

CASL Newsletter

Issue: 2009-1

Researcher in Profile

Prof. Joao Marques-Silva has joined the School of Computer Science & Informatics & CASL as an SFI Stokes Professor. Joao has been fulltime in CASL since January.

His research is in Formal Methods, namely system specification and verification, and model checking. Algorithms for Boolean satisfiability and extensions. Application of formal methods in design automation, artificial intelligence, and computational biology.

2 PhD students from Southampton joined Joao at CASL & he plans to add more to his team during 2009.

Welcome to Joao and his team!

School Highlights

School of Electrical Electronic & Mechanical Engineering celebrate Prof. Orla Feely being the first Irish woman to become a fellow of the Institute of Electrical & Electronic Engineers.

Prof Peter Lynch & Dr Rodrigo Caballero, School of Mathematical Sciences, give series of public Lectures as part of the [UCD Earth Systems Institute Climate Change Seminar Series](#)

Dr. Joe Carthy, Head of School of Computer Science & Informatics, celebrates Kazakh Scholars at UCD.



Feb-Mar 09

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Collaborate! DARIUS – Volunteers Needed

“We might all hope that our hearts sound like Mozart, unfortunately at some stage they might sound like Metallica”, Dr. Scott Rickard.

What happens when you put an applied mathematician, a team of electrical engineers, a geophysicist and a cardiologist together (and add some SFI funding)? The hope is that they invent a device which will non-invasively detect early stage heart disease which is the leading killer in the Western world.

The DARIUS project is concerned with the acoustic multichannel detection and localisation of abnormal heart sounds for screening and diagnostic purposes. These abnormal sounds include both valvular and turbulent sounds associated with such pathological conditions as valvular heart disease, cardiomyopathies and coronary artery disease.

The project is named the DARIUS Project, after Darius Vaseghi, a UCD Engineering student who passed away tragically in 2005 as a result of an undiagnosed cardiac abnormality.

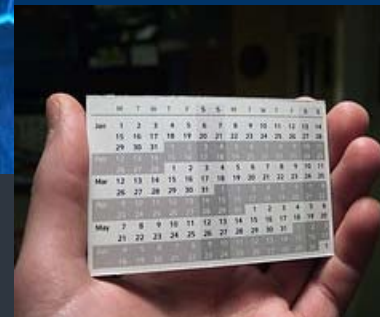
The focus of our research is the detection and localisation of the turbulent sounds produced by coronary artery stenosis. The diagnostic value of this project cannot be disputed.

The current gold standard for diagnosis of coronary artery disease (CAD) is the coronary angiogram, an invasive procedure with many associated risks. Thus, development of a non-invasive method of diagnosis would both reduce the risk associated with diagnosis and provide a user-friendly system for screening the general public for CAD.

The team in CASL which is performing this research consists of Scott Rickard, Aishwarya Moni, Conor Fearon, Gary McDarby & Chris Bean.

The project needs more data to work on and needs about 30 volunteers, who are available on Friday the 7th of March, who are willing to let us record their heart sounds. The recording involves placing six sensors on the chest and taking a 20 second recording while you hold your breath. Everyone who volunteers will be entered into a draw to win a Nintendo DS Lite!! If you are interested in taking part please reply to Aishwarya.moni@ucd.ie.

For links to recent articles on this & other CASL research go to - [CASL Press](#).



Recent Publications

K. Drakakis, R. Gow, S. Rickard (2009) 'Common distance vectors between Costas arrays'. *Advances in Mathematics of Communications*, 3 (1). (PRJ)

Dempsey, I., O'Neill, M. and Brabazon, A. (2009) *Foundations in Grammatical Evolution for Dynamic Environments*. Berlin: Springer. (B)

Bradley, R., Brabazon, A. and O'Neill, M. (2009) 'A Neuro-evolutionary Approach for Interest Rate Modelling' In: *Natural Computing in Computational Finance (Volume II)*. Germany: Springer. (BC)

Schyuan, W. and Brabazon, A. (2009) 'The Emergence of a Market: What Efforts can Entrepreneurs Make?' In: *Natural Computing in Computational Finance (Volume II)*. Germany: Springer. (BC)

O'Neill, M (2009) 'Book Review: A Field Guide to Genetic Programming'. *Genetic Programming and Evolvable Machines*, 10 . (PRJ)

C. Bracken, E. Byrne, N. Markin, G. McGuire (2009) 'Fourier Spectra of Binomial APN Functions'. *SIAM Journal of Discrete Mathematics*, . (PRJ)

I.Walsh, D.Baú, A.J.M.Martin, C. Mooney, A.Vullo, G.Pollastri (2009) 'Ab initio & template-based prediction of multi-class distance maps by two-dimensional recursive neural networks'. *BMC Structural Biology*, 9 . (PRJ)

Q.Le, G.Pollastri, P.Koehl (2009) 'Structural Alphabets for Protein Structure Classification: a Comparison Study'. *Journal of Molecular Biology*.

