Bryan M.H. Pong

«Common mode noise suppression in switching power converter by transformer construction techniques»

Abstract: Electromagnetic Interference (EMI) suppression is an important issue in switching power supply design. Generic method for EMI suppression is by putting in filters. Filters are bulky, expensive and dissipative which are not desirable but inevitably all switching power converters have EMI filters. Here in this presentation an EMI reduction technique is presented which has no EMI filter and does not involve extra cost. The technique is to arrange the winding of the power transformer in the switching power converter in such a way to cancel out the EMI. All is needed is an extra winding which operates at an opposite phase to the primary winding generates EMI, in particular common mode EMI. This presentation will start with a review of the EMI concept in switching power converter, which has not been clearly understood. Common mode noise and differential mode noise are explained to illustrate common mode noise is often more difficult to conceptualize and tackled. The method is then explained with an application example. The technique is then extended to planar transformer which is becoming popular because of it thin physical size.

Dr. Bryan M.H. Pong received his BSc degree in Electronic and Electrical Engineering from the University of Birmingham and his PhD degree in Power Electronics from Cambridge University in the U.K. He was a principal engineer and engineering manager at ASTEC International which was one of the major switching power supply manufacturer. Now he is an Associate Professor at the Electrical & Electronic Engineering Department of Hong Kong University of. His research interests focus on switching power supply. In particular on topics including synchronous rectification, EMI issues, design optimization of power converters, planar and bendable power converters. He has published more than 100 technical papers and has more than 40 technology patents.

Abdelhakim Senhaji Hafid

«Mobile Vehicular Networks»

Abstract: Intelligent Transportation Systems (ITS) make use of advanced communications and information technology to improve the safety and efficiency (e.g., in terms of mobility and energy consumption) of transportation. Mobile vehicular networks represent the key component of ITS; indeed, they are the foundation of a wide spectrum of novel safety, traffic control and entertainment applications which are realized mainly through vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) communications. To enable these applications, novel schemes and protocols need to be developed to support their requirements in terms of performance and reliability. In this talk, we define mobile vehicular networks and we present a number of applications that can be supported by this type of networks. Then, we present key challenges facing the realization of the potential of vehicular networks. We will also briefly overview related contributions produced by the Network Research Lab at the University of Montreal.

Dr. Hafid is Full Professor at the University of Montreal, where he founded the Network Research Lab (NRL) in 2005. He is also research fellow at CIRRELT, Montreal, Canada. Dr. Hafid published more than 200 journal and conference papers; he also holds 3 US patents. He supervised to graduation more than thirty graduate students in addition to 9 postdoctoral fellows. Prior to joining U. of Montreal, he spent several years, as senior research scientist, at Telcordia Technologies (formerly Bell Communications Research), NJ, US working in the context of major research projects on the management of next generation networks including wireless (e.g., mobile ad-hoc networks) and optical networks. Dr. Hafid was also Assistant Professor at Western University (WU), Canada, Research director of Advance Communication Engineering Center (venture established by WU, Bell Canada and Bay Networks), Canada, researcher at CRIM, Canada, visiting scientist at GMD-Fokus, Berlin, Germany and visiting professor at University of Evry, France. Dr. Hafid has extensive academic and industrial research experience in the area of the management of next generation networks including wireless and optical networks, QoS management, distributed multimedia systems, and communication protocols. He sits on the technical program committees of several conferences including IEEE ComSoc flagship conferences (e.g. IEEE Globecom, IEEE ICC and IEEE WCNC).

