III Workshop 2024 - EMBM-VD

Experiments

CONTEXT:

- VD

Application of simulation tools to enhance the human-machine interface, enabling demonstrative use cases that investigate the behavior of drones operating simultaneously through the use of artificial intelligence and augmented reality.

- SIMUA

UAV (Unmanned Aerial Vehicle) technological solutions for maintaining surveillance, carrying out efficient diversion maneuvers and returning to original routes after conflict resolution (ABDAA – Airborne Detect and Avoid).

GOALS OF THIS PRESENTATION

- Explain the events that will be held as proof of concept for the CONCEPTIO Lab's developments.

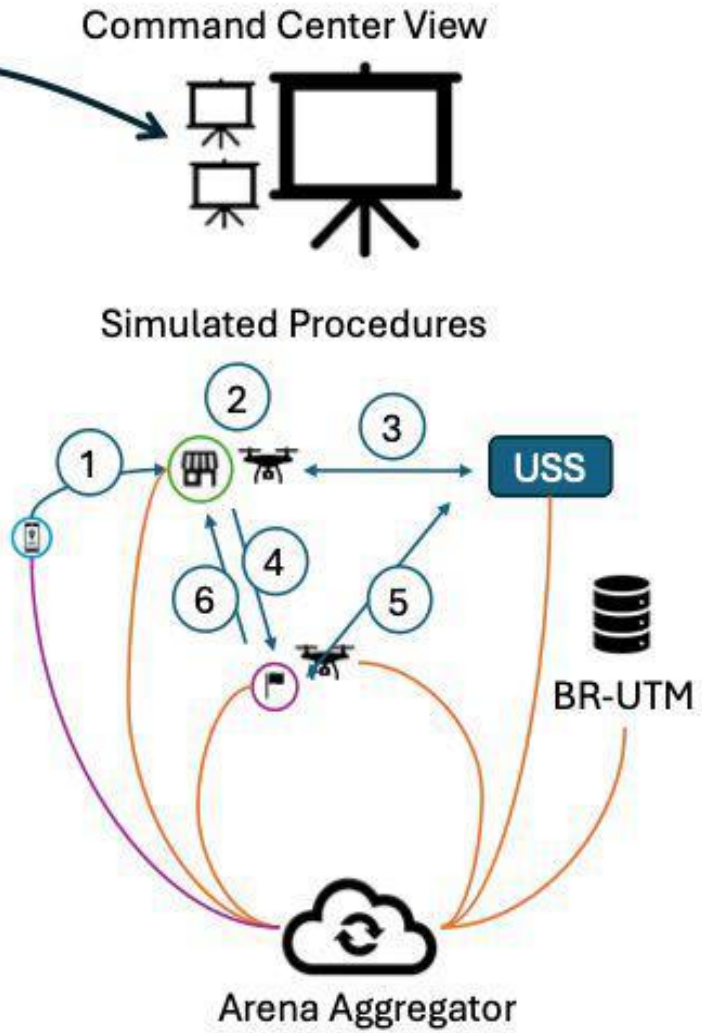
Events

Demonstration – SIRESANT

- Curitiba
- The event will take place on December 10 and 11, 2024
- sixth edition – promoted by the Department of Airspace Control (DECEA), with the support of the Second Integrated Center for Air Defense and Air Traffic Control (CINDACTA II)
- participation of 500 to 700 people in person and thousands online

