

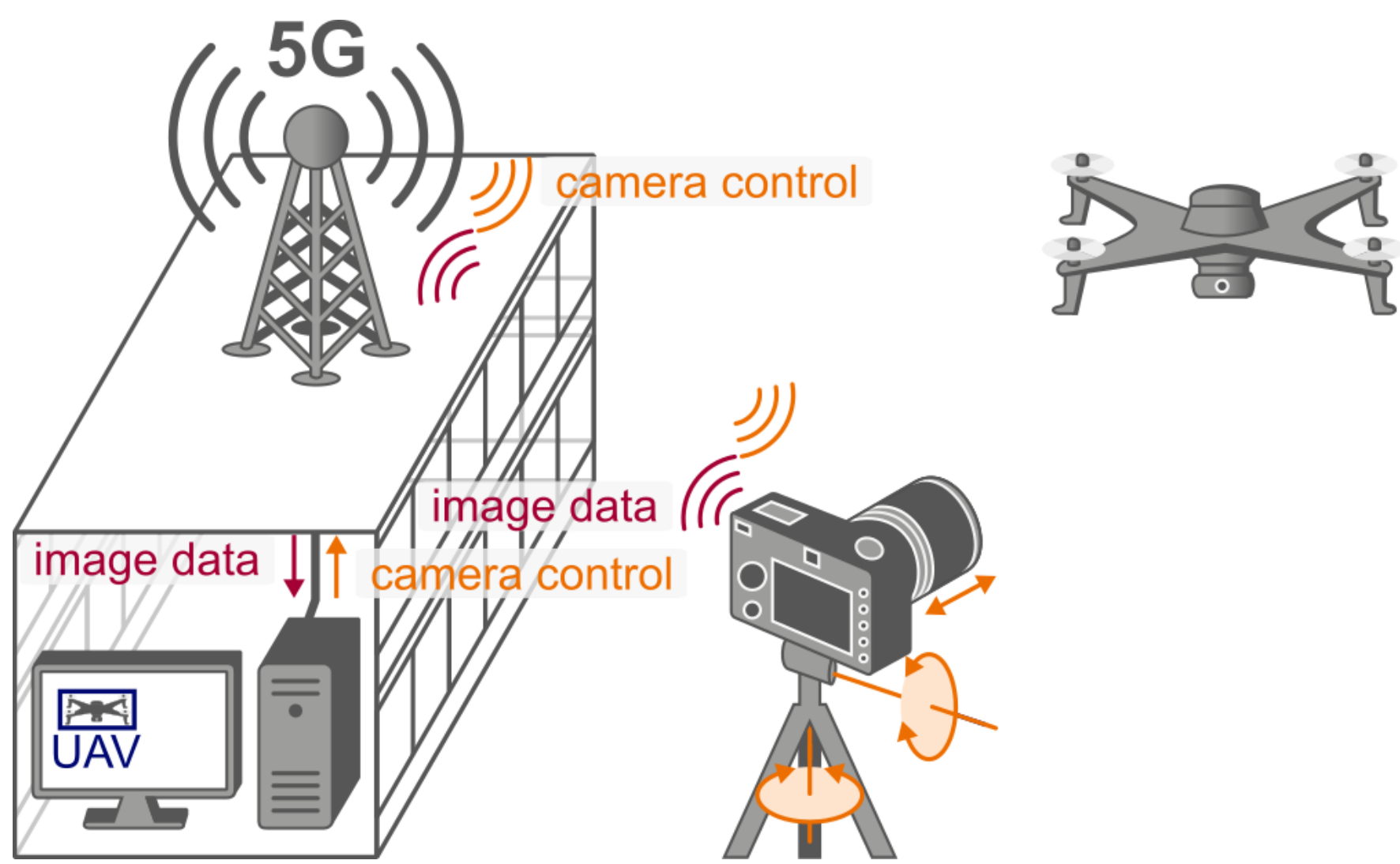
UAV Detection with Color and Infrared Images in the 5G Network

