

Torsten Fiolka

NRW: Vorreiter für Drohnen im Luftraum – 03.02.2026

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# Drohneneinsätze in Katastrophenszenarien



# FRAUNHOFER FKIE

Fraunhofer Institute for Communication, Information Processing and Ergonomics FKIE



Fraunhofer FKIE develops models, methods and tools for **networked operational Command and Control Systems**.

## Research Areas

- Sensor Data and Information Fusion
- Communication Systems
- Human Systems Engineering
- Information Technology for Command and Control
- Balanced Human Systems Integration
- Product and Process Ergonomics
- Cognitive Mobile Systems
- Cyber Analysis and Defense
- Cyber Security
- Usable Security and Privacy

Locations	Wachtberg and Bonn
Founded	1963
Fraunhofer	since 8/2009
Staff	> 500
Budget	> 40 Mio €
Director	Prof. Dr. Peter Martini
Website	<a href="http://www.fkie.fraunhofer.de">www.fkie.fraunhofer.de</a>

# Drohneneinsätze in Katastrophenszenarien

## Motivation

### Drohnen bei BOS weit verbreitet

- Flexibel
- Kostengünstig
- Schnell einsetzbar
- Guter Überblick
- Sofortige Situationsbewertung



# Drohneneinsätze in Katastrophenszenarien

## Anwendungen

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Situationsbewertung bei Großschadenslagen

