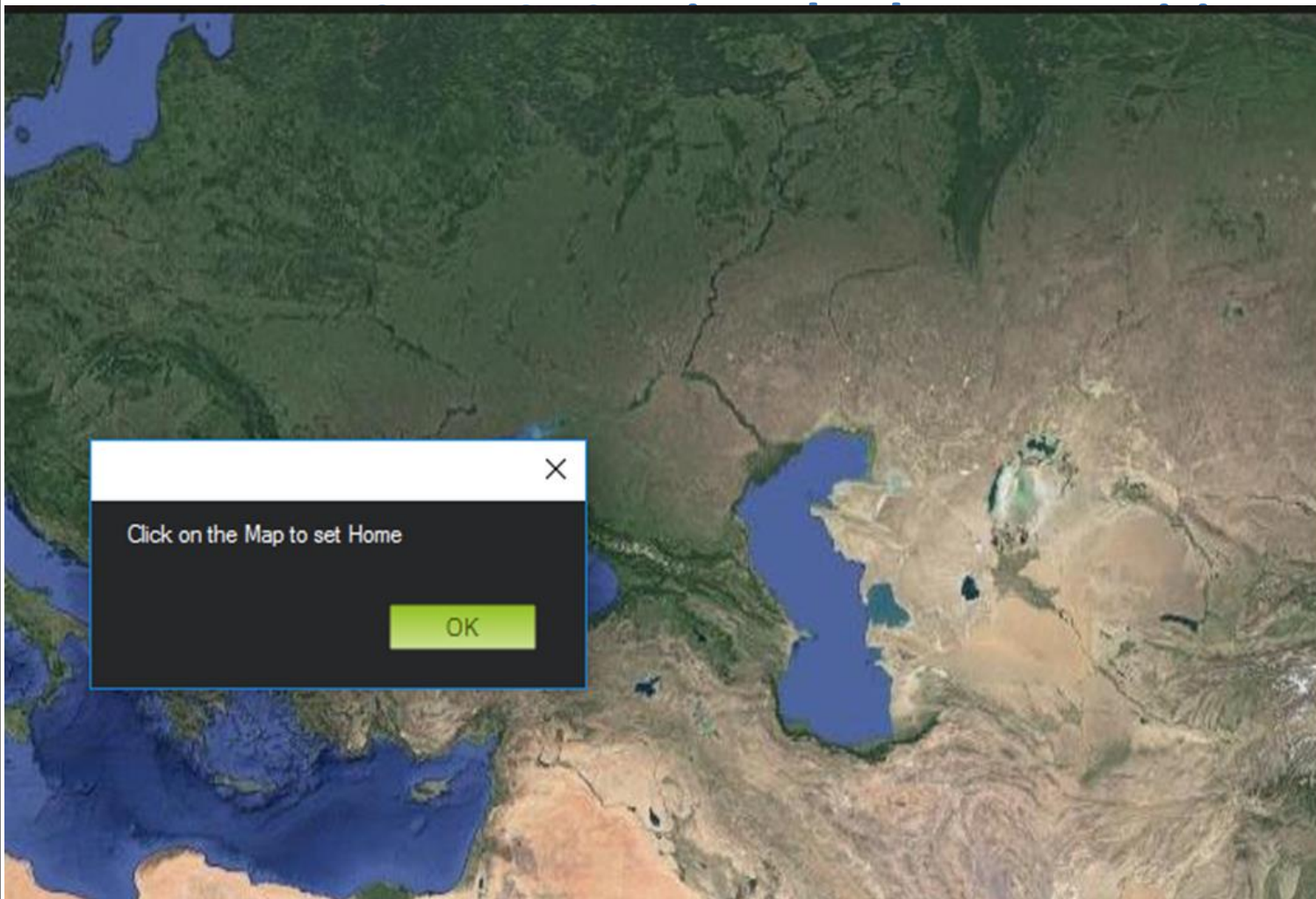
STEP 2: Setting the home position

On FlightPlan panel find the place where you want to
flight.

