



NETWORKS

Alumni Newsletter of UCD Electrical and Electronic Engineering

January 2016

Head of School Foreword

I am delighted to introduce a fourth issue of our Newsletter for graduates in Electrical/Electronic Engineering and related programmes in UCD. In July of this year I had the honour of becoming Head of the School of Electrical and Electronic Engineering here at UCD. I'm stepping into the formidable shoes of Professor Tom Brazil, who served the School so well over the past number years and I would like to acknowledge the leadership Tom provided and wish him well as he continues his research and teaching with us. The School is now primed for further growth and I look forward to engaging with you, our valued alumni, in this process.

This has been a busy, but also, highly successful year for the School of Electrical and Electronic Engineering. The School continues to play a leading role in a number of significant national and international research initiatives. One of note is the recently established UCD-IBM Colab in which Professor Bob Shorten is playing a leading role. As part of this programme IBM and UCD will collaborate on researching and developing new technologies for the next generation of smart and sustainable cities. Continued success is being delivered in the area of Energy, both in terms of research and commercialisation activity, with a new spin out company NovoGrid formed and the award of €10m in funding through a Science Foundation Ireland Partnership Programme

2015 has also been a year of personal successes, of which, there are more details below. It is worth highlighting one or two here though. Madeleine Lowery achieved a fantastic success with the award of a highly prestigious and competitive European Research Council project in the area of Biomedical Engineering. Another achievement of note was the election of Prof. Orla Feely as a member of the Royal Irish Academy, again a well-deserved honour.

We continue to attract some of the best and brightest students to UCD Engineering and they continue to do us proud. Seven out of a total of seventeen Intel Women in Technology Scholarships were awarded to UCD Engineering students, which is a great indicator of the calibre of student we are privileged to educate. These awards are open to students in fields from across Engineering, Computing and Physical science. Finally, my colleagues and I are very keen to reach out to our alumni, to hear from you and to keep you up to date with our activities, while also encouraging you to support us actively. Please send us your feedback (eee@ucd.ie), visit our website (www.ucd.ie/eacollege/eee) or just call in to see us in the Engineering building in Belfield at any time, where you will always be most welcome.

Dr Andrew Keane, Head of the School of Electrical and Electronic Engineering

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Energy Systems Integration Partnership Programme

Minister English announces new partnership to lead cutting-edge Energy System Integration research in Ireland- €11million investment from Science Foundation Ireland in partnership with Industry and Philanthropic funds

On the November 24th the Minister for Skills, Research and Innovation, Mr Damien English TD, announced funding of over €11 million to the Energy Systems Integration Partnership Programme (ESIPP). ESIPP will receive €5.5 million from the Department of Jobs, Enterprise and Innovation through Science Foundation Ireland, coupled with €5.5 million from five industry partners - AIB, EirGrid, Ervia, Glen Dimplex, ESB and a philanthropic contribution from Mr David O'Reilly, former Chairman and CEO of Chevron Corporation, and current Chair of the UCD Energy Institute Board.

Making the announcement at UCD, Minister English said "Fostering partnerships between industry and academic researchers is a key element of the Government's Action Plan for Jobs. This partnership programme will enable Ireland to take a leadership role in Energy Systems Integration within Europe and globally. This is a significant investment in a partnership programme by multidisciplinary collaborators who are predominant players in the field of energy systems integration."

ESIPP programme will be led by Professors Mark O'Malley, Eoin Casey and Frank McDermott of UCD, in collaboration with leading researchers from UCD, DCU, ESRI, NUIG, TCD, UCC, UL, and a number of international research institutions. ESIPP will work closely with an additional 17 industry collaborators.



