FRIDAY 08:30 – 12:30

Nonlinear Radar: from Concepts to Applications

SF02
EuRAD

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Room: Juliana 2

Conventional radar systems are well-suited for detection and tracking of highly reflective objects whose complex permeability differs significantly from the medium around them. Illuminated by an incident electromagnetic wave such objects reflect back a wave at the same frequency and a scaled amplitude, which is then detected and procced at the radar receiver. Nonlinear radar operates differently. It relies on the nonlinear properties of a target to reflect an electromagnetic wave at a frequency different from that of the illuminating signal. Such a nonlinear response can be enabled by target's inherent nonlinearities, as is the case with most electronic devices that use semiconductors, or by supplying the target with a specially designed transponder tag. One of the main advantages of nonlinear operation is that the background clutter is greatly reduced, since wave reflections from most objects are linear and can be easily filtered out at the receiver. This allows detection of objects that would otherwise be virtually invisible to the conventional radar. It also creates unique opportunities and challenges for system design. Unique properties of nonlinear radar systems makes it an attractive technology for small animal tracking, electronic surveillance, search and rescue, health monitoring, and automotive applications. This SC provides a comprehensive introduction into the field of nonlinear radar including main concepts, design approaches, most recent developments and common application use cases followed by a practical demonstration using a portable X-band FMCW nonliner radar developed at the University of Twente.

PROGRAMME

Nonlinear radar: Introduction and basic concepts

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Design, analysis and characterization of nonlinear targets

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X-band FMCW nonlinear radar: system design and evaluation

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Use case examples and system demonstration

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