First you can check the coordinates using internet or
other application with GPS

School in Sisak is: 16,3836085796356
 45,4587685487451

When you launch drone its position will be on the map



Zoom

Akcja >>

GEO 41.705729
70.048828
Invalid 0.00m

Grid [View KML](#)

GoogleSatelliteMap >

Status: loaded tiles

Załaduj plik WP

Save WP File

Odczytaj WP

Zapisz WP

Polozenie startu
Lat 44.15068115
Long 21.09375
Wys (abs)

geographical coordinates





STEP 3: Taking off

Planning the mission is adding waypoints to the list of tasks. Click the bottom **Add Below**. Each waypoint can be changed. The first one should be **TAKE OFF**

Waypoints														
WP Radius	Loiter Radius	Default Alt	Absolute		Verify Height	Add Below		Alt Warn	Spline					
5	45	100	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
	Command	Delay			Lat	Long	Alt	Delete	Up	Down	Grad %	Angle	Dist	AZ
1	WAYPOINT	0	0	0	0	0	0	X			0,0	0,0	5304623,2	196



STEP 3: Taking off

The screenshot shows a drone flight software interface. On the left, a menu lists various actions, with 'TAKEOFF' highlighted in blue. Below the menu, a 'Waypoint' table is visible. The main area shows a satellite map with a green takeoff point icon and a dashed circle. At the bottom, there are control buttons like 'Verify Height', 'Add Below', 'Alt Warn', and 'Spline', along with a table of waypoint data.

	Lat	Long	Alt	Delete	Up	Down	Grad %	Angle	Dist	AZ
1	WAYPOINT	0	0	0	0	X	0,0	0,0	5304623,2	196



STEP 4: Planning the flight

Click on the map to add next waypoints



Waypoints

WP Radius: 5 Loiter Radius: #5 Default Alt: 100 Absolute Verify Height Add Below Alt Warn: 0 Spline

	Command	Dela				Lat	Long	Alt	Delete	Up	Down	Grad %	Angle	Dist	AZ
1	TAKEOFF	0	0	0	0	0	0	100	X			0,0	0,0	5304623,2	196
2	WAYPOINT	0	0	0	0	45,4589793	16,3835979	100	X			-18,6	-10,5	23,4	327
3	WAYPOINT	0	0	0	0	45,4590921	16,3838124	100	X			0,0	0,0	20,9	53
4	WAYPOINT	0	0	0	0	45,4589868	16,3840163	100	X			0,0	0,0	19,7	126
▶ 5	WAYPOINT	0	0	0	0	45,4587987	16,3840806	100	X			0,0	0,0	21,5	167

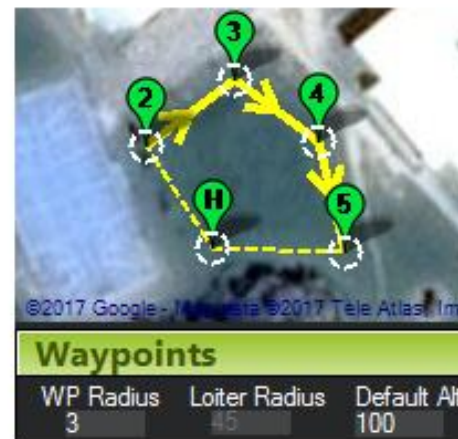


STEP 4: Planning the flight – WP Radius

WP Radius is the radius of circle, when drone is inside this area flight controller confirm that point and go to the next place.