ESIPP launch at the annual Energy Institute symposium; from left to right Mark Ferguson (SFI), Prof. Órla Feely (UCD), Mr. Damien English (Minister for Skills, Research, and Innovation), Michael Mc Nicholas (ERVIA), Prof. Mark O'Malley (UCD, Director of Energy Institute)

Professor Mark O'Malley said that "Energy System Integration is the process of making our energy system more coordinated. It does this by finding and exploiting synergies across the system e.g. storing energy as heat at times when there is abundant renewable electricity available. Working at the interfaces between systems requires engineers, scientists, economists, business people and psychologists to find new ways to use resources more efficiently. Successful research, demonstration and deployment will deliver a more cost effective energy system with less impact on the environment. ESIPP is designed to build much needed human capacity which will put Ireland at the forefront of this important area."

Energy Systems Integration (ESI) is a multidisciplinary area ranging from science, engineering and technology to policy, economics, regulation and human behaviour. ESI is coming to the fore in the planning, design and operation of the global energy system and seeks to optimise the energy system and other large scale infrastructures, in particular water, by leveraging the synergies across all scales and pathways (i.e. electricity, fuels & heat).

Prof Mark Ferguson, Director General of Science Foundation Ireland and Chief Scientific Adviser to the Government of Ireland, added "Science Foundation Ireland is delighted to support this partnership programme, which will

encourage and strengthen the links between multidisciplinary research teams and industry partners while also facilitating the training in energy systems integration, for industry orientated researchers at early and mid-career stages. ESIPP will foster industrial partnerships and develop research capacity in areas of current and emerging economic importance to Ireland.”

Mr David O’Reilly, former Chairman and CEO of Chevron Corporation, and current Chair of the UCD Energy Institute Board said that he is “delighted to be involved in establishing a world class research program which is targeting new technologies in energy for the 21st century. Successful execution will benefit the Irish and global economies”. Mr. Michael McNicholas, Ervia Chief Executive said “ESIPP allows the key utilities in Ireland’s energy sector to work together for the first time with universities and the private sector, researching how gas, water, electricity and heating can integrate and serve our customers more efficiently and dynamically. Ervia along with our industry partners involved in this programme welcome today’s announcement by the Minister and we all look forward to building strong working relationships to make this programme a success.”

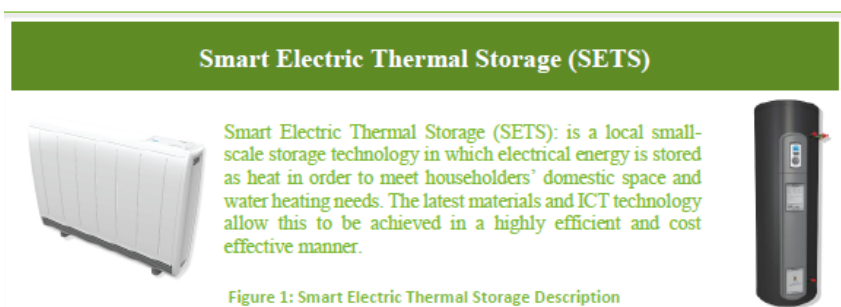
REAL VALUE

A Horizon2020 grant of ~€1.2 million has been awarded to the UCD Energy Institute via Prof Mark O’Malley, Snr Lecturer Dr Donal Finn and Snr Researcher Dr Daniel Burke. The project is “RealValue-Realising Value from Electricity Markets with Local Smart Electric Thermal Storage (SETS)”.

RealValue aims to assess how local small-scale energy storage, optimised across the EU energy system with advanced ICT, could facilitate an integrated and optimal socio-economic energy system design. The total project cost is €15.5m (EC contribution approx. €12.0m) lasting 36 months. RealValue will use three physical

deployments of SETS appliances in 1,250 homes in Germany, Latvia and Ireland, each representing unique conditions, representative of the diversity of EU energy markets. To validate the model at large scale RealValue will use desktop techno-economic modelling & virtual demonstration to assess the technical and commercial potential of local small-scale energy storage aggregated in millions of homes across representative EU regions. Desktop analysis will also consider alternative technologies such as heat-pumps and electrochemical small scale battery storage. The benefits of SETS technology and the RealValue aggregated co-optimisation approach will thus be assessed in terms of cost savings, wind/solar energy curtailment mitigation, CO₂ emissions reduction, power system reliability improvements and asset investment reductions. Results and analysis will be freely disseminated and will inform present and future EU energy policy directions.