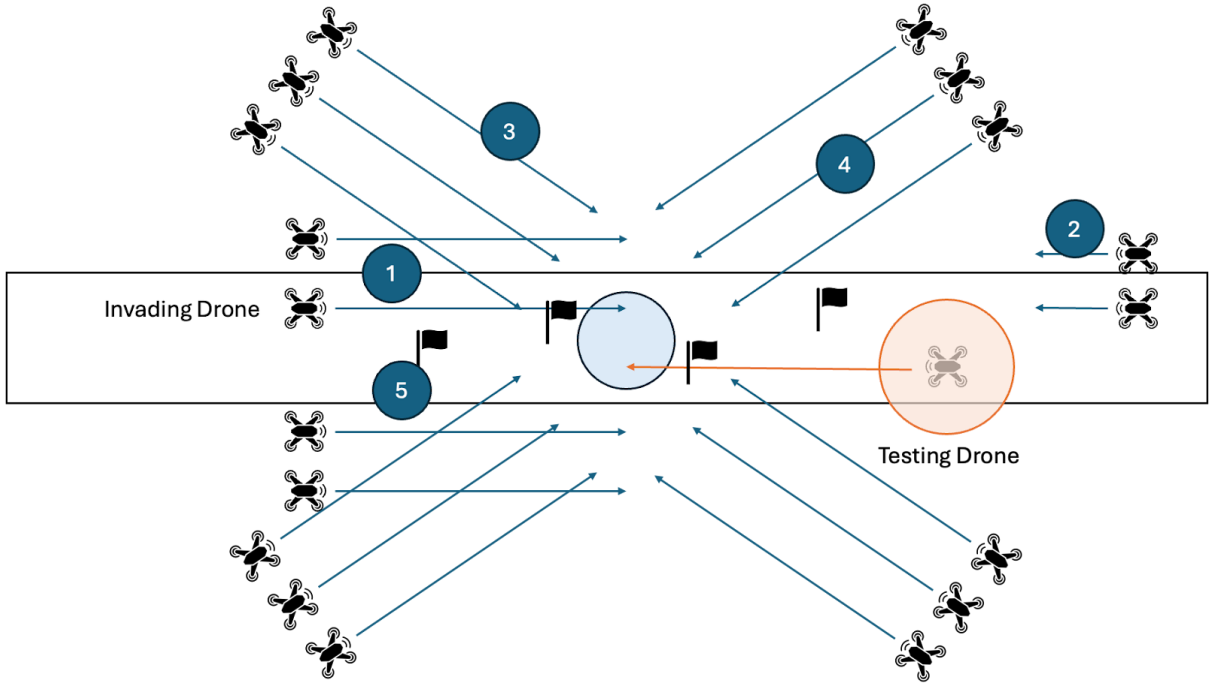
Curitiba

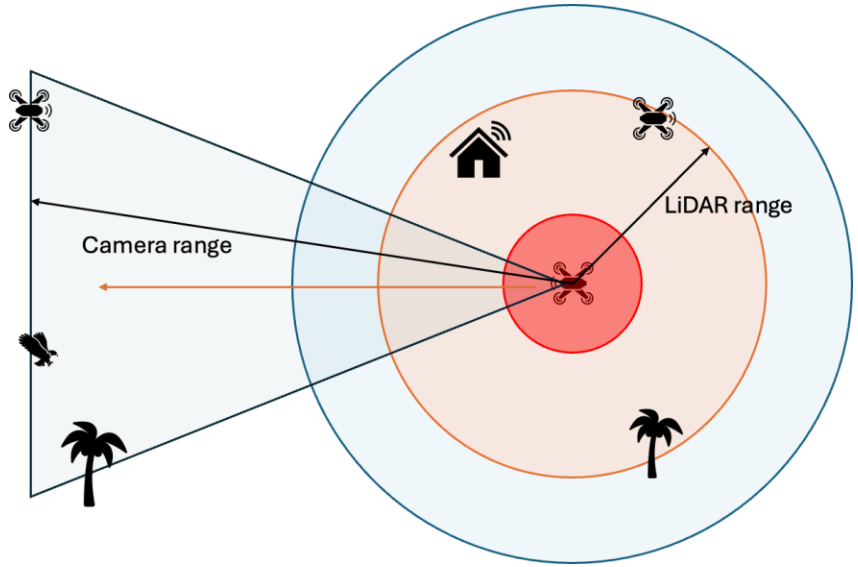

Park Shopping Barigui
Parque Barigui
Virtual Stores
Delivery Places
Ordering Appa


