



The University
Of
Sheffield.

In Control

Newsletter for Automatic Control & Systems Engineering at Sheffield

Winter 2012 Issue 2

Head's Welcome

Welcome to this edition of 'In Control'. Since the previous edition ACSE has recruited more staff in order to grow and maintain our position as the largest group in the UK and Europe dedicated to research and teaching in systems and control engineering. Our streamlined portfolio of delivery-focussed undergraduate and postgraduate programmes reflect our research strengths, including a new MSc in Computational Intelligence which runs alongside the flagship MSc in Control Systems. Our diversity, impact and visibility are the products of ACSE staff, students present and past, as well as industrial, commercial and academic partners. I would like to thank them all for their part in the continuing success of the Department.



Professor Visakan Kadirkamanathan, Head of Department

Putting on the RITC!

The Network Rail funded Rail Innovation & Technology Centre (RITC) at Sheffield was established in 2009 with the broad aim of bringing to bear expertise and solutions from non-rail sectors on rail problems, with a particular focus on "intelligent" systems engineering. The Sheffield RITC operates as a virtual centre, drawing from all seven departments across the Engineering faculty, from the Advanced Manufacturing Research Centre (AMRC) - a major collaboration between Sheffield and Boeing, and from the Factory of the Future (with Rolls-Royce). Network Rail chose Sheffield not because we had a lot of railway-related research underway but because we have such a good track record of delivering innovative solutions to a wide range of leading industrial organisations. The idea is to take a new look at rail-related problems without feeling constrained by conventional thinking.

The virtual centre has its headquarters in AC&SE and is under the direction of Dr Rob Harrison, with Dr David Fletcher from Mechanical Engineering the Deputy Director.

The initial agreement is for five years with an expected £2M research benefit to accrue from Network Rail's £1M investment. We are now just past the mid-point of the initial contract period and already c. £2M of funding has been committed with a further c. £1M of wider rail-related activity.

In early October 2011 Sheffield hosted the Third Annual Rail Research & Innovation Conference at The Edge with approaching 300 delegates from across the rail industry,



academia and government. At this we reported on a wide range of projects including recycled composite sleepers (Dr Hodzic, Mechanical) whose prototypes will go live very soon, to self-powered remote sensors (Prof Thompson, AC&SE), from wheel-rail contact measurement (Dr Lewis, Mechanical), to the limiting behaviour in a widespread type of bridge (Dr Gilbert, Civil). New projects in energy harvesting (Dr Stone, EEE) and high-speed railhead grinding (Dr Marshall, Mechanical) are under way, with many more under discussion.

The sheer size and scale of the rail network presents an enormous challenge even to apparently simple engineering solutions. Changing it while keeping it running is not easy. I don't suppose most of you think of the railway industry as a destination for systems engineers but perhaps you should – you will be pleasantly surprised.

Professor Rob Harrison, Director, RITC

Alumni View

I decided to study at the Department of Automatic Control and Systems Engineering as the material studied in the course can be applied to a wide range of fields, such



as aeronautical and chemical. I enjoyed my time with the Department which was amazing and with a University that has so much to offer to students. The course exceeded my expectations as the material taught was interesting and the lecturers passionate about what they were teaching. I also took part in various volunteering opportunities through University which helped me find a job after my studies as it differentiated me from other candidates. I graduated in July 2011 with an MEng in Systems and Control Engineering with a year work experience at Airbus. The year's work experience at Airbus, which the Department encouraged me to undertake was interesting as I learned about how projects were run in an engineering company. This helped me greatly in the final year project required for my MEng as I could use the tools and processes acquired during that placement on it. I am now on the Direct Entry Graduate Programme at Airbus. I apply not only technical knowledge that I learned through my course in my every day job but also use the skills set that I have developed through my time at University.

Marion Carrabin, MEng Systems and Control Engineering with Employment Experience, 2011

If you are an alumnus we'd like to hear from you so please contact us on m.ham@sheffield.ac.uk

Also please visit the new web site to see what opportunities are available to alumni.

www.sheffield.ac.uk/acse/alumni

A New Student's Perspective

For me, having a chance to obtain a degree from the University of Sheffield really was an honour. Not only because it has just been awarded University of the Year, but the reputation that the Department of Automatic Control and Systems Engineering has earned itself is second to none. The moment that I moved here I could tell that the Department really prides itself in what they do and the research that they conduct, and I couldn't wait to become part of that.

Moving to a city like Sheffield after living in a small seaside town like Skegness was very overwhelming at first, however both the University and the Department made all students, home and overseas, feel very welcome and at home here. Be it the trivial question about where a lecture theatre is to more serious matters, there is always someone who will happily listen to you and help as much as they possibly can.

I have always been interested in computing and programming, and this combined with my passion for engineering fitted the criteria for the 'Computer Systems Engineering' course here at The University of Sheffield perfectly. Since the start of the course we've been involved in hands-on projects such as programming Lego robots for a competition in intro week, to designing, making and programming an electronic door lock in just week 6!

I am very happy that I have chosen this course and that it has delivered everything it had promised and more! I look forward to seeing how a degree from this Department will benefit me in the future.



