



DroneCMS: Flying Infrastructure for Intelligent Crowd Management and Security for Mega Events

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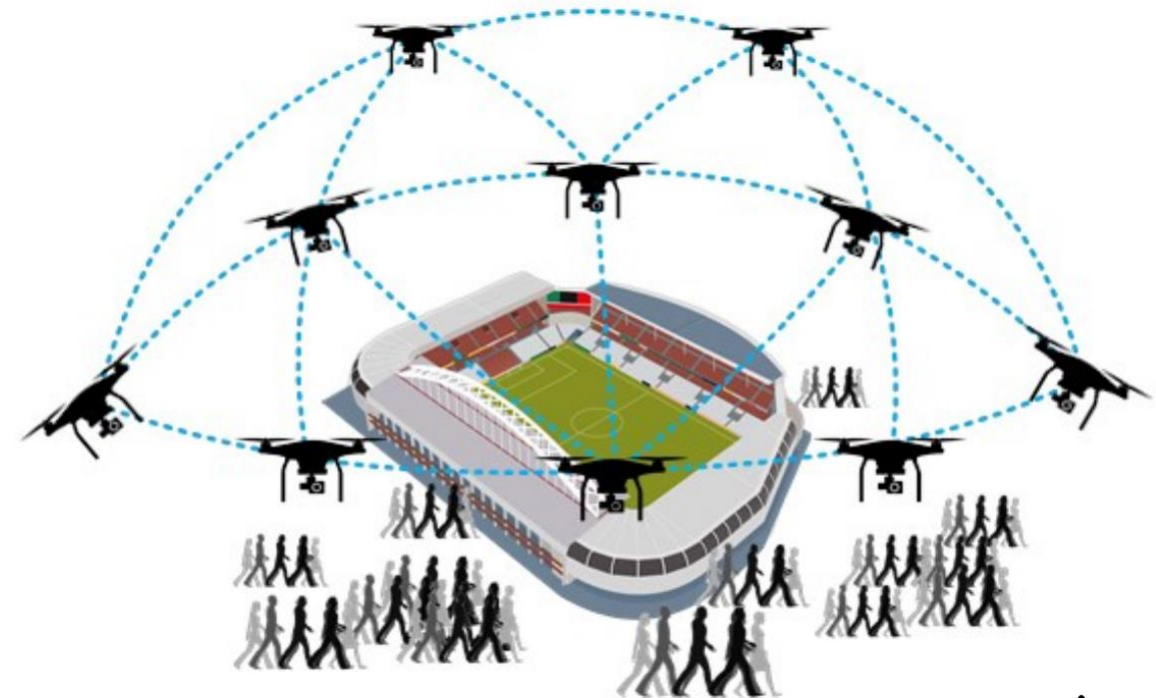