The RealValue consortium is a complementary partnership across the energy supply chain. Glen Dimplex and Intel, will bring expertise in electric and heat storage devices and advanced ICT respectively. SSE is a vertically UK/Ireland integrated energy company with a large renewable energy portfolio, and MVV/BEEGY is a large German based energy supplier. Energy network operators ESB-Networks and EirGrid manage extremely high renewable energy grid penetrations. The UCD Energy Institute, VTT-Finland, the Deutsches Institut Fuer Wirtschaftsforschung Germany, University of Oxford England, and Rigas Techniska Universitate Latvia are world-leading institutes that comprise the scientific partnership.



STAFF NEWS

The School has welcomed three new members of academic staff since the start of 2015.

Prof. Robert Shorten received a B.E. degree (with first class honours) in electronic engineering and a Ph.D. degree from University College Dublin (UCD), Dublin, Ireland, in 1990 and 1996, respectively. From 1993 to 1996, he was the holder of a Marie Curie Fellowship at Daimler-Benz Research, Berlin, Germany to conduct research in the area of smart gearbox systems. Following a brief spell at the Centre for Systems Science, Yale University, working with Prof. K. S. Narendra, he returned to Ireland as the holder of a European Presidency Fellowship in 1997. He is a co-founder of the Hamilton Institute, National University of Ireland Maynooth, Ireland, where he was a full Professor until March 2013. He was also a Visiting Professor at Technische Universität Berlin, Berlin, Germany from 2011 to 2012. From 2013-2015 he was a Senior Research Manager at IBM Research Ireland, Dublin, leading the Control and Optimisation activities at IBM Research in Dublin.



Prof. Robert Shorten

He currently holds a dual appointment with IBM Research and University College Dublin, where he is Professor of Control Engineering and Decision Science. He has been active in computer networking, automotive research, collaborative mobility (including smart transportation and electric vehicles), as well as basic control theory and linear algebra. His main field of theoretical research has been the study of hybrid dynamical systems.



Dr. Hamed Ahmadi

Hamed Ahmadi is a lecturer at University College Dublin, Ireland. He received his B.Sc. degree in computer engineering from Ferdowsi University of Mashhad, Mashhad, Iran, in 2004, M.Sc. degree in software engineering from National Aerospace University of Kharkiv (KhAI), Kharkiv, Ukraine, in 2008, and Ph.D. in electrical engineering from National University of Singapore (NUS) in 2012. He worked as a research fellow at CONNECT/CTVR centre, Trinity College Dublin in 2012-2015.

Dr. Ahmadi's current research interests include design, analysis, and optimization of wireless communications networks, cognitive radio networks, and the application of machine learning in small cell and self-organizing networks. Dr. Ahmadi is serving several international journals as a reviewer as well as being part of several Technical Programme Committees at different worldwide conferences/congresses. In 2013, Dr. Ahmadi was selected as an exemplary reviewer of IEEE Communications Letters.

John Healy received the PhD degree from UCD in 2010 in the area of numerical simulation of optical systems. He has worked as a postdoctoral fellow in physics in UNAM, Mexico, and in computer science and electronic engineering in Maynooth University. In 2012, he was awarded the NUI Postdoctoral Fellowship in the Sciences. He was appointed as a lecturer in Electrical and Electronic Engineering in UCD in January 2015. He is a member of the IEEE, the Optical Society of America and SPIE, the international society for optics and photonics. John currently teaches a number of modules in the Internet of Things Engineering programme in Beijing as part of the Beijing-Dublin International College. His current research interests include time-frequency distributions in optics and the theory of optical coherence.



Dr. John Healy

Appointments **PROF. DAVE BURKE**

In April this year Dr. Dave Burke was given the appointment of Adjunct Professor. Prof. Burke has recently been promoted to Vice President of Engineering at Google and one is one of most successful and high-profile graduates in Electronic Engineering that UCD has produced in recent years. He is responsible for a team of over 300 engineers at Google in Silicon Valley and manages platform engineering which is at the core of the phenomenally successful Android operating system, used on billions of devices worldwide.

