

CWTe 2015 Research Retreat

October 21, 2015

Chickens go wireless

Speakers: Dick van de Ven & Jack Abrahams, Vencomatic Group; Esther van den Dungen, ISA

Abstract:

Since in the EU all chickens that lay commercial eggs are kept in alternative group housing systems, it's interesting for a breeding company like ISA to keep their stock also in alternative systems. This in order to breed the best suitable animals for the alternative housing systems. However, collecting individual data like egg production will be a challenge when all hens are kept together in one system. This project contains the engineering and developing of an individual automatic laying nest including a RFID tagging method that is able to connect the egg with the chicken that produced that particular egg. With this development, a big step can be made in breeding animals for alternative systems in alternative systems.

Speaker's bio:



Dick van de Ven (1988) is a freelance product designer who started working on his own in 2010 under the name Stik Design after finishing the Bachelor program of Industrial Design at the Eindhoven University of Technology. The first project was realized with the price money granted after winning the Social Design Talent Award during the Dutch Design Week. From that moment on he has worked in many different fields either in collaboration with partners or on commission. His work consists of products designed for construction tools, interactive playground equipment, pest control and industrial machinery. Many of the latest projects have been in commission of the Vencomatic Group, with whom he shares an elaborate history.



Jack Abrahams (1965) worked after finishing the H.T.S. Mechanical Engineering (Eindhoven) at several companies like BTM, FMT and Caripro. He started his own company in building special machinery for the food industry (1997) and a watercutting company (2000). After selling the first company he became a senior engineer at the Vencomatic Group (2011) with already several patents on his name. At Vencomatic he works only on special projects like the individual automatic nest project.



Esther van den Dungen – Bloemen (1986) did a BSc. study in Animal Management (2003-2007) followed by a two year MSc study Animal Breeding and Genetics (2007-2009) at Wageningen University. From October 2009 onwards she is working as a geneticist at Institut de Sélection Animale (ISA), the layer breeding business unit of the multi species breeding company Hendrix Genetics, located in Boxmeer. Day to day work varies among others from selecting the pure line animals to improve and optimize upcoming generations, data analyses on commercial products and participating in innovative projects like genomic selection and the individual automatic laying nest project.

The Future of Wireless Communication System Design

Speaker: Gerd Ascheid, RWTH Aachen

Abstract:

The progress in wireless communication systems, in particular in cellular communication, is strongly linked to the progress of (digital and analog) silicon CMOS technology. However, Moore's law is struggling, IC design costs soar, and issues like on-chip power or variability make designs more challenging. The talk will discuss the impact on future wireless systems and platforms. On one hand, cellular standards have become ever more complex and support increasing data rates. Can this trend continue beyond 5G? On the other hand, application specific platforms combining application processing and wireless connectivity for M2M and IoT must be cost and performance efficient, so complexity of the wireless processing must be adequate. Also, issues with on-chip power consumption may require a new design paradigm focusing on getting the maximum number of bits per energy. Issues and possible directions will be substantiated with recent research results of our institute.

Speaker's bio:



Gerd Ascheid received his Diploma and PhD (Dr.-Ing.) degrees in Electrical Engineering (Communication Eng.) from RWTH Aachen University. He worked nine years as Director/Senior Director with Synopsys Inc., a silicon valley based EDA market leader before he joined in 2003 RWTH Aachen University as a full professor at the Institute for Communication Technologies and Embedded Systems. His research interest is in wireless communication and sensing algorithms as well as in application specific integrated platforms, in particular, for mobile terminals and cyber physical devices.

Gerd Ascheid has co-authored three books, published numerous papers in the domain of digital communication algorithms and ASIC implementation and is founder of several successful start-up companies.

Wireless challenges in the 'Ageing in Place' environment

Speaker: Jan Poessé, Philips

Abstract:

With a growing elderly population the wish from many elderly is to stay at home as long as possible. The 'ageing in place' environment has many challenges how technology can help as unobtrusively as possible. Here wireless sensors networks play an important role to assist in monitoring activities. The Internet of Everything approach with cloud based analysis of sensor events makes novel ways of working possible. Within Philips the health continuum plays an important role. We can follow people from a young and healthy age until frail and in need for daily support at home. The new Philips HealthSuite Digital Platform is supporting this need.

Topics being discussed are ageing in place applications like personal emergency response systems, activity of daily living monitoring systems and vital signs monitoring systems. Practical applications for wireless sensors are discussed with state of the practice solutions.

Trends for wireless sensor networks are included, both short range and long range. Practical challenges will be indicated.

Speaker's bio:



Jan Poessé is System Architect in the Personal Health domain of Philips Research. He interacts at the crossroad where connectivity meets user experience.

In his past roles in Philips he worked on factory automation systems and information technology solutions for Philips products and systems, both in Europe and in the US, in specialist, manager and system architect roles. Among the products he worked on are Plasma and LCD TVs, networked audio players, HD media players with internet connectivity and wireless streaming in the home, digital signage and home healthcare products. Recent activities include NFC applications and Indoor Location architecture.

