



# UCD CSI Review 2008



[www.csi.ucd.ie/news](http://www.csi.ucd.ie/news)

# Welcome



The last 12 months have seen many developments in the Irish education sector. With much emphasis placed on the projected shortages in high-skilled graduates over the coming years, UCD School of Computer Science and Informatics remains at the pinnacle of teaching and research at third level and continues to produce high-quality graduates each year. In recent times we have sought to lead the way as one of the foremost contributors to Computer Science education in Ireland.

The School continues to develop, through new initiatives and an ever-increasing focus on the pursuit of excellence. It is this unwavering determination to excel which will see UCD School of Computer Science and Informatics ideally placed to guarantee the provision of high-skilled graduates and cutting edge technologies to revitalise Ireland's technological progression.

This publication is a celebration of the spirit of Computer Science and Informatics in UCD and the school's achievements in 2008. Happy Reading!

A handwritten signature in black ink that reads "Joe Carthy".

Dr. Joe Carthy, Head of School

### Teaching & Learning

[Fudan News](#)

[CSI Outreach](#)

[CPSC Activities](#)

[CCI News](#)

[Other T&L News](#)

### Research

[ODCSSS News](#)

[PEL News](#)

[TRIL News](#)

[CLARITY News](#)

[Other Research News](#)



# Teaching & Learning



## Ireland Week Festivities

2008 has been a very eventful year for the UCD/Fudan BSc. International programme. During the annual Ireland week festivities in Fudan we were delighted to welcome Mr. Dick Roche, the minister for European affairs to the campus.

The minister presented prizes to the winners of the George Bernard Shaw essay competition and to the winners of the inaugural iShamrock competition. This competition was open to all undergraduates in Fudan and attracted a lot of interest. We kindly acknowledge the support of Puca software, Enterprize Ireland and the Irish Consulate all of whom contributed to making the ceremony a memorable one.



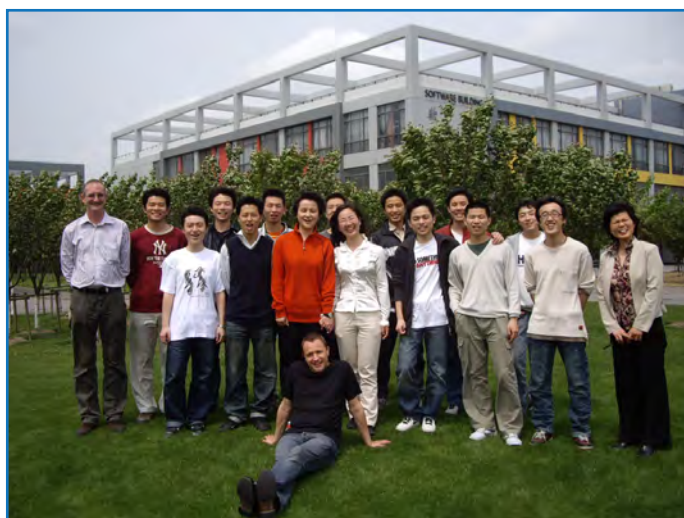
## St. Patrick's Day

The St. Patrick's day parade is now an established annual event in Shanghai. Organized by the Irish Consulate, it is an opportunity for the Irish in Shanghai to celebrate as if they were back at home. It is also an opportunity to completely confuse the locals who politely watched as groups of people sporting green hats marched through the streets around Xintiandi. The Shanghai Gaelic football club and the UCD alumni were well represented. And of course the Fudan Software school we also present. On stage after the march we witnessed the first public display by the Fudan Irish dancers.



## Guenole Silvestre's Departure

After 6 years with the programme Guenole gave his last modules in Fudan. Guenole has contributed an enormous amount to the programme. He is extremely popular with all of the students who have enjoyed his lectures on Logic programming, Functional programming and more recently, practical child rearing skills. To mark his leaving the students organized 3 going away parties. Guenole would like it to be known that he is now observing a strict "Pizza free" diet.



# Fudan News (cont'd)

## UCD Sign new Fudan Partnership Agreement

October 2008 saw the continuation of our thriving partnership with [Fudan University](#). UCD has been delivering courses on the software engineering degree programme at Fudan University, Shanghai, since the inauguration of the university's software school in 2002/2003.

UCD Registrar, Dr. Philip Nolan travelled to Shanghai to sign a new contract which will see the partnership extended beyond 2013. Education Minister Batt O'Keefe, who was leading a trade delegation to Shanghai at the time, kindly agreed to witness the signing of the contract.



In early May both Damian Dalton and Ann O'Hanlon arrived in Shanghai. Damian gave a module on Entrepreneurship which was very popular with the students. Both himself and Ann attended a party which we organized to promote the programme with the students. Ann gave a demonstration of some Irish dancing which the students loved. Damian would have joined in had we been able to get an outfit that fitted him.