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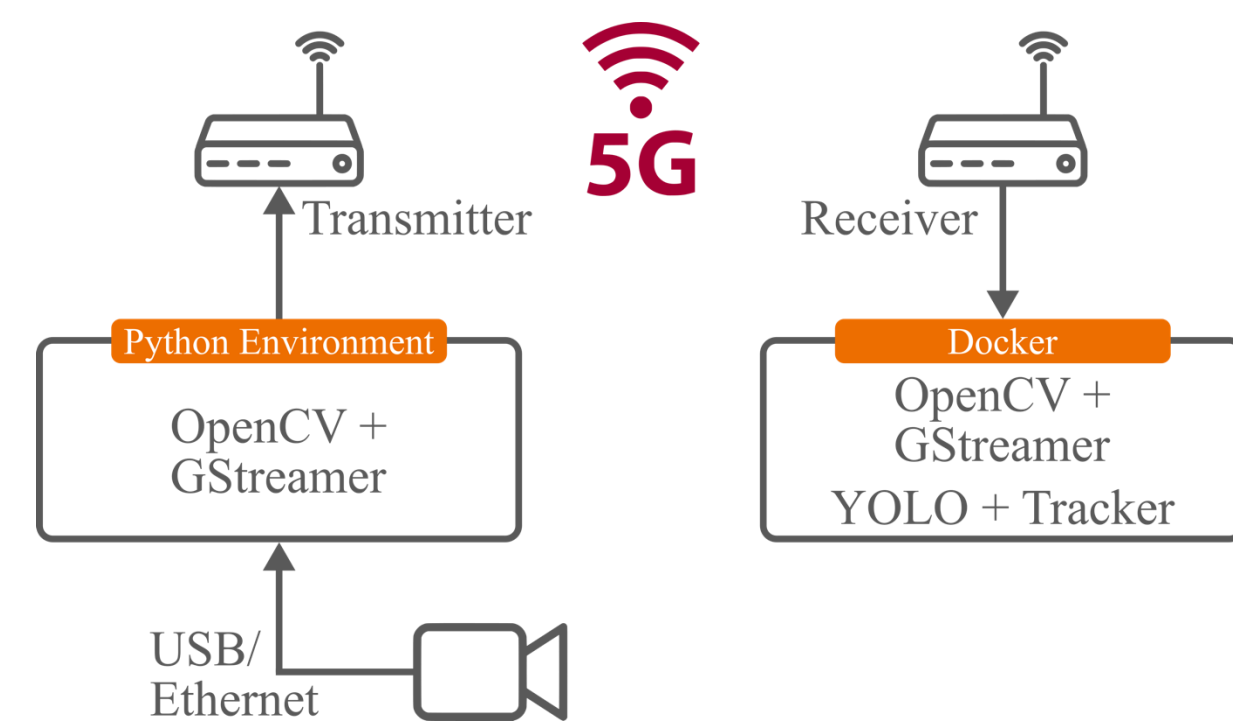
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Project Overview

- Detection of unmanned aerial vehicles (UAVs) on color and infrared camera images through machine learning
- Transmission of image and control data between camera and processing computer via the 5G campus network



Complete System



Dataset

Dataset [1]:

- <https://github.com/purbaditya/Drone-Detection-Dataset>

Three different cameras:

- FLIR Scion OTM366 (640 x 480 pixels)
- InfraTec VarioCAM HD Z (1024 x 768 pixels, 25 – 150 mm)
- Sony Alpha 6000 (1920 x 1080 pixels, 16 – 50 mm)

Four different UAVs:

- Artcopter Raptor
- Holybro X500
- DJI Mavic Pro 2
- DJI Phantom 2

Two different locations:

- Football field on campus
- Small harbor

[1] P. Bhattacharya, P. Nowak, D. Ahlers, and U. Zölzer, „A Dataset of Infrared Images for Deep Learning based Drone Detection“, in 17th International Conference on Signal-Image Technology & Internet-Based Systems (SITIS), 2023.

Features

- PyQt-based graphical interface for image processing and sending/receiving data via UDP
- YOLO in a Docker container with support for GStreamer and NiceGUI/Flask
- YOLO-v7 expanded with modules and cross-correlation-based tracker

Results

Dataset	FLIR YOLO-v7 640 x 640	InfraTec YOLO-v7W6 1024 x 1024	Infrared YOLO-v7W6* 1280 x 1280	Color Image YOLO-v7W6* 1280 x 1280
Number of Parameters	36,50 M	80,90 M	101,20 M	101,20 M
MAP _{0,5:0,95}	0,46	0,57	0,74	0,70
MAP _{0,5}	0,82	0,86	0,97	0,95
Average Time per Image in Milliseconds	18,70	24,30	22,80	24,00



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Digital Sensor-2-Cloud Campus-Platform



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