15th FEA research symposium

Faculty of Engineering and Architecture

UNIVERSITEIT
GENT

15th FEA Research Symposium
Zebrastraat, December, 5th 2014

Contents

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Creative Rail Technology for Sustainable Mobility

De Liefkenshoekspoorverbinding in de Haven van Antwerpen illustreert perfect waar TUC RAIL voor staat. Het ingenieurs- en projectmanagementbureau stond in voor ontwerp, studie en beheer van dit megaproject voor rekening van Infrabel, de infrastructuurbeheerder van het Belgische spoorwegnet. Daarmee zette TUC RAIL niet enkel zijn eigen toekomst stevig op de sporen, maar ook die van de Antwerpse haven.

Een toekomst waarin spoortechnologie een belangrijke krachtlijn is in elke doordachte visie op mobiliteit. Flexibiliteit, technische expertise, creatieve oplossingen: dat is TUC RAIL ten voeten uit. TUC RAIL werkt mee aan de ontsluiting van zeehavens (Antwerpen, Zeebrugge), luchthavens (Zaventem, Charleroi) en steden (Spoorbypass Mechelen en GEN-project voor de capaciteitsverhoging van lijnen naar Brussel) en aan grootschalige modernisering zoals die van de seinposten op het Belgische net.

In technologische creativiteit voor duurzame mobiliteit is TUC RAIL tegelijk toonaangevend en baanbrekend. Deze troeven wil TUC RAIL telkens weer toetsen aan nieuwe uitdagingen in België maar ook elders in de wereld. Ruim 1000 gedreven medewerkers kijken er naar uit!

Flexible thinking, reliable results

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Three and a half years ago, Bjorn swapped the academic world for a job at Atlas Copco. Since then he has been working on rotordynamics. "I started as a project engineer, and now I am a project leader. This means I am responsible for disseminating knowledge. I actually act as a kind of consultant, with two important projects: firstly, I assist our Production Department on the engineering of rotordynamics. And secondly, I am responsible for expanding our long-term R&D vision: I develop new simulation tools and new experimental techniques for rotordynamics."

"Atlas Copco builds its machine technology on the improvement of its machines using prototypes and tests. This accounts for Atlas Copco's leading position; competitors cannot simply copy our quality. From day one, I was amazed at how all these machines operate. Rotors rotating at enormous speeds, mere microns from each other: what design ingenuity! My amazement has given way to pure passion. Every day I am trying to unravel the mystery of these machines, step by step."

"Technology at Atlas Copco is very diverse," Bjorn continues. "Yesterday I was testing prototypes, last week I installed a vibration system in China, and next week I'll spend three days testing a new measuring technique. Technology here is very R&D-driven; a perfect illustration of Atlas Copco's long-term vision."

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Preface

Foreword by the Dean of the Faculty of Engineering and Architecture

On behalf of the Faculty of Engineering and Architecture, I welcome all of you at the 15th Research Symposium of our faculty. Fourteen years ago, we organized the first edition of what became a very successful series of PhD symposia in the meantime. That very first edition was for sure an innovative one: with the support of the Dean at that time (Prof. Ronny Verhoeven), the Chair of the Commitee for Scientific Research (Prof. Jan Van Campenhout), and thanks to a great effort of many young researchers of the faculty (especially the members of the Organizing Committee, which was led by current Prof. Luc Dupré), more than 100 researchers presented their work. I still remember the very positive atmosphere of that 'launch edition'.

Personally, I played a small role in the organization of that first edition. At that time, I was chairing the 'OAP' (Dutch: 'Overig Academisch Personeel' - say, the academic staff besides professors). My main contribution was to convince Luc to take the lead, and to motivate the members of the Organizing Committee. Right after the first edition, some of us went to a pub, and we stated 'loud and clearly' that 'a tradition was born'. Did we really believe it? Well, at least we dreamt it.

Did our dream came true? Absolutely, reality even went beyond our dream. Year after year, successful PhD symposia have been organized. They were not only organized to allow our researchers to present their work, they were also organized by them. The latter is, in my opinion, a crucial point: neither the Dean nor 'the faculty as a whole' should steer the symposium organizers. We should only support them strongly, and allow them to be creative while composing the program of the PhD symposium. In other words: they should be free to organize it according to their ideas. So, if this year's edition will be succesful (and I'm sure it will be!), the credits should not go to the faculty, to the Dean or to anyone else in particular. They should go to our researchers in the first place!

Before closing this foreword, I would like to express my appreciation to the Organizing Committee of this year's symposium. They did a lot of work. So, to all who were involved in its organization: many thanks.

This year's program looks just great. I hope that you will have an inspiring day!

Rik Van de Walle, Dean
Faculty of Engineering and Architecture

Foreword on behalf of the Organizing Committee

The 15th edition, a lustrum that makes us proud. Browsing through the booklets of the past editions, lots of evolutions stand out: the name of the faculty has changed a number of times, the symposium was run in multiple language modes, it was staged at different venues. As the dean points out in his proem, however, through its history, this symposium has always been an activity by and for us, the junior scientific staff of the Faculty of Engineering and Architecture.

We as a group have grown both in size and diversity over these 15 years. Some of us are here to get a PhD, some of us are here on exchange, some run very successful R &/or D projects with industrial partners or spin-offs. All of this with a myriad of different types of contracts, intentions and perspectives. Function rather than form is what unites us and, besides teaching, research is the one function that brings us all together. That is why we decided that the poster session should reflect all research of the faculty, not just that labeled as 'PhD-research'. The poster session has become the backbone of the program, intertwined with skills labs and networking breaks. In short: the shrot version of a conference, the ideal way to discover that the next opportunity for an exciting research project is often literally just around the corner.

Through this booklet, we are excited to present you with an overview of the program and a full collection of short introductions to the divers topics currently studied in our labs that will be presented today. Before I invite you to start browsing, I would like to take this opportunity to thank the many partners that made this event possible: our sponsors by their financial support, the team of the Organizing Committee with their enthusiasm and sheer strength of muscle, and most certainly all of you, through your active contributions.

Welcome, thanks and enjoy!

Jelle Laverge
Chair FEA Research Symposium 2014

Programme

12.00 Registration, Sandwiches and Posters
Lounge

13.00 Posters
Expovleugel

Workshops:
Post doc. Post what? - Karen Vandevelde
Room Panamarenko
How to become a Samurai Scientist - Esther De Smet
Room Anneke Eussens
Plan, focus, succeed - time for some serious play - Erik Talboom
Room Honoré D'O
Leadership in times of change - Filip Maertens
Room Thomas Huyghe
The little book of secrets: Parallel sessions for junior researchers
Room Nick Ervinck

15.00 Coffee Break, Networking and Posters
Expovleugel

16.00 Plenary Session - Kris De Decker
Ever considered low-tech?
Room Ned Kahn

17.15 Best Poster Awards & Closing Speech
Room Ned Kahn

17.30 Reception
Lounge

Workshops

Post doc. Post what?

Room: Panamarenko

Organiser: Karen Vandevelde (policy advisor Research - DOZA-ECOOM)

The world is producing more PhDs than ever before. Is it time to stop? More and more PhDs are making the move from academia to industry: are doctorate holders ready? Karen Vandevelde is policy advisor at Ghent University and researcher at ECOOM, and tries to find answers to these types of questions. In this workshop you will match your own (anecdotal) impressions with evidence-based information on the careers of PhD holders in Flanders and abroad. This will help you find out which skills are required in your next position and how you can make the most out of your own investment in your PhD training.

How to become a Samurai Scientist

Room: Anneke Eussens

Organisers: Esther De Smet (senior research policy advisor aka ResearchUGent)

Want to break free from the restraints of your office? Is scientific fatigue quietly sneaking up on you? Does it seem like no one (not even your parents) is losing sleep over your research? Do you have the solution to world peace at your fingertips? Why not become a Ghent University Samurai Scientist! This workshop will take you on a journey of discovery on how you can create societal value to your research and have a real impact. Sensei Esther will guide you on the path of enlightenment in 7 lessons. Discover the wealth of possibilities that the new digital era has to offer. Get to grips with social media and kick some ass with your newfound scientific power!

Plan, focus, succeed - time for some serious play

Room: Honoré D'O

Organiser: Erik Talboom (Co-Learning)

Are you having a hard time to celebrate success in your research? Do you sometimes have the feeling you are not getting anything done? Is it hard for you to focus during those difficult days? You are not alone in this. We will explore topics ranging from personal responsibility, over effective communication to the importance of slack time and how the agile mindset can help you during your research. I can promise you that you will pick up a few practical tips to make your life easier and don't expect a 2 hour lecture, this is a "work"shop. Are you ready to add some gamification to your life?

Leadership in times of change

Room: Thomas Huyghe

Organiser: Filip Maertens (Argus Labs)

A crisis is often called the best time for innovation. However, game changing innovations are never achieved under a lack of adequate leadership. Hierarchical models have continued to break down after industrial revolutions, while democratic and team-models are found too slow to drive innovation. Surviving the many challenges, many organizations face are only overcome by demonstrating bold and true leadership.

While many studies have been devoted to the various aspects of leaderships styles, most remain only viable when applied in stable and artificial environments. Today, true leaders emerge by being fearless about change and having the will-power to execute on their promise.

By taking well communicated, but often brutal decisions, contemporary leaders build thriving companies and continue to disrupt traditional markets while traditional players perish. Nokia losing terrain against Apple, Microsoft against Google and many more illustrate that the key to success is relentless execution of a vision, while employing virtually military tactics to lead your team and company to success.

This workshop will highlight some contemporary and emerging leadership styles and hereby take a unique take on what we can learn from hustlers, startup founders and warfare tactics.

The little book of secrets: Parallel sessions for junior researchers

Room: Nick Ervinck

By FEA post-docs

Sessions for junior doctoral researchers (less than 2 years of experience) are concentrating on the participants' research experiences and the day-by-day problems encountered. Within each parallel session, active participants give a 3-minute presentation to briefly present their research and highlight the issues they are dealing with, in order to trigger the discussion afterwards. We have accommodated each parallel discussion session with a number of postdocs from different departments. Because of their experience in obtaining a PhD, they have the perfect profile to warn starting researchers for the pitfalls they are and will be facing. Their job is to guide the interaction among presenting researchers and the supportive audience that is encouraged to take part in the discussion.

Posters

1. Jonas Anseeuw, Femke De Backere, Femke Ongenae, Stijn Verstichel and Filip De Turck (EA05)

   FallRisk: The Future of Fall Detection

   Fall incidents among elderly are an important problem that impacts their capability and confidence to live independently. Although already proving beneficial, current fall detection solutions are far from perfect. They are often not integrated and also associated with high amounts of false positives such as undetected falls and/or false alarms. Historically, the IBCN research group has been involved in research into using semantic technologies for information integration challenges in niche markets. For this purpose a scalable, extensible and modular reasoning platform, named MASSIF, has been built. The FallRisk project has enhanced the MASSIF platform further, called the OCarePlatform, specifically for the eHealth an eCare domain. The OCarePlatform facilitates the intelligent and coordinated integration, analysis, combination and efficient usage of data gathered by a plethora of sensors. This voluminous data is subsequently given meaning by using semantics. The aim of FallRisk is to automatically and continuously assess the resident's fall risk and filter our false positive fall incidents, as detected by the individual systems. By integrating multiple systems and using semantic technologies, taking the current context into account, we expect a significant decrease in false positives compared to traditional fall detection solutions. This will help elderly people to live longer independently. Finally, real life deployments of the FallRisk system will validate this research.

2. Gaelle Aziz, Nathalie De Geyter and Rino Morent (EA17)

   Incorporation of Amine Moieties onto Ultra-High Molecular Weight Polyethylene (UHMWPE) Surface via Plasma Polymerization of Allylamine

   The need for medical devices i.e. implants used to replace organs for transplantation is currently rapidly expanding. Many of these products are completely or partly (e.g. artificial joints) made of polymers. Ultra-high molecular weight polyethylene (UHMWPE) is the most widely used polymeric material for joint implants because it has a low coefficient of friction, is wear resistant and relatively inert in the body.

   Since the interaction between the biological environment and biomaterial takes place on the material surface, the success of an implant is determined to a large extent

by its surface properties (surface functional groups and their density, and surface topography). However, in contact with biological systems, compatibility of polymers is not always given. Surface engineering of bio-polymers is thus often required to introduce bioactive functionalities (e.g. amine groups) that can increase their biocompatibility without affecting their bulk properties. One way to do this is by coating the biomaterial surface via plasma polymerization of an amine containing monomer.

In this study, amine functionalities were incorporated onto UHMWPE surface via plasma polymerization of allylamine. These coatings were afterwards characterized using different physical and chemical characterization techniques followed by a cell test evaluation.

3. Yu Ban, Johan Bauwelinck and Guy Torfs (EA05)

   High Speed Data Transmission over Electrical Backplane Channels.