## New Student Induction

Henry McLoughlin travelled to Fudan in September to attend the annual induction day for the new students on the programme. Over the past few years the programme has been attracting more and more interest and this year we welcomed 57 new students which represents a 20% increase over the previous year. A meeting was held at the Zhangjiang campus to welcome the students followed by a reception in the Irishman pub in Big Thumb plaza which Enterprize Ireland and the Irish Consulate had organized. John Lynam, the vice-Consul spoke to the students about Ireland and Irish culture.



# CSI Outreach

## Overview of CSI Outreach Activities

Recent decreases in applicant numbers and the pre-existing retention concerns of the school have dictated a more aggressive approach to student attraction and retention. This approach focuses on conveying the right message to prospective undergraduate students in order to clarify not only what is expected of them but also what they can expect from their chosen programme and from the school in terms of their ongoing support.

2008 was an extremely busy year with the school participating in a number of external events as well as organising key events internally.

Recent outreach activities have placed a major focus on cooperation with other units within the university. In the past year, the school have contributed to outreach events organised by New Era, the CSCB Summer Schools and the Conway Institute Transition Year Summer Schools. Through cooperation in this manner, the school is assisting with the overall promotion of science as a discipline and it is hoped that, as a knock on effect, we may encourage students to consider science and, in particular, Computer Science as their degree of choice.

## Introductory Workshops 2008

In January and February 2008, UCD CSI hosted free Saturday workshops for second level students from Transition Year upwards. With 72 students from 44 schools attending the workshops, they were a great success! 3 students who attended the workshops have accepted places in UCD Computer Science for the 08/09 academic year. Following on from this success, we have decided to run the workshops again drawing on some of the materials developed for the new CSI module as well as the original format. These workshops will be held over 3 Saturdays in January and February 2009. Advertisement of the modules will begin in November 2008.

## AccessScience 2009

UCD CSI will be submitting entrants for AccessScience 2009 in order to further publicise Computer Science to second level students and institutions. The School internal finals will take place on the 29th of January 2009 and the winner will proceed to the main UCD final in March.

## ICSP Launched for Second Level Students



2008 saw the launch of "Introduction to Computer Science and Programming" (ICSP), a new outreach module run in conjunction with Google Ireland. This module was designed to introduce school level students to computer science as it is not currently taught as a Leaving Certificate subject. The aim of the module is to promote computer science as a discipline while allaying some of the stereotypes and misconceptions associated with the subject outside of the university environment. Dr. Michael O'Neill, with the assistance of module coordinator Erik Hemberg and Karl Abbey, our Recruitment Officer, was responsible for the design and introduction of the new outreach 5-credit, Level 0, module for 2008-09 aimed at LC and TY students. This module will be taught through an innovative combination of weekend tutorials/workshops and online lessons. Students will be formally assessed in UCD and will be allowed to use their credits if they come to study at UCD.



## CSI Outreach (cont'd)

This is probably the first time in Ireland that pre-university students can take such a module where they earn university credits before they register. In addition, we have won a competitive award of €10,000 from Google to support this unique initiative - one of only 8 European universities to win such an award from Google in 2008.

On November 8th 2008, after considerable preparatory work from all concerned, the first group of 23 students attended their first workshop in the school building and commenced their 12 week course of study. Students participating in the module study through a variety of mediums including on-site instruction and distance learning. Support is provided through online virtual classroom hours as well as discussion forums on the csi moodle server.



The first phase of the module has recently been completed with students performing exceptionally well and quickly adapting to the new information being thrown at them. It has been remarked that the material covered in the module is, in some cases, at a higher level than that currently being taught to our undergraduate students. This makes the achievements to date of the participants even more impressive.

Moving on to the next phase of the module, participants will be introduced to materials of increasing complexity. By gradually introducing core computer science concepts and technologies, it is hoped that the students will be encouraged to continue their studies at third level to further explore the discipline.

### UCD Open Days- December 2008

On December 8th and 9th 2008, UCD hosted its annual Open Days for Leaving Certificate Students. With approximately 5000 attendees over the 2 days of the event, it is the main event at which we can recruit new students to our undergraduate programmes. The stand this year was extremely popular and attracted a large number of interested students.



We would like to thank the following people for their contribution during the event. Special thanks go to Abey Campbell for his excellent demonstration and to Karl Abbey, who organised and managed the Schools presence at the event.

# CSPC Activities

## CSPC Official Opening

The Computer Programming Support Centre (CPSC) opened on January 14th 2008, to provide additional support to UCD students taking Computer Science modules who are worried about, or have problems with, computer programming. Initially, the centre was run with minimum resources and a temporary coordinator but was given permanency with the appointment of Martina Naughton in April 2008.

