Centre for Wireless Technology Eindhoven (CWTe)

CWTe 2013 Research Retreat

October 29, 2013

Low-cost single-chip radar design at 60 GHz
Speaker: Paul van Zeijl, CTO, Omniradar

Abstract:

The last frontier to be overcome as predicted by Gordon Moore is the integration of radar systems ("the successful realization of such items as phased-array antennas, for example, using a multiplicity of integrated microwave power sources, could revolutionize radar", Electronics April 19, 1965). OMNIRADAR is a fabless company designing one-chip radars. This presentation will show the design, results and applications for such one-chip radars.

Speaker's bio:

Paul van Zeijl studied analog electronics and IC integration at the Delft University of Technology. His PhD Thesis on fully integrated FM broadcast receivers with on-chip SAW-filters was awarded with the "Vederprijs". From 1991 to 2003 he worked at Ericsson in Enschede, Emmen and Lund (Sweden) on DECT, Wide-Area Paging, GSM en Bluetooth. He was the project leader of the world's first Bluetooth CMOS System-On-Chip (RF, radio, digital-signal-processing, micro-processor and software on one piece of silicon) which was awarded the "best IP/SoC prize" in 2002. From 2003 to 2011 he worked at Philips research on Bluetooth, GSM, polar transmitters for WLAN and integrated radar circuits in deep-submicron CMOS technology. In 2011 he founded OMNIRADAR.

RF in contactless connectivity
Speaker: Gied Habraken, System Architect, TE Connectivity

Abstract:

In the new field of smart connectors, TE is working on Contactless Connectivity. This presentation will give some insights in the use and (system) requirements of the RF part of those connectors.

Speaker's bio:

Gied Habraken received his degree as M.Sc. from Eindhoven University of Technology in 1985, graduating on the Wave propagation through the Atmosphere. Gied worked for over 24 years at Philips (Consumer Electronics, Semiconductors and Lighting) in various fields from digital video processing to power electronics. He worked as development lab manager, program manager and architect and was based in Eindhoven, Taipei and Oss.
Since July 2011 Gied is System Architect in the field of Contactless Connectors at TE Connectivity in 's Hertogenbosch.

Wireless energy transfer into the human body
Speaker: Peter van de Graaf, Kiva

Abstract:

Direct energy transfer in the human body to power and control electronic devices has several advantages over battery powered devices. The devices itself are passive when not actuated, and do not contain batteries.
In this presentation a development will be presented whereby bodily functions which no longer perform adequately, can be powered and operated from the outside through wireless means.

Speaker's bio:

Peter van de Graaf is an independent industrial designer (TU Delft 1987), part owning the product development company Kiva. Over the years he has designed a variety of products for several international companies, establishing 7 patents. After part time coaching at the Technical University Eindhoven, he decided to capitalize on his contacts there to develop a personal project. This presentation presents part of the story, other parts not being ready for publication yet.

Will networks still repel video streams in 2020?
Speaker: Antonio Liotta, Professor, TU/e

Abstract:

Video is by far the predominant consumer of network capacity. Yet, the Internet is a 'video repellent' machine, one that can transfer data but has no notion of deadlines. So what are we getting from modern video services? How can we unveil the intricate relationship between a real-time stream and its delivery system? In which ways does wireless network interference affect our perception of service quality? In this talk I look at some counter-intuitive trends in modern networks, showing why 'higher' stream quality often leads to 'lower' user satisfaction.

Speaker's bio:

Prof. Antonio Liotta holds the Chair of Communication Network Protocols at the Eindhoven University of Technology, where he leads the Smart Networks team. He is editor of the book series Internet of Things: Technology, Communications and Computing (Springer), associate editor of the Journal of Network and System Management (Springer), and serves the editorial board of five more journals. During the last decade, he has investigated topical issues in the area of computer and multimedia networking and is currently studying cognitive systems in the context of optical, wireless and sensor networks. He has five patents and over 160 publications to his credit, and is the author of "Networks for Pervasive Services: six ways to upgrade the Internet" (Springer, 2011).