Abdellah Benzaouia

«On positive systems»

Abstract: This plenary presents the class of feedback systems which have the property that the state is nonnegative whenever the initial conditions are nonnegative. In the literature, such systems are referred to be positive. These systems appear in many practical problems, when the states represent physical quantities that have intrinsically constant sign (Absolute temperatures, levels, heights, concentrations, etc). In comparison with the previous works, this work provides a new treatment for the stabilization of positive linear systems where all the proposed conditions are necessary and sufficient, and expressed in terms of Linear Programming (LP). This technique proposes to extend those results to systems with delays, presenting a new approach for the stabilization of MIMO linear positive systems with delay by means of state feedback. The proposed results are new in the sense that they give necessary and sufficient conditions. Both

controllers with memory and memoryless can be considered, and the issue of control limitations is dealt with.
This extension to systems with delay is prompted by the existence of transport delays in many control problems in process control, irrigation systems, thermal systems, etc. The stabilization problem is of interest, because the existence of a delay might cause instabilities. The stabilization of this kind of systems have been extensively studied in the literature. Some authors have considered positive systems in this context of time-delay systems. However, so far, no one has come up with a complete solution to the stabilization problem for delayed positive system. This work, for the first time, presents necessary and sufficient conditions, which turn out to be easily checkable and computable in terms of LP.
Thus, following the approach proposed in this talk, one can solve the problems of stability and stabilization for systems with delay and control constraints, T-S fuzzy systems and fractional order systems imposing nonnegative states. It is worth mentioning that the proposed approaches are more simple than the ones that can be obtained using the LMI approaches, with lower computational complexity. Although the stabilization of constrained plants have been studied in the literature, the approach in this talk is original, and no previous work outside our team have been done on imposing nonnegativeness in constrained systems with delay. For this class of systems, simple necessary and sufficient conditions are obtained, expressed also in terms of Linear Programs (LP).

Abdellah Benzaouia received the degree of electrical engineering at the Mohammedia School (Rabat) in 1979 and the Doctorat (PhD) at the University Cadi Ayyad in 1988. He is actually professor at the University of Cadi Ayyad (Marrakech) where he is also head of the laboratory of research LAEPT, CNRST laboratory. His research interests are mainly constrained control, robust control, pole assignment, systems with Markovian jumping parameters, hybrid systems and fuzzy systems. He collaborates with many teams in France, Canada, Spain and Italy.

Mohammed M'Saad

«A Process Control History»

Abstract: The motivation of this talk consists in providing a process control approach and its application to three control problems that have shown to be of fundamental importance for the engineering system, namely the temperature control in chemical reactors, the diameter control of optical fibers in an industrial draw tower and the position control of flexible systems. The involved process control approach has been developed throughout a fruitful research activity, over twenty years, starting in the Laboratoire d'Electronique et d'Etude des Systèmes Automatiques de Rabat and pursued in the Laboratoire d'Automatique de Grenoble and the Laboratoire de Commande de Procédés de Caen.
The involved control approach consists in a genuine combination of the available results in the linear system identification as well as the predictive (adaptive) control bearing in mind the fundamental robust control and adaptive control features. Indeed, the robust- ness requirements are achieved through an appropriate shaping of the usual sensitivity function of the control system. And a robust parameter adaptation is used to incorporate an auto-tuning as well as an auto-calibation capability into the control design thanks to the available and comprehensive adaptive control theory. A particular emphasis is put on the robustness of the parameter adaptation and the

noise measurement insensitivity and dynamical performances of the standard industrial process control, namely the PID and internal model control.
Of fundamental interest, we will show that the performances of the temperature control in chemical reactors can be improved in a suitable nonlinear control design framework provided that the process modelling ha been perfectly carried out. The involved control design is particularly addressed by suitably combining a high gain observer together with a high gain state feedback control. A particular emphasis will be put on the high gain ob- server design as the the high gain state feedback control design is simply obtained thanks to the duality concept.

Mohammed M'Saad was educated at the Ecole Mohammadia d'Ingénieurs where he held an assistant professor position in September 1978. He started his research activities at the Laboratoire d'Electronique et d'Etude des Systèmes Automatiques where he prepared an engineering thesis of the Université de Mohammed V on the adaptive control of industrial processes. In November 1982, Mohammed M'SAAD joined the Laboratoire d'Automatique de Grenoble to prepare a PhD thesis of the Institut National Polytechnique de Grenoble, on the fundamental features of the adaptive control and its applicability, which he obtained in April 1987. In April 1988, he held a research position at the Centre National de Recherche Scientifique with an affectation in the Laboratoire d'Automatique de Grenoble. In September 1996, Mohammed M'SAAD held a professor position at the Ecole Nationale Supérieure d'Ingénieurs de Caen where he founded a control process laboratory in 1997 which became a control group at the GREYC UMR CNRS in January 2004. His main research activities are mainly devoted to the fundamental, methodological and applied features of the identification, observation and adaptive control of dynamical systems. He had several important scientific and collective responsibilities, namely the director of the GREYC UMR CNRS from January 2012 to March 2016.

