

Funded by European Union Civil Protection

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Al in Emergency Management

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KIOS CoE, University of Cyprus



KIOS Technical Focus & Specialization

Intelligent monitoring, control, management and security of complex, large-scale, dynamical systems





Telecommunication Networks & Cybersecurity



Emergency Management Response

COVID19 Decision-support



Hospitals

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MARI-Sense

* cyprusseeds

 Section 2,000,000.00 EU R&D funding (DG ECHO PREDICATE, SWIFTERS, LEAPFROG, AIDERS, ARTION projects, DG HOME CERETAB, H2020 PathoCERT, CARAMEL, SESAME, RIF Ronda, MARISENSE)

Industry R&D funding from national first responders (Cyprus Police, Ministry of Defence) and critical infrastructure operators (EAC)

• UCPM trainings including the **Exchange of Experts** and the **AMC**

PreSeed funding by Cyprus Seeds and Research & Innovation Foundation

Facility

- Drones
 - 3 DJI M300, 4 DJI M100, 2 DJI M210 platforms
 - 12 DJI Mavic units
 - Fixed-wing Parrot and DeltaQuad
- Camera payloads
 - HD, thermal, multispectral cameras
 - Lidar sensors
 - Spectroscopy sensors
- Power
 - One 1045Wh Power station
 - Multiple drone batteries
- Computing
 - 2 Ruggedized laptops, 1 ruggedized tablet
 - 2 GPU laptops
 - 12 Nvidia Jetson Nano
 - 2 Samsung Tablets, 12 smartphones
 - HPC cluster



Mobile C3

Computing Servers

PCBs









Exercises and Trainings













Field Deployments













LoRa Sensor Network & Data



Al for Emergency Response



What can AI/ML do?

□Systems that forecast events in order to take preventive actions

- Decision-support systems
- Decision-making systems
- □Al-powered automated robotic devices

Stages of Disaster

Emergency



Employing AI in Emergency Response



What we do



Detection and tracking



Integrated hardware and software intelligent systems



Damage assessment and severity (Xyliatou)



<image>

Normalized Difference Vegetation Index







A multiple drone flights performed and big imagery sets collected serial. The 3D view of the burnt area as well as the Digital Elevation Model resulted when the Photogrammetric and GIS analysis had been applied on the initial data. A high detailed orthophoto file has also been created, empowering the disaster recording procedure.

Web and Mobile apps

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Fire analysis

□Need information in all phases:

- Prevention / Preparedness
- Response
- Recovery

Data needed include:

Weather, tolopogy, fuel conditions, fire behavior



Iarge volume of data that need to be processed both different phases





Multispectral overlay



Flood monitoring

□Modelling and guidance

- LISFLOOD-FP simulator is used to predic
- Use collected data in real-time to impro

Data needed includes:





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Earthquake assessment

□Hazard and risk assessment

- Using OpenQuake, etc
- Data needed include:
 - Soil type, Building quality, distance from fault, number of floors, population density, distance from public open area







3D reconstruction



Water contamination Case Study







Water contamination Case Study

Technology layout



Emergency Response Technologies









Autonomous Systems

Embedded Hardware

UCPM Trainings

Field Exercises

DG ECHO LEAPFROG – GA 782233

□Conduct extensive training and exercises to build capacity and assert the competencies

□Introduce the RPAS module to the voluntary pool

□SOP to be developed

- Factsheet
- Standard operating procedures for
 - Plan of action, Safety and security, Self-sufficiency , Information management, Data protection
- □Addressing the complete mission cycle
 - Preparedness, Mobilization, Deployment, Demobilization





GARIA







Available at: <u>https://www2.kios.ucy.ac.cy/ARTION/</u>

Datasets, algorithms, manuals, etc.New material will be regularly posted