J. Marques-Silva (2009) 'Boolean Satisfiability and EDA Applications' In: Cambridge University Press. (BC)

Recent & Upcoming Events

Recent

The TRUST Collaborative Seminar Series ran on Feb 5, 12 & 19 & included talks from Gary McGuire, Joe Kiniry, Konstantinos Drakakis, Nigel Boston, Pavel Gladyshev & Mark Flanagan. Link: [Talks on the Trust Theme](#)

Warren D. Smith, Hamilton Institute, "How I broke AES (Advanced Encryption Standard)---if I did it", CASL Seminar Room, Feb 3 '09

David Edelman, "Finance in a Nutshell" : a crash 'conversion' course in the conventions, modeling, understanding, and management of uncertain cash flow. Jan 22 & 23 '09. [Talks on the Finance Theme](#)

TRIL Expo 2009 held in the Science Gallery , Trinity College Dublin, Feb 26 '09.

Upcoming

Innovation Seminar Series:

Feb 26: Seminar by Francois Pinchot - NovaUCD & the Commercialisation Process, 3-4pm UCD CASL Seminar Room.

Mar 5: Barry Jennings – Research & Start-up Funding- Enterprise Ireland, 3-4pm UCD CASL Seminar Room.

Mar 12: Venture Capitalists - What they do and what they look for?- 4th Level Ventures, 3-4pm UCD CASL Seminar Room.

CASL Seminar:

Mar 2: Lennon O'Naraigh, Imperial College London - Interfaces: From classical times to Cahn and Hilliard, 11am UCD CASL Seminar Room.

Look out for in March

Denis Shields will give two talks as part of the Computational Biomedicine and Bioinformatics Cluster on:

-Biological networks of proteins and genes; and

-Biosequence motifs and their network contexts

Mar 26: ICHEC Director J-C Desplat will give a seminar 'Opportunities for collaboration with ICHEC' in the CASL Seminar Room.

Themed CASL Coffee Hours - We want to host themed coffee hours every month based on your countries of choice. If anyone has any suggestions for countries and their specialties please email casl@ucd.ie.

Social Corner

Welcome to

Xiaoyun Li (Feb)
Vieri Del Bianco (Jan)
Joao Marques-Silva (Jan)
Eric Chua (Nov)
Mohamad Saad (Jan)
Shane Martin (Dec)
Edgar Galvin (Feb)
Gerard Moran (Dec)
Michel Schilperoord (Jan)
Jaime Eduardo Souto Perez (Jan)
Gary McDarby (Dec)
Jens Zumbregel (Jan)

Welcome to

Luca Cerone(Jan)
Gary McDarby((Dec)
Keelin Murphy (Feb)
Huan Chen (Feb)
Yadav Nagesh (Feb)
Antonio Jose dos Reis Morgado (Feb)
Eduardo Moreno-Martinez (Feb)
Paulo Battino Viterbo (Feb)
Dragan Stosic (Feb)

Farewell to

Dr. Jill Freyne who is going to Hobart in Australia to take up a Research Scientist's position in the CSIRO ICT Centre.
Andreas Brandes & Hannes Brauckman who are leaving the IRU group to return to the University of Hamburg
Best wishes from everyone at CASL!

Congratulations

Congratulations to Joanne & Ben on the arrival of baby Jessica.

Social Events

Email casl@ucd.ie with any planned social events that you would like CASL & Schools to know about. Any ideas & help on planning events are welcome!

Featured Group

The Claude Shannon Institute and Mathematics of Communications and Trust Cluster



Based in UCD CASL, Communication systems are at the heart of everyday life, and mathematics is at the heart of these systems.

Their purpose is to research areas including cryptography, security, privacy & trust,

Dec 11th 2008 – A poster session was held in the CASL Common room to highlight their interesting research themes. It was enjoyed by many researchers in CASL.

Jan 29th Claude Shannon Institute held their mid term SFI review and it was received positively. Many thanks to those who supported this effort.

Feb 16th & 17th Prof Nigel Boston gives Graduate Module 8 “Graph Based Codes” to students in UCD CASL Seminar room.

Feb 5th, 12th & 19th the cluster ran a series of talks on the theme of ‘Trust’. Thanks to Gary McGuire, Joe Kiniry, Konstantinos Drakakis, Nigel Boston, Pavel Gladyshev & Mark Flanagan.

Feb 25th Claude Shannon host the first all Ireland Cryptography day. The purpose is to bring Academia & Industry together to discuss cryptography research and the applications. Scott Vanstone (CSI) is the Keynote Speaker.

Links – [The Claude Shannon Institute Mathematics of Communications and Trust Cluster](#)



Facing Down the Rising Rivers

By Dick Ahlstrom - From *The Irish Times*, 15th January 09.