Ahmed Chemori

«Recent Advances in Control of Robotic Systems»

Abstract: Robotics was initially, for a long time, guided by industry needs. Indeed, the early years of robotics was largely focused on manipulators and simple factory automation tasks. The cost of computation, the lack of good sensors, and the luck of fundamental understanding of robot control were primary barriers to progress.
The first control systems for robots were designed to control independently each axis as a Single-Input-Single-Output(SISO) linear system, for some basic tasks. However, the consideration of new complex tasks and applications required a deeply understanding of complex nonlinear dynamics of robots. Besides, it has motivated the development of new theoretical advances in different control fields, which has enabled more sophisticated applications.
Nowadays, robotic control systems are highly advanced, including manipulators, underwater and flying robots, mobile robots, medical robots, parallel robots, exoskeletons, humanoid robots and others.
The objective of this talk is to highlight the control challenges of some of these robotic systems and to give some recent advanced control solutions to illustrate both the concept and the application. All the proposed control schemes will be illustrated through real-time experiments on different real-robots (parallel, underwater, humanoid, exoskeletons, etc).

Ahmed Chemori received his M.Sc. and Ph.D. degrees, respectively in 2001 and 2005, both in automatic control from the Grenoble Institute of Technology in France. He has been a post-doctoral fellow with the automatic control laboratory of Grenoble in 2006. He is currently a tenured research scientist in Automatic control and Robotics at the Montpellier Laboratory of Computer Science, Robotics, and Microelectronics (LIRMM). His research interests include nonlinear, adaptive and predictive control and their applications in complex robotics systems including underwater vehicles, humanoid robots, exoskeletons, parallel robots and under-actuated mechanical systems.

Mustapha Ait Rami

«SIS Epidemiological Models under Switching Policies»

Abstract: This talk explores ongoing research on disease models for a structured population. The model considered is a time-varying switched model, in which the parameters are subject to abrupt change. Some stability results are derived for switched compartmental epidemiological models of SIS (Susceptible-Infectious-Susceptible) type. Such models are related to structured populations to which an infection graph is associated. The switching features the changes of some parameters that represent infection or recovery rates. The issue of uniform stability for the disease free equilibrium is presented, as well as instability results. Other important issues are introduced and discussed, such as persistence and periodic orbits, disease spread under Markovian switching and switching -based stabilization of the disease free equilibrium.

Mustapha Ait Rami Doctor in Applied Mathematics (Systems & Control), University Paris-IX Dauphine, Paris, France. Worked on diverse cutting edge practical projects with high research impact recognized worldwide. Previous international academic experience in USA (UCLA University Los Angeles California), Hong Kong (Chinese University of Hong Kong). Germany (University of Würzburg), France (ENSTA Paris Tech, and Picardie Jules Verne University), Spain (Valladolid University). The overarching theme of his research is to develop theories and computational techniques from convex programming to obtain quantitative and computational results in variety of contexts with connections to system engineering, and in general, to systems & control and estimation. His methodological approach can be viewed as a practical blend of both theory and computation. His contributions pioneered novel approaches based on Global Optimization, Semi-Definite Programming (optimization over the cone of semi-definite matrices) and Linear Programming. Recently, Dr Mustapha Ait Rami works at EMSI, Marrakech, Morocco.