Prof. Burke has been very supportive of efforts by the IDA to promote the Irish ICT industry within Silicon Valley, and he is well-disposed to contributing in a tangible way to the development of UCD's strategic development of research and teaching in ICT and its applications. Following UCD's recent articulation of areas such as data science and enabling technologies for the Internet-of-Things, as key themes for its future development within ICT, and building on the university's successes in major SFI-funded research centres such as INSIGHT and CONNECT, a closer collaboration with a person of Prof. Burke's standing is of immense benefit to the School, the College, UCD and indeed Ireland as a whole.

David Burke completed his PhD in Electronic Engineering at UCD in 2003. He is author of a book on Speech Processing for IP Networks published by Wiley in 2007. He has published numerous scientific articles and is named as co-inventor on several patents. His rise to the top of Google, as one of the world's most influential and successful ICT companies, has been remarkable and is evidence of the kind of intellectual ability and leadership qualities that UCD would expect of an appointee at the Adjunct Professor level.



*Professor Dave
Burke*

PROF. ROBERT STASZEWSKI COAUTHORS BOOK

Prof. Robert Staszewski has coauthored the book "Millimeter-Wave Digitally Intensive Frequency Generation in CMOS", with Wanghua Wu, and John R. Long. This book describes the digitally intensive time-domain architectures and techniques applied to millimeter-wave frequency synthesis, with the objective of improving performance and reducing the cost of implementation. Coverage includes system architecture, system level modeling, critical building block design, and digital calibration techniques, making it highly suitable for those who want to learn about mm-wave frequency generation for communication and radar applications, integrated circuit implementation, and time-domain circuit and system techniques.

The intended readership for this title includes university researchers, R&D engineers in industry, RFIC design engineers, and graduate students who want to learn about mm-wave frequency generation for communication and radar applications, integrated circuit implementation, and time-domain circuit and system techniques.



Prof. Robert Staszewski

COMMERCIALISATION AWARDS NEWS

Novogrid scoops 2014 UCD Start-Up Award

NovoGrid, a new engineering venture, was declared overall winner of the 2014 University College Dublin (UCD) VentureLaunch Accelerator Programme. In addition to the 2014 UCD VentureLaunch Accelerator Award, NovoGrid was presented with a €25,000 prize.



NovoGrid has developed an intelligent control system to enable wind farm owners reduce energy losses associated with the transfer of electricity to national grids thereby assisting them to improve energy efficiencies and to increase revenues. NovoGrid's novel software-as-a-service solution can be used by wind farm owners to optimally control operational set points, in real-time, within wind farm stations and intelligently exploit existing wind farm capabilities to significantly reduce these energy losses resulting in increased efficiencies and revenues.

NovoGrid is a new venture emerging from research carried out over several years in the Electricity Research Centre at the UCD School of Electrical, Electronic and Communications Engineering by co-promoters, Dr Andrew Keane and Dr Peter Richardson. Paul Manning, an MBA graduate of the UCD Michael Smurfit Graduate Business School, and co-promoter of NovoGrid said, "We are delighted to have won the 2014 UCD VentureLaunch Accelerator Award and we see a very bright future ahead for NovoGrid. Following a planned field trial set for early next year we expect to be operational in over 10 wind farms in Ireland and in the UK during 2015 and to be significantly increasing revenues for wind farm owners."



Professor John Sheridan and James Ryle win UCD Engineering Sprint Award

Professor John Sheridan and Dr James Ryle won the UCD Engineering Sprint award for the commercial potential of a device that allows medics to monitor brain stem activity or alertness by measuring involuntary eye movement. Accurate measurement of the movement, known as Ocular Micro Tremor, is considered important by doctors in a range of areas, including assessing the effect of concussion or head trauma. It can also be used to predict outcomes in coma patients and to determine dosage

in patients under anaesthesia and those with multiple sclerosis or Parkinson's disease. Lack of such movement enables doctors to confirm brain-stem death.