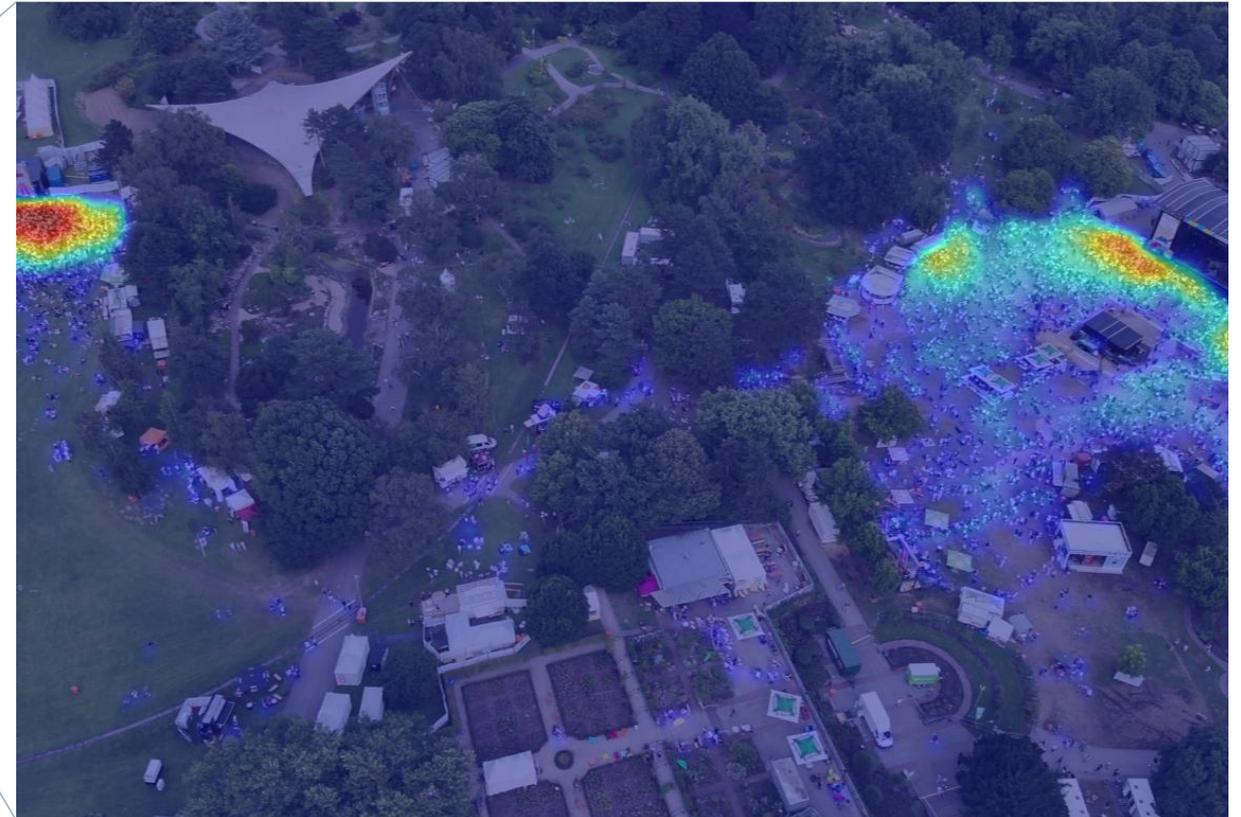
Vermisste Personen

Crowd Monitoring

Bergrettung

Ausbreitung von Feuer und Wasser

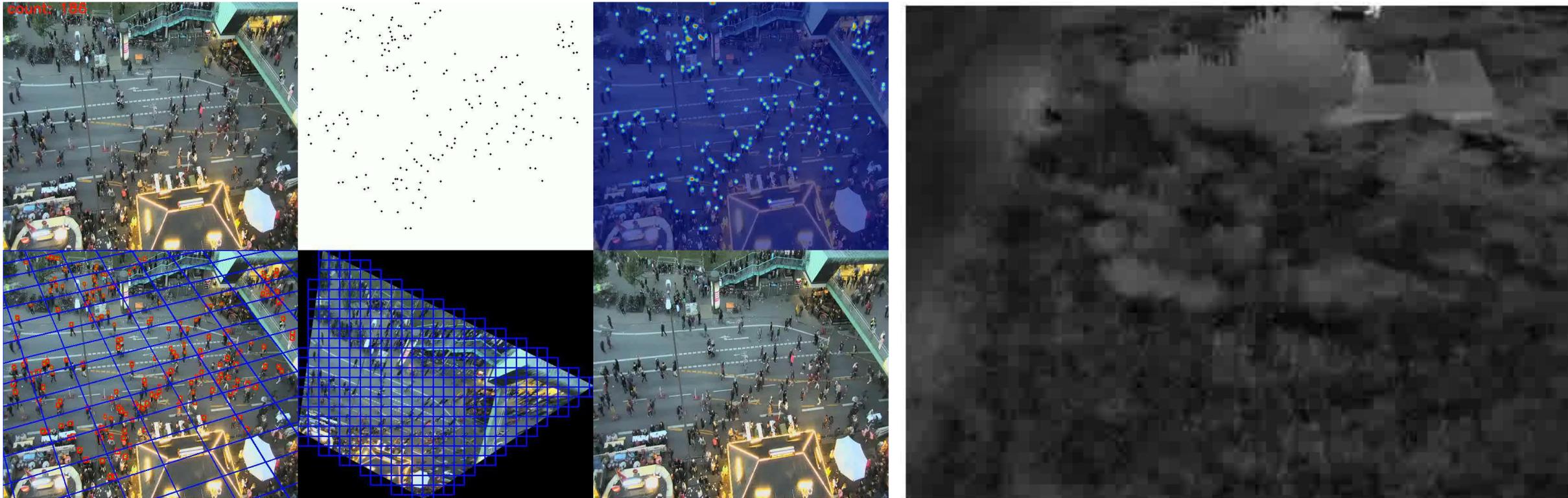
Deichüberprüfung



# Drohneneinsätze in Katastrophenszenarien

## Methoden

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## Hochautomatisiertes UAS für die Aufklärung radioaktiver Stoffe

# Reconnaissance of radioactive sources

## Motivation

### A radioactive capsule is missing in Australia. It's tiny and potentially deadly

  By Heather Chen and Hillary Whiteman, CNN  
Updated 10:35 PM EST, Tue January 31, 2023



Department of Fire and Emergency Services/AP

State authorities in Western Australia are searching for a tiny radioactive capsule believed to have fallen off a truck.