DroneCMS – Project Scope

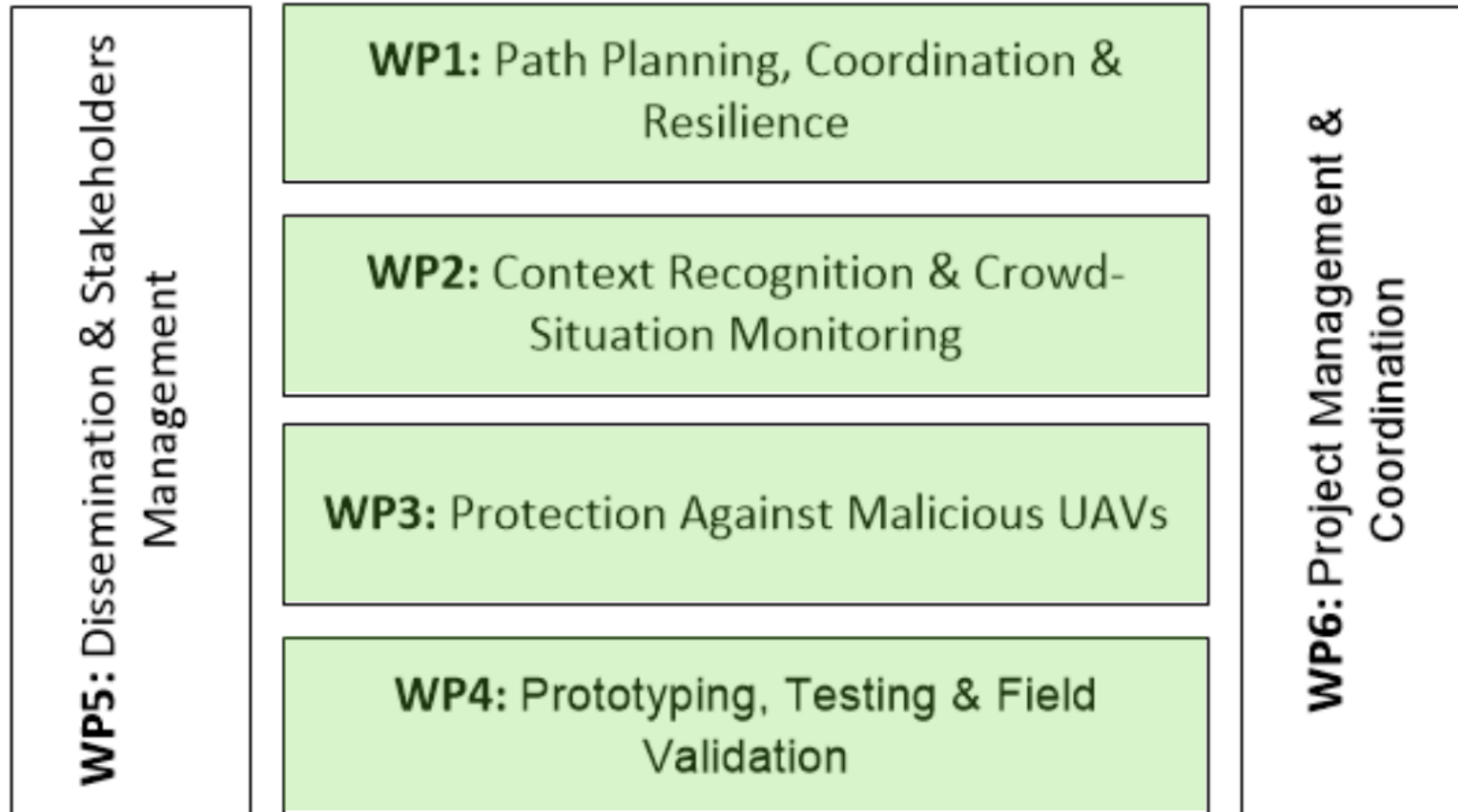


Utilizing UAVs to help enhancing the management of large crowd of people from operations as well as from safety aspects.

- Crowd Tracking and Context Recognition Using Videos Coming from Flying Sources
- Path Planning and Coordination Among Automated UAVs to Provide a Full Site/Crowd Coverage
- System Security and Protection Against Intrusion of Unauthorized UAVs



Work Packages



Path Planning, Coordination & Resilience



- Information exchange in real time over BLE
- Relative **distance measurement** and **collusion avoidance**.

