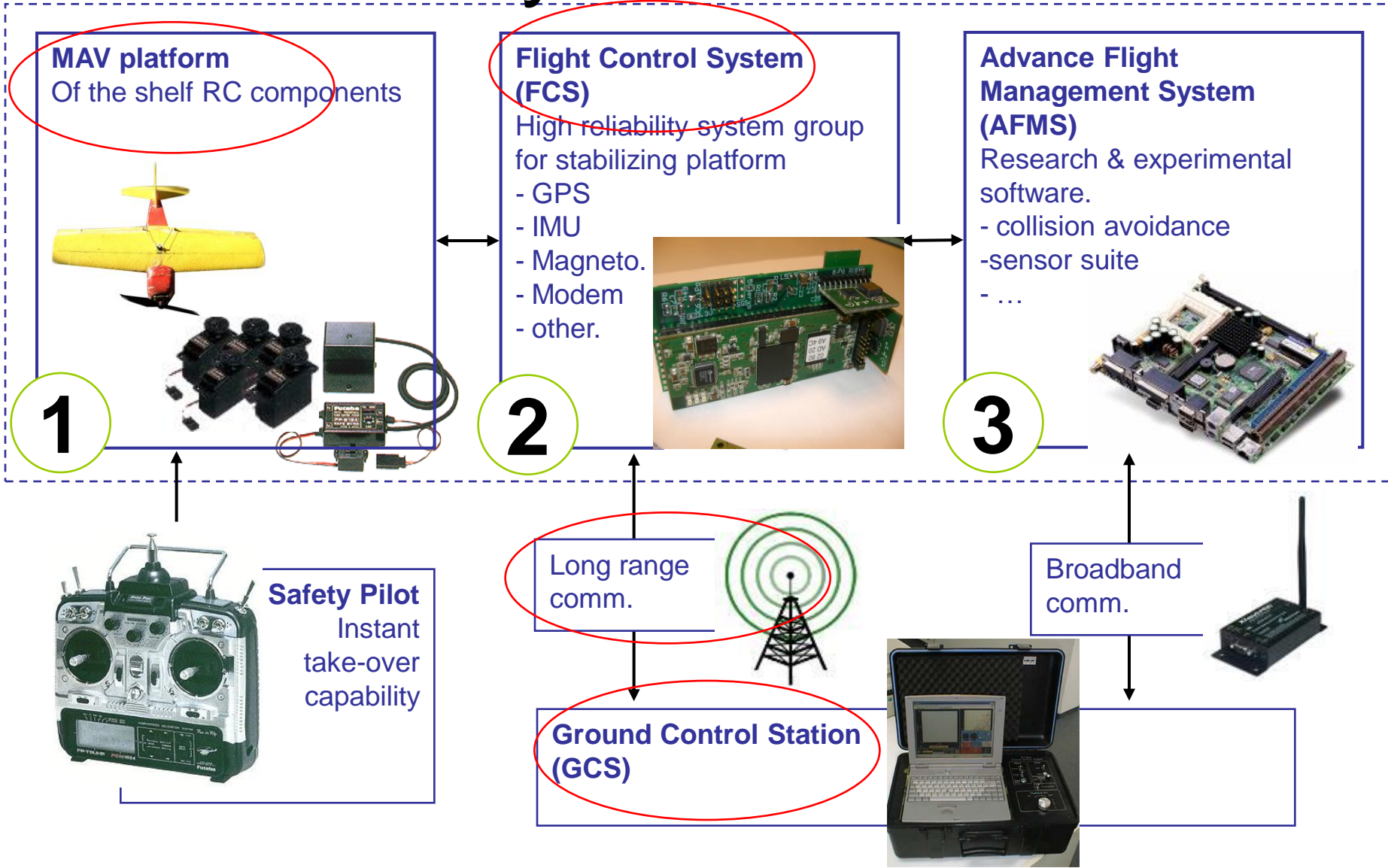


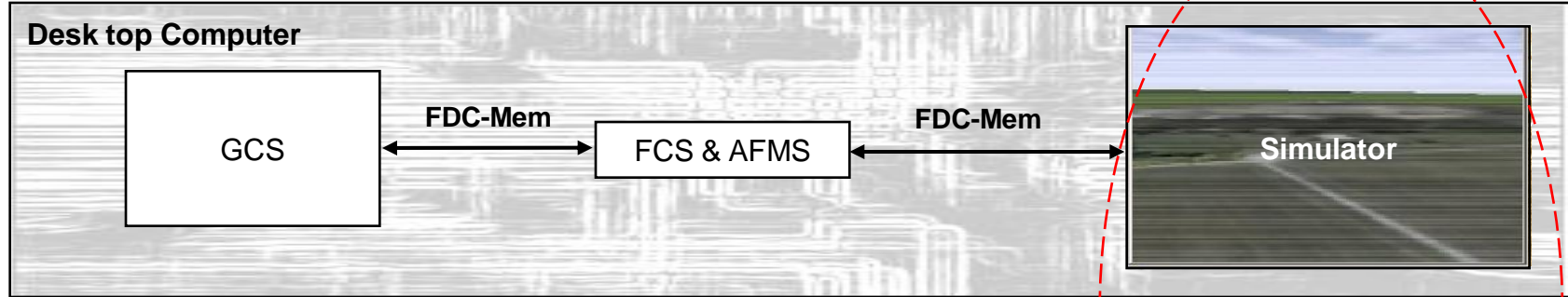
Christophe De Wagter, Matthijs Amelink,
Niels Diepeveen, Eddy van der Heijden