Distributed beam-forming gain in relation to backbone communication
Speaker: Peng Zhang, TU/e

Abstract:

To achieve good balance between high-speed connection and low-power (green) transmission becomes to an increasingly important issue in the development of new generation wireless telecommunication systems. One of the promising techniques is Multi-Cell Processing (MCP) or Coordinated Multipoint transmission / reception (CoMP) in 4G-Long Term Evolution (LTE) that utilizes cooperative strategies at the base station (BS) level. To make MCP possible, multiple BSs must be connected by backbone links, e.g. optic cables, such that cooperative encoding and decoding can be realized. In previous studies, unlimited backbone capacity is normally assumed, which is not the case in practical design.

In this work, we investigate the relation between the finite backbone capacity and the system performance when the beam-forming provided by distributed BSs is applied to increase the downlink transmission rate.

Speaker's bio:

Peng Zhang was born in Beijing, China. He received B.Sc. and M.Sc. degrees of Electrical Engineering from Huazhong University of Science &Technology, Wuhan, China in 2004 and University of Twente, Enschede, the Netherlands in 2007, respectively. In 2007, he joined a two-year Post-Masters Stan Ackermans Institute program on Information and Communication Technology at TU/e, and obtained his PDEng degree in September 2009.
In October 2009, he started working on the Ph.D. project on the subject of robustness and reliability in low-power wireless communication in the Signal Processing System group at TU/e. His research interest lies in signal processing for wireless communications, especially on the topics of modulation and channel coding schemes for one-hop and multi-hop transmissions. In addition, his research work also involves information-theoretic study for communication networks.

Towards the future of satellite communication: the Focal Plane Array antenna
Speaker: Mojtaba Zamanifekri, TU/e

Abstract:

The explosive growth in TV and internet demands has a dramatic effect on communications and the required bandwidth. Hence, there is a growing need to generate highly directive multiple beams with large signal bandwidth in order to satisfy such broadband multimedia applications. Focal plane arrays are considered as one of the most promising concepts for future satellite communications. It combines the low cost and high performance properties of a standard reflector antenna with electronic beam steering and beam nulling (over a limited range) of a phased-array. In this way, multiple satellites can be tracked simultaneously with a relatively small reflector system.

This presentation will cover the numerical electromagnetic analysis and the design of the focal plane array (FPA) for the Ka band, including the electronic integration.

Speaker's bio:

Mojtaba Zamanifekri was born in Iran, in 1985. He obtained the Bachelor degree in communication systems from Khajeh Nasir Toosi University of Technology (KNTU), Iran, in 2008. He received M.Sc. degree in Electrical Engineering in 2010 from Chalmers University of Technology in Sweden on research on the square kilometre array project (SKA). During this period he also worked part time at Onsala space observatory in Gothenburg, Sweden.

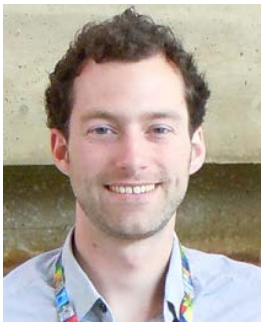
Currently he is working towards the PhD degree in the field of focal plane array design for the next generation of the TV satellites receivers in EM group at Eindhoven university of technology. His research interest includes, phased array antennas, design and modeling of reflector antennas and wideband structures. Throughout his research, he has collaborated with several international and national companies and he completed an exchange project with IMST GmbH in Kamp-Lintfort, Germany.

Optimization of power combining of broadband PA cells
Speaker: Jaap Essing, TU/e

Abstract:

Cognitive radio (CR) systems employ wideband spectrum-sensing for detection of unused spectrum, which sets the need for a broadband power amplifier (PA). Feedback is employed to achieve a well-defined broadband output impedance at active cell level. The performance of power cells, which comprise multiple active cells, scales not linear with the number of active cells. This is due to impact of interconnect and therefore the power cell's performance is investigated as function of the number of active cells. The power combiner, used for matching and combining of power cells, consists of an in-phase current combiner together with a transformer balun. An optimization routine is implemented for this power combiner to obtain the optimum design parameter values for maximizing the amplifier's output power and efficiency. Considering the combined performance of power cell(s) and combiner, it can be beneficial regarding output power and efficiency to use a larger number of power cells with each containing a smaller number of active cells. This is demonstrated with an example case.

Speaker's bio:



Jaap Essing received the MSc degree in electrical engineering from the University of Technology Eindhoven in 2010 and is currently working towards a PhD-degree at the same university. His PhD project is related to structured design of silicon based high power mm-wave power amplifiers. Next to this, related measurement techniques are also of his interest, with a focus on large-signal device verification/characterization and load-pull.