Alex Godbehere,
MEng Computer
Systems Engineering

New Academic Staff



(from left to right) - Dr R Gross, Dr G Panoutsos, Dr B Jones, Dr S Pope, Dr A Sharma and Dr R Purshouse.

The Department has welcomed a number of new staff since our last newsletter. Dr George Panoutsos, Dr Simon Pope and Dr Robin Purshouse all completed PhDs with the Department before gaining academic positions in ACSE. Dr Panoutsos' current research is in the field of metals design and processing with applications focusing on 'through-process modelling and optimisation'. Dr Pope, meanwhile, focusses on noise and vibration control, structural health monitoring and space systems. Dr Purshouse specialises in the modelling and analysis of complex social systems as well as decision-making in uncertain, multi-criterion and multi-stakeholder environments such as healthcare resource allocation.

Dr Roderich Gross leads the Natural Robotics Lab in the Department, which investigates robotic systems inspired by nature and robotic models of natural systems. Roderich joined the Department

following a spell as a Marie Curie Intra-European Fellow at EPFL in Switzerland and his main focus is on the study of self-assembling robotic systems and swarm robotic systems.

Dr Bryn Jones joined the Department from the Scottish Association for Marine Science following a stint with the British Antarctic Survey at the Halley V research station in Antarctica. Bryn's work has focussed on low-power instrumentation for climate change scientists and researching novel energy harvesting technologies for use in polar environments.

Dr Ati Sharma became a member of ACSE in 2011, following a research fellowship position at Imperial College London. Dr Sharma's PhD had examined the modelling and control of tokamak nuclear fusion reactors and he also has experience of research and trading in the finance industry.

The ACSE Society

The ACSE Society provides all the social needs for members of the ACSE department. A typical year as an ACSE Society member will see you taking part in a whole range of exhilarating events spanning from Paintball to Football, as well as the occasional bar crawl of course.

Recent Fun

One of the latest society events was a trip to an indoor paintballing centre. A surprising (perhaps worrying) number of people jumped at the chance to shoot their fellow classmates and we managed to sell out the venue. Another recent event was Geek Chic. A bar crawl that saw all the Science, Mathematical and Engineering societies come together on one night to raise money for Children in Need. The event was a huge success and a healthy amount of money was raised through a lot of Geeks having a lot of fun.

Ever Expanding

The society is ever expanding and it is this growth that's opening the doors to bigger and better occasions for ACSE students. Some plans and ideas for the future have included going to sports events such as Ice Hockey and Tennis, inviting guest speakers from industry and perhaps even an ACSE camp.

Kevin Stanley-Adams, President of ACSE Society and BEng Systems and Control Engineering. Society Details at <http://on.fb.me/acsesoc>

If you would like to contribute to the next edition of the ACSE newsletter please email m.ham@sheffield.ac.uk

For an electronic version of this newsletter go to www.sheffield.ac.uk/acse/news

IET/InstMC Accreditation Success

The Department was delighted to receive confirmation of the excellence of its teaching and learning from two world leading professional organisations in March 2011. The accredited status of all of ACSE's undergraduate and taught postgraduate programmes with the Institution of Engineering and Technology (IET) and Institute of Measurement and Control (InstMC) was renewed following a panel visit to the Department.

The two day visit to the Department was the final stage of a process which ensures ACSE programmes fully satisfy the requirements leading to professional Chartered Engineer status. The Panel thoroughly examined all aspects of the Department's teaching and learning and quality assurance and met with 20 students from all years and programmes. Amongst a number of commendations from the panel, the IET praised the Department for "the level of industrial contact that supports [its] programmes" as well as the level of student access to academic staff.

Visitors

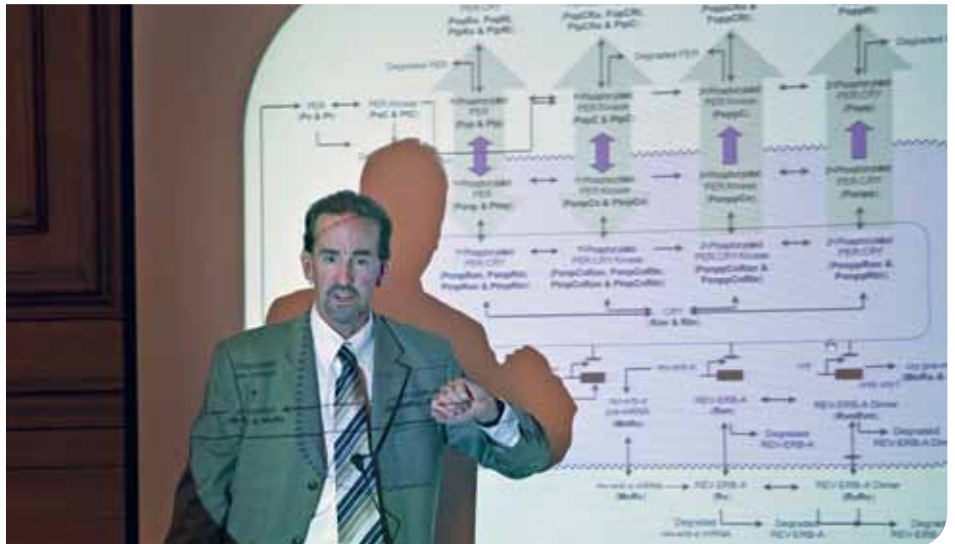
Researchers from all over the world visit ACSE to share their expertise and have the opportunity to work with our academic staff. The Department is currently hosting visitors from institutions such as Chongqing University China, the Italian Institute of Technology, Hiroshima University and University Beira Interior.