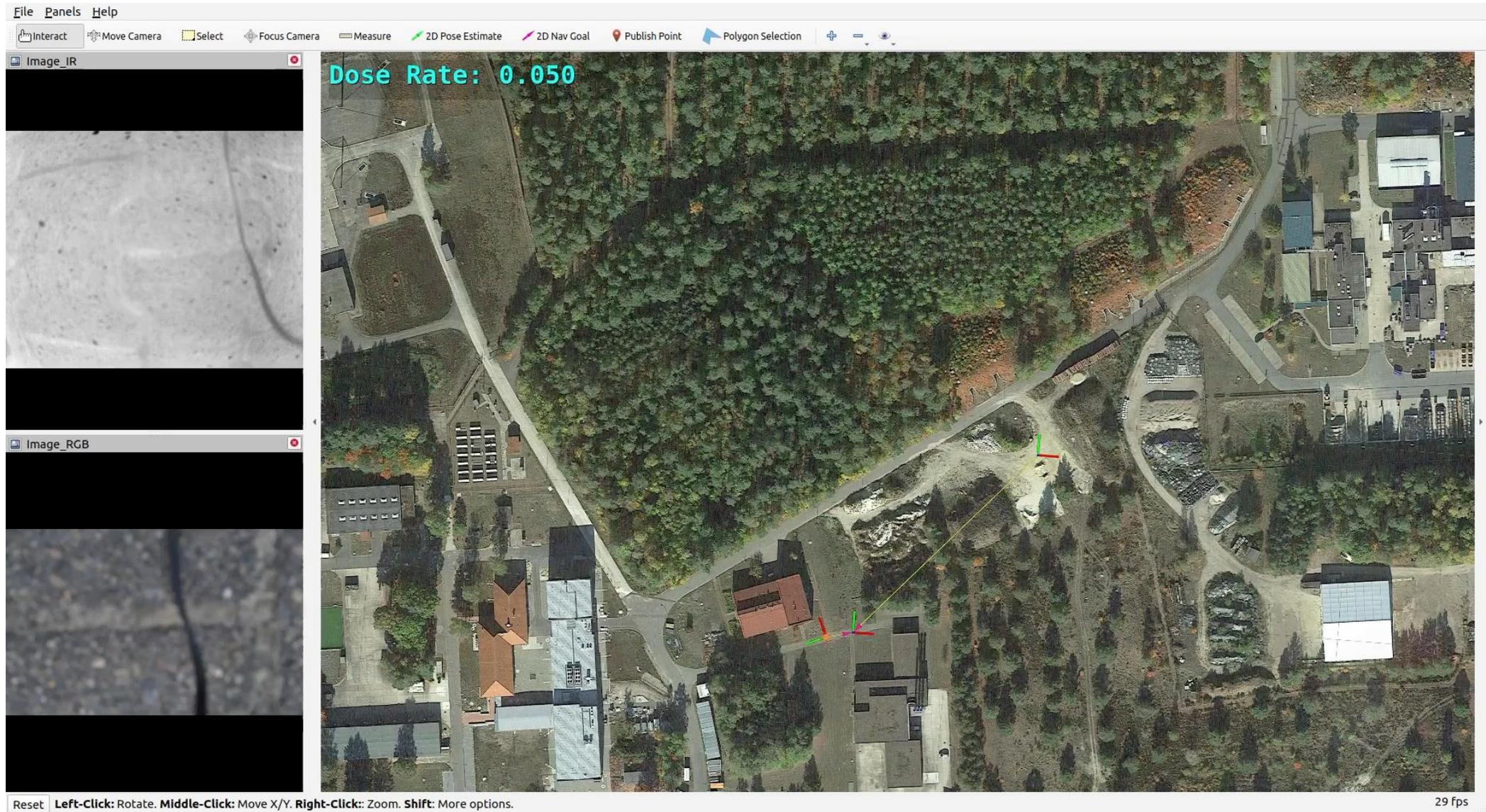
<https://edition.cnn.com/2023/01/31/business/missing-radioactive-capsule-explainer-rio-tinto-intl-hnk/index.html>, 08.02.2023



Rudolph, Claudia, Benjamin Knoedler, and Josef Heinskill. "Comparable data evaluation method for a radio-nuclear sensor when used on an UAV." 2020 IEEE SENSORS. IEEE, 2020.

