34th **C**entral **E**uropean **C**onference on **I**nformation and **I**ntelligent **S**ystems

PROJECT SECTION **PITCHES**

PROJECT NAME:

ORKAN - **UNMANNED AERIAL VEHICLE CONTROL AND SURVEILLANCE FRAMEWORK**

INSTITUTION:

University of Zagreb, Faculty of Organization and Informatics

PRESENTER:

Neven Vrček

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ORKAN project

Objectives (1/2):

- Research business, legal and ethical trends and development of methodology for risk assessment related to drones in urban environment
- Research business models and use cases
- Energy efficient UAV communication
- Constellation UAV RF spectrum scanners
- UAV constellation control center (UCCC)

Ovaj je rad financirala Hrvatska zaklada za znanost projektom IP-2019-04-4864.
This work has been supported by the Croatian Science Foundation under the project IP-2019-04-4864.

ORKAN project

Objectives (2/2):

- Signal source localization
- Measuring the efficiency of intruder drone pilot localization using the final constellation model
- Development of mechanisms for autonomous, semi-autonomous or manual navigation by constellation of UAVs
- Testing various use cases and scenarios

UAV constellation as a platform for scientific research

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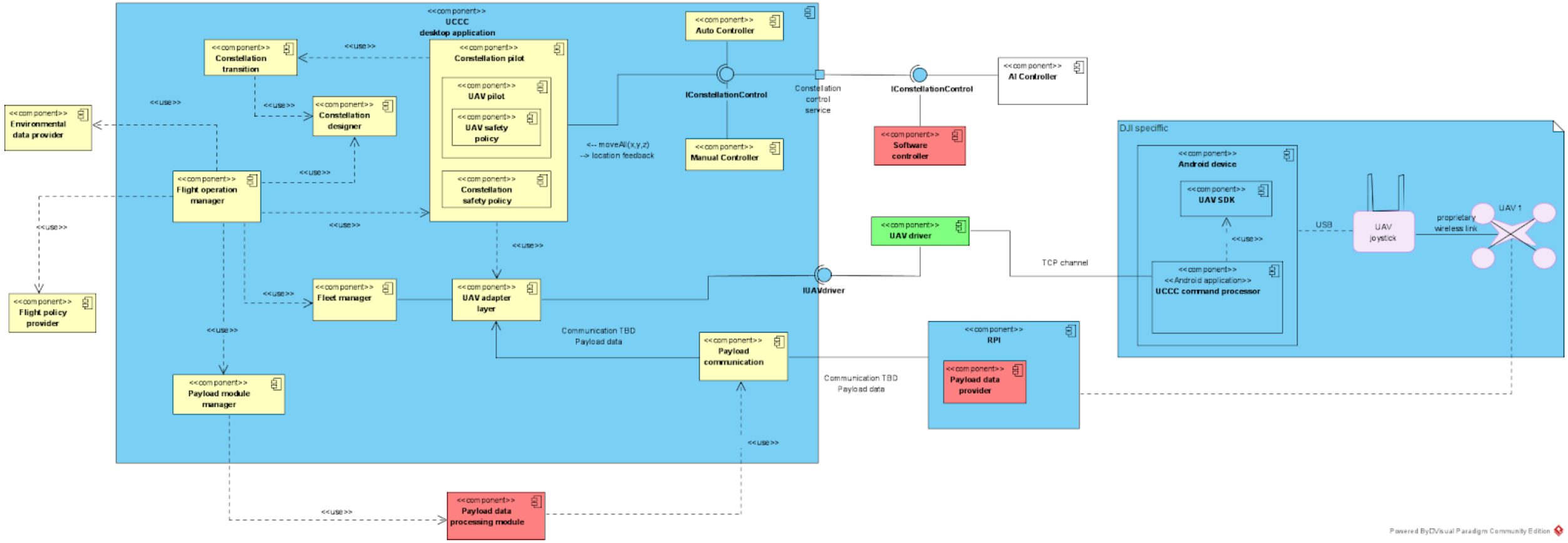
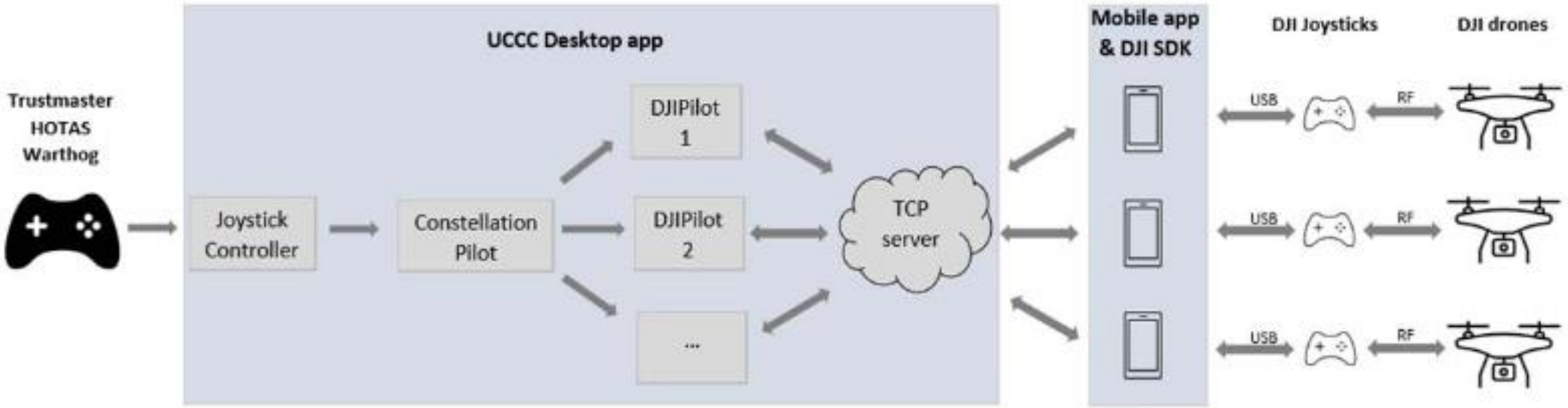
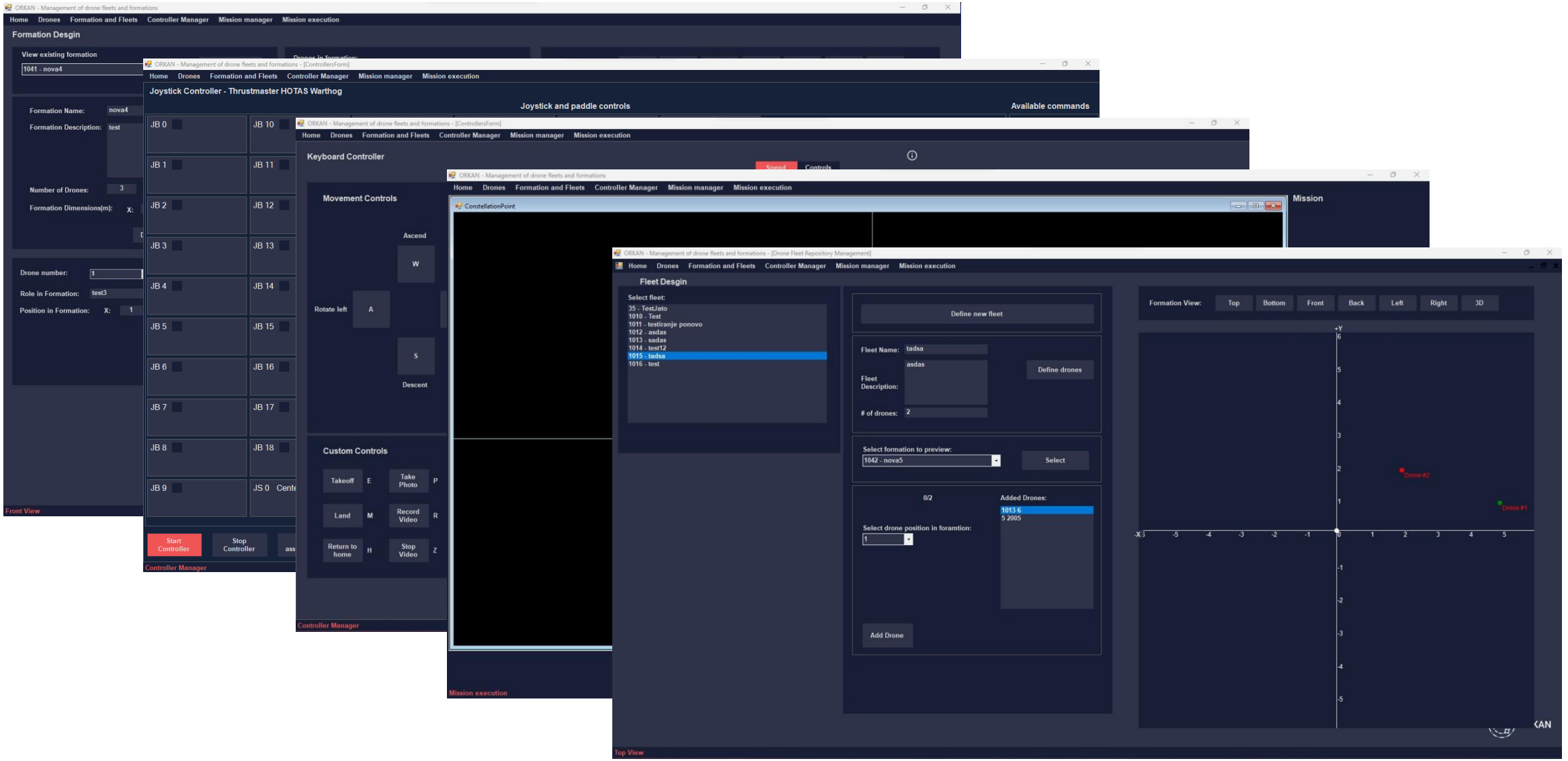
Modular and extensible design