MAV system overview

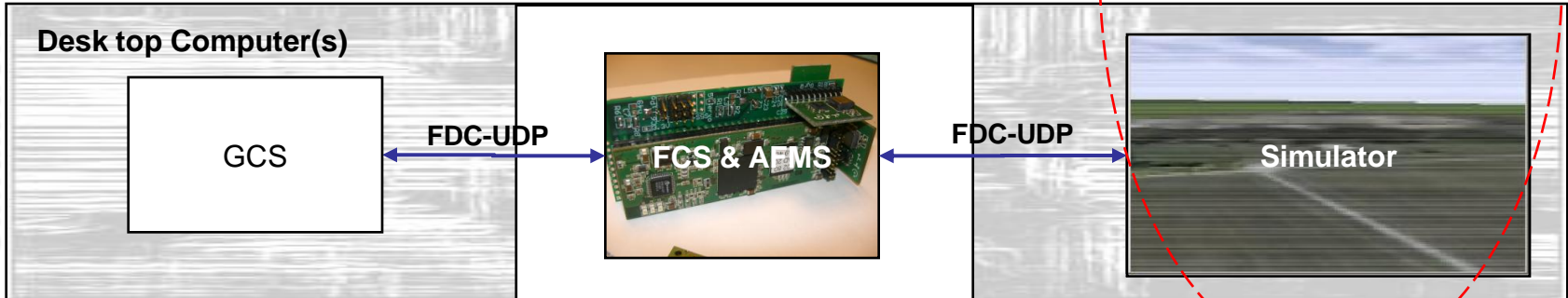


Software architecture

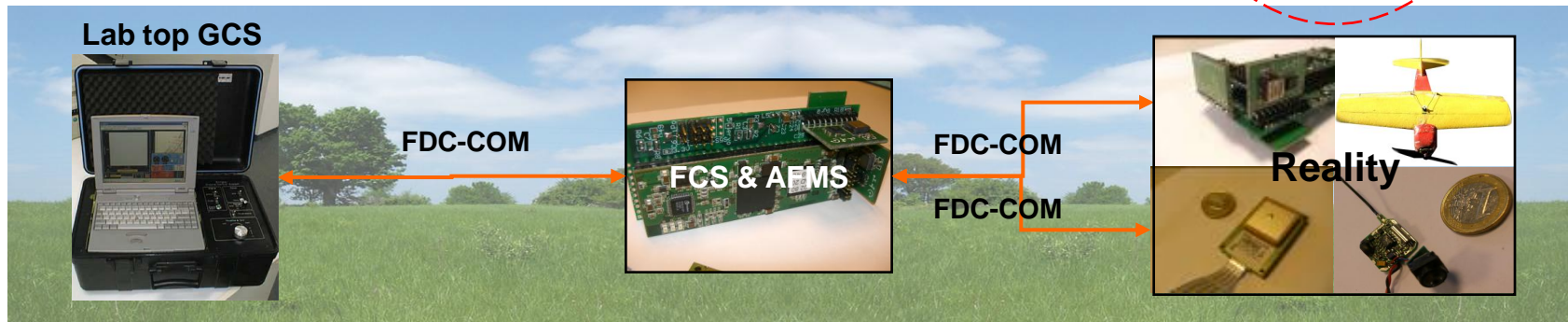
Simulation



