

# CONTACT

## Fraunhofer Institute for High Frequency Physics and Radar Techniques FHR

Fraunhoferstr. 20  
53343 Wachtberg  
Germany

Phone: +49 228 9435-227  
Fax: +49 228 9435-627  
info@fhr.fraunhofer.de  
www.fhr.fraunhofer.de

### Head of the Institute

Prof. Dr.-Ing. Peter Knott (executive)  
Prof. Dr.-Ing. Dirk Heberling

### Speaker Business Unit Security

Dr. rer. nat. Jens Klare  
Phone: +49 228 9435-311  
jens.klare@fhr.fraunhofer.de



Projects:  
<http://www.fhr.fraunhofer.de/security>

# BUSINESS UNIT SECURITY

1 *Modern and compact MIMO radar systems offer valuable support to rescue teams in disaster-stricken areas.*

#### Pictures

© Fraunhofer FHR  
© Shutterstock  
© Uwe Bellhäuser





# ENHANCED SECURITY WITH RADAR

Major events, traffic intersections, public areas – these are places where security is absolutely essential. When researching forward-looking security solutions, Fraunhofer FHR incorporates its long and extensive experience in high frequency and radar techniques in the development of a wide range of different applications.

Police and rescue teams make increasing use of mobile sensor systems when faced with the task of protecting large, complex areas or when they have to deal with hazardous situations. Fraunhofer FHR therefore focuses on the research of compact and autonomous sensor technologies which can provide the emergency personnel with detailed situation images and information – in real time and in all weather conditions. The institute investigates forward-looking technologies and processes within the framework of application-oriented projects. The researchers develop, for example, cost-effective and highly integrated chips on a silicon-germanium (SiGe) basis. In combination with the MIMO principle, it is therefore possible to realize cost-effective and efficient systems that are individually developed for a specific application.

## Smart and mobile

A sophisticated blend of advanced technology and signal processing can be found at the core of each and every radar system. In addition to making images of a scene and detecting as well as classifying moving objects, radar is also capable of recording and analyzing temporal changes, e. g. minimal debris movements. Moreover, radar waves can penetrate clouds, fog, smoke and dust and, in suitable wavelengths,

are also capable of penetrating clothes and suitcases. They are therefore ideal for applications in accident scenes that are difficult to access, in adverse weather conditions as well as in the area of prevention for the detection of explosive devices and weapons. Transportation to the operational site is also unproblematic due to their compact design.

The detection, tracking and classification of UAVs (Unmanned Aerial Vehicles) is a key issue today: UAVs are successfully used for a wide variety of applications, but they also constitute a danger, e.g. command and control or motor failures may result in collisions with humans, transport sites or critical infrastructure. Furthermore, UAVs can also be used for espionage or for attacks with explosives and toxic substances. Due to the rapid increase in the number of UAVs worldwide, early hazard identification and intervention is one of the most urgent security problems that needs to be addressed today.

## Always a reliable partner

The researchers at Fraunhofer FHR, however, also shed light on the positives of UAVs, e.g. utilization as a carrier for sensor systems, and conduct research on innovative concepts and technologies. The first radar systems for UAVs with a load

capacity of more than 5 kg have already been developed by the researchers. Images of urban terrain or disaster areas can therefore be acquired quickly and in a reliable manner.

In addition to radar research, the scientists cooperate with partners from research and industry in the development of complex multi-sensor concepts with a view to providing the best possible security solution for each application. Thanks to excellent networking within the Fraunhofer-Gesellschaft and with other research institutes the world over, Fraunhofer FHR provides the entire chain of security research from a single source. In addition to research and development, the institute also offers its partners comprehensive consulting services on prevention and in emergency situations. The systems developed at Fraunhofer FHR make an important contribution to a secure future.

- 1 MIMO radar demonstrator MIRA-CLE Ka.
- 2 Measurement setup with multistatic radar, optical 3D camera and hand grenade.
- 3 ISAR measurement of a person taken at a distance of 140 m with the ultra-high resolution radar MIRANDA 300.
- 4 Detection of UAVs (Unmanned Aerial Vehicles) with MIMO-Radar.



Speaker Business Unit:  
**Dr. rer. nat.**  
**JENS KLARE**  
 Phone: +49 228 9435-311  
 jens.klare@fhr.fraunhofer.de