The expertise of our visitors at present comprises everything from Food Robotics to Artificial Neural Networks, Swarm Robotic Systems and Artificial Intelligence to the architectures and algorithms of Intelligent Modelling and Control.

If you are interested in coming to the Department as an academic visitor please email the respective member of academic staff who you are interested in collaborating with. Academic staff profiles are at:

www.sheffield.ac.uk/acse/staff

Nicholson Lecture



Professor Frank Doyle III, Inaugural Nicholson Lecture

In 2010 the Department honoured its founder, Professor Harry Nicholson (1926-2005), by naming its Distinguished Lecture in Control Engineering series after him. Professor Nicholson's vision of the relevance and potential of Control Systems Engineering as a distinct university subject area enabled the Department to begin its journey to the strong national and international profile it holds today. The annual Nicholson Lecture series therefore seeks to attract the most prestigious academics in the field today to present to staff, students and an invited audience from across the University.



Second Nicholson Lecture: (Left to Right) Prof. V Kadiramanathan (Head of Department), Prof. R Isermann (Darmstadt University of Technology), Prof. M Hounslow (Pro Vice Chancellor, Faculty of Engineering), Prof. P Fleming (Professor of Industrial Systems and Control).

The inaugural lecture took place in 2010 when Professor Frank Doyle III of the University of California, Santa-Barbara, presented on "Shedding Light on the Control of Circadian Rhythms: From Genes to Cells to Systems".

In May 2011, Emeritus Professor Dr R Isermann of the Institute of Automatic Control at the Darmstadt University of Technology in Germany, informed the 80-strong gathering about 'On the Way to Accident Free Driving'.

Look out on the Department's website (www.sheffield.ac.uk/acse) for details about the 2012 speaker and how to book a place.

General News

Seminars

The Department hosts a weekly research seminar series attended by both students and academic staff. Subjects vary from complex systems, computational intelligence, control, and robotics to the application of these in emerging areas of science and engineering. For more information on upcoming seminars visit www.sheffield.ac.uk/acse/research/seminars

Honours and Awards

Professor Peter Fleming has been elected a Fellow of the International Federation of Automatic Control (IFAC). This is a great accolade as Professor Fleming is one of only two of the first Fellows from the UK and was chosen for his "pioneering research contributions to evolutionary multi-objective optimisation and its application to industrial control design".

Professor Mahdi Mahfouf and Dr Moulmoud Denai received the top prize at the Medipex NHS Innovation Awards Ceremony.

Dr Anthony Rossiter received a University Senate award for Excellence in Learning and Teaching whilst

Mrs Linda Gray was voted the 'Staff Student Committee Coordinator of the Year' at the 2011 Students Union Academic Awards ceremony.

Lists of prize winning ACSE students can be found at

www.sheffield.ac.uk/acse/prizes



Departmental 40th Anniversary Celebrations: (Left to right) *Prof V Kadiramanathan (Head, 2009-), Prof P Fleming (Head, 1993-1999), Mr E Rose (Acting Head, 1988-1989), Mrs G Nicholson (Widow to Prof H Nicholson, Head 1968-1988), Prof D Linkens (Head, 1989-1992), Prof R Harrison (Acting Head, 2008-2009)*
Absent: *Prof DH Owens (Head, 1999-2008)*

Research Grant Announcements

Since 2009, the Department has been awarded in excess of £6m in research funding. Projects with significant funding include:

Professor S Billings

ERC: Nonlinear System Identification in the Time Frequency and Spatio-Temporal Domains

Professors S Billings, M Balikhin, D Coca, V Kadiramanathan and Drs Z Lang and H Wei

EPSRC: System Identification and Information Processing for Complex Systems

Professor D Coca and S Billings

BBSRC: Reverse-engineering Drosophila's self tuning retinal networks

Prof R Harrison

Network Rail: Research Centre Core Budget (1st Tranche)

Professor M Mahfouf

EPSRC: Goal-directed Trajectory Planning of Therapeutic Pathways for Septic Shock Patients using Fuzzy Granules-Oriented Maps

Professor P Fleming

Rolls-Royce: UTC Control and Systems Engineering

Professor M Balikhin

European Space Agency: Cluster Active Archive

Dr T Dodd

DEFRA: The Grail Robot

PhD Awards

Over 60 ACSE students have obtained a PhD since our previous newsletter. Theses from 'Identification of Non-Linear Processes in Space Plasmas' to 'A Framework for Modelling Spatiotemporal Cortical Dynamics' have all been awarded and the Department passes on its congratulations to all involved!

If you would like to know more about the department you can contact us at:

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