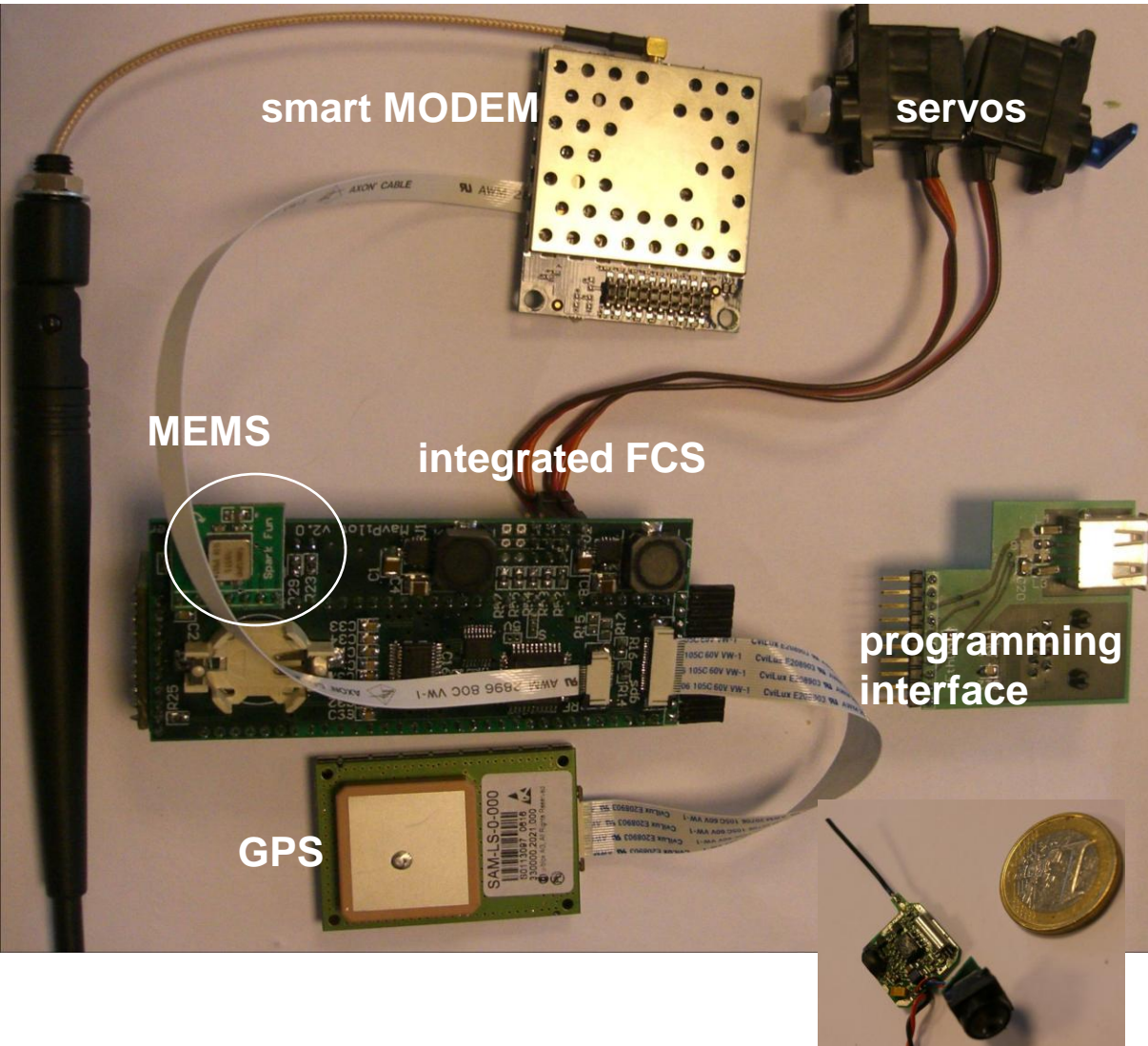
Hardware
in the loop
Simulation



Real

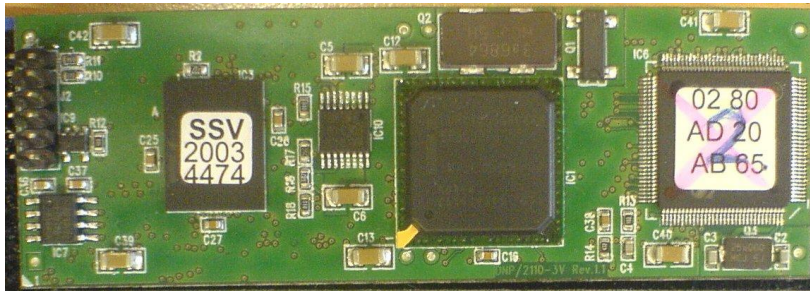
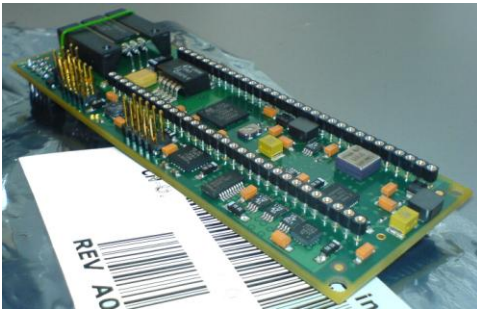