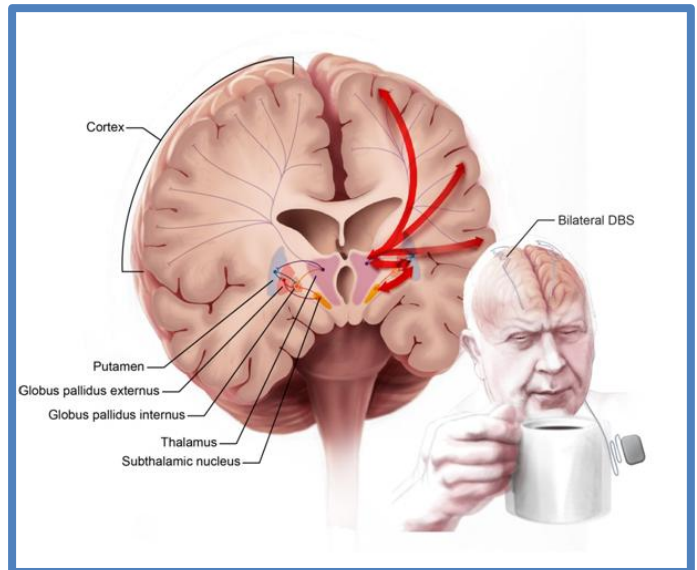
Currently, medics have to use a probe, or needle, against the white of the eye in an invasive and time-consuming procedure. The indirect Brainstem Activity Monitor developed by Prof John Sheridan and Dr James Ryle, makes no direct contact with the eye, is portable and can deliver a fast reliable result. The early-stage business idea has now won the 2015 UCD Engineering Innovation Sprint Programme, with UCD Director of Enterprise and Commercialisation Brendan Cremen saying it "has the potential to make a significant impact in the health industry in Ireland and internationally".

Research Profile

Neuromuscular Systems and Neural Engineering laboratory

Overview with Professor Madeleine Lowery

One of the projects that the Neuromuscular Systems and Neural Engineering laboratory, led by Professor Madeleine Lowery, are working on is focused on enhancing and improving treatments for Parkinson's disease. Parkinson's disease is the second most common neurological disorder and affects an estimated 7 million people worldwide. Over the past decade, deep brain stimulation (DBS) has become established as an effective method for treating the symptoms of the disease. DBS involves implanting electrodes within the brain, to deliver stimulation to nerves within the circuits controlling movement in the form of repeated current or voltage impulses. Though effective at controlling symptoms in a limited subset of patients, it is not known how or why the approach works. Getting a better understanding of the possible mechanisms of how it works and applying novel control algorithms to the pulses it is hoped to make the treatment more universally effective.



To get a better understanding, the group at UCD, supported through recent ERC funding, are developing models of the nervous system to simulate the electrical field in the surrounding brain tissue and the dynamics of information flow within networks of interconnected neurons. This will lead to a better understanding of how DBS works and enable the development of more effective approaches to stimulation. In parallel, experimental research in patients and healthy individuals is ongoing to examine the changes that occur within the neuromuscular system and to identify biomarkers which in the future could be used to provide quantitative information on patient symptoms. Together, these computational and experimental approaches aim to aid in the early diagnosis and assessment of medical, surgical or exercise-based treatments.

Research within the group has shown how DBS suppresses or disrupts pathological or 'bad' oscillations across networks of neurons within the brain which are associated with parkinsonian symptoms including limb tremor, slowed movement and muscle rigidity. They are now exploring how information recorded from the nervous system can be fed back to the stimulation device, enabling the stimulator settings to be continuously updated and adjusted in response to patient needs.