Jiwa Abdullah

«Wireless Sensor Network(WSN) and Future Challenges»

Abstract: In this complex and dynamic system, devices are interconnected to transmit useful measurement information and control instructions via distributed WSN (wireless sensor networks). A wireless sensor network (WSN) is a network formed by a large number of sensor nodes where each node is equipped with a sensor or multiple sensors to detect physical phenomena such as light, heat, pressure, gas content, humidity and many more interesting parameters. WSNs are regarded as a revolutionary information gathering techniques to build the information and

communication system which will greatly improve the reliability and efficiency of the infrastructure systems. WSNs feature easier deployment and better flexibility of devices, as compared to the wired solution. With the rapid technological development of sensors, WSNs will become the key enabler technology for more advances in future networking paradigm such as IoT. In this presentation we initially discuss the WSN in general and its characteristics with regards to its communication and networking principles, and how various strategies for its networking optimizations. We review the WSN applications, while also focusing the attention on infrastructure technologies, applications and standards featured in WSN designs. Part 2 discuss the idea of localization in WSN, Image processing for WSN applications, Corona based WSN and also application of WSN in agriculture. Part 3 looks into various research potentials in the aspect of WSN, IoT and the integration of WSN and IoT.

Assoc Prof. Dr Jiwa Abdullah received his Bachelor of Engineering degree from Liverpool University, United Kingdom, in Electronic Engineering. He obtained his Master of Science degree (1990) and PhD from Loughborough University (2007), United Kingdom. His PhD thesis is on QoS for Mobile Ad Hoc Networks. Currently he is attached to the Faculty of Electrical and Electronic Engineering, Universiti Tun Hussein Onn Malaysia, Batu Pahat, Johor, Malaysia. His main interests are wireless sensor networks, underwater wireless sensor networks, mobile ad hoc networks, wireless communications, networking, application of computational intelligence to communication systems, integration of WSN and IoT and also in the area of engineering educations. He authored more than 60 publications in journals, conferences and book chapters. Assoc Prof. Dr Jiwa Abdullah is a member of IEEE and Board of Engineers Malaysia.

Mohamed Deriche

«Advances in seismic data analysis and interpretation»

Abstract: Seismic data, obtained through the reflection of seismic waves from the earth's subsurface, contains important geological information used to identify a number of characteristics, events, and features, of the earth layers including salt domes, faults, horizons, etc. The oil and gas industry uses such characteristics to detect and locate reservoirs. The accurate localization of oil fields is crucial to the exploration process as it assists industry in preserving their resources and avoiding financial losses which may happen when drilling at wrong locations. This keynote speech will provide a throughout analysis of state of the art signal processing techniques used for different seismic data interpretation applications. We will show that the characterization of the events mentioned above can a be a very challenging task for automatic and semi-automatic analysis systems. In addition to the data being a mere representation of the reflections from the layers of the earth, we have also to deal with different types of noise including random noise, noise due to multiple reflections, noise due to refracted energy, among others. In the past, seismic interpretation was carried by expert human interpreters. One of the primary goals of such analysis was the extraction of important information, such as salt bodies, from the seismic data. The human interpreter, however, needs substantial training and adequate experience in order to successfully interpret seismic data such as identifying “precisely” the location of seismic events. Although manual interpretation is reliable and widely used in seismic industry, the method is slow and requires a huge amount of manpower, and subjected to bias due to fatigue, non-seen before events, historical data, etc.

In the presentation, we discuss the move to using more automated techniques of the analysis of seismic data the interpretation of such data so that important events are extracted. One important task we will discuss in details is the detection and tracking of of salt bodies from 2D and 3D data. We will see that the application of traditional image processing techniques including edge detection, texture analysis, etc.. cant provide robust results. We will see how more advanced techniques including sparse signal representation techniques, patch based modeling, dictionary based techniques, higher order statistics, can be used to enhance the event detection and localization results. We will also discuss the research opportunities that still face the signal processing community and professionals from industry in solving many of the problem in seismic data interpretation.