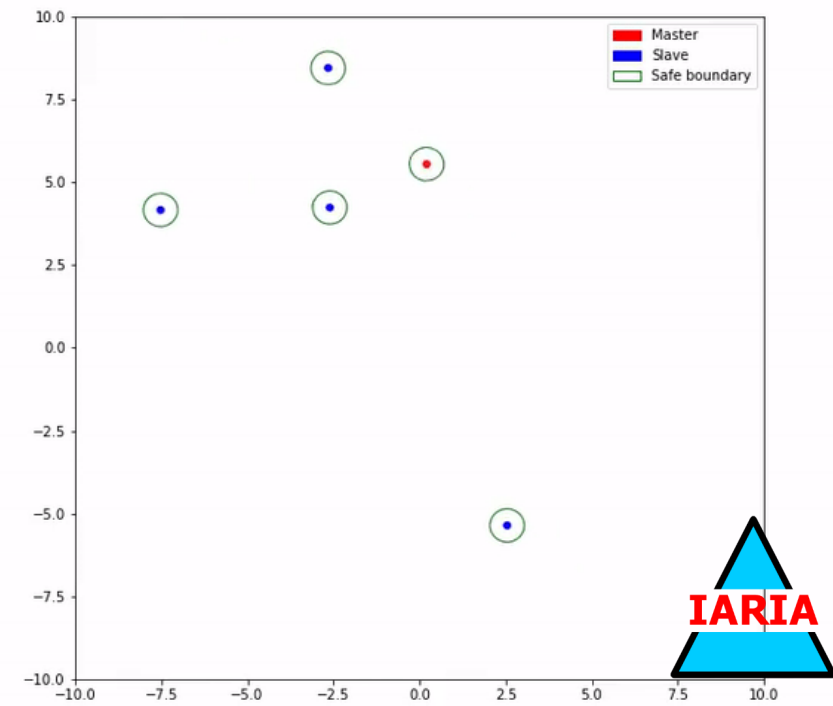
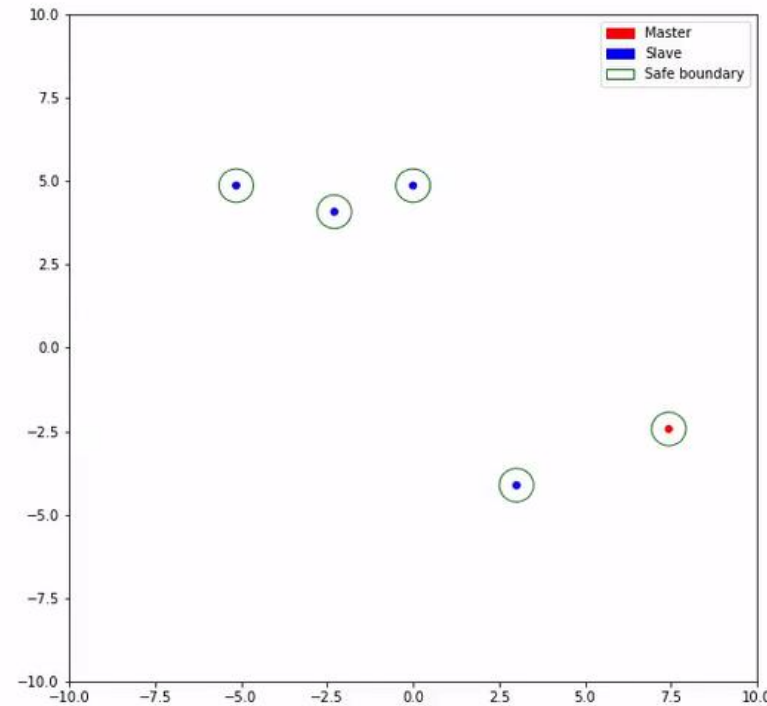
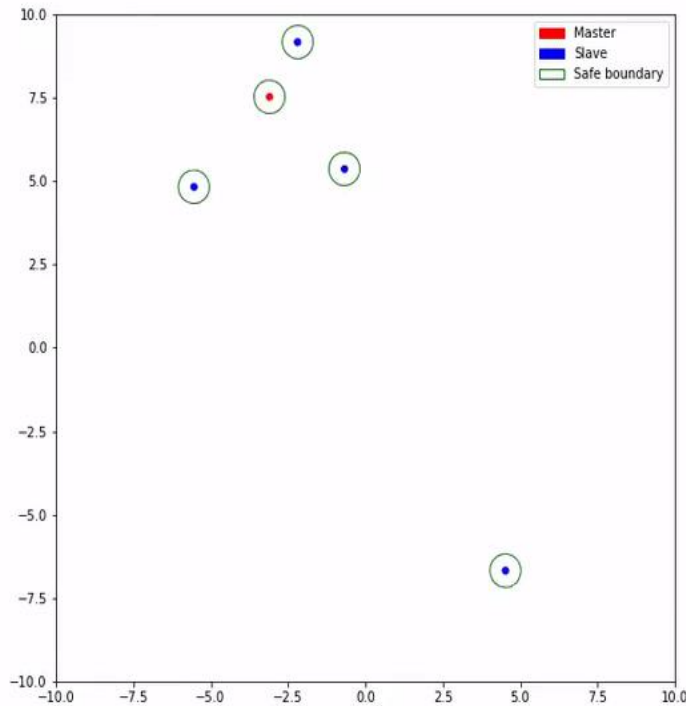