In addition to applications in movement disorders DBS, is also being trialled for a wider range of other neurological and psychological conditions including epilepsy, medication-resistant depression, Alzheimer's disease and obsessive compulsive disorder. Interest is also moving towards electrically stimulating the peripheral nervous system to treat a wide range of other diseases. This has given momentum to the concept of 'bioelectronic medicines', which aims to use modulation of neural electrical activity an alternative to conventional pharmacological treatments. As the field develops further, it will continue to provide new engineering challenges to address major health problems facing society.

“Google never sits still. We’re a company that’s built on innovation and if you build on innovation, you build on change. It’s what makes us such an exciting company,” says Ronan Harris, Head of Google in Ireland, and Vice President, Google, Europe, Middle East and Africa.

“I’ve always had a huge focus on innovation and on trying to constantly drive change and look for the next thing”, he says. “It harks back to my engineering days in UCD where we were challenged to constantly ask questions and seek better ways of doing things; to accept no boundaries. That attitude has stood to me throughout my career in the tech sector, where change is constant. If I look back over the 23 years since I graduated from UCD, the world has been transformed by the seismic technological change that has taken place.



Ronan Harris

Apart from a brief spell in private equity Ronan has spent his career working with global leaders in technology. He started his career in Japan working with Mitsubishi Chemical Corporation at their Information Storage Products division and spent nine years in Asia working in technology and consulting. “Japan was a global centre of innovation and technology in the 1990’s, I had an amazing time and I was really lucky to work on some great projects. Ireland didn’t offer the same level of opportunity that it does today, where Dublin is seen as the ‘go to’ city for anyone looking to pursue a career in the digital sector”.

Ronan returned to Ireland in 2001 and joined Google’s fledgling EMEA headquarters in Dublin in 2005. Strange as it might seem today, it wasn’t a ‘no brainer’, Google was still in start-up mode and he actually had to think about the offer for a few days before accepting it. Luckily it was the right career move! Today, as head of Google in Ireland, he leads a team of 5,000 Googlers who hail from over 65 countries and work with companies in more than 50 countries, helping them to grow their businesses in the digital marketplace. In addition, the engineering team in Dublin is responsible for networking, site reliability and building the tools that keep Google’s core products running.

His focus over the years in Google has been on where the company can innovate and change to do things better for its customers, build new services and products for partners and change how it operates internally to be more efficient. This unrelenting drive to innovate is central to his leadership of Google in Ireland. “I’m really proud of the international reputation Google in Dublin has for innovation and for our expertise in all things digital. We’re supporting economic growth across Europe and it’s really important to me that we stay at the forefront of that. So we’re constantly innovating so that we remain the fountain of insight for our users, advertisers and partners and help them grow their businesses”, he says.

He says that the advances in connectivity, storage and computing power mean that the world is at the dawn of the next industrial revolution. “While the pace of change might seem fast, we’re never again going to experience change as slow as it is today. It’s only going to accelerate as more and more people become connected to the internet. So we can’t afford to stay still. We have to be constantly challenging and thinking about what’s next, and that’s what makes life fun, and ultimately what keeps us ahead of the game” he says.

STUDENT NEWS

Classes of 2015



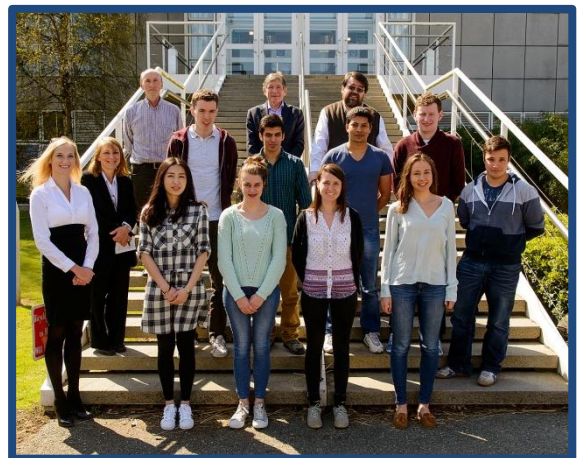
BE (E&E) and BE Biomedical Engineering



ME Biomedical Engineering



ME Electronic and computer Engineering



ME Electrical Engineering

STUDENT AWARDS

MTTS Undergraduate Scholarship Award
2015 ESB Engineering Challenge

Travel Scholarship Award

Yuting Wei
Michael Purcell, Robert Fenlon,
Aaron Collier and Daniel Cullen
Rebekah Murphy

SCHOOL NEWS

Awards and Honours

Professor Orla Feely, has been elected to the ranks of the Royal Irish Academy (RIA) in recognition of her outstanding academic achievements.