Dr. Mohamed Deriche received his undergraduate degree from the National Polytechnic School of Algeria. He then joined University of Minnesota, USA, where he completed his MS and PhD in 1990, and 1993 respectively. He then joined the Queensland University of Technology, Australia, in 1994. In 2001, he joined the EE Department at King Fahd University of Petroleum & Minerals, KFUPM, where he is leading the signal processing group. He has published over 200 papers in multimedia signal and image processing. He has delivered numerous invited and tutorial talks. He has chaired several conferences including TENCON, GLOBALSIP-MPSP, IEEE GCC, and IPTA. He has supervised more than 35 MSc and PhD students. He has received the the ENP best student award, the IEEE third Millennium Medal, the Shauman award from best researcher, and both the excellence in research and the excellence in teaching awards at KFUPM, as well as several other awards. His research interests include Multimedia signal and image processing, Quality of Experience, Seismic data analysis, Biometrics, and Biomedical applications.

Essam A. Al-Ammar

«Smart Grid: is it the answer for the future?»

Abstract: Nowadays, there is a great pressure to limit carbon dioxide emissions, which is leading to expanded adoption of renewable energy resources, electric energy storage, and distributed energy resources as well as expanded electric transportation and demand response technologies. With high confidence and expectations, smart grid is planned to provide the enabling infrastructure for these carbon reduction technologies. Many exporters believe that smart grid technologies will also add values through time-based dynamic pricing of electricity, demand response, and other market innovations and services. Globally speaking, smart grid initiatives provide a great opportunity to recover the economic downturn by creating new jobs, and most importantly lead the nations in developing and deploying new innovative technologies and products to export. This is a defining moment in terms of commitment to providing a modern and sustainable electric energy system, meeting societal needs of the 21st century and beyond. There is confidently a critical need for research, development and demonstration of smart grid solutions. This presentation introduces the concept of Smart Grid, initiatives, challenges and its main driving forces. An attention will be giving to the main topics of research and development of smart grid in the world.

Essam A. Al-Ammar worked as a Power/Software Engineer at Lucent Technologies in Riyadh for two years. In 2003, he received his MS degree from University of Alabama, Tuscaloosa, AL, and Ph.D. degree from Arizona State University in 2007. He is an Associate Professor in Electrical Engineering Department, King Saud University, Riyadh, Saudi Arabia, as well as Governor's Advisor in Electricity Co-Generation Regulatory Authority (ECRA). He was an advisor at Ministry of Water and Electricity (MOWE) and a former Energy Consultant for Riyadh Techno Valley (RTV). He involved in many local and international committees in different aspects in the areas of power and electrical energy. He published nearly 90 papers and 8 patents. His current interests include high voltage engineering, power system transmission and distribution as well as renewable energy and smart grid. He is a Senior Member of IEEE since 2007 and Saudi Engineering Committee since 1997, and has been a featured expert speaker at many energy conferences and workshops.

Mohamed Sahmoudi

«Advanced Multi-Sensor Fusion for Robust Navigation of Autonomous Systems»

Abstract: Knowing precisely where a vehicle is located is one of the core requirements of many intelligent transportation systems applications. For example, Autonomous Unmanned Aerial Vehicles (UAVs) known as Drones require avionics systems that enable them to maintain a stable attitude and to follow a desired flight path. Upcoming autonomous cars also need a precise positioning module to be embedded and certified to guarantee that the car still in the right lane and that is keeping the mandatory safety distance to others vehicles and road infrastructure. All aspects of the system intelligence, from behavioral decision making to low level lateral and longitudinal control require accurate vehicle position, velocity, and vehicle heading, pitch and roll information at a fairly high update rate.
These and so many other modern services and applications of positioning, geolocalization and navigation make this field a key element of R&D activity for autonomous systems development and

success.

In this Tak, Dr. sahmoudi will introduce first the technological need and localization requirement for autonomous systems, existing navigation technologies, with a particular focus on the advanced fusion of multi-sensor measurements. Then, all technical aspects of a navigation system will be covered including, sensors of localization and perception, measurements models, algorithms of optimal state estimation and integration (fusion) architectures. Finally, emerging topics will be presented such as robustness, integrity of developed systems and certification. With practical examples, the seminar should help to understand, design and evaluate the performance and cost-efficiency of GPS/ INS / Vision and integrated multi-sensor systems.