Path Planning, Coordination & Resilience



Self-organizing and resilience

Simulations of collision avoidance based on location infos exchange



Path Planning, Coordination & Resilience



Implementation and field tests



Path Planning, Coordination & Resilience



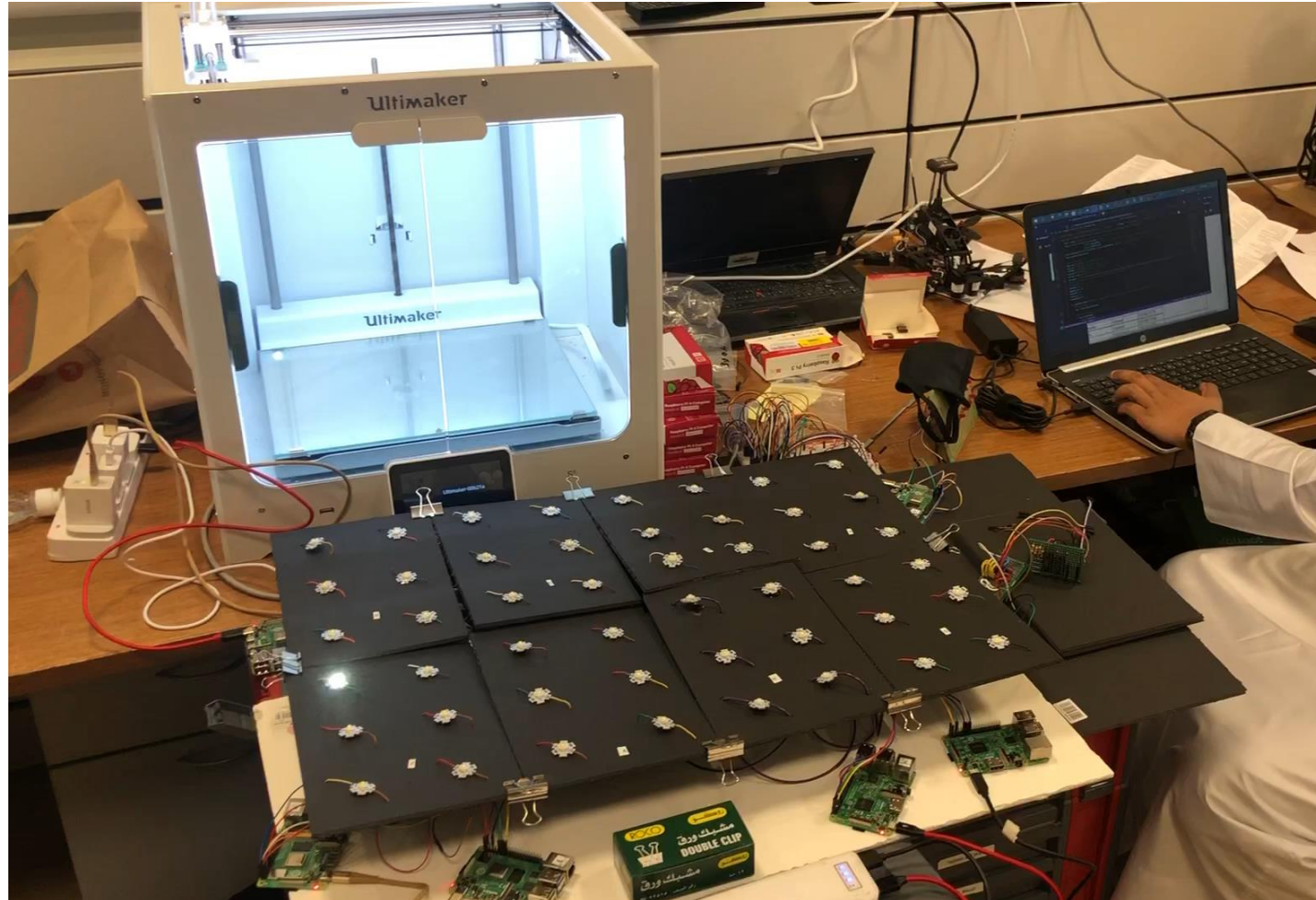
Implementation and field tests



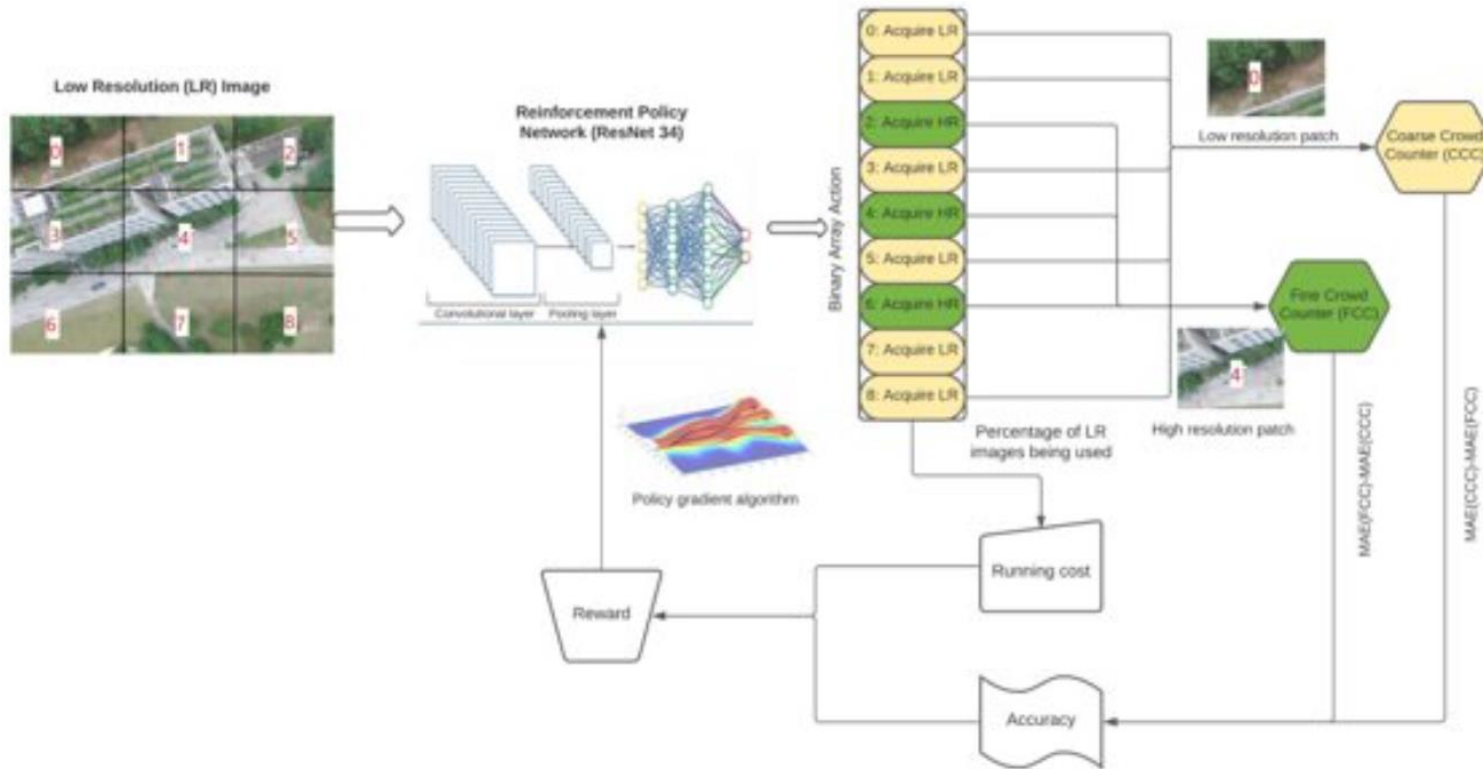
Path Planning, Coordination & Resilience



Flying Dynamic Message Sign (DMS)