Orla Feely is Professor of Electronic Engineering at the UCD School of Electrical, Electronic and Communications Engineering and is the UCD Vice-President for Research, Innovation and Impact. She has served as Chair of the Irish Research Council and has a worldwide reputation as a leading researcher in nonlinear electrical circuit theory and its applications. In recognition of this, she was elected a Fellow of the Institute of Electrical and Electronics Engineers (IEEE), the first Irish woman to achieve this distinction.



Professor Órla Feely



The IEEE Board of Directors, at its November 2015 meeting, elevated Prof. Federico Milano to IEEE Fellow, effective 1 January 2016, with the following citation: **"for contributions to power system modeling and simulation"**

Recognizing the achievements of its members is an important part of the mission of the IEEE. Each year, following a rigorous evaluation procedure, the IEEE Fellow Committee recommends a select group of recipients for elevation to IEEE Fellow. Less than 0.1% of voting members are selected annually for this member grade elevation.

Professor Federico Milano

Professor Madeleine Lowery, received the highly prestigious European Research Council (ERC) funding for a project entitled "Multiscale Modelling of the Neuromuscular System for Closed Loop Deep Brain Stimulation". Professor Lowery's research aims to create computer models of the human brain and neuromuscular system. The models will be used to understand how stimulation of the deep structures of the brain can alleviate the symptoms of Parkinson's disease, and to develop new approaches for treating Parkinson's disease using adaptive deep brain stimulation.



Professor Madeleine Lowery

UCD's RF & Microwave Research Group has been awarded a contract by European Space Agency (ESA) to work on "GaN based, passively cooled, linearised L-band SSPA for avionics terminals" in collaboration with MACOM and Honeywell.

A team led by Dr. Anding Zhu and Prof. Bogdan Staszewski has received funding from MCCI (Microelectronic Circuit Centre Ireland) to develop digitally compensated high power and high efficiency RF-DACs for next generation wireless communications.

UCD SCHOOL OF ELECTRICAL, ELECTRONIC AND COMMUNICATIONS ENGINEERING

ACADEMIC STAFF



Dr Hahmed Ahmadi
Biomedical Engineering



Dr Elena Blokhina
Circuits and Systems



ProTom Brazil
RF and Microwave



Dr Barry Cardiff
Communications and Signal Processing



Dr Paul Curran
Circuits and Systems



Prof Tony Fagan
Communications and Signal Processing



Prof Orla Feely
Circuits and Systems



Dr Mark Flanagan
Communications and Signal Processing



Dr Damian Flynn
Electrical Energy



Dr John Healy
Optical Engineering



Dr Andrew Keane
Electrical Energy



Dr Simon Kelly
Biomedical Engineering



Dr Justin King
RF and Microwave



Dr Madeleine Lowery
Biomedical Engineering



Prof Federico Milano
Electrical Energy



Brian Mulkeen
Circuits and Systems



Dr Terence O'Donnell
Electrical Energy



Jerry O'Dwyer
Electrical Energy



Prof Mark O'Malley
Electrical Energy



Dr Giacomo Severini
Biomedical Engineering



Prof John Sheridan
Optical Engineering



Prof Robert Shorten
Control Engineering



Prof Robert Staszewski
Electronic Circuits



Rick Watson
Electrical Energy



Dr Anding Zhu
RF and Microwave

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Liam Carroll



Luke Dalton



Declan Lehane



Steve McEvoy



Pat McNally

ADMINISTRATIVE STAFF



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