It is warmer now than it has been for the past half a million years. “We are outside the range of natural variation.” The latest modelling systems look at all aspects of the Earth system, from the atmosphere & the oceans to the forests, ice cover, land masses & cloud cover.

“We need to model the entire Earth system because there are interactions between them,” he says. “Cloud feedbacks are the largest uncertainty in the system. This really is a source of serious uncertainty.”

Some results remain alarmingly consistent, however, including a doubling of the flooding incidents seen on some of our river systems he says. This is predicted with a relatively conservative 1.5 degree increase in average temperatures. Higher sea water temperatures are also expected to bring more powerful and more frequent storms. “The intensity of storms will increase,” he says.

The 1986 visit of the remnants of Hurricane Charley caused significant damage in Ireland, and this type of event is going to be repeated in the future. “The old patterns are being broken and there is evidence hurricanes are becoming more destructive,” he states. The greatest fear relates to what he calls “unanticipated emergent phenomena”, which are “some new things we haven’t been able to predict at all”.

Some of these may arise due to a “positive feedback”, where a change serves to accelerate further change in a runaway reaction. “The worrying thing about the climate system is there are a number of these feedbacks.”

The loss of reflective polar ice results in more dark earth & sea, which heat faster & thereby speed up further ice loss. Melting permafrost releases the greenhouse gas methane, which causes more atmospheric warming, which causes more melting. “It could be catastrophic,” Prof Lynch suggests.

These changes are akin to an asteroid strike, a low probability event that if it occurs carries enormous consequences. “There is an unquantifiable risk of a catastrophic climate change,” he believes. “Being prudent is recognising the risk. We have got to reduce CO2 emissions to avoid a tipping point.” We have also got to prepare policies to help us cope with the changes when – not if – they come.

The data delivered by Prof Lynch comes via the C4I, Community Climate Change Consortium for Ireland (www.c4i.ie). It has been able to make use of the huge computer power available from the Irish Centre for High-End Computing (www.ichec.ie), which supports Irish research activity.



Feature – CASL Advisory Board

On 15th December 2008 CASL held their first International Advisory Board (IAB) review. The advisory board members were initially chosen owing to their enormous depth and breadth of research expertise aligned to CASL, coupled with their leadership in information, communication, software and computational research and development.

The International Advisory Board recognizes that the Complex and

Adaptive Systems Laboratory (CASL) at UCD has moved from concept to operation at a significant scale in a short period of two years.

The IAB finds that CASL provides an environment where researchers from different disciplines join together to attack grand challenges from application domains that are of strategic international interest.

“We are impressed by the amount of funding from the Science Foundation of Ireland (SFI) and by the incubation of smaller individual grants to larger multidisciplinary awards. CASL has critical mass at the nexus of engineering, biomedical sciences, computing and the mathematical sciences. In a world that is drowning in data, CASL can lead by integrating data management, analysis (including machine learning) and visualization”

Featured Interview



Prof Paddy Nixon
TRIL CENTRE DIRECTOR

Prof. Paddy Nixon, TRIL Co-Director, discusses *Building Bridges* research project on Ireland AM.

TRIL’s Building Bridges research project featured on Irish TV station, TV3 on Tuesday 10 February 2009. TRIL’s Co-Director Prof Paddy Nixon and one of TRIL’s Building Bridges participants were interviewed during the feature. The TRIL feature appeared on TV3’s morning programme, Ireland AM.

[See the TV Interview Here](#)

Operations Update

For 2009 CASL will experience significant changes to the current occupancy levels. Since December 2008, 18 new people have already joined (see Social Corner) and it is expected that in 2009 a further 50-60 new people will join (including interns).

The Clarity Group will be leaving CASL by the end of March, which will be roughly 25 people. We will host a farewell event for them (details in March - Social Corner) & expect to continue the good relationship & collaborations from their new home – the Physics North Building on UCD Campus. There will also be an additional 10-15 people leaving this year.

With all these changes you can expect some moves and related activity over the coming month.

- The Meeting Room is now on the Ground floor of CASL.
- Temporary Desks added to 2nd floor (4 spaces) and the 3rd floor (8 spaces).
- The photocopier from the second floor has been moved to reception.
- We are testing a new people search database, which will be added to the CASL homepage.

Did you know?

There are shower facilities on the 2nd and 4th floor if you are considering biking in the near future as the weather is improving (Hopefully ☺)

EYE ON IT Conferences 09

The 20th Irish Signals & Systems Conference 2009 will be hosted in UCD – June 10 - 11 2009. Co-Chairs are Chris Bleakley & Scott Rickard.

The Claude Shannon Institute is hosting the 9th International Conference on Finite Fields and their applications at UCD– July 13-17 2007.

Other Conferences? – Please let people know – Email casl@ucd.ie.

Computing Corner

CSI Programming Competition



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B:0

B0.02

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The Code left on the CASL Notice Boards is written in hexadecimal. First line is the date 4.4.2009, second line is the time 11:00am and third line is the room B0.02 (which is in the CSI building)