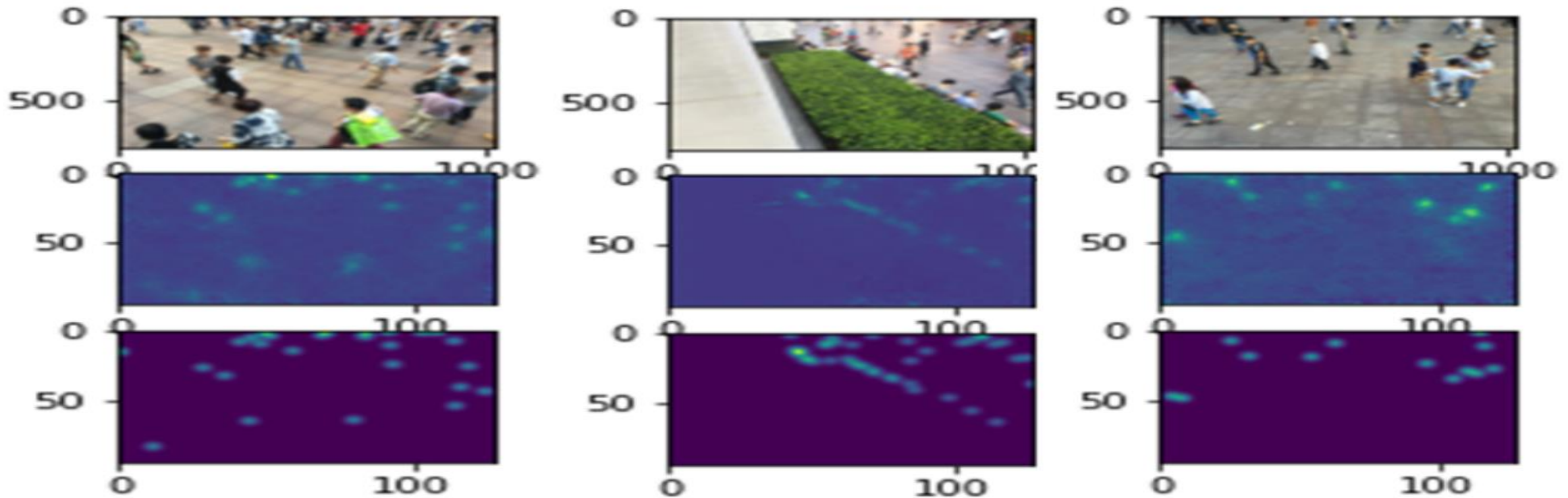
Context Recognition and Crowd-Situation Monitoring



SOTA Crowd Counter + Policy Network (Reinforcement Learning)

Less inference time and memory usage for drone surveillance

Context Recognition and Crowd-Situation Monitoring



Hamrouni, H. Ghazzai, **H. Menouar** and Y. Massoud, "An Improved Dilated Convolutional Network for Herd Counting in Crowded Scenes," 2020 IEEE 63rd International Midwest Symposium on Circuits and Systems (MWSCAS), Springfield, MA, USA, 2020, pp. 1024-1027, doi: 10.1109/MWSCAS48704.2020.9184558.



Implementation and field tests



AI-based Search & tracking in a crowd

Objective: searching and tracking a person with specific look, e.g. based dress color.



