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## Radar Imaging for Reliable Safeguard in Harsh Environment

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Optical Sensors have established as an excellent source of information for environment detection and safeguard applications. However, relying on optics make surveillance systems susceptible for visibility restrictions caused by external light sources, dust, smoke or strong radioactive radiation.

Radar imaging can obtain 3D images of the environment not being affected by the visibility as proven for automotive sensing. Additionally, an effective shielding of radar sensors can protect them from external radiation making them a promising option for surveillance in nuclear sites.

Integrated radar technology can provide 3D imaging with modules which can be easily implemented on robotic systems. Such imaging MIMO-radar technology was developed in the Horizon2020 project SmokeBot. A radar module with 24 transmitter and 24 receiver elements was developed for 3D imaging with less than 1 degree angular resolution. However, radar can provide more than images. Tracking the phase of each voxel in the image movement tracking allows to detect vibrations down to the micrometer range. Characteristic movements of persons can be detected as well as vital parameters such as heartbeat or breath. The radar vision system can therefore not only see shapes, but also characterize movement patterns which makes it perfect for security surveillance.

The presentation will introduce radar imaging from comparing the features with optical technology. The multi-channel radar imaging technology (MIMO) is presented in detail including imaging results from the SmokeBot project. The talk will provide perspectives for radar technology for safeguard applications to give an impression of the perspectives of that technology.

### Which "Key Question" does your Abstract address?

TEC2.8

### Topics

TEC2

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