   The progressive growth of network traffic in the data center is demanding ever faster chip-to-chip electrical interconnects in network switches and core routers. However, due to the frequency-dependent channel loss, bandwidth limitation in electrical interconnections becomes a main bottleneck for increasing the serial data rate over electrical backplanes. Today, data rates in industrial core routers are typically below 10 Gb/s per lane, which restrict the total capacities of data transmission systems. In this research, we investigate the feasibility for achieving a serial data rate beyond 40 Gb/s in a power-efficient solution, by applying an optimal combination of more efficient modulation techniques, improved backplane PCB materials and backplane connectors, together with faster transmitter / receiver modules. The measured bit error rate shows an error-free, serial data transmission beyond 40 Gb/s across an electrical backplane.

4. Bert Boute (EA19)

   Design of a Breastboard for Prone Breast Radiotherapy

   This research project is collaboration with UZ Gent about the development a new breastboard for better breast cancer treatment.

   A breastboard is a device that is used for the treatment of patients with breast cancer. Prone radiotherapy for breast cancer reduces acute toxicity and lowers the risk of lung cancer induction and cardiac damage.

   The current devices for prone position breast radiotherapy have several limitations; suboptimal design for lymph node irradiation, CT image-artifacts, restriction in the range of good beam directions and partial body support causing localized pain.

   The new breastboard gives better beam access and body support, avoid CT-artifacts and give the possibility to treat the lymph nodes in prone position. Different anatomical positions were explored to find the ideal position. Based on the ideal anatomical position of the patient, several prototypes were made. These prototypes were tested on cadavers, volunteers and patients with different body types to optimize the design of the breastboard. Further research is going on patient position optimization (both functional and comfort), designing a slim and lightweight but also strong breastboard to ensure the biggest possible beam access for irradiation.

5. Stijn Broekaert, Sebastian Verhelst and Michel De Paepe (EA03)

Heat Transfer in Homogeneous Charge Compression Ignition Engines

A lot of research efforts focus on further improving the efficiency, emissions and power output of internal combustion engines (ICE) to propel ever heavier vehicles with lower fuel consumption and emissions. A new type of internal combustion engine is being developed which combines the high efficiency of a diesel engine with the low emissions of a gasoline engine, the homogeneous charge compression ignition (HCCI) engine.

To enhance the development of this type of engine, computer tools are being developed to simulate the engine cycle. An important part in these models is the prediction of the heat transfer to the cylinder walls, which needs to be calculated at every time step to solve the equations of mass and energy and to determine the in-cylinder temperature. Because the auto-ignition reaction is a thermally controlled process, an accurate heat transfer model is essential to obtain correct simulation results. However, current HCCI simulation tools use heat transfer models developed for traditional gasoline and diesel engines, which has been found to be inadequate for both the HCCI combustion and alternative fuels. Hence, PhD research has started at Ghent University with the goal of constructing a heat transfer model based on heat flux measurements on an HCCI engine.

6. Dieter Bruggeman and Michiel Dehaene (EA01)

Electrifying Overmere - The Establishing of the Belgian Utility Systems in a Perspective of Urbanisation

My poster presents the history of the electrification of Overmere from 1900 until the end of the 1920s. At that time Overmere was nothing but a typical, small village in rural Flanders. Yet the history of its power grid makes it possible to reflect on the historical urbanisation process of Flanders and the region's contemporary urban condition.

In establishing and developing the electricity network in Overmere many different actors were involved and each of them operated according to a particular conception of the region, relying on different landscape imaginaries, based on the motives, scale, topologies, etc and specific to that actor. The network can be interpreted as the hybrid result of, or the precarious balance found between different strategies of territorialisation. This balance is not only visible in the physical construction and expansion of the network, but also left its traces in the cultural habits that in time came to surround the network and determined the various ways in which it would come to be embedded in everyday life. Retracing the history of such a dynamic balance, with respect for its aspects of contingency and co-evolution, sheds a light on the different deep-seated landscape imaginaries and varying territorialisations at play in Flanders and the processes of urbanisation in weakly-integrated urban areas such as Flanders.

7. Lukas Buelens, Aditya Dharanipragada, Vladimir Galvita, Hilde Poelman and Guy Marin (EA12)

   Materials for CO2 Capture and Conversion via Chemical Looping Process

   The amount of renewable energy such as wind and solar energy is often variable and unpredictable in time. Because of the high endothermicity of its activation, CO2 is a favorable material for storage of renewable energy. To make use of this property, development of processes for CO2 capture and activation are necessary. Calcium oxide based sorbent materials were investigated for their ability to capture CO2 by a cyclic process comprising a carbonation and calcination step. For its subsequent reduction by a chemical looping redox process, materials based on iron oxide as oxygen carrier are promising. The best performing sorbent material 90CaO-10Al2O3 is stable over 25 cycles of carbonation and decarbonation corresponding with 16 hours at temperatures between 650° C and 800° C. As for iron oxide, the effect of Al2O3, MgAl2O4 and MgO on material stability and activity are addressed. MgAl2O4 promoted iron oxide shows the highest activity and stability. 10Fe2O3-90MgAl2O4 remains stable over more than 60 redox cycles corresponding with 17 hours at 750° C.

8. Amélie Chevalier, Clara Ionescu and Robin De Keyser (EA08)

   Control of Knee Joint Motion in a Dynamic Knee Rig

   The biomechanics of the knee joint have been a focus of extensive research with a twofold reason: Firstly, knee injuries account for 15 to 50% of all sports injuries and secondly, there is a considerable aging in the population which coincides with a high number of knee injuries caused by wear. Total knee replacement, replacing the knee by a prosthesis is a common used treatment. To test the performance of newly designed prostheses, the orthopedic surgeons can use a knee simulator where natural movements are imposed on the prosthesis. Controlling the motions and forces applied is not an easy task to do. Designing a control strategy for this application is the main focus of this research.

9. Pieter-Jan Cierkens (EA01)

   Louis Roelandt and the 1815 Waterloo Competition

   In 1816, the ambitious Belgian architect Louis Roelandt (1786-1864) eagerly participated in a prestigious architectural competition launched by British Parliament to commemorate Wellington's victory at Waterloo. The Waterloo monument - although unexecuted - is considered to be Roelandt's first personal design, following his graduation from the École Spéciale d'Architecture and predating the Ghent Aula.

   This poster proposes both a formal and iconographical analysis of Roelandt's design for the Waterloo monument. First, it is pointed out that the Waterloo monument was conceived as part of a broader layout on the urban level. Second, it is argued that the global design was based upon four specific typologies of (neo-)classical architecture: the Roman circus, the trophy, the mausoleum, and the monumental staircase. Each of these typologies is associated with an essential concept inherent to the Waterloo competition: national unity, military success, remembrance, and Britain's triumph.

An analysis on Roelandt's adaption of these typologies to fit the specific needs of the Waterloo monument, forms the core of the study.

10. Pieter Cools, Nathalie De Geyter, Els Vanderleyden, Peter Dubruel and Rino Morent (EA17)

    Surface Analysis of Titanium Cleaning and Activation Processes: Non-thermal Plasma versus other Techniques

    Titanium is a commonly used material for implant applications, as it has a relatively low elastic modulus, high strength to weight ratio and a good corrosion resistance. The main problem encountered when using titanium in the biomedical field, is the adsorption of volatile hydrocarbons onto pristine titanium surfaces. This contamination layer has detrimental effects on the histological performance of the metal and drastically reduces the implant success rate. In this study a novel cleaning method is developed, based on non-thermal plasma, to remove this adsorbed layer. Its cleaning effectiveness is compared to classic wet-chemical and thermal cleaning techniques, using a variety of surface analysis techniques such as water contact angle goniometry, X-ray photoelectron spectroscopy (XPS) and atomic force microscopy (AFM). Results indicate a 20% higher removal efficiency compared to the wet-chemical methods and no changes to the bulk of the material, which was not the case for the thermal treatment. Plasma treatment times are at least 8 times shorter compared to all other techniques and the lack of solvents gives it a green character. In general, the non-thermal plasma treatment technique can be considered the most compatible cleaning technique for biomedical titanium.

11. Dana Copot, Clara M. Ionescu and Robin De Keyser (EA08)

    Drug Delivery System for General Anesthesia: Where are we?

    The three main parts of general anesthesia: neuromuscular blockade (NMB), hypnosis and analgesia are critically observed and perused from a global objective perspective. The outcome of this review is that quan-tifying and controlling depth of anesthesia is a challenging process and that current bottlenecks are singularly due to lack of direct measurement of analgesia during general anesthesia. Some ongoing efforts are recognized towards the development of a pain transmission model, possibly leading to the breakthrough required for analgesia sensor availability.

12. Bram Corne, Colin Debruyne, Jos Knockaert and Jan Desmet (EA19)

    Stator Current Measurements as a Condition Monitoring Technology

    Condition monitoring of electrical machines has proven to be economically beneficial within industrial production sites. Unexpected failures of IM's can result into abrupt interruption of production processes and high maintenance effort, leading to significant economic and ecologic costs. This poster illustrates the technical implications of Motor Current Signature Analysis (MCSA) as a tool to detect mechanical and electrical errors. Because MCSA has become a valuable tool within the broader scope of condition monitoring during the last decade, a vast amount of new research opportunities can be presented. One of these opportunities is to determine Frequency

Response Functions (FRFs) between the rotor vibrations and the stator current as a function of the operating point of the machine. This allows to estimate the mechanical machine fault vibrations out of the stator current frequency components, independently of its speed and load

13. Stéphan Creëlle, Laurent Schindfessel and Tom De Mulder (EA15)

Open Channel Confluence Hydrodynamics

Open channel confluences form important elements in riverine networks. The complex 3D flow at these confluences is a widely studied topic, since the associated flow features, head losses and mixing properties are of paramount importance for the entire network. This poster focusses on some of these important characteristics in order to obtain a profound understanding of these interesting, complex flow features. This understanding can lead to better design, modeling and maintenance of these open channel confluences.

14. Bruno da Silva, Erik D'Hollander, Dirk Stroobandt and Abdellah Touhafi (EA06)

Exploiting High-Level Synthesis Tools for High-Performance Applications on FPGAs

Nowadays hardware accelerators such as Graphics Processing Units (GPUs) or Field Programmable Gate Arrays (FPGAs) commonly replace multi-cores for high-performance applications. FPGAs are hardware accelerators that provide a programmable and massively parallel architecture, but the degree of freedom presents an additional challenge to create efficient designs in a short time span. While high-level synthesis (HLS) tools reduce the implementation effort, the huge design space exploration (DSE) demands a methodology to exploit the FPGA for a particular application in a reasonable time. In order to evaluate the efficiency of FPGAs, a roofline model was adapted to predict the performance and to quantify the impact of the HLS optimisations on the performance overhead. This model will be further fine-tuned and used to guide the design of selected algorithms for high performance execution.

15. Lode Daelemans, Wim Van Paepegem and Karen De Clerck (EA11)

Interlaminar Toughening of Resin Transfer Moulded Glass Fibre Epoxy Laminates by Electrospun Nanofibres

Thermoset matrix fibre reinforced composites are widely used in industry, due to their light weight, high stiffness and strength. However, these composites still face a serious problem as the thermoset matrix is a brittle material. This can lead to failure of the composite due to relatively low out of plane impacts. It is also the main cause of delamination. Thermoplastic nanofibres have the potential to increase the toughness of composites substantially. Nanofibrous webs can be readily embedded in the composite. They have the large benefit of their inherent nanoscale distribution, which may improve the traditional limitations in (nano) particle dispersion. Owing to their macro-scale length, no health hazards are involved in the production and handling of electrospun nanofibres. Although there are many expected obvious benefits, the research on composites enhanced with (electrospun) thermoplastic nanofibres is very

limited. A thorough understanding of the toughening mechanism is clearly needed. The primary goal of this proposal is to develop highly toughened nanofibre enhanced composite laminates and get a thorough understanding of the toughening mechanism and behaviour.

16. Jan De Bisschop, Ahmed Abdallh, Peter Sergeant and Luc Dupré (EA08)

    Identification of Demagnetization Faults in Axial Flux Permanent Magnet Synchronous Machines using an Inverse Problem coupled with an Analytical Model

    This paper presents an analytical method for permanent magnet demagnetization detection in an axial flux permanent magnet synchronous machine. Firstly, a forward model is built to calculate the three phase terminal voltages with as inputs the three phase currents, the geometry of the machine and the electromagnetic properties of the machine. To model the demagnetization fault, the scalar potential equation is solved. The magnetization waveform is a square wave corrected with magnetization factors which represent the individual magnetization of every magnet. Secondly, the forward model is inverted so that the magnetization factors are computed out of the three phase currents and the three phase terminal voltages. The forward model is validated with experimental data and FEM simulations.