Implementation and field tests



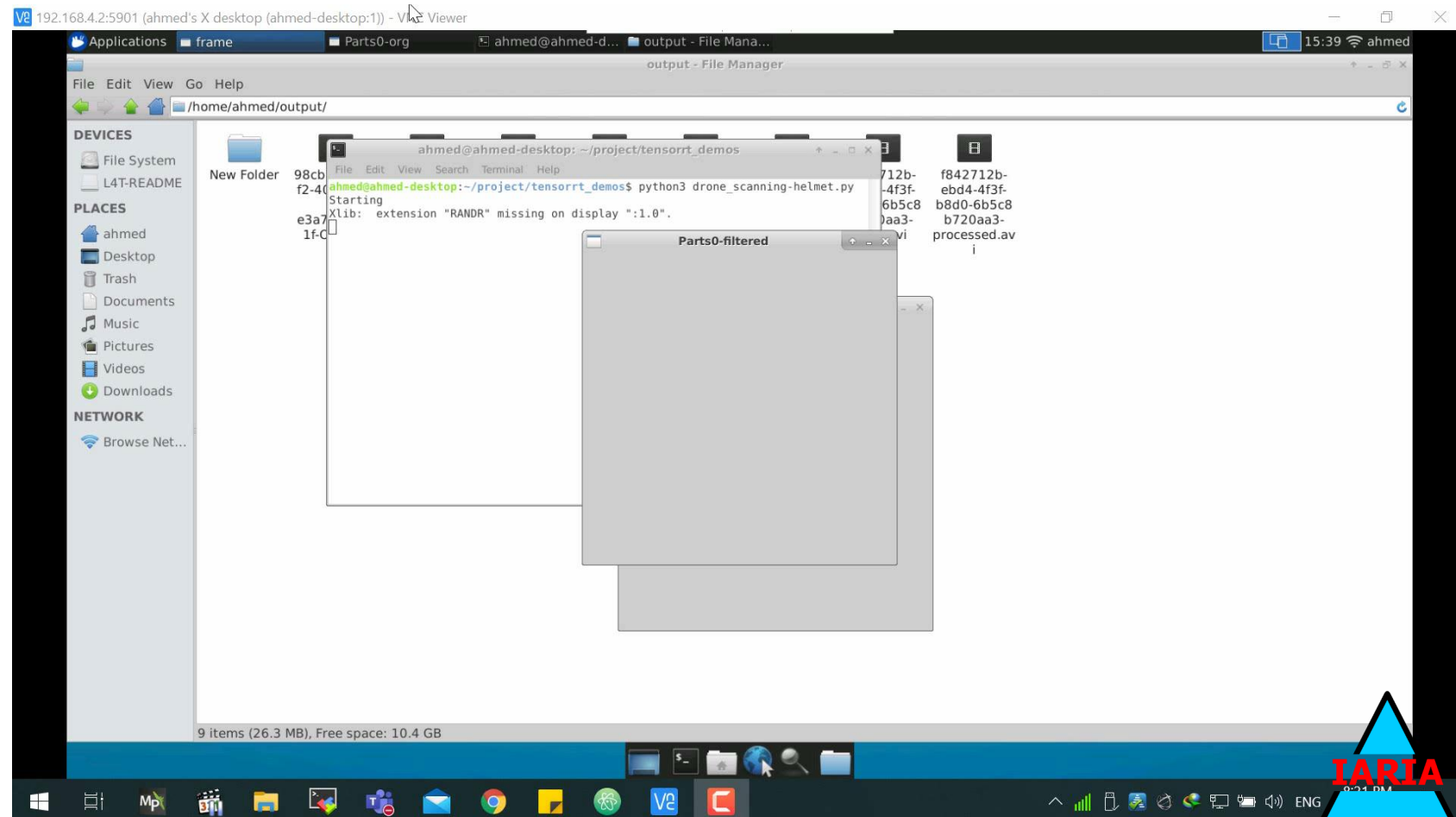
AI-based Search & tracking in a crowd

Path planning for scanning the targeted search area

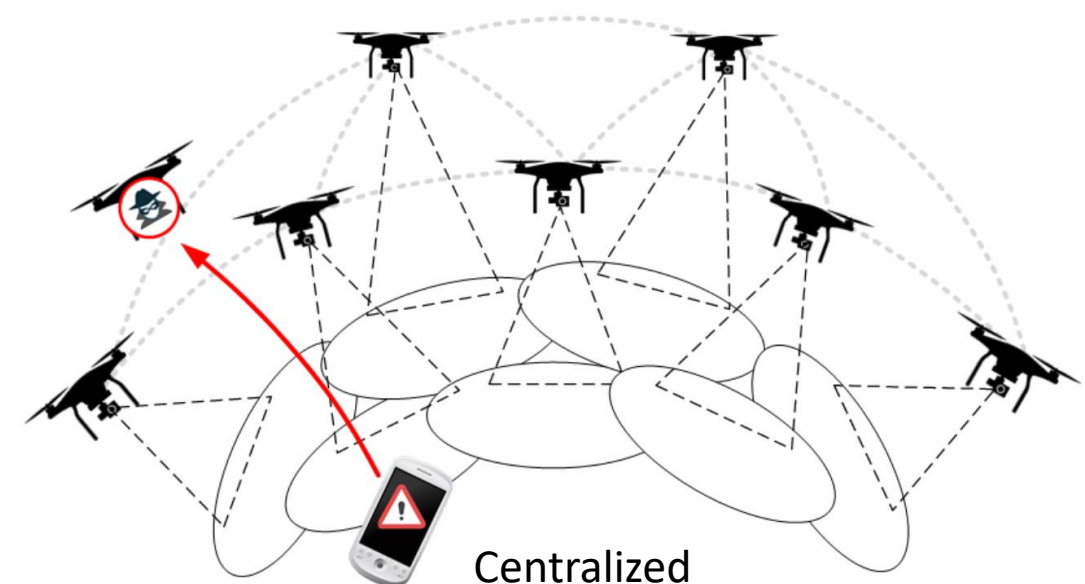
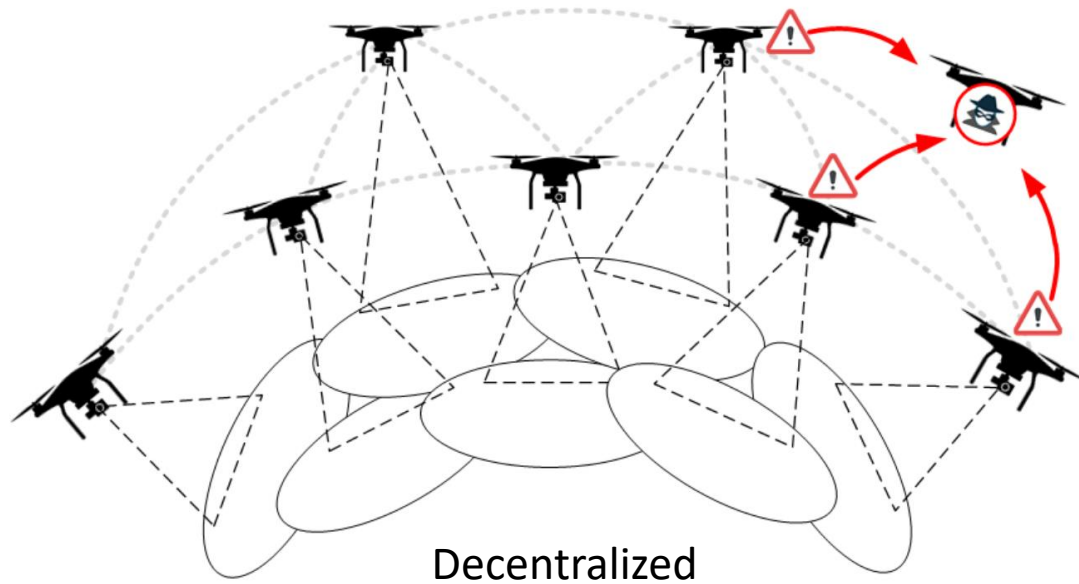


Implementation and field tests