# HUGIYN

## Systemtest



# Radar Rescue

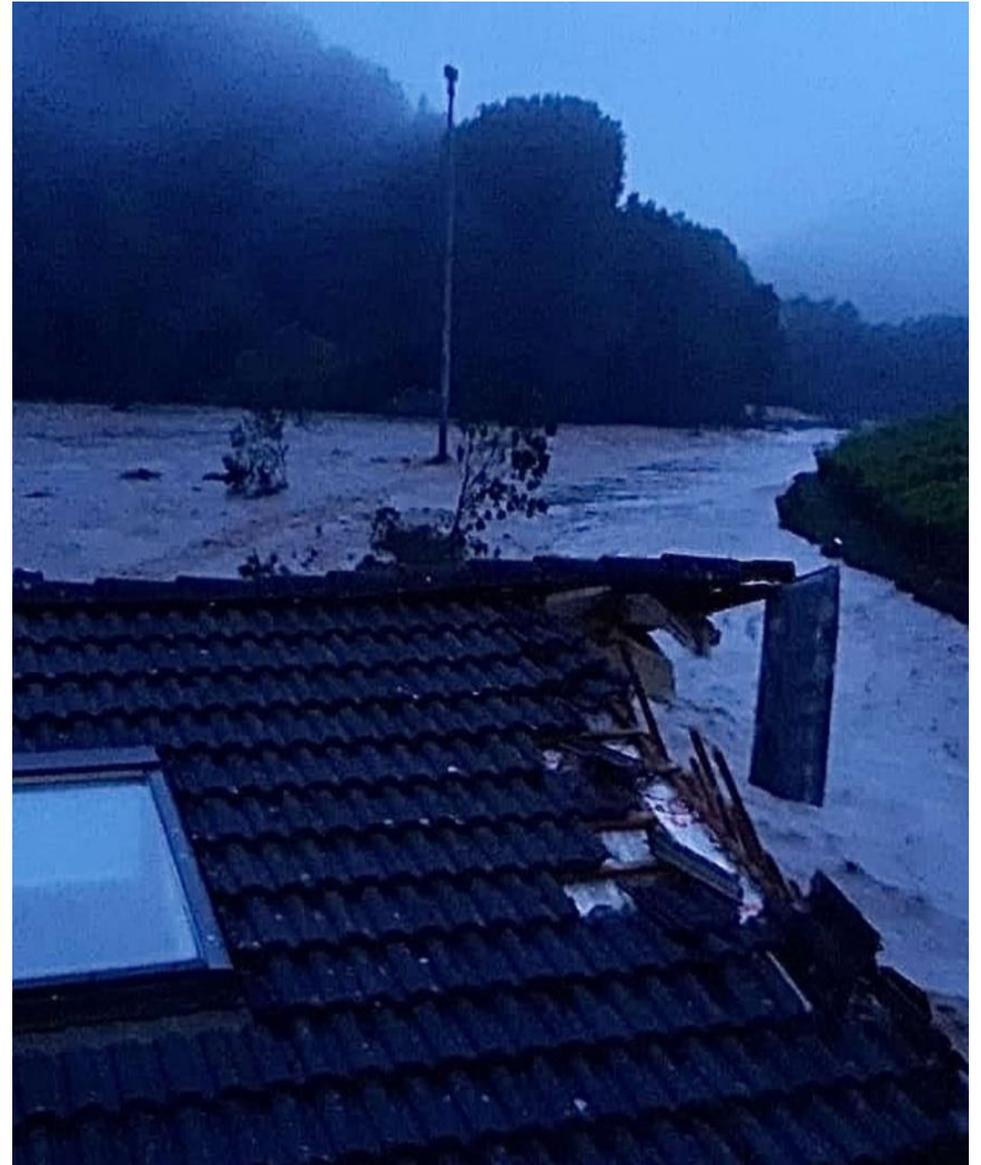
## Motivation

Skills which are required by drones in major incidents:

- Quick terrain exploration in critical situations and poor visibility
- Finding persons which need help, especially in the dark and in smoke
- Automated flight guidance with collision avoidance even at high flight speeds and with reduced visibility

Use of radar sensors on drones:

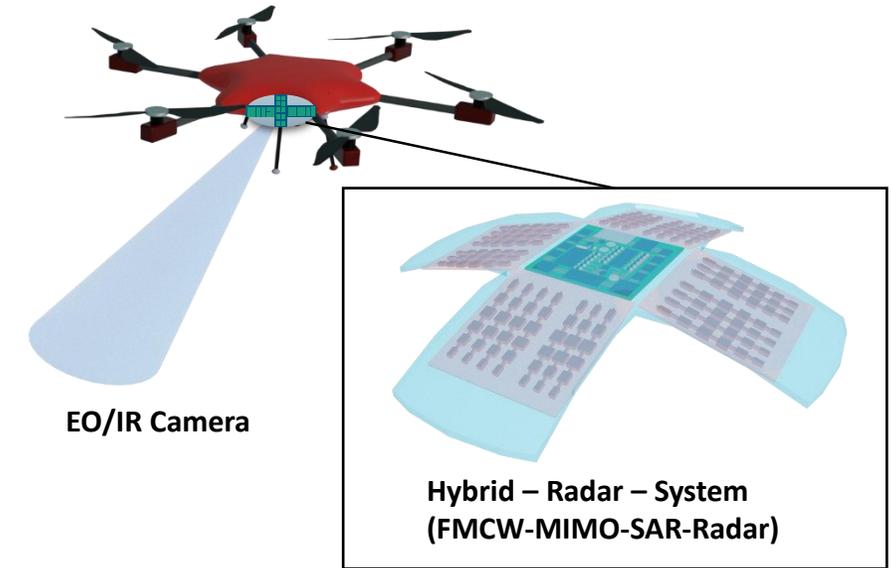
- Independent of external lighting
- Visibility through fog, rain and smoke
- Compensates the limitation of optical sensors