17. Nele De Geeter, Guillaume Crevecoeur and Luc Dupré (EA08)

    Modeling the Response to Transcranial Magnetic Brain Stimulation

    In Transcranial Magnetic Stimulation (TMS), an applied dynamic magnetic field induces electric fields in the brain that interact with the neural system by altering membrane potentials. Gaining more insight with TMS modelling is crucial because in vivo measurements are expensive, difficult, and restricted due to ethical issues.

    We developed a toolbox that models TMS in a case- and subject-specific way from the macroscopic fields to the potentials on microscopic neuronal level. Head models are constructed with realistic geometry, tissue heterogeneity, and anisotropy based on structural and diffusion-weighted MRI (DTI). Moreover, neural pathways are traced using DTI-based tractography. They are modelled as compartmental neurons with passive and active membrane properties. First, the induced electric field distribution is computed using a recently developed electromagnetic solver, which leads to three stimulation mechanisms. Second, the spatio-temporal variation of the membrane potentials is computed along a selection of neurons near the maximal field. It is important to embed realistic tracts since the neuron's orientation is a crucial parameter.

    This toolbox can, for example, investigate the sensitivity of coil positioning, predict the mechanism and initial location of excitation and estimate which pathways contribute effectively to the stimulation. Therefore, it can help you with planning your TMS experiments.

18. Jeroen De Ridder (EA03)

Fluid Flow: A Thread to Nuclear Reactors?

Flow-induced vibrations are an important concern in the design of nuclear reactors. Typically, the occurrence of flow-induced vibrations increases with higher flow velocities, higher fluid density and, in the case of tube bundles, with lower pitch-to-diameter ratios.

A computational methodology has been developed which allows the determination of vibration characteristics of a structure in contact with a fluid flow. The fluid-structure interaction in this methodology is simulated with a combination of computational structural mechanics and computational fluid dynamics. In contrast with more classical descriptions, all fluid forces are taken into account in an exact way (up to numerical accuracy and turbulence modeling errors). Moreover, no empirical coefficients are needed (apart for some rather universal parameters in the turbulence model) for the prediction of viscous forces. This methodology was successfully applied to predict the dynamics of a clamped-clamped cylinder in axial flow.

To compute turbulence-induced vibrations at least the largest eddies should be resolved. This is done in a series of Large-Eddy Simulations, presented on the last part of the poster, in which the power spectral density and the coherence of the forcing function due to turbulence is analyzed.

19. Benedikt De Vos and Birger Raa (EA18)

Horizontal and Vertical Collaboration in Transportation and Inventory

Rising competition and fuel prices force transportation companies to look for more cost-efficient ways to organize logistics. Currently, shippers optimize logistics operations (transportation and inventory management) within the individual company and they treat transportation separate from inventory management. This research increases cost-efficiency of logistics by applying a more collaborative approach in the supply chain. The first kind of collaboration is introduced between shippers and their retailers. This results in more flexible delivery quantities and frequencies, such that inventory and transportation are better coordinated. Secondly, shippers collaborate among each other and join their retailer sets. These two kinds of collaboration result in more efficient routes and volume savings thanks to the geographical proximity of the retailers and the coordination at one stocking point. We look for the shipper coalition with the highest savings potential and guarantee its long-term sustainability by making sure that all partners are better off within the coalition than individually. A fair savings distribution among the shippers ensures that no one has an incentive to leave the coalition. This is obtained by applying cooperative game theory. The Shapley Value allocates the savings based on the marginal expected contribution to the savings of every additional shipper in a coalition.

20. Jolien De Waele (EA12)

Catalyst Particle Size and Reactor Optimization for Industrial Scale Ethanol Dehydrogenation

At present, a transition is taking place in the chemical industry from processing fossil resources to exploiting renewables. New routes for the production of base chemicals from these renewable sources are being explored and optimized. An example of such a new production route is the production of acetaldehyde by ethanol dehydrogenation. Acetaldehyde is a key intermediate in the production of acetic acid, acetic anhydride, pyridine, 1,3-butadiene, ethylacetate, acetone, 2-propanol, butyraldehyde and is currently mainly produced via ethene selective oxidation. Alternatively, as a more sustainable, green option, acetaldehyde could be obtained from ethanol dehydrogenation.

In order to process bio-ethanol, i.e., an ethanol/water mixture, the catalyst stability should not be affected by the presence of water. Hydrotalcite-like catalysts have proven to remain stable in the presence of a high amount of steam. When these are used as a basis for the production of an active catalyst for ethanol dehydrogenation, the ethanol/water azeotrope can be circumvented by the conversion to acetaldehyde. Another advantage for the production of catalysts with a hydrotalcite support is that metal nanoparticles can be obtained on the surface via the diffusion of the metal from the support by reduction. PdZn has proven a highly stable and selective catalyst for ethanol dehydrogenation and it is expected that the production of PdZn nanoparticles with a narrow particle size distribution could further enhance the selectivity towards acetaldehyde. Via catalyst characterization, performance testing and microkinetic modelling of a first generation of catalysts, insight will be obtained in the reaction and guidelines can be proposed for the second generation of catalysts.

21. Colin Debruyne (EA19)

Additional Losses in Stand-Alone Generator Systems due to Unbalanced or Non-Linear Loads

Recent events have resulted in a generalized public awareness of the geo-political scarcity of electrical power. In order to avoid a total black-out for certain critical loads, the use of small scale decentralized back-up power has gained a lot of interest. Although renewable decentralized power might add some degree of continuity, due to its robustness the majority of the back-up power is still produced by combustion engines in combination with an electro-mechanical generator.

If this generator is used to supply power to unbalanced and non-linear loads , the nature of the current will inversely affect the energy efficiency of the electrical generator. Although the additional losses are of electrical origin, this additional amount of active power has to be generated by the prime mover. This implies that, imperfect loading of the machine will result in excessive and possibly avoidable, fuel consumption. Taking into account that the price of electrical energy from a backup generator is still up to 3 times more expensive than power drawn from the dirstirbution grid, this research not only has a high level of challenging technical questions, but also has a high valorization potential.

22. Laurens Delva, Kim Ragaert, Joris Degrieck and Ludwig Cardon (EA10)

Twin-screw Extrusion of Montmorillonite filled Polypropylene: (re)Processing and Characterization

The (re)processing of polypropylene composites filled with montmorillonite clay was carried out by twin-screw extrusion. The mechanical and morphological properties at different clay loadings and different operating conditions were characterized. The influence of the clay loading on the crystal morphology was studied using optical microscopy. It was found that crystal growth was affected by the incorporation of nanoparticles. The reprocessing results indicated that the intercalation of the MMT clay was improved in the first few extrusions, thus improving the mechanical properties. Further Increasing the processing steps lead to a decrease in elastic modulus and impact strength, which was attributed to a reduction in matrix-filler interaction, most probably caused by organoclay degradation.

23. Brecht Devolder, Pieter Rauwoens and Peter Troch (EA15)

Numerical Modeling of Wave Energy Converters

Wave energy from ocean waves is absorbed using Wave Energy Converters (WECs). In order to extract a considerable amount of wave power at a location in a cost-effective way, large numbers of WECs are arranged in farms using a particular geometrical configuration. Interactions between the individual WECs (near field effects) affect the overall power production of the farm. One should avoid, for instance, that one WEC is positioned in the wake region of another WEC. The wave height reduction behind an entire WEC farm (far field effects) affects other users in the sea, the environment or even the coastline.

By using a coupled numerical modeling, I aim to develop a methodology (and a related numerical tool) to answer the fundamental underlying questions on farm design: finding the optimal and cost-effective configurations of WEC farms for power production, and quantifying the related environmental impact. A numerical model, suited for near field effects will be developed and validated. It will be combined with a numerical model suited for predicting far field effects for two purposes: to reduce the computational cost of the near field model and to get more accurate results of the far field effect of WECs.

24. Anastasia Dimou (EA06)

Mapping, Enriching and Interlinking Data from Heterogeneous Distributed Sources

As Linked Open Data is gaining traction, publishers incorporate more their data to the cloud. Since the whole Web of Data cannot be semantically represented though, data consumers should also be able to map any content to RDF on-demand to answer complicated queries by integrating information from multiple heterogeneous sources distributed over the Web or offline. In both cases, the quality and integrity of the

generated RDF output affects the performance of traversing and querying the Linked Open Data. Thus, well-considered and automated approaches to semantically

represent and interlink, already during mapping, the domain level information of distributed heterogeneous sources is required. We propose a uniform way of defining how to map and interlink data from heterogeneous sources, alternative approaches to perform the mappings and methods to assess the quality and integrity of the resulting Linked Data sets.

25. Joachim Druant, Frederik De Belie, Peter Sergeant and Jan Melkebeek (EA08)

    The Electrical Variable Transmission

    An electrical variable transmission (EVT) is an electromagnetic device with dual mechanical and electrical ports. In hybrid electric vehicles (HEV's) it is used to split the power to the wheels in a part coming from the combustion engine and a part exchanged with the battery. The most important feature is that the power splitting is done in an electromagnetic way. This has the advantage over mechanical power splitting devices of reduced maintenance, high efficiency and inherent overload protection. This paper describes the induction machine based EVT in which no permanent magnets are required. It gives a theoretical framework of how the torque on both rotors of the EVT can be controlled simultaneously using a field oriented control scheme. Simulation results are used to vouch the theoretical derivations.

26. Hugo Eguez Alava, Nele De Belie and Geert De Schutter (EA14)

    The Ingress of Chlorides in Concrete under Compressive or Tensile Loads

    One common aggressive mechanism acting in reinforced concrete is steel corrosion. Although it has mostly been studied and analyzed separately it has been observed that loads acting on concrete may modify the deteriorating effect.

    In this research the effect that combined attack provokes on concretes made of ordinary Portland cement (OPC), high sulfate-resistance cement (SR) and blast furnace slag (BFS) cement is investigated. Five mixes were made with these materials, 2 of them using a type 52.5 N (OPC) cement, 2 replacing OPC by 50 and 70 % of BFS and 1 made of 52.5 N (SR) cement type. Cubic samples made with all binder types were exposed to a 3% by weight sodium chloride solution while applying a permanent splitting tensile load corresponding to 50% of their breaking capacity. Prismatic samples (100 x 100 x 400 mm) made of OPC binder were exposed to a 3% by weight sodium chloride solution while maintaining a compressive load equal to 30% of their maximum capacity. After the exposure time, ground layers were obtained from the samples to determine the chloride ingress into the concrete by means of potentiometric titration. To define chloride transport in concrete an error function solution was applied to Fick's second law.

    In terms of their diffusion coefficient and chloride surface concentration in decreasing order of performance were found: the concrete with 70% replacement by BFS, followed by the concrete with 50% BFS substitution, then pure OPC concrete and finally the sulfate resistant cement concrete.

    Load levels of 30% in compression and 50% in splitting tensile testing, improved the resistance of concrete to chloride attack.

27. Sarah Elsaid and El-Houssaine Aghezzaf (EA18)

A Framework for Sustainable Waste Management

The current work presents a general long term vision and framework for municipal waste management in developing cities. The main aim of waste management is to treat, reuse, recycle and recover energy whenever possible. Waste management is a complex task, where different types of wastes are separated and treated differently, whereas the outputs are circulated back into the society. Materials, energy and nutrients can be utilized, thereby reducing the need for virgin production and fuels; minimizing the release of carbon dioxide and other harmful emissions to the atmosphere.

The models built for the current research are based on unsorted wastes, which makes it challenging task. It is different from models surveyed in literature which rely on separation at source. The current work aims at utilizing the concept of supply chain design and management in an attempt to develop a sustainable system for waste management in developing cities. The system aims at estimating the costs required to a have a clean environment and sets a fair cost that a citizen should pay to be able to sustain this clean environment.

28. Yusuf Cagatay Ersan, Nico Boon and Nele De Belie (EA14)

Granular Activated Carbon Protected Bacteria for Concrete Repair

Micro-cracks on concrete structures facilitate the ingress of corrosive substances, thus they are severe threats for embedded steel reinforcement. Current extrinsic methods for repairing cracks are expensive and time consuming. Therefore, self-healing of concrete is favorable. One of the strategies for self-healing concrete is microbial mineral precipitation inside the crack. However, due to its relatively small pore sizes (~0.1 μm) and alkali pH (pH ~13) concrete is a difficult environment for bacteria to survive and to function. Yet, bacteria having certain resilience can be used in concrete with certain protection. In this study, survival and performance of two resilient bacteria, Pseudomonas aeruginosa and Diaphorobacter nitroreducens, were investigated with and without protection in concrete similar environment. Granular activated carbon was used for protection of bacteria. Performances were correlated with microbial nitrate and nitrite reduction. Bacteria incorporated with granular activated carbon could survive at pH 13 for 2 weeks. Additionally, the protection increased the microbial activity 4 and 2 times at pH 7 and pH 9.5, respectively. In conclusion, Pseudomonas aeruginosa and Diaphorobacter nitroreducens could survive concrete similar pH if only they were protected. Granular activated carbon was not only protective in concrete similar environment but also improved the bacterial performance.