AI-based Search & tracking in a crowd

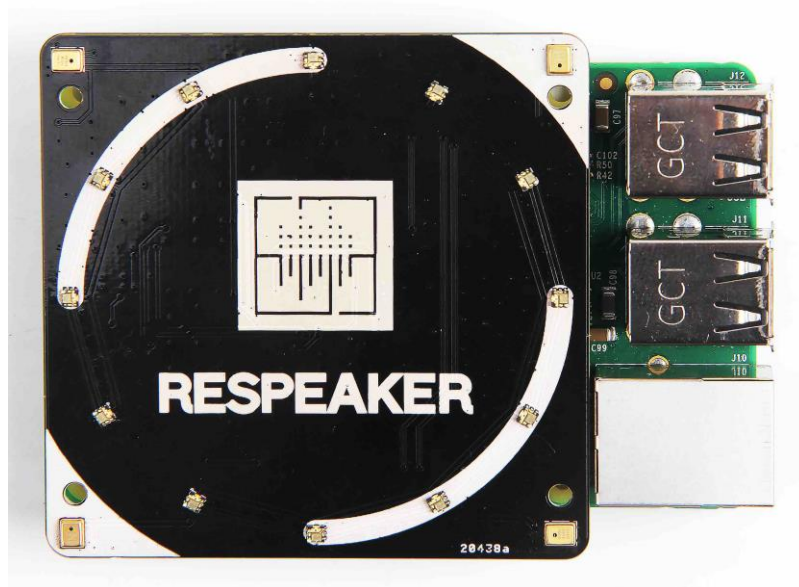


Protection Against Malicious UAVs



Malicious UAVs Detection

Acoustic sensor



RF sensor



AI-based Malicious UAVs Detection





Thank you!

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