

## Radar Warning and Information System (RAWIS)

A „Radar-Warning and Information System for Applications in Disaster Management (RAWIS)“ will be created and built up by a consortium of eight partners in order to support the emergency forces during complex cases of operations. This project is funded by the Bundesministerium für Bildung und Forschung (BMBF) with totally 3.6 mill. Euro within the programme „Research for Civil Security“. Manager of the consortium is the Fraunhofer Research Institute for High-frequency Physics and Radar Technology (FHR), an important project partner of the Center for Sensor Systems (ZESS), hosted by the University of Siegen, i.e. professorship of Prof. Dr.-Ing. Joachim Ender. The BMBF provides financing for two scientific appointments for a period of three years.

In case of earthquakes and similar disasters the emergency forces are subject to serious dangers such as instable mountains of rubble, ruins close to collapse or one-sided broken structures. Workers of rescue teams can be buried and struck by crashing walls during the rescue actions. The information about the danger of collapse is urgently needed in order to decide, whether the emergency forces can approach the remains. Moreover, a dangerous situation should be recognized early allowing to alert the rescue teams immediately.

For such applications the consortium creates an information system, whose core is a Multi-Input-Multi-Output (MIMO-) Radar, which is designed and built up at Fraunhofer FHR. Radar sensors provide very exact measurements of distances and distance changes. The MIMO-Radar is capable of producing radar images in the dimensions distance, azimuth and elevation without any moving or rotating parts.

The work share of ZESS is to design and create software for high-precision data analysis. The radar raw data will be firstly transformed by means of signal processing algorithms into a series of complex three-dimensional images. Through time series analysis and space-time filtering the echoes of the non-moving details are suppressed. The further processing of the echoes is particularly difficult, as the characteristics of instable walls have to be isolated from various interfering signals finally leading to a complete display of dangerous situations in the scene. For that purpose, advanced signal and information processing techniques such as Compressive Sensing are applied.

The project duration will end in 2017 with a final demonstration of the whole system at a THW-test area.



Collapsed structures after earthquake: Typical scenario for application of RAWIS warning system.  
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