29. Ibrahim Gadala and Akram Alfantazi (EA04)

Potentiodynamic Polarization and Anodizing Response of API-X100 Pipeline Steel in Near-neutral pH Groundwater Simulations

The corrosion behavior of API-X100 pipeline steel in near-neutral pH groundwater simulations of different temperatures and anion concentrations is investigated here with potentiodynamic and potentiostatic polarization in the passive potential region (anodizing). Groundwater alkalinity does not necessarily induce passivation, especially at higher temperatures, whereas bicarbonate ion does. Chloride and sulfate both drive anodic dissolution of the steel and breakdown of formed iron hydroxide or iron carbonate passive layers. A synergistic effect of both species is identified. Colder, more bicarbonate-rich environments aid the development of iron carbonate in the primary passive region with anodizing, and can be modeled well with a two time-constant electrochemical equivalent circuit.

30. Julia García González, Desirée Rodríguez-Robles, Andrés Juan-Valdés, Julia Ma Morán-Del Pozo, M. Ignacio Guerra-Romero and Nele De Belie (EA14)

Pre-Saturation Technique of the Ceramic Recycled Aggregates from Construction and Demolition Waste: Solution to the Water Absorption Drawback

The replacement of natural aggregates by ceramic recycled aggregates in the concrete manufacturing has been spreading worldwide as a recycling method to counteract the large amount of construction and demolition waste. Although legislation in this field is still not well developed, many investigations demonstrate the possibilities of success of this trend given that concrete with satisfactory mechanical and durability properties could be achieved. However, ceramic recycled aggregates present a low quality compared to natural aggregates, the water absorption being their main drawback. When used untreated in concrete mix, the recycled aggregate absorb part of the water initially calculated for the cement hydration, which will adversely affect some characteristics of the recycled concrete. This article seeks to demonstrate that the pre-saturation is able to solve the aforementioned problem. In order to do so, the water absorption of the aggregates was tested to determine the necessary period of soaking to bring the recycled aggregates into a state of suitable humidity for their incorporation into the mixture. Several concrete mixes were made with different replacement percentages of natural aggregate and various periods of pre-saturation. The consistency and compressive strength of the concrete mixes were tested to verify the feasibility of the proposed technique.

31. Hajar Ghaem Sigarchian, Wesley De Neve, Erik Mannens and Rik Van de Walle (EA06)

Towards Efficient and Effective Authoring of Digital Handbooks for Personalized and Contextualized Learning

Educators aim at providing learners with digital handbooks that consist of up-to-date content that is both personalized and contextualized. However, manually constructing such digital handbooks for a learner-centered learning context is a time consuming and labor-intensive task: educators need to dedicate substantial efforts to (1) seek

up-to-date content, (2) update the current version of the digital handbook, (3) ideally assign content of a particular teaching subject to an individual learner, and (4) republish an updated version of the digital handbook. Furthermore, present-day learners expect to be able to learn at any time and at any place. In this PhD research, we investigate how to make use of open standards and technologies to create adaptive digital handbooks that facilitate teaching and learning at any time and any place. The investigated standards and technologies are taken from the field of digital publishing, information retrieval, and the Semantic Web. In particular, in this PhD research, we propose an adaptive digital handbook in which learning content can be (semi)-automatically updated from within other heterogeneous open learning objects (e.g., e-textbooks).

32. Dieter Gunst, Kristof Van Der Borght, Vladimir Galvita, An Verberckmoes and Marie-Françoise Reyniers (EA12)

    Assessment of Different Zeolites in Butanol Dehydration

    The increasing commercial production of bio-butanol makes it an interesting and emerging bio-based building block in view of the depletion and increasing costs of fossil feedstocks for the synthesis of butenes (through dehydration) that are widely used in polymers, oxygenated additives and rubbers, ... The dehydration of alcohols can be catalysed by acid sites, of which zeolites are the most promising. Shape selective effects of zeolites can give rise to high yields of butene isomers compared to other types of catalysts and differences in selectivity are found with the use of various zeolites. In this work, butanol dehydration was studied in a high throughput setup on different zeolites to determine the effect of topology, Si/Al ratio and crystallite size. Three interesting zeolites for this reaction where used: ZSM-5, Ferrierite and ZSM-11. To determine these effects different zeolites where provided by Zeolyst and synthesised in lab.

33. Dietmar Hertsen (EA17)

    Theoretical Rationalization of the Propagation Rate Order of 2-Methyl-2-oxazoline and a Methyl Ester Functionalized 2-Oxazoline in Cationic Ring-opening Polymerizations

    "Poly(2-oxazoline)s (POxs) are an interesting class of biocompatible polyamides whose physical and chemical properties can easily be tuned. These polymers are readily synthesized via cationic ring-opening polymerization (CROP) of various monomers, yielding polymers with distinct properties. The characteristics of the resulting pseudo-polypeptides can be altered even further by chemical functionalization of the residue side chains. Because of their versatility and biocompatibility, poly(2-oxazoline)s are candidate drug-delivery systems.

    The CROP propagation step of 2-methoxycarbonylethyl-2-oxazoline (MestOx) was shown to be faster than the incorporation of 2-methyl-2-oxazoline (MeOx) during homopolymerizations. However, the copolymerization of both monomers revealed an increase of the MeOX propagation rate, leading to a rate order inversion. This remarkable behaviour was investigated by means of Density Functional Theory (DFT) calculations.

The presence of nearby MestOx residues in the growing polymer chain close to the cationic reactive center was shown to stabilize the propagation transition state (Figure 1). This explains the faster MestOx homopolymerization and the MeOx rate increase in the copolymerization. The specific interactions between the MestOx residue and the monomer were characterized by Natural Bond Orbital (NBO) interaction energies and Hirshfeld-I (HI) charges. The nucleophilicity of the monomer was increased in the pre-reactive complex due to these reactions. Furthermore, it is indicated that isolated MeOx monomers are more nucleophilic than MestOx monomers, supporting the inversed rate order in the copolymerization.

In conclusion, stabilization of the propagation transition state by interactions between nearby MestOx residues and the monomer, and the higher nucleophilicity of MeOx explain the experimentally observed homo- and copolymerization rate order.

34. Karel Heyse, Karel Bruneel and Dirk Stroobandt (EA06)

Mapping logic to Reconfigurable FPGA Routing

Recently, Field Programmable Gate Arrays (FPGA) are starting to replace GPUs in supercomputers to perform highly parallel computations. FPGAs are a type of electronic chips that can be programmed to implement any digital circuit. The program that is executed on the FPGA is called a configuration bitstream. Building configuration bitstreams is a very time-consuming process.

Parameterised configurations for FPGAs are configuration bitstreams of which part of the bits are defined as Boolean functions of parameters. By evaluating these Boolean functions using different parameter values, it is possible to quickly and efficiently derive specialised configuration bitstreams with different properties and/or functionality. This can make the process of creating configuration bitstreams much faster.

To generate parameterised configurations from HDL a new FPGA tool flow is needed. We focus on the technology mapping step of this tool flow. A new algorithm for technology mapping, called TCONMAP, has been developed that is aware of the parameterisability of the interconnect network and the logic blocks of the FPGA.

35. Thong Hoang Van Duc, Thomas Demeester and Chris Develder (EA05)

Saving Time by Judging more: Exploiting the Benefits of Cheap Approximate Labels

With the ever increasing size and complexity of data collections under investigation in various information retrieval and extraction tasks, supervised learning methods as well as representative evaluation scenarios require correspondingly larger amounts of manually annotated data. Intuitively, we suggest reducing the net annotation cost by exploiting cheap approximate annotations in addition to the original full labels. We address the fundamental research question that originates from that simple intuition: can we reduce the overall annotation cost, using such approximate annotations, without sacrificing the overall annotation quality (i.e., the confidence on the annotated labels)? The presented results on data from the TREC 2013 Federated Web Search

track show that a significant reduction in the total page annotation time can be achieved, even when accounting for the extra effort in obtaining well-chosen approximate snippet annotations.

36. Lennart Joos, Berend Smit and Veronique Van Speybroeck (EA17)

From Accurate Models to Zero Emissions

More than 70% of the world's energy consumption is provided by the combustion of fossil fuels and the inevitable exhaust gas emissions are putting tremendous strain on our environment. Efficient processes to remove hazardous components such as CO2 (responsible for human-induced climate change) and NOx (responsible for smog and acid rain) are imperative to reduce the impact on our planet.

We propose a new upside-down approach for NOx removal and CO2 capture: 'High-temperature Adsorption & Low-temperature Desorption' that enables the validation of residual heat from the exhaust gases. The 'waste' heat is the only energy input during the adsorption step and no additional energy is required during the desorption stage. The processes therefore become much more efficient.

Molecular Modeling provides fundamental understanding of this entropy-driven mechanism and enables efficient prediction of the most promising materials to further investigate the potential of this behavior. At my poster, I will show you how a 'superacid can keep our air superclean' and how 'Carbon Capture Can Curb Climate Change'!

37. Marija Lazova, Alihan Kaya, Henk Huisseune and Michel De Paepe (EA03)

Super Heat Exchangers for ORC Applications

The aim of this work is to show that there are possibilities for increasing the performance of the Organic Rankine Cycle. Supercritical ORC is introduced as promising technology for low grade waste heat recovery (with main focus on industry processes) within temperature range of 90° C and 200° C. The advantage of Supercritical Organic Rankine Cycles (SC ORCs) is a better thermal match between the heat source and the working (organic) fluid temperature profiles in the supercritical heat exchanger. This leads into improvement of the overall cycle efficiency.

Moreover, at supercritical state there are strong variations of the thermophysical properties of the fluid. As the value of the heat transfer coefficient depends on these properties of the working fluid, it is important to study and understand the behaviour of the thermophysical properties of the fluid going from subcritical to supercritical state.

Hence, there are many challenges in the design process of components of the supercritical cycle. For instance, for designing heat exchangers suitable to work at relatively high pressure and temperature and at strong properties variations of the fluid further research has to be conducted. Therefore, for determining new heat transfer coefficients and correlations a test set-up was designed and built.

38. Maarten Liefooghe and Maarten Van Den Driessche (EA01)

Components, Models, and Scenarios - Retracing the Contours for a Museum of Contemporary Art in Flanders

In January 2014 Labo A was asked by the Flemish Government Architect to project scenarios of growth, shrinkage or status-quo onto the existent M HKA Museum for Contemporary Art Antwerp, in order to frame imminent decisions concerning this museum. The scenarios had to take into account the national and international surrounding landscape of museum institutions. Arguing that the museum today, in particular the museum of contemporary art, has lost its once-clear shape both on an institutional and an architectural level, we approached the development and discussion of scenarios first in terms of qualitative profiles and only in the second instance in terms of (corresponding) quantitive parameters.

To this end we developed a conceptual vocabulary but also graphic tools to analyze the existing building and the intitutional profile of the M HKA, and to structure discussions about a project definition. In an idealtypical conception, we distinguished between six potential but clearly different museum models that require different infrastructure. Each idealtypical museum model is composed of a combination of the same three components EXPO, DEPOT and STUDY, but the profile and the balance of the components varies. These models can restructure discussions about museum policy and museum infrastructure.

39. Stavros Lopatatzidis, Jasper De Bock and Gert de Cooman (EA08)

A Pointwise Ergodic Theorem for Imprecise Markov Chains

We introduce the notion of submartingales and supermartingales for Markov chains with finite state sets, when the transition probabilities are imprecise, i.e. lying in intervals.

We manage to prove a game-theoretic version of the strong law of large numbers for submartingale differences and using this we derive an alternative pointwise ergodic theorem.

This theorem states that the limit inferior of the time-average of a possible sequence of values, will be greater or equal to the minimum expectation of the random variable at time n strictly almost surely, as n approaches infinity.

40. Renbo Luo, Wenzhi Liao, Wilfried Philips and Youguo Pi (EA07)

An Improved Semi-supervised Local Discriminant Analysis for Feature Extraction of Hyperspectral Image

Hyperspectral image(HSI) offers much richer spectral information than regular RGB and multispectral images and has pupolar appications. However, the high dimensionality of HS data causes several challenges to HSI analysis. One way of overcoming this problem is to adopt a proper feature extraction method in the classification framework. In real-world applications, very limited labeled samples are usually available, for this reason, semi-supervised methods gained popularity in the machine learning

community. Recently, Liao et al. proposed semi-supervised local discriminant analysis (SELD) for feature extraction of HSI. Their method used only labeled samples in local discriminant analysis method to maximize the class discrimination and used only unlabeled samples in neighborhood preserving embedding method to preserve the local neighborhood information. However, the relationship between labeled and unlabeled samples was not well exploited in SELD. In this paper, we propose an improved semi-supervised local discriminant feature extraction (ISELD) to reduce the dimensionality of the HSI. Compared with SELD, the proposed ISELD builds matrices to model the correlation of labeled and unlabeled samples. We set an edge between labeled and unlabeled samples where an unlabeled sample is closest to the cluster of one labeled class. This way we better infer class separately and preserve local neighborhood information by combining both labeled and unlabeled samples.