FCS: MavPilot2



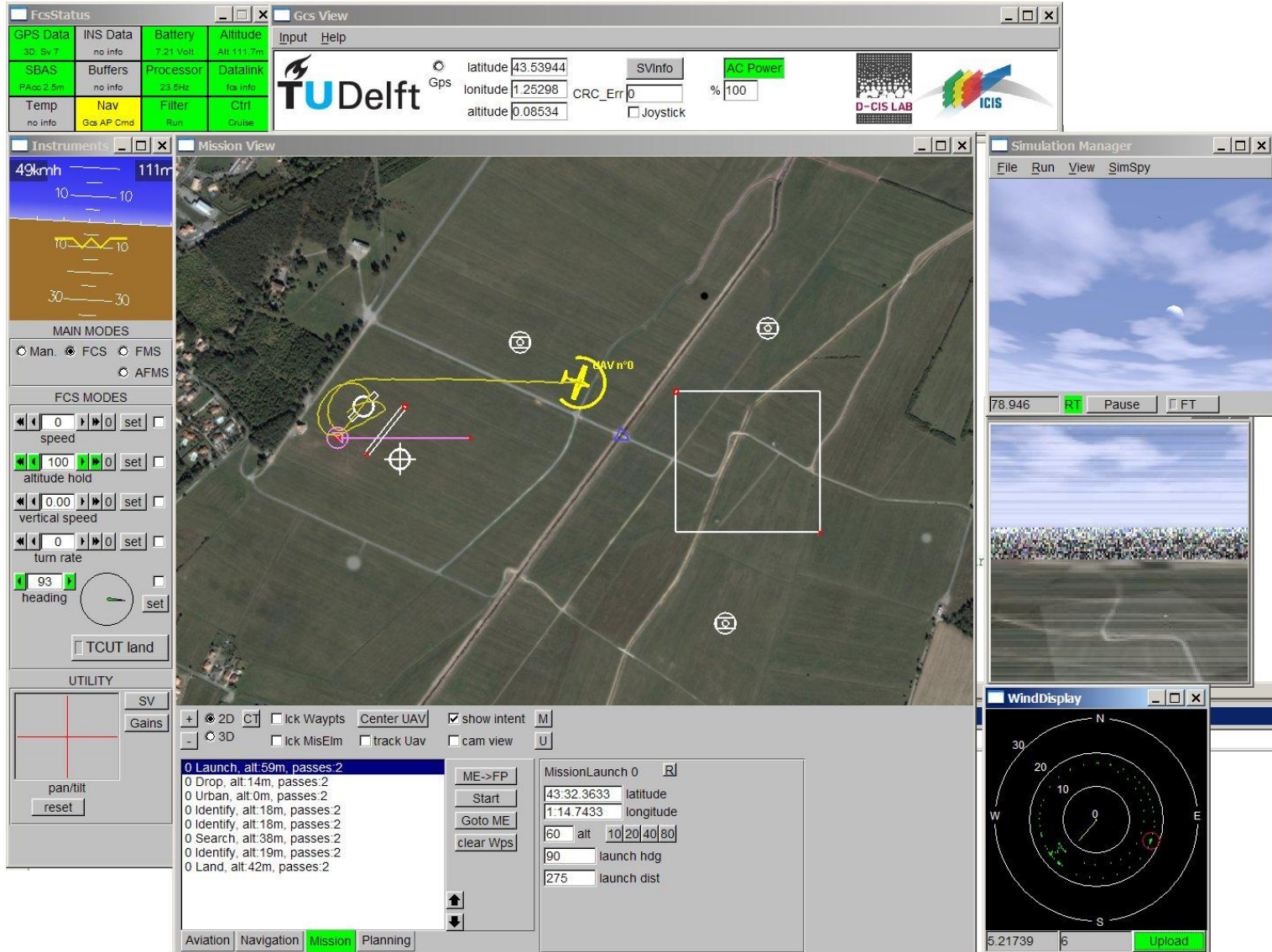
- Weight: 125 gr
- 4Hz GPS
- 6 DoF MEMS IMU
(3 gyros, 3 acc.)
- 250mW, 868MHz comm.
- Ethernet, USB
- 3 serial ports
- 8 servos
- power converter (95% eff.)
- 32 MB RAM, 16 MB Flash
- 180MHz (1W), 32 bit ARM
- Wireless cam.