Incorrect



Correct



STEP 4: Planning the flight – Default alt

Default Alt is the default altitude when entering new waypoints.
100 m is very high so be careful about this number.
Each waypoint has alt, which can be changed

Waypoints											
WP	Radius	Loiter Radius	Default Alt				Absolute	Verify Height	Add Below	Alt Warn	Spline
3		45	100				<input type="checkbox"/>	<input type="checkbox"/>		0	<input type="checkbox"/>
	Command	Dela				Lat	Long	Alt	Delete	Up	Down
1	TAKEOFF	0	0	0	0	0	0	100	X		
2	WAYPOINT	0	0	0	0	45,4589793	16,3835979	90	X		
3	WAYPOINT	0	0	0	0	45,4590921	16,3838124	80	X		
4	WAYPOINT	0	0	0	0	45,4589868	16,3840163	90	X		
5	WAYPOINT	0	0	0	0	45,4588626	16,3840002	100	X		



STEP 5: Returning to home

The next waypoint is RETURN_TO_LAUNCH. The drone after the mission come back to home position, but is still above the ground

The screenshot shows a mission planning interface with a list of waypoints on the left and a table of mission parameters on the right. The 'RETURN_TO_LAUNCH' waypoint is selected and highlighted in blue.

Waypoint	DO_JUMP	DO_CHANGE_SPEED	DO_GRIPPER	DO_PARACHUTE	DO_SET_CAM_TRIGG_DIST	DO_SET_RELAY	DO_REPEAT_RELAY	DO_REPEAT_SERVO	DO_DIGICAM_CONFIGURE	DO_DIGICAM_CONTROL	DO_MOUNT_CONTROL	UNKNOWN	Alt Wam	Delete
1	0	0	0	0	0	100	X							X
2	0	0	45,4589793	16,3835979	90		X							X
3	0	0	45,4590921	16,3838124	80		X							X
4	0	0	45,4589868	16,3840163	90		X							X
5	0	0	45,4588626	16,3840002	100		X							X
6	RETURN_TO_LAUNCH	0	0	0	0	0	0	0	0	0	0	0	0	X



STEP 6: Landing

To put gently the drone to the ground add Waypoint LAND

Waypoints										
WP	Radius	Loiter Radius	Default Alt	Absolute			<input type="checkbox"/> Verify Height	Add Below	Alt Warn	<input type="checkbox"/> Split
	Command	Delay				Lat	Long	Alt	Delete	
1	TAKEOFF	0	0	0	0	0	0	100	X	
2	WAYPOINT	0	0	0	0	45,4589793	16,3835979	90	X	
3	WAYPOINT	0	0	0	0	45,4590921	16,3838124	80	X	
4	WAYPOINT	0	0	0	0	45,4589943	16,3841021	90	X	
▶ 5	WAYPOINT	0	0	0	0	45,4588626	16,3840002	100	X	
6	RETURN_TO_LAUNCH	0	0	0	0	0	0	0	X	
7	LAND	0	0	0	0	0	0	0	X	



STEP 6: Saving the mission

Now you can save the file.

The most important is to load mission to drone.