41. Mohammad Mohammadi Masoudi, Lieven Penninck, Tangi Aubert, Raquel Gomes, Zeger Hens, Filip Strubbe and Kristiaan Neyts (EA06)

    Polarized Light Emission by Deposition of Aligned Semiconductor Nanorods

    The ability to control the position and orientation of nanorods (NRs) in a device is interesting both from a scientific and a technological point of view. Because NRs exhibit anisotropic absorption, and spontaneous and stimulated emission, aligning individual NRs to a preferred axis is attractive for many applications in photonics such as solar cells, light-emitting devices, optical sensors, switches, etc.

    Electric-field-driven deposition from colloidal suspensions have proven to be an efficient method for the controlled positioning and alignment of anisotropic particles. In literature strong AC fields are combined with casting of single drops and subsequent drying of the solvent, which is not compatible with reproducible and homogeneous deposition on large substrates as required for large size applications such as solar cells or OLEDs. In this work, we present a novel technique for the homogeneous deposition and alignment of CdSe/CdS NRs on a glass substrate patterned with transparent indium tin oxide (ITO) interdigitated electrodes, with a spacing of a few micrometers. This method is based on applying a strong AC electric field over the ITO electrodes during the dip-coating procedure and subsequent evaporation of the solvent. The accumulation, alignment, and polarized fluorescence of the NRs as a function of the electrical field during deposition are investigated. An alignment with order parameter of 0.92 and a polarization ratio of 0.60 has been obtained.

42. Nicolas Mys, An Verberckmoes and Ludwig Cardon (EA10)

    POLYFORCE - Polymers with and without Reinforcements for Part Manufacturing through Selective Laser Sintering

    Selective Laser Sintering (SLS) is an additive manufacturing process that forms 3D objects by selectively fusing together successive layers of powdered material. The advantage of such processes is the ability to form parts with significantly greater geometrical complexity than can be done in more traditional processes. Although SLS is mostly known as a rapid prototyping technique it recently expanded its field to the production of actual end-of-use parts. A stumbling block in the progression of this

technology is the limited range of materials that can be processed. With the current move towards the end-use products the mechanical properties of the produced parts become increasingly important and other materials need to be developed to broaden the application window. This research focuses on finding a general method to process possible polymers into a suitable form for SLS printing using both mechanical and physico-chemical approaches. It is our goal to produce in this way small spherical particles of about 50-90 μm with a good density. Within the scope of processing techniques extra attention will be given to spray drying and solution precipitation techniques next to conventional ball milling as they are most likely to yield the desired particles.

43. Bram Naudts, Sofie Verbrugge and Didier Colle (EA05)

    Standing on the Shoulders of Giants: Software-defined Networking, Network Function Virtualisation and DevOps in Communication Networks

    Network innovation has been driven by virtualization and centralization of network control based on SDN and by network functions moved to the cloud with NFV. Together with the application of DevOps, these principles are considered as promising enablers to reduce costs and spur innovation. The goal of this research is to conduct a techno-economic analysis in the domain of communication networks that estimates the potential for cost reductions and the ability to generate extra revenue via new services. This allows to evaluate the profitability for all actors.

44. Inge Nys, Jeroen Beeckman and Kristiaan Neyts (EA06)

    Liquid Crystal Lasers for Lab-on-chip Applications

    Liquid crystal lasers have great potential as small size, low-cost, widely tunable lasers. Dye-doped chiral nematic liquid crystals are often used as active laser media since a photonic bandgap for visible light is spontaneously formed. I use chiral nematic liquid crystal to develop novel in-plane emitting lasers that can be used for efficient biosensing. These lasers have the potential to achieve low threshold lasing and they are suited for integration in a lab-on-chip environment. The merger of a cheap tunable laser with opto-fluidics technology could allow building a fully integrated platform for biological analyses. The ultimate goal of this research is to demonstrate the integration of a tunable liquid crystal laser with a microfluidic channel. The liquid crystal laser will be used to provide sheet illumination of the sample.

    Compared to the conventional out-of-plane emitting chiral nematic liquid crystal lasers, in-plane emitting lasers with a lying helix structure are more difficult to obtain experimentally. We have investigated different techniques to obtain an in-plane lying helix structure and the advantages and disadvantages are discussed in the poster. We also show some preliminary results for the lasing properties and discuss a few possibilities for future improvements.

45. Iuliia Onyshchenko, Nathalie De Geyter and Rino Morent (EA17)

Propagation and Penetration of an Atmospheric Pressure Plasma Jet for Polymer Treatment

One of the most widely used polymers in our everyday life is polyethylene which has a wide variety of applications in many technological fields because of its excellent bulk properties, good resistance to corrosion and relatively low production cost. Nevertheless, a major disadvantage of polyethylene is its low surface free energy resulting into poor adhesive properties. Since polyethylene tubes are very important and widespread products in everyday life, the interest to improve the surface characteristics of these tubes is significantly growing. Currently a lot of publications deal with the problem of inner tube sterilization for medical applications and a large interest is shown in a treatment with an atmospheric pressure plasma jet. The choice for this type of source originates from its possibility to selectively treat parts of a substrate, there is no limitation to flat and thin samples and they are easily integrated into existing production processes. However, the question on how the plasma jet itself penetrates inside tubes still remains largely unanswered. To cope with this lack of information, this work intends to investigate the processes of plasma propagation inside small tubes.

46. Francesca Ostuzzi, Jelle Saldien, Lieven De Couvreur and Jan Detand (EA19)

Open-ended Design: the Role of Digital Technologies, Co Creation and Knowledge Transfer in the New Landscape of Industrial Design

This poster illustrates the Landscape where Industrial Design acts. The Landscape is described by using two variables: volume of production and products features. It is composed by 9 areas, different in terms of possible design strategies and actions.

Particular focus is appointed to the emerging area, the New Landscape of Industrial Design, where Digital Technologies (for example: 3D Printing, Laser Cutting), Co Generation processes/spaces (for example: FabLabs, Living labs) and Knowledge Transfer (for example: Instructables, Workshops) play a central role in the creation of Open-ended Product Designs.

An Open-ended Product Design (OePD) is characterized by its flexibility, that is the ability to be changed thanks to the context (of production and/or use). An OePD also stimulates a process of active involvement of end-users in the final design and production phase. In this new scenario we also highlight the ability of producing in small series and low volumes.

Practical examples are described in the poster, with the purpose of sketching roles, implications, strength and weaknesses of this emerging scenario.

47. Maximi Papathanasiou (EA01)

Tracks of Experience: Curated Routes in Space

Today the majority of travelers are experienced users of the cities who want to move beyond the 'tourist bubbles' and feel a sense of belonging to a place. Our project proposes an alternative to the existent tourist itineraries. We investigate a methodology of engaging individuals to the spatial and conceptual value of leftover locations; neglected urban zones, suburban and sprawl areas, horizontal metropolis and 'nebulous cities'. We approach space not as a blank page with abstract coordinates, but rather a charged place filled with meaning. By emphasizing the 'chronotopic' value of a route we highlight places that do not usually attract the interest of visitors. The users of the 'Curated Routes' prototype could experience different narrations of an area by selecting the filter that express better their mood and interests. Once the visitor has selected a 'chronotope' filter, a three-step process will be generated in order to synthesize the personalized route that maximizes his satisfaction. Overall goal of the project is to outline the conceptual guidelines of the 'Curated Routes' prototype that could be later used for the development of the informatics model.

48. Geert Peeters, Charlotte Debbaut, Pieter Cornillie, Thomas De Schryver, Diethard Monbaliu, Wim Laleman and Patrick Segers (EA15)

A Multi-Level Computational Model to Characterize the Hepatic Circulation in Human Cirrhosis

Aim: Liver cirrhosis is a chronic liver disease affecting both liver architecture and perfusion by the formation of fibrosis, regenerative nodules, shunt vessels etc. This process impairs the hepatic circulation and may elevate the intrahepatic vascular resistance (IVR). To gain more insight in the hemodynamic consequences of cirrhosis, multiscale models were developed.

Methods: Vascular corrosion casting and multi-level micro-CT imaging (up to a 1.7 μm resolution) were applied to an excised human cirrhotic liver. Image processing enabled 3D reconstructions of the cirrhotic microcirculation which formed the basis for computational fluid dynamics (CFD) simulations. In addition, a simplified 3D CFD model of the cirrhotic macrocirculation was constructed to analyse the effect of the presence of regenerative nodules (lacking sufficient perfusion) on IVR.

Results: The macrocirculation model indicates that regenerative nodules may severely increase the IVR, with a low (x 1.5), moderate (x 2.9) and steep (x 17) increase corresponding to a nodular volume percentage of 30%, 60% and 83%. In contrast, the micromodels suggest that local compensation mechanisms are present to counteract the macroscopic IVR effect. For example, shunt vessels and dilated sinusoids decreased the IVR by a factor 30 and 5.5 respectively, compared to normal liver tissue.

49. Maria Adelaide Pereira Gomes De Araujo, João Feiteira, Sandra Van Vlierberghe, Peter Dubruel and Nele De Belie (EA14)

Development and Characterization of Polymers for Self-healing of Cementitious Materials

Due to its high compressive strength and relatively low cost, concrete is the most commonly used construction material. However, cracking is very common in concrete as a consequence of its relatively low tensile strength. Since these cracks can provide entry channels for potentially aggressive liquids and gasses which can result in concrete deterioration, a mechanism for self-healing is very beneficial for the durability of concrete.

In the present work, we aimed at evaluating the potential of crosslinked hydrogel to seal dynamic concrete cracks. For this purpose, the elastic healing agent was manually injected into concrete cracks possessing a width of 200-300 μm. The crack width was increased up to 150% to evaluate the polymer elasticity and its strain capacity. Interestingly, a strain of at least 150% could be achieved as no differences were observed in the microscopy images of the healed crack after each stepwise elongation.

The results indicate that the hydrogels developed show favorable mechanical properties and are thus promising candidates to be applied for self-healing concrete.

50. Huu Ha Giang Pham, Peter Van Impe, William Van Impe, Patrick Mengé and Wim Haegeman (EA15)

Liquefaction Assessment of Crushable Sands by Shear Wave Velocity Measurements

In many studies, liquefaction resistance of sandy soils is correlated to the small strain shear wave velocity (Vs). This makes Vs an indispensable parameter in liquefaction assessment. However, for calcareous sands, selecting representative samples for the field conditions is difficult; therefore, almost all measured soil parameters (post-seismic properties) do not reflect exactly the soil state before seismic loading. In some cases of dynamic loading, a change in grain size distribution (GSD) of soils, especially for calcareous sands might occur. Moreover, many of these sand types behave differently from silica sands owing to their mineralogy, particle characterization, soil skeleton, and the continuous changing of particle size. Although a lot of correlations between cyclic resistance ratio (CRR) and Vs were discussed and proposed by many researchers, the existing correlations do seldom predict the behavior of calcareous sands due to the issues aforementioned.

51. Manoj Prasad (EA06)

Switching of Charged Inverse Micelles

Non-polar liquids with added surfactant are relevant for electrophoretic displays. The electrical behavior of such non-polar surfactant systems is governed by the presence of charged inverse micelles (CIMs). The electrodynamics of surfactant such as polyisobutylene succinimides (PIBS) CIMs has been studied extensively and understood well for polarizing and relaxation voltages. However, the electrodynamics of CIMs

for reverse voltages is rarely studied. In this work, we studied the switching characteristics of PIBS's CIMs for reverse voltages, using transient current measurements. We report, switching of CIMs for small reverse voltages (up to10 V) can be understood well on the basis of drift and diffusion model. However, for the large reverse voltage (|V| >10 V), the maxima in the measured transient current occurs earlier than the simulation. We attribute this to electrohyrodynamic (EHD) flow in the liquid, due to which CIMs move faster than expected. With transient trajectories of tracer particles, the occurrence of the EHD flow in the liquid for reverse voltages has been verified.

52. Lina Rambausek, Sheilla Odhiambo, Carla Hertleer and Lieva Van Langenhove (EA11)

Unraveling the Mystery of Textile Electronics: 5 Unbelievable Ways to integrate Intelligence into your Clothing

Imagine, you would like to make a shirt which lights up in the dark. You already know that the electronic function giving light can be fulfilled by light emitting diodes (LED). The challenge is to combine the two components: the textile and the electronic function.

And here the trouble starts and introducing intelligence into your clothing and accessories is a major driver of developments in the field of smart textiles and wearable electronics. The understanding and definition of smart textiles is still complicated and difficult to grasp.

