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

Dr. Hamid Menouar
Senior R&D Expert and Product Manager
Qatar Mobility Innovations Center (QMIC)
hamidm@qmic.com | www.menouar.com
Dr. Hamid Menouar
Senior R&D Expert and Product Manager
Qatar Mobility Innovations Center (QMIC)
hamidm@qmic.com | www.menouar.com
DroneCMS: Flying Infrastructure for Intelligent Crowd Management and Security for Mega Events

NPRP12S-0313-190348
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

**WP1:** Path Planning, Coordination & Resilience

**WP2:** Context Recognition & Crowd-Situation Monitoring

**WP3:** Protection Against Malicious UAVs

**WP4:** Prototyping, Testing & Field Validation

**WP5:** Dissemination & Stakeholders Management

**WP6:** Project Management & Coordination
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 info 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

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

Decentralized

Centralized
Malicious UAVs Detection

Acoustic sensor

RF sensor
AI-based Malicious UAVs Detection
Thank you!

Dr. Hamid Menouar
Senior R&D Expert and Product Manager
Qatar Mobility Innovations Center (QMIC)
hamidm@qmic.com | www.menouar.com