Mohamed Sahmoudi was born in Morocco in 1977. He received the degree of Mathematics from Fes University Sidi Mohamed ben Abdellah in 1999 and a Master degree from Pierre and Marie-Curie Paris VI in 2000. Dr. Sahmoudi received a PhD in signal processing and communications systems from Paris-Sud Orsay University, France, in collaboration with Telecom Paris in 2004. From 2005 to 2007, he was a post-doctoral researcher fellow on GPS Signal Processing and Navigation at Villanova University, PA, USA. In august 2007, he joined the ETS school of engineering at Montreal, Canada, to lead the research team of precise positioning (RTK and PPP). In 2009 he joined the French Institute of Aeronautics and Space (ISAE-SUPAERO) as an Associate Professor, University of Toulouse. Currently his research interests focus on all aspects of signal processing for cognitive navigation and positioning in harsh environment (weak GNSS signals acquisition and tracking, multi-frequency and multi-GNSS receivers, multipath mitigation and constructive use, multi-sensor fusion for robust navigation). He has been involved also in several projects of radar array processing, impulsive noise mitigation, MIMO beamforming for broadband wireless communication systems (LTE, WiMax), cognitive radio and acoustic blind sources separation. Dr. Sahmoudi has published more than 60 papers in international conferences and journals and 3 patents. He has received several research grants from CNRS France, USA Navy (ONR), NSERC Canada, French Space Agency CNES, DGA (French Defense Agency), Thales, SAFRAN, and academic awards, including the IEEE ICC 2004, ION GNSS 2011 and ION GNSS 2013 best paper & presentations award.

Lamia Iftekhar

«Collaborative Autonomous Driving: Towards Ensuring Total Safety»

Abstract: The gradual development of vehicular technology and adaptation of intelligent transportation system is an integral element in the continuous progress of the human civilization. Despite the plethora of new advances in various directions, we can narrow down two crucial directions of development in vehicular technology that is going to define the future - connectivity and autonomy. Connected cars can communicate with other vehicles, infrastructure and devices (V2V, V2I, V2X) - making driving more efficient, greener, more accessible and much safer. Such collaborative driving proves to be cheaper, demonstrating awareness of a wider range than driving purely sensor-based vehicles. On the other hand, autonomy in vehicles would remove the element of human error and limitations. Even in this day and age, getting behind the wheel is one of the most dangerous daily task a person can do (nearly 1.2 million people die every year due to road accidents globally in a world where there are 1.2 billion vehicles). Traditionally, the tendency has been to emphasize on safety measures in vehicle to save drivers and passengers in the event of a

crash. Collaborative autonomous driving shifts the focus from surviving crashes to preventing crashes in the first place. The ultimate goal here is to acquire a zero fatality rate. This talk presents the latest developments in connectivity and autonomy in vehicles. As an illustrative example, it provides details of a flocking-based autonomous driving protocol designed to be highly safety-aware. This algorithm can enable intelligent cars to share the road with existing cars, preventing any collision. A comparative discourse on the newest technologies from industry, academia and government institutions is presented to provide an idea of the various challenges and opportunities in this exciting field. Touching upon security, privacy and policy issues after discussing the technical advancements and feasibility, a thorough overview of the topic is covered which will enable one to catch up with the current state of affair and be inspired to examine new future trends. In brief, the talk explores how close we are in achieving connectivity and autonomy in vehicles to arrive at a day when using vehicles would be a fully safe maneuver and accidents would be a thing of the past.

Lamia Iftekhar is an Assistant Professor at the Department of Electrical and Computer Engineering, North South University (NSU) , Dhaka. She is the Vice President of IEEE Women In Engineering Affinity Group, Bangladesh Section. Lamia's current research interests is two-fold: transportation and robotics. She has been fiercely passionate about transportation issues for a long time since her home city Dhaka's urban transportation is not exactly the greatest system in the world (just do an image search on Dhaka traffic and behold the horror!) . Her research interests in this category includes vehicle safety, intelligent transportation systems, networked vehicles, driver behaviour modelling, traffic model and congestion control.