He's currently exploring opportunities for Philips in the ageing in place context.

Cognitive radio – new players, a different game

Speaker: Erik Fledderus, SURF – TU/e

Abstract:

The topic of cognitive radio is already around for a long time. Some researchers have limited their interest to the spectral area, finding white spots of un-used spectrum. However, the field is much wider. The presentation will discuss a number of different application fields where cognitive capabilities may play an important role as a solution to an otherwise difficult-to-solve problem. In addition, we will introduce some interesting notions from the field of game theory, and will illustrate how this field is particularly suited to address the decision problems that aim for local intelligence and ‘super-local’ optimality.

Speaker’s bio:



Erik Fledderus is managing director SURF and part-time professor at TU Eindhoven, in the field of wireless communication. He is the new chairman of the DG Connect Advisory Forum, advising on ICT in Horizon2020 and its use in Societal Challenges. He is one of the founding fathers of “5Groningen”, the Dutch 5G-fieldlab in and around Loppersum, together with KPN, Ericsson, Huawei, Agentschap Telecom, TNO and SURF.

Exploration with bare sensor balls

Speaker: Erik Duisterwinkel, INCAS3 – TU/e

Abstract:

Wireless Sensor Networks (WSN) localization is a hot research topic in indoor, underwater, or autonomous sensing applications. But how much fun would it be if you take away all the basic ingredients like communication, processing power, or even power at all? Some new mapping and exploration applications are for environments that until recently couldn't even be accessed with sensor devices. Deep underground oil reservoirs have awakened the quest to be creative with as little as possible.

In this talk Erik Duisterwinkel will tell about his work on sensor swarm localization using solely ultrasound range measurements between neighbouring sensor motes, but mainly why you would want to limit yourself with constraints.

Speaker's bio:



Erik Duisterwinkel graduated with honours his MSc. Applied Physics at the University of Groningen where he also obtained his BSc. degree. For his MSc. thesis, he developed a Compton X-ray Spectrometer for quality assurance of e.g. medical CT scanners and to aid in the research for radiotherapy. At INCAS3 he got granted the possibility to create and propose his own PhD research, and he is currently working as external TU/e PhD-student in the SPS-group (Prof. Jan Bergmans) to pursue this goal.

Ultra-high Capacity Indoor Optical Wireless Communication using Steered Pencil Beams

Speaker: Ton Koonen, TU/e

Abstract:

Free-space indoor optical communication deploying pencil beams can offer ultra-high wireless capacity individually per user device. By means of 2D diffractive modules, such as a pair of crossed gratings, 2D steering of multiple beams by just tuning the wavelength of each beam can be achieved. The design aspects of an indoor system fed via an intelligent optical fiber backbone network are discussed. First experiments have shown a capacity of 42.8Gbit/s per infrared beam.

Speaker's bio:



Ton Koonen is full professor in Eindhoven University of Technology since 2001. Since 2004 he is chairman of the group Electro-Optical Communication Systems and since 2012 vice-dean of the department Electrical Engineering. Before 2001, he worked for more than 20 years in applied research in industry, amongst others in Bell Labs - Lucent Technologies. He is Bell Labs Fellow (1998), IEEE Fellow (2007), OSA Fellow (2013), and Distinguished Guest Professor of Hunan University, Changsha, China (2014). He also is a 2011 recipient of an Advanced Investigator Grant of the European Research Council. His current research interests are spatial division multiplexed systems, and access and in-building fibre networks, including high-capacity POF networks, radio-over-fibre techniques, and wireless optics techniques.

Interference Suppression Techniques for Millimeter-Wave Integrated Receiver Front Ends

Speaker: Chuang Lu, TU/e – IMEC-NL

Abstract:

In the millimeter-wave (mm-wave) frequencies range, i.e. 30 GHz to 300 GHz, there is abundant spectrum available, which can support various applications, e.g. high data-rate communications, radar and imaging applications. In the future, as the mm-wave systems become popular and the number of mm-wave devices, systems and standards grows dramatically, interference issues will become important for the co-existence of different devices. The goal of this work is to explore methods to reduce interference effects in communication systems in the mm-wave receiver front-ends. First, spatial interference suppression with antenna arrays is studied. Robust spatial null-forming technique assisted with genetic algorithms is developed to selectively reduce the antenna gain in specific directions. As a next step CMOS integrated phase shifters with high resolution are developed for the null-forming phased array. Second, self-interference between Tx and Rx chains is investigated. Specific on-chip interference suppression techniques are developed to effectively reduce the Tx/Rx leakage, including a filtering low-noise-amplifier for satellite applications and a hybrid-transformer-based duplexer for radar applications.

Speaker's bio:



Chuang Lu was born in China. He received the B.Sc. degree from the Zhejiang University, Hangzhou, China, in 2008 and the M.Sc. degree from the Eindhoven University of Technology, in 2010. From 2010 to 2014, he worked as a Ph.D. candidate in the Mixed-Signal Microelectronics group at Eindhoven University of Technology. Since December 2014, he works in IMEC-NL in Eindhoven, as a researcher in the wireless group.