Connect the drone to PC and click **Write WPs**



STEP 7: Before the flight – the compass line

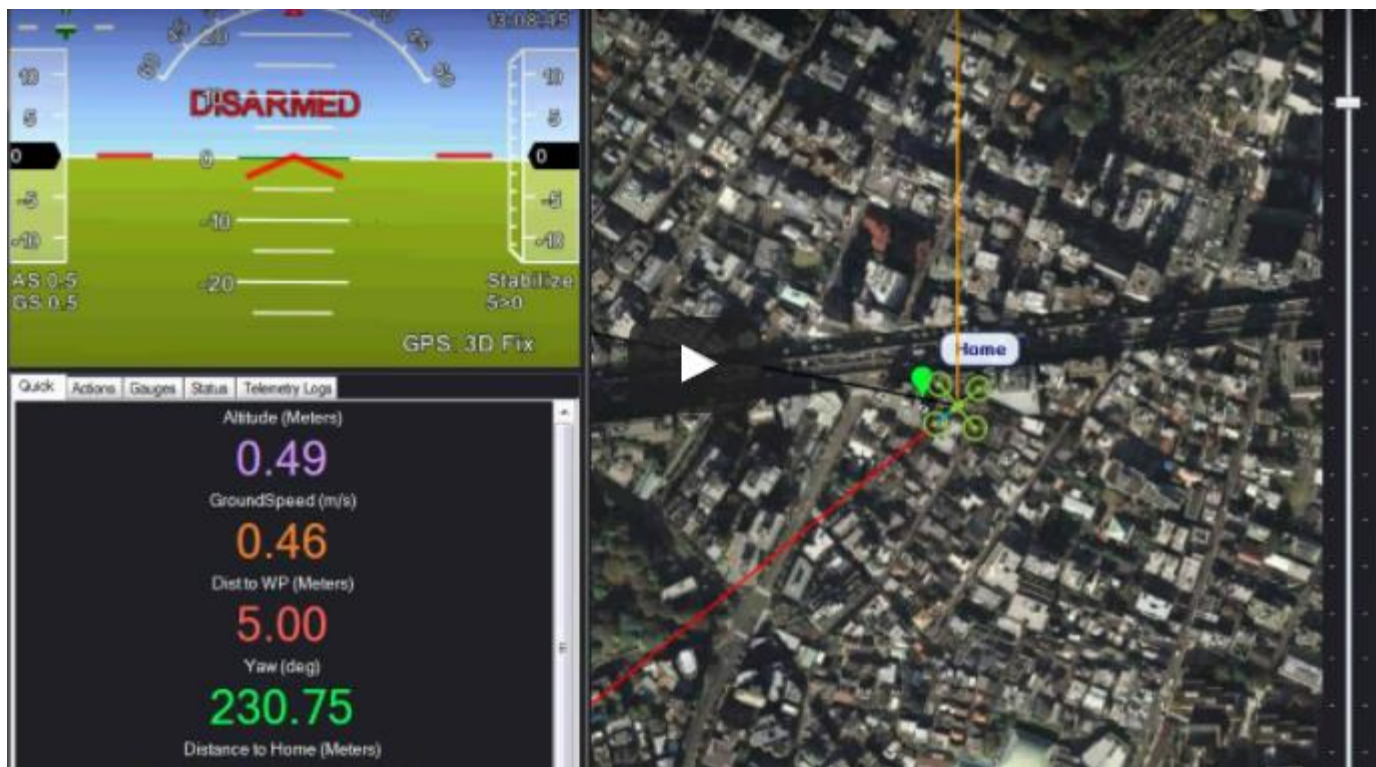
Prepare drone to the flight – check with your list

Place the drone near home point (check on the map)

The line from compass should be in good direction.
There can be 15 degrees difference.



STEP 7: Before the flight – the compass line





STEP 7: Before the flight – number of satellites and hdop

The minimum number of satellites the drone should see is 6. In practice, when you have 8 or more

Hdop is another important number. It should be really low: max is 2.5



STEP 7: Before the flight – number of satellites and hdop

Mission Planner 1.3.48 build 1.1.6330.3\130

FLIGHT DATA | FLIGHT PLAN | INITIAL SETUP | CONFIGURING | HELP | DONATE

300° NW 330° 345° 0° 15° 30° NE 0°

0% 00:10:00

DISARMED

AS 0,0 GS 0,0 EKF Vibe **GPS: No GPS** Unknown 0>0

Quick | Actions | PreFlight | Gauges | Telemetry Logs | DataFas

Altitude (m)	GroundSpeed (m/s)
0,00	0,00
Dist to WP (m)	Yaw (deg)
0,00	0,00
Vertical Speed (m/s)	DistToMAV
0,00	0,00

hdop: 0.0

Sats: 0 | Current Heading | Direct to current WP | Target Heading | GPS Track (Black)

2017 Google | Map data 2017 | Imagery 2017 | Terrain 2017

GEO 0,000000 0,000000 0,00m Tuning Auto Pan Zoom 7.0



STEP 8: Flight

Armed the drone.

Switch to Auto mode

Put the throttle up.

Dron should start making mission