From April 3rd to May 15 2008, over 40 tutorials were held in topics from over 11 modules ahead of the summer exams 2008. This figure includes six group tutorials that were organized due to the increased demand from students for modules such as Operating Systems 1 (Comp 30090), Object Orientated Programming (Comp 30070) and Principles of Programming (Comp 30100).

On the 22nd of September 2008 the centre's existence was further solidified when CPSC opened at its new location beside the B0.02 lab on the ground floor of the main CSI building. The centre operates primarily as a drop-in service where students are encouraged to discuss their difficulties, and receive one-to-one support throughout the year. Students can also book tutorials by e-mailing the CPSC at [cpsc@ucd.ie](mailto:cpsc@ucd.ie).

The CPSC tutors include the coordinator and a team of four senior postgraduates (Steven Knox, John Doody, Edwin Costello and Brendan Sheehan), whose knowledge spreads across numerous, if not all modules held within the School. Since its relocation, the CPSC has held over 167 tutorials with over 70 students in topics from over 15 Computer Science related modules.

It is also important to note that the CPSC has also aided many Engineering students with EEEN 20010 (Computer Programming for Engineers), illustrating that the centre is not just beneficial to Computer Science students.



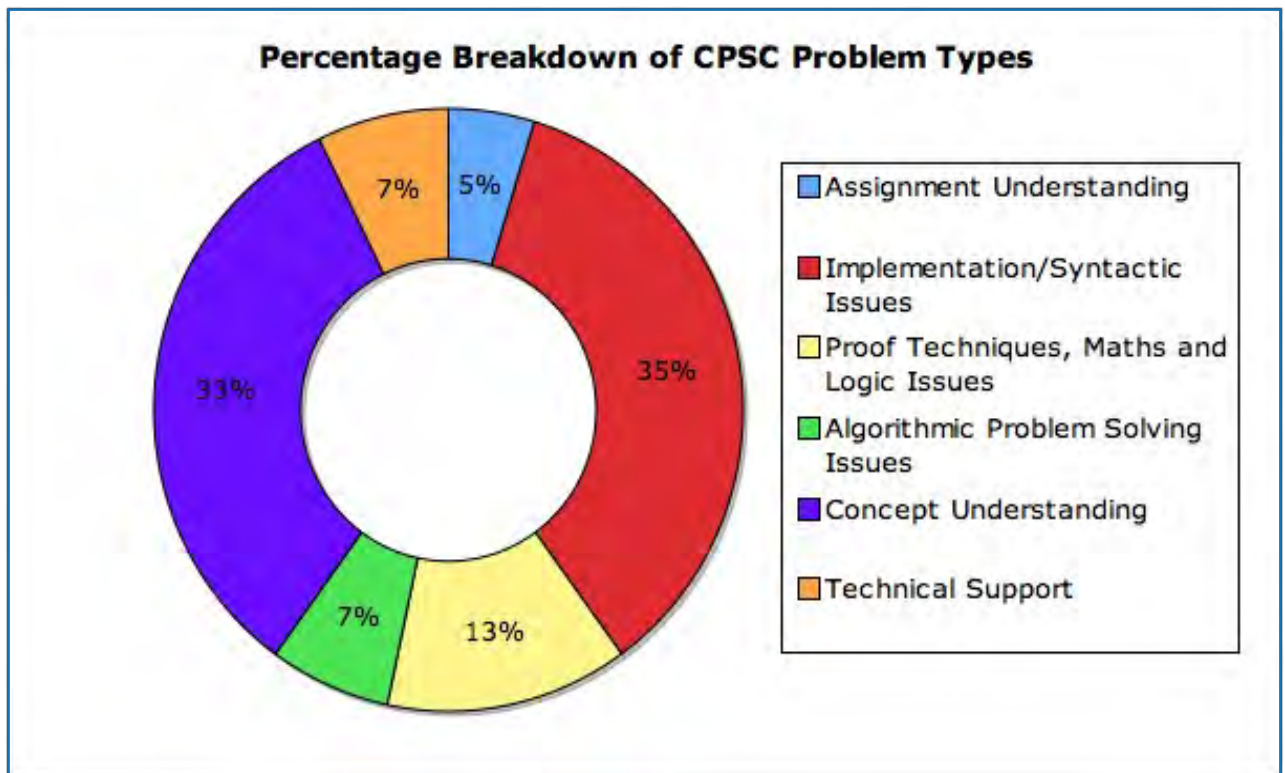
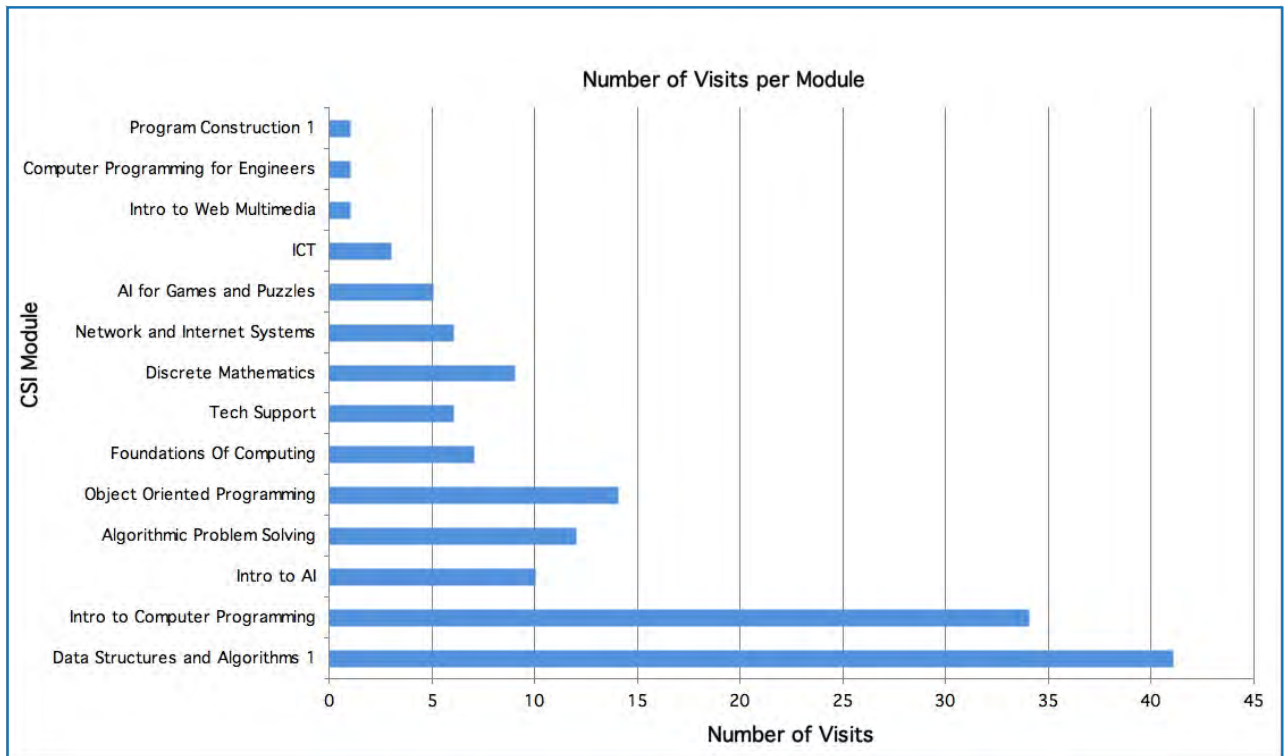
The CPSC also provides group revision tutorials ahead of each exam session. This semester nine such tutorials were held between the 27th and the 5th of December 2008. These tutorials covered topics from seven modules (such as Introduction to Programming (Comp 10010), Algorithmic Problem Solving (Comp 10030), Data Structures and Algorithms 1 (Comp 20010) and Foundations of Computing (Comp 30010)), and were attended by approximately 106 undergraduate students.