The field of smart textiles is a multidisciplinary one. Therefore, it is necessity to establish a common terminology supporting the technical development of smart textiles - not only in research but also with a commercial interest.

We investigated different levels for integrating active electronic functions or components. Based on the different levels of textile integration, a classification scheme could be developed.

A set of five levels has been established to allow the comparison of technologies. The levels concern the integration of (1) rigid components into textiles by design or tailoring, (2) rigid components added onto textiles by for example gluing, (3) flexible components added-on or built into the textile, (4) the electronic function directly on the textile substrate (textronics) (fabric, yarn/fiber, material), (5) the entire smart textiles system on level 4 (incl. interconnections/connectors)

The Smart Textile Group (Department of Textiles, UGent) conducts research on today's highest level of integration, i.e. the active electronic function is generated directly on textile substrate (textronics). Fibrous transistors, textile batteries and antennas are examples for our research work which will be shown at the FEA Research Symposium 2014.

53. Alireza Rasekh, Peter Sergeant and Jan Vierendeels (EA03)

A Parametric-CFD Study for Heat Transfer and Fluid Flow in a Rotor-Stator System

The numerical modeling in this paper relates to the average convective heat transfer in disk-type electrical machines. The simplest configuration of the discoidal system has been considered, where the rotor-stator system is enclosed in a cylindrical cover. The surface temperature of the stator, the rotor and the cover are kept at 120° C, 100° C and 50° C, respectively. Multiple reference frame (MRF) and sliding mesh (SM) techniques are employed to model the rotor-stator interaction. The heat transfer rate and flow characteristics are calculated when the rotational Reynolds number, Re=WR2/u, ranged from 2.50*104 to 2.50*105 and the air-gap ratio, G =s/R, ranged from 0.00667 to 0.02667. A new cooling solution is then investigated. In fact, the presence of holes in the rotor is examined, and it is found that the addition of the holes in the rotor is advantageous for the heat transfer as air is allowed to enter into the air-gap through the holes, resulting in a net radial flow in the gap region between the rotor and the stator. For the case investigated, the maximum increase in the heat transfer for the stator surface was up to 25%.

54. Desirée Rodríguez, Julia García-González, Andrés Juan-Valdés, Julia Ma Morán-del Pozo, M. Ignacio Guerra Romero and Nele De Belie (EA14)

Effect of Mixed Recycled Aggregates from Construction and Demolition Qastes on Mechanical Properties of Concrete

The use of construction and demolition waste in concrete manufacture allows the concept of sustainability to be included in the construction industry and helps to alleviate both the large consumption of natural resources and the high generation of waste. The present research assesses first the suitability of two different mixed recycled aggregates as coarse aggregates for concrete according to the code on structural concrete (EHE-08) and subsequently evaluates the effect of their use as a partial (50%) replacement of natural coarse aggregate (gravel) on the mechanical properties (compressive strength, splitting-tensile strength, flexural strength, stressstrain curves and modulus of elasticity) in concrete mixes of 25 MPa strength grade. The secondary material characterisation shows that, although presenting promising properties in terms of granulometry, particle size, density and shape, the recycled aggregates should be pretreated in order to comply with the quality of fines and water absorption, and their resistance to fragmentation limits their application in concretes mixes with a strength grade below 30 MPa. Regarding the results of the tests performed on the hardened concrete, the values obtained suggest that the use of mixed recycled aggregates is feasible, but at the expense of minor losses of the mechanical characteristics.

55. Seyedeh Sahel Sahhaf, Dimitri Papadimitriou, Wouter Tavernier, Didier Colle and Mario Pickavet(EA05)

Experimentation of Geometric Information Routing on Content Locators

Information-centric networking has been proposed to achieve efficient and reliable distribution of content. We propose a model to assign content locators to content names. Information routing decision is made based on geometric routing using the assigned locators. We demonstrate on the iLab.t virtual wall the successful operation of the proposed scheme and the gain of using content locators on capacity utilization by means of caching.

56. Bart Scheerlinck and Peter Sergeant (EA08)

Losses due to Transverse Flux in Axial Flux Permanent Magnet Synchronous Machines

A 2D and 3D non-linear and anisotropic FEM model at various frequencies and induction levels is used for calculating the iron losses in axial flux Permanent Magnet Synchronous Machines (AFPMSM) due to transverse magnetic flux (fringing flux). The models are experimentally verified in the linear case with a rigid set-up without moving parts, which is a part of an AFPMSM with adjustable air gap. Classical, hysteresis and excess losses are calculated using a loss model fitted on the basis of Epstein frame measurements.

57. Caspar Schreuer, Toon Brans, Stijn Vandewiele, Filip Strubbe, Kristiaan Neyts and Filip Beunis (EA06)

Advanced Optical Trapping Electrophoresis

Charging mechanisms of particles in liquids are little understood. A relatively new method, Optical Trapping Electrophoresis (OTE), is designed to measure the surface charge of colloidal particles. OTE can measure with elementary charge resolution. This is a distinct quality that can not be achieved with any commercially available devices. This property allows OTE to study the charging dynamics of particles in suspensions.

In this work, OTE will be further developed by working on three key features. The first is to counter electro-osmosis, a liquid flow that disturbs charge measurements. The next step is to extend the technique to Holographic OTE (HOTE), which enables the orientation control over non-spherical particles. Finally, the setup will be adjusted to work in liquids such as water.

Through the combination of its dynamic aspects and its ultimate charge measurement resolution, OTE shows to be a powerful measurement technique. Further development will enhance the scope of applications to non-spherical particles and polar liquids.

58. Berg Severens and Dirk Stroobandt (EA06)

A better Optimized and Predictable FPGA Tool Flow

FPGA (Field Programmable Gate Arrays) are digital programmable chips. They are a great way to design applications within a relative short time interval and a low NRE. These chips are built of a matrix with logic blocks. Between these blocks there is an interconnection network. Both the logic and interconnection elements can be configured by the user. In this way the customer can implement any desired HDL code onto the FPGA.

Mapping the HDL code onto the FPGA is done by using the FPGA tool flow. This tool flow contains five different steps. The first step is mathematically, where the following steps are taking more and more architecture details into account. In each step a certain criterium is optimized which is an estimate of the final goal (clock frequency, area and/ or power). Because of the limited accuracy of these estimates the translation problem occurs: in every step we make suboptimal choices and these suboptimalities are added.

Therefore it is important to have accurate criteria. In technology mapping (the second step) we created a new criterium which performs better than the state-of-the-art criteria. We want to use this to optimize the algorithm and to give hardware designers early feedback about timing results.

59. Sachin Sharma, Didier Colle and Mario Pickavet (EA05)

Enabling Prioritization over the Internet

The explosion of Internet traffic coupled with the massive increase of equipment performance and the effect of competition have reduced the price of delivering traffic over the Internet significantly. This downward effect is continuing and is leading to lower profit margins for network infrastructure owners while web companies (e.g., Skype, Google, Netflix, Akamai, Facebook etc.) who send a large amount of traffic over the Internet tend to have high profit margins. Many infrastructure owners are seeking to rectify such imbalance, as they bear the massive cost (operational, maintenance and infrastructure cost) of the network infrastructure. We propose a prioritization scheme for the Internet so that everyone such as infrastructure owners, web companies, and users can take profit for the traffic delivered over the Internet. In our scheme, the network infrastructure owners dimension the network into high-priority and best-effort, and charge the users and web companies for the services they received over the Internet.

60. Hao Shen, Wim Haegeman and Herman Peiffer (EA15)

Design of a new Instrumented Dilatometer

The flat dilatometer, DMT, is a stainless steel blade having an expandable circular steel membrane on one side and is introduced by S. Marchetti in 1980. The Marchetti DMT measures a series of pressures at prescribed displacement of 0.05 mm and 1.1 mm at the center of the membrane. In addition, it is assumed that the pressure- displacement relation is linear provided that the displacement is below 1.1mm, and then

linear elasticity theory is employed to interpret the soil stress- strain behavior during the membrane expansion. A ne instrumented DMT was under construction to fulfill the following criteria: (a) Instead of a 60mm diameter flexible steel membrane, a 40mm diameter rigid piston is employed; (b) A porous element is located at the centre of rigid piston together with an internal pore pressure measurement system; (c) An expansion of at least 3mm should be possible; (d) Automatic Data Acquisition is achieved by the NI DAQ and Labview with PC; (e) The dimension of the blade should as same as the Marchetti DMT; (f) Displacement controlled mode and pressure- controlled mode can be both achieved by pressure regulator with Labview programming. (g) The results should be repeatable and accurate.

61. Louis Sileghem and Sebastian Verhelst (EA03)

Alcohol and Driving: Always a bad idea?

Fossil fuels are still the main energy source for transport but these fuels are not going to last forever. Moreover, the concentration of the sources is geographically unevenly distributed and frequently located in politically unstable regions. Also the growing world population, the increasing energy demand per capita and the large greenhouse gas emissions, which contribute negatively to the environment make the need for alternatives undeniable.

Liquid alcohols, methanol and ethanol in particular, are attractive alternatives fuels. They are liquid and thus are largely compatible with the current fuel and distribution infrastructure and are easily stored in a vehicle. They can be used in the current vehicle powertrains with little or no changes. Methanol and ethanol are also miscible with gasoline which enables a soft start to an alternative fuel economy in contrast to other alternatives. Research showed that light alcohols have the potential to increase the engine performance and efficiency over that achievable with gasoline and that gasoline-ethanol-methanol blends formulated with a high proportion of methanol can be cheaper than gasoline on a cost per unit energy basis. As a result, an affordable alternative fuel technology could actually be preferable financially for the customer without any government subsidy to encourage its uptake.

62. Michael Sluydts, Jan Vanhellemont, Veronique Van Speybroeck and Stefaan Cottenier (EA17)

Ab Initio High-throughput Study of Extrinsic Point Defects in Si and Ge

Due to the increased availability of computational resources, previously time-consuming first principles calculations can now be performed in large numbers. As a consequence, automated high-throughput screening methods have appeared, capable of generating extensive datasets, directly from first principles. Datasets of this size can be difficult to obtain experimentally due to the time and effort involved in lab work. By examining them, global trends and interesting cases can be identified which serve as a starting point for further research.

In the present work we applied a high-throughput methodology to study dopant behavior in the prototype semiconductors Si and Ge. Calculations were performed for 73 dopants from H to Rn at 6 common positions in the Si and Ge lattices, always

with full geometry optimization. The lowest-enthalpy positions were identified and compared to experiment, providing a means of validation. The same dataset was then used to determine vacancy trapping enthalpies. By formulating specific criteria for a given application, the dopants that lead to optimal vacancy traps could be selected. Such knowledge is of direct relevance to industrial processes such as Czochralski growth, where suitable vacancy traps can suppress void formation.

63. Wouter Soenen, Johan Bauwelinck and Xin Yin (EA05)

PAM-4 Transmitter IC for Long-wavelength VCSEL Links in Data Centers

Cloud services such as computing and storage along with social media and high-definition streaming have become a necessity for the end user, but a big challenge for the provider. Data centers are therefore stacked with thousands of servers that communicate with each other through a majority of optical multi-mode fiber cables (MMF). The increased demand of network bandwidth leads to an expansion of data center infrastructures (e.g. Google, YouTube and Facebook) that require higher data rates over longer distances. However, modal dispersion in MMF puts a hard constraint on this trade-off and limits the data rate to less than 10 Gb/s when covering lengths beyond 1 km. Transitioning to single-mode fiber (SMF) offers a way out, but currently requires power-hungry lasers.

We have designed a transmitter integrated circuit (IC) optimized for long-wavelength vertical-cavity surface-emitting lasers (VCSEL) to enable high-efficiency SMF links. The data rate vs. distance constraint is further relaxed by implementing feed-forward equalization (FFE) and four-level pulse amplitude modulation (PAM-4) on chip. Although error-free transmission after 1 km at 28 Gb/s reveals the potential of the presented link, efforts will be made for the next generation of the transmitter to surpass these results.

64. Frederik Soetaert, Guillaume Crevecoeur and Luc Dupré (EA08)

Magnetic Nanoparticle Hyperthermia: A new Frontier in Cancer Treatment

Cancer accounts for 8.2 million deaths this year. Traditional therapies are often not effective. Hyperthermia is an alternative therapy that exposes biological tissues to elevated temperatures for a period of time. Heat is known to induce cell death and can thus be used as a local cancer therapy. Magnetic nanoparticles generate heat when subjected to an alternating magnetic field. Our goal is therefore to perform fundamental research on magnetic nanoparticle hyperthermia and to translate this from bench to bedside.

