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by Alexandra Radics

REF. N. 09_18

Job Description:
Job title: **1 PhD position in Technology**
Name of Organisation: Faculty of Electrical Engineering - Eindhoven University of Technology (TU/e)
Country: Netherlands
City: Eindhoven
Main research fields: Technology
Sub research fields: Embedding Digital Communication in Car Radars

Application deadline: 12/05/2018 22:00 – UTC

Required Education:
Level: Master Degree
Fields: Signal processing for communications, information theory, or a related discipline.

Language skills:
Required languages: English
Level: Good

Required research experiences:
The candidate must be able to bridge the distance between advanced fundamental concepts and theories, practical implementation and evaluation of these concepts.

Application details:
Job description: Future self-driving vehicles will often need to communicate wirelessly with other vehicles, for example to drive cooperatively in a platoon. In such settings safety-critical information (e.g. on obstacles that surface ahead of the platoon) needs to be communicated with high reliability and small latency. The current wireless communication standard, IEEE 802.11p, does not fulfil this requirement in e.g. highly congestive situations.
For cooperative driving, also accurate localization of vehicles is of great importance. For this purpose, vehicles are increasingly equipped with radar systems, e.g. as a parking aid or for automatic cruise control. The main objective of this project is to investigate whether communication functionalities can be added to automotive radar systems, so as to overcome some of the limitations of 802.11p.
Automotive radar systems are currently typically based on frequency-modulated continuous-wave (FMCW) signals in which frequency-modulated pulses (chirps) are transmitted. To use these systems for communication, the frequency modulation of the chirps can be changed or one out of K different chirps can be used depending on the information that needs to be communicated. A disadvantage of these methods is that the achievable data rate is limited. Alternative modulation approaches such as orthogonal frequency division multiplexing (OFDM) permit higher data rates but strongly limit the radar performance (e.g. ranging accuracy, tracking of movements). The key scientific challenge of the project is therefore to investigate how reliable radar communication can

be achieved without degrading radar functionality. This will involve advanced modulation and signal-processing schemes, possibly combined with using multiple radar antennas.
The project will build on an advanced experimental automotive radar platform made available by NXP, one of the global leaders in automotive radar. The project will be carried out in part in the research laboratories of NXP Research, also in Eindhoven, and will be supervised by leading TU/e and NXP experts.
Duration of job: 4 years
Status: Full-time
Salary: A gross salary per month of € 2.222- (first year) as a PhD up to € 2.840- (final year).
Benefits: TU/e offers an excellent package of fringe benefits such as:

- Annual holiday allowance and end of year allowance;
- The possibility of child care;
- reimbursement for moving costs;
- Assistance in finding accommodation.