# Radar Rescue

## Innovative radar sensor

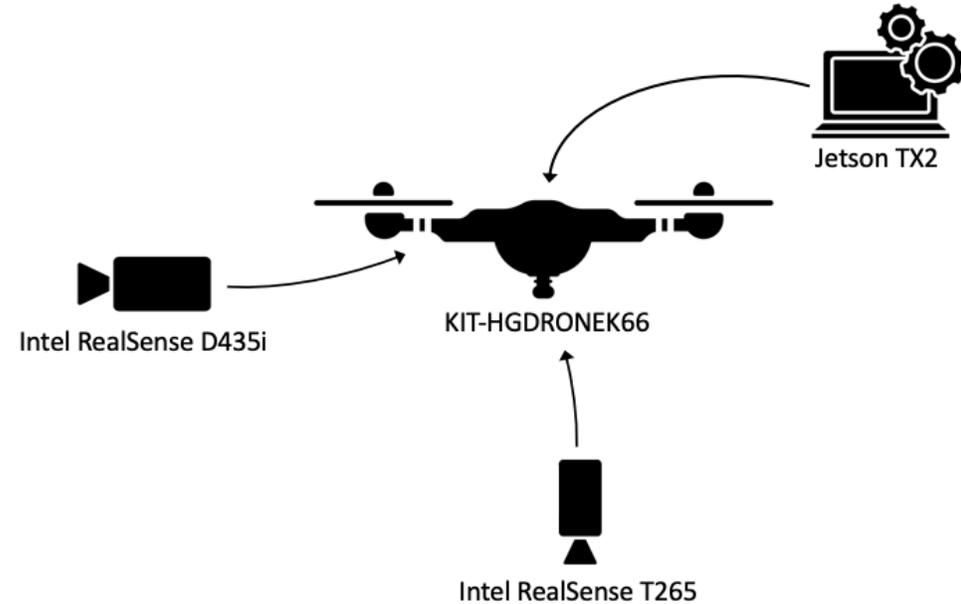
- Support firefighters in search and rescue missions under low visibility conditions due to smoke, fog or dust.
- Reconnaissance of the operation site with a drone equipped with:
  - **Two cameras**
    - RGB : colour information and objects detection
    - Thermal: objects temperature
  - **One radar** with two principles
    - FMCW-MIMO: distance measurement for collisions avoidance
    - Synthetic Aperture Radar (SAR): Imaging radar for objects identification
- Fusion of the radar data with the colour and temperature information from cameras to provide a combined situational awareness of the site and an automated drone navigation



# INSIDE – Einsatz von Drohnen in Innenräumen

## Grundlegender Aufbau

- Flugstabilisierung
  - Lage im Raum über INS
  - Position im Raum über Kamera
    - Visuelle Odometrie
- Wegpunktflug
  - GPS, falls verfügbar
  - lokale Koordinaten
- Wegfindung & Hindernisvermeidung
  - Lokaler Planer (Sensorinformation)
  - Globaler Planer (Karte)



# INSIDE – Einsatz von Drohnen in Innenräumen

## Schleifenschluss



# About UAV DACH

## Our strong community

- European Association for Unmanned Aviation
- Established in year 2000
- More than 260 organization united from 10+ countries
- Heterogene membership: manufacturers, operators, researchers, users
- A remarkably powerful voice for the European drone economy

## Our mission

- Clearing obstacles to commercial UAS operations

## Our goals

- Support a growing and competitive European drone industry
- Enable real world use cases through clear and practical rules
- Build public acceptance through visibility, transparency and safety
- Counter and sanction abusive or illegal drone activities

# Kontakt

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Torsten Fiolka  
Sensordaten- und Informationsfusion

Tel. +49 228 9435-496  
[torsten.fiolka@fkie.fraunhofer.de](mailto:torsten.fiolka@fkie.fraunhofer.de)

Fraunhofer-Institut für Kommunikation,  
Informationsverarbeitung und Ergonomie FKIE  
Fraunhoferstr. 20 | 53343 Wachtberg

[www.fkie.fraunhofer.de](http://www.fkie.fraunhofer.de)