MavPilot3



- Delivered the day before departure
- IMU 6 DOF: 12 bits precision
- Integrated static pressure port
- Integrated IO processor lessens load on main processor
- Processor board 180Mhz (1W) ARM
- Piggyback servo control center for 6 servos
- Development by TUDelft and D-CIS lab

GCS: simulated flight



FcsStatus

GPS Data 3D Sv:7	INS Data no info	Battery 7.21 Volt	Altitude Alt:111.7m
SBAS PAcc:2.5m	Buffers no info	Processor 23.5Hz	Datalink for info
Temp no info	Nav Go AP Cmd	Filter Run	Ctrl Cruise

Gcs View

latitude: 43.53944
 longitude: 1.25298
 altitude: 0.08534

SVInfo AC Power %100
 CRC_Err 0
 Joystick

Instrument

49kmh 111m

MAIN MODES
 Man FCS FMS AFMS

FCS MODES

speed: 0 set
 altitude hold: 100 set
 vertical speed: 0.00 set
 turn rate: 0 set
 heading: 93 set

UTILITY
 pan/tilt reset

Mission View

UAV n°0

Simulation Manager

File Run View SimSpy

78 946 RT Pause FT

WindDisplay

30
20
10
0
W E S N

5.21739 6 Upload

Mission Launch

0 Launch, alt:59m, passes:2
 0 Drop, alt:14m, passes:2
 0 Urban, alt:0m, passes:2
 0 Identify, alt:18m, passes:2
 0 Search, alt:38m, passes:2
 0 Identify, alt:19m, passes:2
 0 Land, alt:42m, passes:2

ME->FP Start Goto ME clear Wps

MissionLaunch 0
 43:32.3633 latitude
 1:14.7433 longitude
 60 alt 10 20 40 80
 90 launch hdg
 275 launch dist

Aviation Navigation **Mission** Planning

GCS: simulated flight

The screenshot displays the GCS (Ground Control Station) software interface, which is used for planning and controlling drone flights. The interface is divided into several main sections:

- FcsStatus (Top Left):** A grid of status indicators for various system components:
 - GPS Data: 3D Sv: 6, no info
 - INS Data: 7.21 Volt, Alt: 92.9m
 - Battery: Processor: 21.4Hz, DataLink: for info
 - SBAS: PAcc: 2.5m, no info
 - Temp: no info
 - Nav: to wp: 1
 - Filter: Run
 - Ctrl: Cruise
- Gcs View (Top Center):** Displays real-time GPS coordinates:
 - latitude: 43.53943
 - longitude: 1.25298
 - altitude: 0.00000
 - CRC_Err: 0
 - AC Power: 100%
- Instruments (Middle Left):** Shows a speed graph (49krph) and altitude graph (62m). Below are control modes:
 - MAIN MODES: Man, FCS (selected), FMS, AFMS
 - FCS MODES: speed, altitude hold, vertical speed, turn rate, heading
 - UTILITY: TCUT land, pan/tilt, reset
- Mission View (Center):** A top-down aerial view showing a mission plan with 24 waypoints (WP 0 to WP 24) connected by lines. The current UAV position is marked with a yellow 'X'.
- Simulation Manager (Middle Right):** Contains two video windows:
 - Top: A sky view from the drone's perspective.
 - Bottom: A ground view from the drone's perspective.
 - Controls: RT (Real Time), Pause, FT (Fast Forward).
- Waypoint List (Bottom Left):** A list of 12 waypoints with their altitudes and next waypoints:
 - 0 WP, alt: 59m, nextWp: 1
 - 1 WP, alt: 14m, nextWp: 2
 - 2 WP, alt: 14m, nextWp: 3
 - 3 WP, alt: 14m, nextWp: 4
 - 4 WP, alt: 0m, nextWp: 5
 - 5 WP, alt: 0m, nextWp: 6
 - 6 WP, alt: 0m, nextWp: 7
 - 7 WP, alt: 0m, nextWp: 8
 - 8 WP, alt: 18m, nextWp: 9
 - 9 WP, alt: 19m, nextWp: 10
 - 10 WP, alt: 18m, nextWp: 11
 - 11 WP, alt: 18m, nextWp: 12
- Waypoint Editor (Bottom Center):** A detailed view of Waypoint 1:
 - Coordinates: 43.32 4210 latitude, 1.14.9282 longitude
 - Altitude: 15
 - Speed to wp: 40
 - Next Wp: 2
 - Options: Altitude (checked), Along leg, climb, descent, landing
- WindDisplay (Bottom Right):** A circular wind speed indicator showing wind direction and speed.

Safety Logic

