



# KR05 – Data Collection and Edge Processing

## SCOPE

7SHIELD UAV is one of the first UAVs with a separate onboard computer with an embedded Jetson Xavier processor, running the latest version of Robot Operating System (ROS) in order to host Artificial Intelligence (AI) algorithms for **object detection and identification for edge processing**.

DCEP is embedding the 7SHIELD Object Detection (ODE) and interfacing with the control room provided by 7SHIELD in order to **detect physical threats**.

## PARTNERS



**ACCELLIGENCE**  
Cyprus

**ACCELLIGENCE LTD** (ACCELI) is engaged in cutting edge R&D activities in order to boost innovation capital, improve products and ensure alignment of the services to the state of the art.

In particular, the company, since its establishment, started focalising its R&D activities on robotic systems and subsystems such as UAVs.

## PURPOSE

The **Data Collection and Edge Processing** (DCEP) is a component including the **Unmanned Aerial Vehicle** (UAV) that embeds an edge processor able to host advanced AI algorithms to support object detection and identification services (on board processing).

Furthermore, this component provides all communication capabilities with the control room as well as the handling of basic drone functions such as **autonomous flights**, camera synchronization and locating objects during the flight.

## TECHNOLOGY

ACCELI exploits the features of rapid prototyping through the use of **3D printing** and **Computerized Numerical Control Machine** (CNC) for the manufacturing of 7SHIELD UAV.

7SHIELD Mission UAV is capable to perform **on-board image processing**, making use of machine learning-based techniques, and more precisely Deep Neural Networks (DeepNN) and Convolutional Neural Networks (CNN) exploiting the data (e.g., 2D/ 3D images/ point clouds) obtained from the various aforementioned sensory inputs.

The innovation of DCEP development lies on the installation, integration and deployment of an GPU in the UAV flying system.

## CONTRIBUTION

ACCELI leads the design and development of the DCEP and provides a **fully customized** Mission UAV, able to accommodate the various hardware components (e.g., height/ distance sensors, cameras) in order to execute smart algorithms (e.g., visual object detection and collision avoidance services, algorithms for swarming), and generally to be **easily adapted** to the current operation by the user.

## STAKEHOLDERS

With its Autonomous UAVs equipped with embedding artificial intelligence, ACCELI is targeting the market segments listed below:

- **Critical Infrastructure Operators**
- **Civil Protection**
- **Agriculture**

The advantage of this module is that it is fully adaptable on any requirement or climate based on the needs of the operators.

## FUTURE IMPROVEMENTS

There are two areas of improvement:

- 1. Fully autonomous operation.** The UAV will be operated after receiving an alert by the control room or the field sensors.
- 2. Power consumption efficiency.** The use of alternative battery technology or the deployment of chargers pods on the field.



Detection



Sensors  
Technologies



IoT



The embedded pc on which DCEP is installed

All the modules developed in the frame of 7SHIELD have been designed with the consultancy of identified external stakeholders, first responders and following the **requirements** provided by the partners working in the space sector acting as Pilots, who provided the Critical Infrastructures for **testing and demonstration**.

## CONTACTS

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