Theoretically, we study the heat distribution based on the Penne's bioheat equation. Particular attention is paid to the spatial distribution and the relaxation losses of the magnetic nanoparticles. Moreover, numerical models are developed to predict the thermal damage. These tools are useful to optimize several nanoparticle properties, e.g. radius, in order to obtain a complete destruction of the target region. Furthermore, we experimentally study the spatial distribution of injected MNPs in LAPC-4 tumors. This information acts as an input for our numerical model and increases the accuracy of our predictions.

Experimental studies in mouse models also indicate that magnetic nanoparticle hyperthermia enhances the effect of radiation therapy. The combination of both therapies is thus an extra treatment modality for cancer patients.

65. Jonathan Spruytte (EA05)

Model for Software Cost Estimation in an ICT Environment

Estimating the effort of a software project is important for both the price setting and the internal time planning of a company. In practice, this kind of estimations is usually made by a single person, the expert, who estimates the project effort mainly based upon his or her own experience. Estimation errors of up to 70% or even 100% occur and lead to large cost overruns, lower code quality or even cancelled projects. Within this research project, a formalization of this expert methodology will be proposed; a method which will take into account both functional and non-functional requirements of the project as well as company-specific data such as the size and experience of the development team and data from previous projects. This goal of this newly estimation method is twofold. On one hand, there's an upfront-estimation, which will allow for an early-stage effort estimation of the project. On the other hand, there's an inline method which will allow estimating the remaining effort for any point in time, during the course of the project.

66. Willeke Staljanssens, G. Strobbe, Leen De Taeye, Dirk Van Roost, Kristl Vonck, Robrecht Raedt, Roel Van Holen, Stefaan Vandenberghe and Pieter van Mierlo (EA06)

Source Reconstruction of the P300 Event-related Potential as a Biomarker for the Efficacy of Vagus Nerve Stimulation in Epilepsy

Vagus Nerve Stimulation (VNS) is an alternative treatment for medically or surgically refractory epilepsy. For about one third of the treated patients, the amount of seizures is reduced with more than 50%. However, the working mechanism of VNS is still not fully understood. Therefore it is currently impossible to predict the patient's response to the treatment. Research on the mechanism of action is needed to find biomarkers indicating a positive response on the therapy. The anti-epileptic effect of VNS is linked to the norepinephrine level in the brain, which modulates the P300 component of the event-related potential. This potential can be measured using the auditory oddball paradigm. In this research we explore whether and how EEG source reconstruction of this component can help to identify a biomarker for the efficacy of VNS therapy. When we compare responders vs. non-responders, we find significant differences in brain activity in the left hippocampus, fusiform gyrus and insular lobe, indicating a possible biomarker for the efficacy of VNS.

When comparing the two conditions: VNS turned off vs. VNS turned on, we find indications that the limbic system is involved in the mechanism of action of VNS.

67. Lucas Sterckx, Thomas Demeester and Chris Develder (EA05)

Applying Semantics for Automatic Knowledge Base Population

Today a large proportion of information available on the web originates in an unstructured form, primarily text. Information Extraction aims at transforming unstructured documents into structured information like relations between entities, which can be stored in Knowledge Bases.

Knowledge Bases are useful in many fields of Artificial Intelligence, applications today include the structured results in Google's search engine and IBM's question-answering system, Watson.

The traditional approach for Information Extraction predicts a fixed set of predefined relations with high accuracy, these extractors require manual annotation or distant supervision. Distant supervision is a way of generating training data using existing knowledge bases, however generated training examples often include false examples of relations being expressed. Open approaches differ from the traditional approach by allowing to discover non-predefined relations, which helps handling the heterogeneous types found in such diverse content as Web data. However structuring the extracted relations (as in the traditional approach) is important to facilitate the access to information for end-users.

In this research we seek to add meaning to phrases expressing relations by applying semantics. Doing so, we can solve many challenges, including the filtering of training-data generated using Distant Supervision and the combining of the traditional and open approaches for Information Extraction.

68. Margo Steuperaert (EA06)

Mass Transport during Intraperitoneal Chemotherapy in Tumor Nodule: A Computational Model

The intraperitoneal (IP) administration of chemotherapy is an alternative treatment to conventional chemotherapy for patients with peritoneal carcinomatosis. During IP therapy, the peritoneal membrane and embedded tumor nodules are brought into direct contact with the cytotoxic solution, aiming for a higher intratumor drug concentration. Currently, there is no widespread use of this promising therapy because of the limited drug penetration depth in the tumor tissue. To study the influence of different parameters governing the drug transport during IP chemotherapy, a 3D computational fluid dynamics (CFD) model was created to represent a single tumor nodule (isotropic porous medium) and its simplified vascular network. A parameter study was performed in which the drug diffusivity, tissue permeability and mass fraction of chemo at the tumor edge were varied. The model is able to simulate the response of both local and systemic drug concentration profiles to changes in different drug and tissue properties during IP chemotherapy. This approach leads to more insight in the therapeutic relevance of the different parameters.

69. Sharmin Sultana, Arne Vandenbroucke, Christophe Leys, Nathaile De Geyter and Rino Morent (EA17)

Air cleaning by combined use of Cold Plasma and Catalysis: Abatement of Chlorinated VOCs

Trichloroethylene (TCE) is a typical chlorinated volatile organic compound (VOC) that is toxic and has carcinogenic/mutagenic effects to human. Non thermal plasma (NTP) i.e. cold plasma technology has attracted growing interest of scientists over the last two decades due to the distinctive characteristic of being able to provide a highly chemical reactive environment (e-, O*, HO2*,OH*, N2*, O3 ...) to decompose VOCs at ambient conditions. Additionally, the abatement of low concentrated VOCs (up to 1000ppm), feasible to indoor air treatment application, is challenging for conventional methods because when VOC concentration decreases, the cost per unit pollutant treatment becomes higher in comparison to NTP. However, the formation of unwanted byproducts, a low mineralization degree and a relatively poor energy efficiency remain bottlenecks to scale this technique to industrial size. To overcome these issues a novel technique has been investigated which combines the advantage of rapid ignition from NTP and high selectivity from catalysis. This hybrid technology leads to increased energy efficiency and suppressed formation of unwanted byproducts. This study is devoted to investigate the opportunities of a plasma-catalytic system with CeO2 downstream (i.e. PPC-Post Plasma-catalysis) for the removal of TCE from air, in terms of abatement and COx selectivity at lower energy cost.

70. Reza Vafadari (EA10)

Crack Propagation in Additive Manufactured Ti6Al4V: Experiments and Simulations

Additive manufacturing method is a popular method for the layer-wise production of 3D metal components using the drops of molten metal materials. Since there is no material to be machined or cut away, very complex geometries can be produced with the minimum material consumption . The aerospace industry has a great interest in these manufacturing technologies, because they offer the opportunity to build very light components directly from the CAD drawings with the minimum material consumption. This layer-wise manufacturing process is the main source of the difference of the mechanical properties of the produced components compared to the conventional methods. Therefore the open question for the industrials sectors is reliable method for assessing the mechanical properties and more importantly the fatigue and fracture behaviour of the additive manufactured materials. This open question is investigated in the current research work for developing method for assessing the structural integrity of additive manufactured materials. To this end, the properties and behaviour of fatigue crack propagation in additive manufactured Ti6Al4V is investigated. Two manufacturing methods which are selected laser melting and laser metal deposition methods are considered. The crack propagation is investigated by performing experiments and developing simulation models. The results are compared against the crack propagation properties in conventional Ti6Al4V alloy and the validity of numerical methods are studied for different considered cases.

71. Arthur Van Camp (EA08)

Choice Functions as a Tool to Model Uncertainty

Our aim is to develop a tool for modelling different types of assessments about the uncertain value of some random variable. One well-know and widely used way to model uncertainty is using probability mass functions.However, such probability mass functions are not general enough to model, for instance, a total lack of knowledge. A very successful tool for modelling more general types of assessments is coherent sets of desirable gambles. These have many applications in credal networks, predictive inference, conservative reasoning, and so on. However, they are not capable of modelling beliefs corresponding to or statements, for example the belief that a coin has two equal sides of unknown type: either twice heads or twice tails. Such more general assessments can be modelled with coherent choice functions.

The first thing we do is relate coherent choice functions to coherent sets of desirable gambles, which yields an expression for the most conservative coherent choice function compatible with a coherent set of desirable gambles. Next, we study the order-theoretic properties of coherent choice functions. In order for our theory of choice functions to be successful, we need a good conditioning rule. We propose a very intuitive one, and show that it coincides with the usual one for coherent sets of desirable gambles, and therefore also leads to Bayes's rule.To conclude, we show how to elegantly deal with assessments of indifference.

72. Joris Van Cauwenberge, Lasse Lovstakken, Patrick Segers and Abigail Swillens (EA06)

Exploring 2D Ultrasonic Blood Flow Visualisation in the Newborn's Heart by means of Multi-Physics Modeling

Ultrasonic (US) blood flow imaging is a preferred tool to detect abnormal intracardiac blood flow patterns in newborns. Unfortunately, current techniques are limited to 1D velocity measurements at low temporal resolution. Our goal is to investigate whether recent advances in scanning technology can conquer these limitations. For this purpose, we generated synthetic US images via multiphysics modeling, integrating computational fluid dynamics (CFD) and US imaging simulations. This approach allows to test new imaging algorithms in an environment where the fluid-dynamics behind the image is known (CFD-data), simultaneously disposing of full flexibility at the level of the imaging setup. The US simulation software represents blood flow as point scatterers on which the US waves reflect. These scatterers are propagated during the simulated scanning using the velocity data from a dynamic CFD-simulation in a 3D neonatal left ventricle. A real-life cardiac probe with an innovative high frame rate acquisition was implemented. Finally, the simulated US data were processed using a block-matching technique to form 2D blood velocity images. We showed that neonatal intracardiac blood flow patterns can be accurately tracked throughout the cardiac cycle (deviations on average smaller than 0.08 m/s for both velocity components) and are hardly hampered by imaging artifacts.

73. Willen Van De Steene, Joris Degrieck, Kim Ragaert and Ludwig Cardon (EA20)

Composite Processing through Extrusion Based Additive Manufacturing

The application of additive manufacturing has revolutionary increased during the last 25 years. One of the most used additive manufacturing (AM) techniques is extrusion based, often referred to as Fused Deposition Modeling (FDM). Despite its popularity, some shortcomings are to be solved. In this study, current limitations of extrusion based processes will be discussed. Further, a brief overview of different composite materials which can enhance mechanical, thermal, electrical, ect. properties will be given. Finally, an innovative building strategy for increasing manufacturing speed and dimensional accuracy is proposed.

74. Samuel Van de Velde and Heidi Steendam (EA07)

Towards Accurate Indoor Positioning

Accurate positioning information inside buildings is becoming increasingly important for a number of emerging applications in commercial, automotive or military systems. However, as opposed to the GPS system for outdoor localization, there doesn't exist an accurate large scale indoor localization system yet due to the lack of infrastructure to support localization.

Most commercial systems today use the available wifi network for indoor positioning, which provides a positioning accuracy of around 3m. In order to go beyond this, a different technology must be considered. A potential candidate for enabling centimeter accuracy is ultra-wideband (uwb) technology. Here, a number of uwb-radios with a known position serve the same purpose as the satellites in GPS. However, due to the limited radio range of uwb, the deployment of such a network is a major obstacle for the widespread use of this technology. In order to overcome this obstacle, we propose cooperation between users. By making uwb range measurements and sharing positioning information with neighboring users, a user can refine its own position estimate without any fixed uwb infrastructure.

Using only the wifi network and cooperation, the positioning error becomes less than 1 meter. Furthermore, with some additional uwb-infrastructure available, the error can even be reduced to a few centimeters. In other words, the proposed method results in a very scalable localization solution, where the localization performance smoothly transitions in accuracy, depending on the available infrastructure.

75. Nathalie Van Den Berge, Ine Dauwe, Christian Vanhove, Benedite Descamps, Pieter Van Mierlo, Kristl Vonck, Robrecht Raedt, Paul Boon and Roel Van Holen (EA06)

Simultaneous DBS and fMRI in the Rodent Brain

Deep Brain Stimulation (DBS) is a promising treatment for neurological and psychiatric disorders. Despite its remarkable clinical success, there are still about 25% of non-responders to the treatment. A better understanding of the whole-brain effect of DBS is therefore necessary to improve treatment efficacy in patients. Visualization of whole-brain effects of DBS requires functional imaging techniques such as functional Magnetic Resonance Imaging (fMRI), which reflects changes in blood oxygen

level dependent (BOLD) responses throughout the entire brain volume. Four adult male Sprague-Dawley rats were stereotactically implanted with a custom-made MR-compatible DBS-electrode in the right hippocampus. Electrical Poisson distributed stimulation was applied using a block-design paradigm (20s on/40s off). MR images were acquired on a Pharmascan 7T using a rat brain volume coil. Data were processed by means of independent component analysis. Clusters were accepted as significant if p-values were 0.05 or less after correction for multiple comparisons. Each resultant statistical map was co-registered onto a structural MR image for anatomical correlation. Our data indicate that real-time hippocampal DBS evokes a bilateral BOLD response in hippocampal and thalamic substructures. Successful translation of this research to patients might reduce the number of non-responders to this expensive and invasive treatment.