PoC architecture



UCCC’s demo

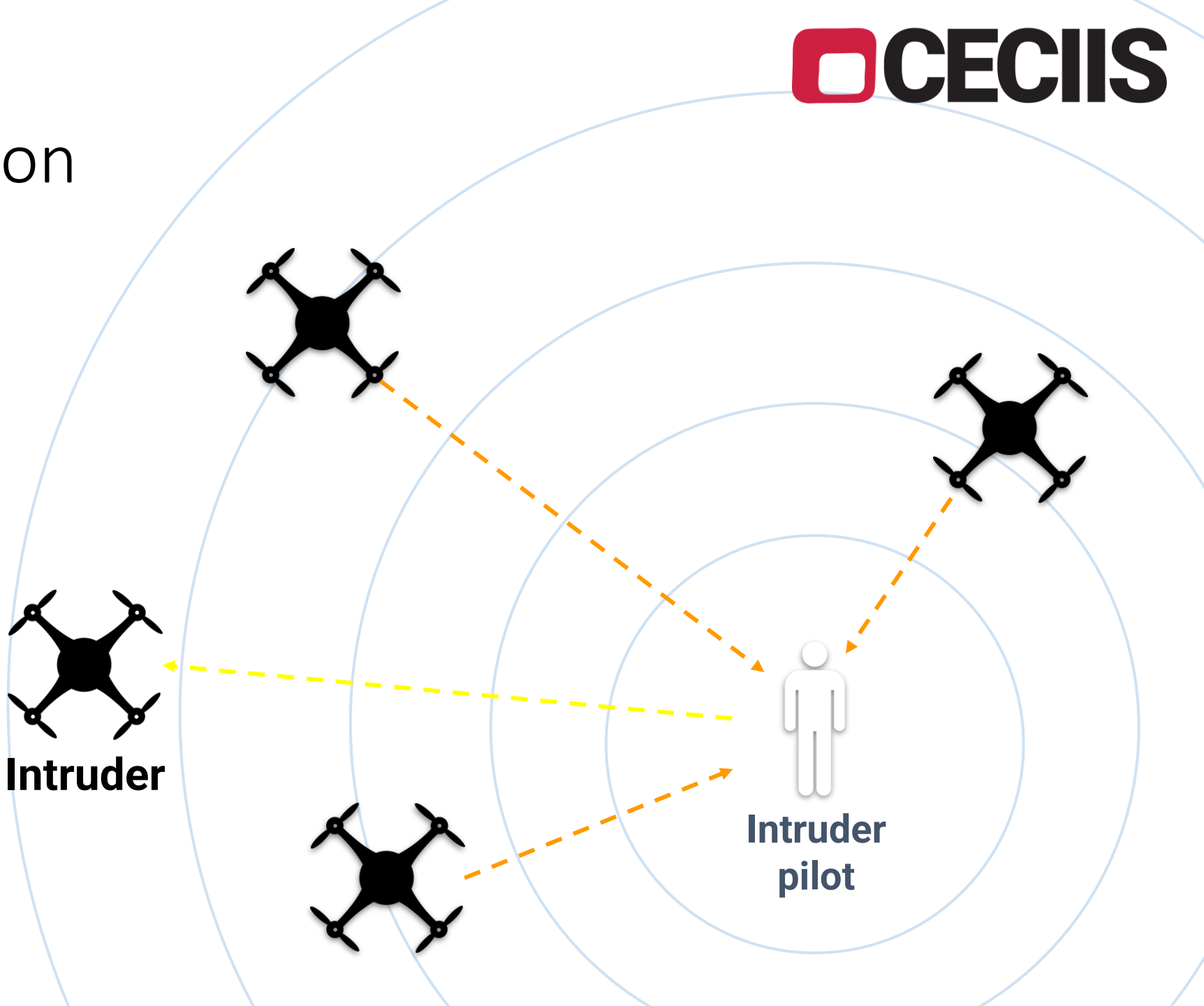


Mission fleet design

RF localization application - Solution

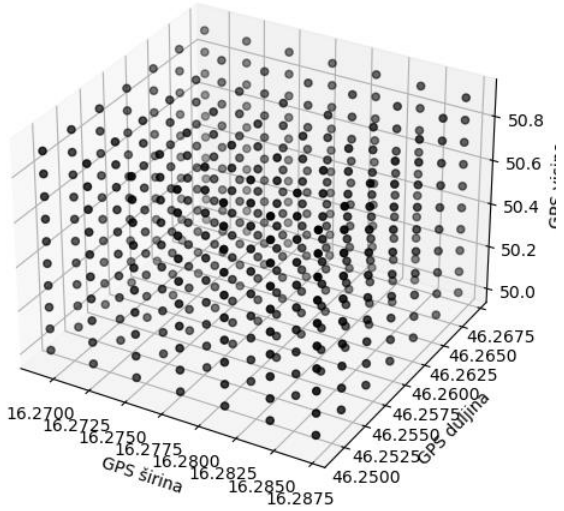
UAV control signal

Signal strength analysis



RF localization application

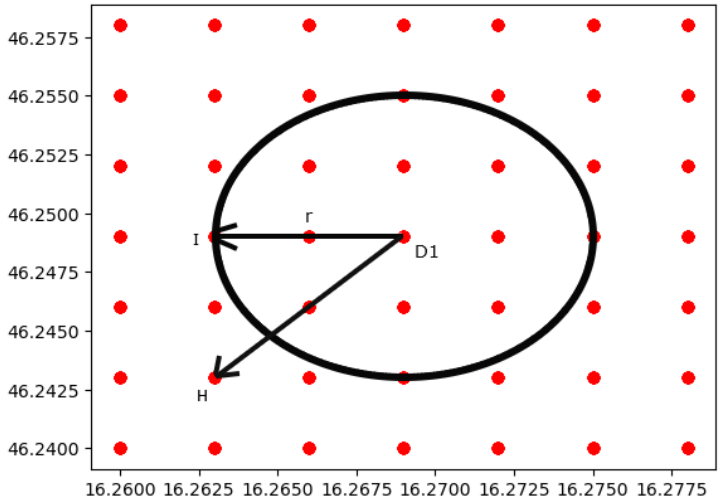
- Algorithm:
  - goal - find the point in space where the probability of the source of signal is the highest
  - after first RSSI reading - adjustable point grid is constructed around the centroid of the constellation (akin to particle filtering)
    - each point assigned a 4-tuple **(X, Y, Z, probability)**
    - distance between each of the points can be adjusted depending on the required precision



Example point grid

RF localization application

- Algorithm:
  - signal propagation is considered omnidirectional
    - a **circle** can be formed around the source of the signal - *fuzzy sphere*
    - radius is calculated using appropriate path-loss models from received signal strength



2D visualization of the grid

D1 = location of RSSI reading

I = example point on the circle

H = example grid point outside of the signal range

r = radius of the circle