Command Center View
Simulated Procedures
1
2
3
4
5
6
USS
BR-UTM
Arena Aggregator

Demonstration – High Level Group SIMUA

- Physical demonstrations of the ABDAA (Airborne Detect and Avoid) technology





Demonstration – High Level Group SIMUA

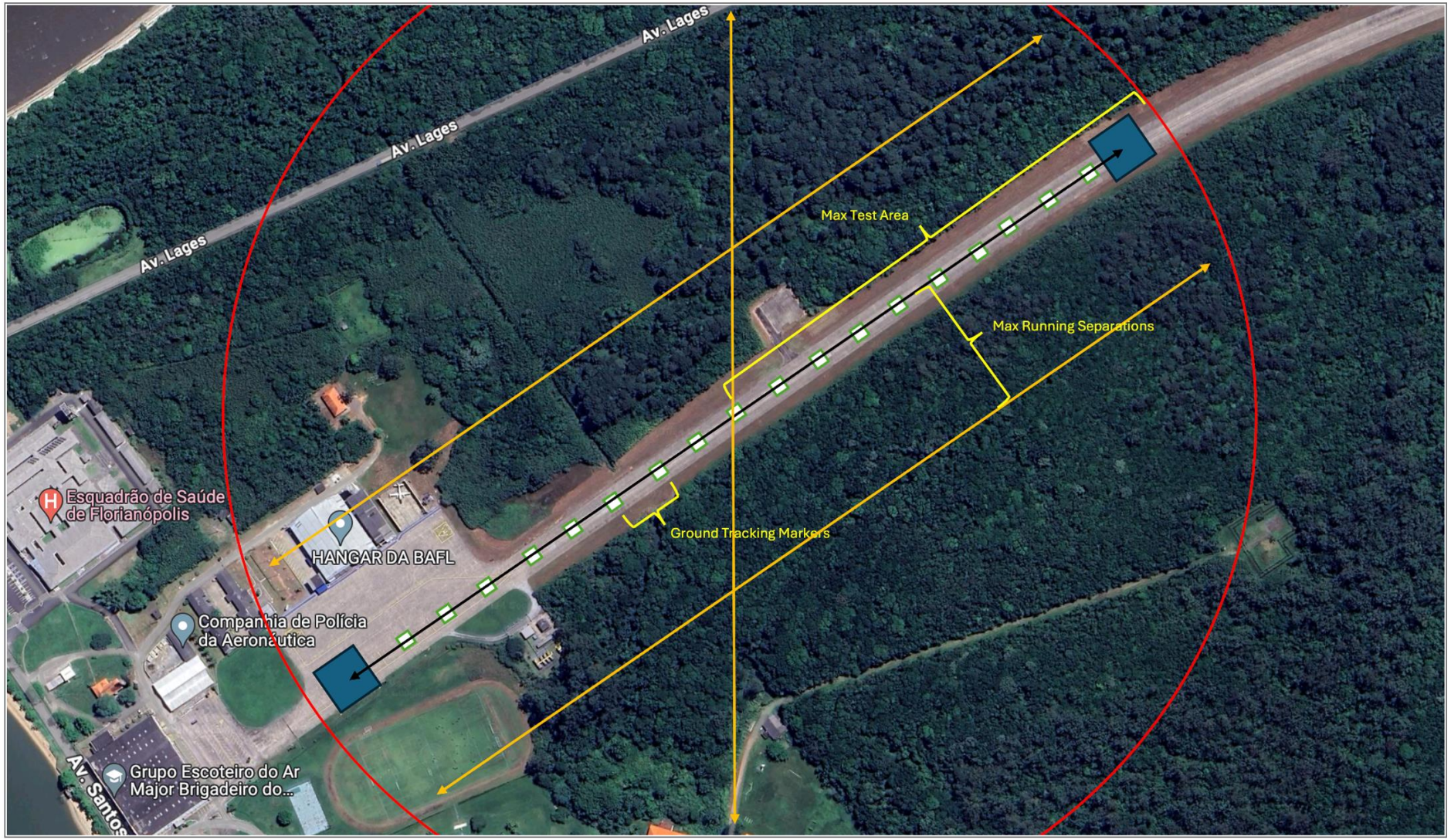
Goal 1: Validate the effectiveness of the DAA system in preventing collisions

- Objective 1.1: Demonstrate a coordinated flight between the two drones along the plane.
- Objective 1.2: Demonstrate the DAA system's ability to detect and avoid another drone.
- Objective 1.3: Demonstrate the DAA system's ability to detect and avoid other real-time obstacles.
- Objective 1.4 Demonstrate a variety of evasive maneuvers, such as altitude changes and lateral displacements.
- Objective 1.5: Demonstrate the autonomous flight capabilities of drones following a pre-defined flight plan.

Goal 2: Effectively present the DAA System to the public of interest.

- Objective 2.1: Give a realistic presentation that explains the technology and capabilities of the DAA system.
- Objective 2.2: Generate discussion among the public about the DAA system and its potential applications.

Demonstration – High Level Group SIMUA



Demonstration – High Level Group SIMUA

Use Case 1: Public demonstration of safe flight of independent drones.	Scenario 2 - Obstacle detection activation conditions
Scenario Objective: Demonstrate the Detect and Avoid system.	
Operational Events: - Drones encounter obstacles on their paths. - Obstacle detection and avoidance systems activate.	
Users Experienced Drone Pilots / Public Observers / Media Representatives / Event organizers / Regulatory agency / Academics researchers / Industry representatives	
Key Actions: * Pilots/ Drone operators: Initialize/calibrate, introduce/simulate obstacles, monitor the flight and drone responses. * Observers: Watch the flight and verify successful obstacle avoidance. * Media: Document and stream the event. * Event organizers: take the flow of activities for the event, restrict public space, and follow safety standards. * Regulatory agency: note possible issues to guide airspace standard * Academics researchers: close observation of the flight, demonstrate concepts developed by the partnerships between the academy and industry, identify improvements to implement in their research * Industry representatives: identify visibility opportunities for their products	
Flow of Events: 1. Prepare and calibrate the drone. 2. Activate the system and set normal flight mode. 3. Initiate a pre-defined flight path with obstacles. 4. The drone flies autonomously, and the system monitors its surroundings. 5. The system detects obstacles and triggers avoidance maneuvers. 6. Drone safely navigates around an obstacle(s). 7. The drone reaches the endpoint and lands.	

drone conflict

Next steps

- Event preparation
- Definition of which measurements and how they will be collected in accordance with ASTM International's Standard Specification for Detect and Avoid System Performance Requirements
- Logistics

Final considerations

Questions/Comments?!

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