76. Kurt Van Hautegem, Wouter Rogiest and Herwig Bruneel (EA07)

Void-creating Algorithms for Fixed Size Packets in Optical Switching

In optical packet/burst switching, packet contention on a single wavelength is resolved effectively by means of Fiber Delay Lines. The involved scheduling algorithm is typically designed to minimize packet loss, by filling so-called voids, and trying to keep the so-called gaps small. We propose a new type of algorithm that selectively creates voids that are larger than strictly needed, only when these will likely be filled. Results obtained by Monte Carlo simulation show that selective void creation can significantly reduce packet loss.

77. Stijn Van Vrekhem, Pieter Cools, Heidi Declercq, Maria Cornelissen, Nathalie De Geyter, Alexander Van Tongel and Rino Morent (EA17)

Adhesion Improvement of a Shoulder Prosthesis by Plasma Technology

Total shoulder arthroplasty (TSA) consists of implanting an artificial shoulder joint and is the third most common arthroplasty in the world, after knee and hip arthroplasty. An anatomical TSA mimics the anatomy of the shoulder joint and therefore consists of a humeral and glenoid component. Loosening of the latter component is the major complication concerning shoulder prostheses. One of the reasons for the high loosening incidence is the chemically inert and hydrophobic nature of the ultra-high-molecular-weight-polyethylene (UHMWPE) used for the glenoid component and its resulting low adhesion to bone cement. In this study, non-thermal plasma technology is used to modify the surface of UHMWPE to a hydrophilic and chemically more reactive surface in order to improve the adhesion to bone cement and bone. Two different methods, plasma activation and plasma polymerization, are used to obtain this goal. First, surface characterization is performed to assess the effects of these two methods on the surface properties and to determine the optimal parameters. Secondly, cell tests are done test the influence of non-thermal plasma technology on cell adhesion and proliferation. Finally, the changes in adhesive strength between the UHMWPE and bone cement are investigated by means of a series of pull-out tests.

78. Cesar Vandevelde and Jelle Saldien (EA19)

Ono - An Open Platform for Social Robotics

In recent times, the focal point of research in robotics has shifted from industrial robots toward robots that interact with humans in an intuitive and safe manner. This evolution has resulted in the subfield of social robotics, which pertains to robots that function in a human environment and that can communicate with humans in an intuitive way, e.g. with facial expressions. Social robots have the potential to impact many different aspects of our lives, but one particularly promising application is the use of robots in therapy, such as the treatment of children with autism. Unfortunately, many of the existing social robots are neither suited for practical use in therapy nor for large scale studies, mainly because they are expensive, one-of-a-kind robots that are hard to modify to suit a specific need. We created Ono, a social robotics platform, to tackle these issues. Ono is composed entirely from off-the-shelf components and cheap materials, and can be built at a local FabLab at the fraction of the cost of other robots. Ono is also entirely open source and the modular design further encourages modification and reuse of parts of the platform.

79. Stijn Vandewiele, Mathieu Balcaen,Toon Brans, Filip Beunis, Paul Van Der Meeren and Kristiaan Neyts (EA06)

Towards Healthier and Creamier Mayonnaise

Double emulsions promise healthy yet tasty foods and provide an exciting approach to enhance cosmetics and pharmaceuticals. These double emulsions are defined as emulsions comprising water-in-oil-in-water or oil-in-water-in-oil particles. Key is their middle phase interface acting as a barrier for enclosed contents dissolved in the inner fluid phase.

This property leads to e.g. mayonnaise with lower fat content, yet having the authentic taste, to cosmetics with separated incompatible substances and enhanced pharmaceuticals with controlled release of entrapped compounds.

Controlling the particles' parameters size, composition and stability are crucial. Therefore, we need analytical tools to characterize these emulsions. Current techniques rely on bulk measurements while single particle measurements would be auspicious for dynamic experiments.

Therefore, we develop a setup enabling time-dependent tracking of individual double emulsion particles to understand the fundamental mechanisms defining these parameters. This system is based on optical trapping of a single particle in a custom microfluidic device with two different fluid flows. By controlling the fluid flow it is possible to move the fluid interface, thus changing the environment of the trapped particle and investigating its stability. The preliminary results are promising. They show that it is indeed possible to trap these particles while moving a potassium chloride loaded particle from a salt rich environment to deionized water, resulting in the swelling of the inner water droplets due to osmotic pressure-driven diffusion of water. Moving the particle back to a salt rich environment shows the reversibility of this swelling behavior.

80. Maarten Vanhoucke (EA19)

STIGglasses: Multi-user wearable open-hardware intuitive video-stream tagging device

Video logging can be a valuable tool for documenting design processes, such as brainstorming sessions, user testing, and prototyping activities. However, the large amount of data captured makes analysis difficult and time consuming. With our STIGglasses, we simultaneously capture first-person view video and biometric data (galvanic skin response) of each agent in a design process. The system consists of a head-mounted video recording device in combination with a wrist-mounted sensor unit. By cross-referencing the biometric data, we can discern key moments in the design process. The time stamps of these key moments are then used to automatically generate a summary video of the process, greatly reducing the laborious analysis process. Design processes captured with the STIGglasses can be intrusively interpreted by other researchers, while simplicity of the devices keeps the interactions limited.

81. Tim Verbrugghe, Andreas Kortenhaus and Julien De Rouck (EA15)

Wave Energy, Charge your Phone with Ocean Power

Wave energy from ocean waves is absorbed using Wave Energy Converters (WECs). A specific type of WEC is the point-absorber. They are floating bodies, connected to the seabed or a moored platform. The oscillatory motion of point-absorbers can be transformed into usable electricity. The component responsible for this conversion is called the power take-off system (PTO).

The main goal of the research is to focus on a hydraulic power take-off concept, with promising theoretical results. The heaving motion of the buoy is transferred to a hydraulic plunger, using a cable system. During the upward buoy motion, the plunger is pushed into a cylinder and hydraulic oil is accelerated. The cyclic flow rates are damped by an accumulator. A more continuous flow drives a hydromotor, connected to an electric generator.

During the research, a scale model of this PTO will be built. Several lab and wave flume tests will be conducted to study the power generation and conversion efficiency.

82. Thibault Verhoeven, Pieter Buteneers, Benjamin Schrauwen and Pieter-Jan Kindermans (EA06)

An Unsupervised Plug and Play BCI with Consumer Grade Hardware

Brain-computer interfaces (BCIs) are systems establishing a direct link from brain to machine. As such they give the ability to control a computer solely by means of your brain signals. The P300 speller for example is a BCI for spelling text. It makes use of Event- Related Potentials in the brain to distinguish the target from a grid of characters presented to the user. In this way, character per character, a sentence can be spelled. As the handled brain signals differ a lot among users, a tedious and time consuming calibration of the system is needed. In this work we use an unsupervised machine learning technique to eliminate the need for this calibration and as such construct a plug and play BCI that is able to give a decent spelling accuracy even

when consumer grade hardware is used. Exclusion of the calibration session clearly makes the speller more attractive. Results show that it is possible to build a speller with an affordable EEG recording system. We can conclude that we are one step closer to building a reliable, user friendly and affordable BCI system.

83. Roel Verschaeren and Sebastian Verhelst (EA03)

Reducing the Environmental Impact of Marine Diesel Engines

Emission legislation that applies to engines used in shipping, rail and land power generation becomes increasingly strict. E.g. IMO Tier III applicable to sea-going vessels limits the NOx emission by 75% compared to IMO Tier II. Therefore complex technologies are implemented such as EGR, Common Rail, multi-stage turbocharging, etc. Each technology typically has multiple calibration parameters.

Ideally these are configured in a way that the engine emits very little harmful components and fuel consumption is very low. The most straightforward approach would be to test every parameter combination, record emission components and fuel consumption and choose the optimal parameter combination. This method becomes prohibitively expensive, both in time as in fuel consumption because every additional operating parameter increases the amount of tests exponentially.

This is why engine simulation becomes inevitable. Accurate engine simulation is able to exclude regions of parameter values that are clearly infeasible and can give a good indication where engine tests are more interesting.

84. Sander Vrijders, Dimitri Staessens and Didier Colle (EA05)

Reducing Network Complexity with the Recursive InterNetwork Architecture

The Recursive InterNetwork Architecture (RINA) is a recently proposed network architecture based on first principles, which promises to solve a number of issues present in the current Internet such as the lack of inherent security. We present the first performance-oriented implementation of RINA. Our open source stack is designed for GNU/Linux Operating Systems, with key components developed in kernel space for optimal performance. The stack achieves a goodput close to line rate on a GbE link, even when multiple Distributed Inter Process Communication Facilities (DIFs) are stacked.

85. Zhiping Ye, Arne Vandenbroucke, Nathalie De Geyter, Jean-Marc Giraudon , Jean-François Lamonier and Rino Morent (EA17)

Synergetic Effect for the Removal of Toluene by combining Non-thermal Plasma with KMn8O16 catalyst

Non-thermal plasma (NTP) has attracted increased attention in the field of air purification, especially for the abatement of diluted (<1000 ppm) volatile organic compounds (VOCs) from waste gases and indoor air. Among the interesting features of this promising technology, the operation at room temperature and atmospheric pressure is highly interesting because conventional technologies such as thermal oxidation demand high amounts of fossil fuels to attain the required operating temperature. However, numerous studies have shown that the industrial implementation of

this technology is hindered by three main bottlenecks, i.e. 1) formation of undesired by-products (CO, NOx, other VOCs), 2) a relatively poor energy efficiency and 3) a low mineralization degree. To overcome these issues, the combination of NTP and heterogeneous catalysis has been proposed in literature. Among the different VOC oxidation catalysts tested, cryptomelane (KMn8O16) was found to be very active in the oxidation of VOC. In this study, we test the performance of cryptomelane combined with non-thermal plasma. The catalyst is placed in the plasma reactor and is in this way in contact with the plasma. This results in synergetic effects between the plasma and the catalyst.

86. Zhifei Zhang and Alain Sarlette (EA08)

Integral Control for Nonlinear Robotic Motion

We have extended the popular integral control technique to nonlinear robotic motion control. More explicitly, we provide an alternative definition of "integral action" for proportional(-derivative)-controlled systems whose configuration evolves on a nonlinear space, for which configuration errors cannot be simply added up to compute a definite integral. We have proved that the proposed integral control allows to cancel the drift caused by a constant bias in both first order (velocity) or second order (torque) control inputs for fully actuated robots moving on nonlinear spaces. We here illustrate the approach on a simple application.

Plenary Session

Ever considered low-tech?

Speaker: Kris De Decker

Low-tech Magazine refuses to assume that every problem has a high-tech solution. A simple, sensible, but nevertheless controversial message; high-tech has become the idol of our society.

Instead, Low-tech Magazine talks about the potential of past and often forgotten knowledge and technologies when it comes to designing a sustainable society. Sometimes, these low-tech solutions could be copied without any changes. More often, interesting possibilities arise when you combine old technology with new knowledge and new materials, or when you apply old concepts and traditional knowledge to modern technology. We also keep an eye on what is happening in the developing world, where resource constraints often lead to inventive, low-tech solutions.

Underlying the common view of a high-tech sustainable society is the belief that we don't have to change our affluent lifestyle. This is not a realistic view, but it sells. However, changing our lifestyle does not mean that we have to go back to the middle ages and give up all modern comforts. A downsized, sustainable industrial civilization is very well possible - and more fun, too!

Kris De Decker, the creator and author of Low-tech Magazine, is a Belgian freelance journalist for (among others) "Knack", "De Tijd" and "De Standaard" operating out of Barcelona.

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Programme

12.00 Registration, Sandwiches and Posters
Lounge

13.00 Posters
Expovleugel

Workshops:
Post doc. Post what? - Karen Vandevelde
Room Panamarenko
How to become a Samurai Scientist - Esther De Smet
Room Anneke Eussens
Plan, focus, succeed - time for some serious play - Erik Talboom
Room Honoré D'O
Leadership in times of change - Filip Maertens
Room Thomas Huyghe
The little book of secrets: Parallel sessions for junior researchers
Room Nick Ervinck

15.00 Coffee Break, Networking and Posters
Expovleugel

16.00 Plenary Session - Kris De Decker
Ever considered low-tech?
Room Ned Kahn

17.15 Best Poster Awards & Closing Speech
Room Ned Kahn

17.30 Reception
Lounge

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15th Ghent University FEA PhD symposium

registration and lunch from 12:00
workshops
poster session
plenary speaker:
Kris De Decker, lowtech magazine

www.ugent.be/ea/nl/symposium.htm

Zebrastraat, Gent

December 5th 2014

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