Finally, we felt it was important to further investigate the types of problems experienced by students attending the CPSC. In order to accurately represent the range of issues presented to us, with the help of Mr. Henry McLoughlin, six major problem categories were identified. Categorisation of issues affords us an opportunity to address student issues on a case-by case basis and provides for a more complete analysis of the difficulties encountered.

To conclude, the coordinator would like to take this opportunity to sincerely thank the CPSC tutors: Steven Knox, John Doody, Edwin Costello and Brendan Sheehan for all their hard work during the year. Further information regarding the CPSC can be found on our web site: <http://www.csi.ucd.ie/cpsc>.

# CSPC Activities (cont'd)

## CSPC Statistics 2008



## Centre News

2008 was a year of growth for UCD's Centre for Cybercrime Investigation (CCI), and staff here have been involved in several interesting and exciting activities, within UCD and globally.

The CCI has continued to forge strong and productive links with LE organisations, both in their capacity as academic advisors to the Europol Cybercrime Investigation Training Harmonisation Group, and as part of the Irish delegation to the INTERPOL Working Party on IT Crime Europe.

The year kicked off in January with the hosting of the Europol (European Police Organisation) Seminar on Botnets and Malware and was quickly followed by the hosting of the 52nd meeting of INTERPOL Working Party in IT Crime - Europe. Law enforcement officers from almost every EU member state attended these meetings along with our industry partners Microsoft and eBay.

## Collaboration

In 2008 the CCI has assisted law enforcement with many operations in the fight against organised crime and terrorism. These operations include providing Interpol with special technical assistance in operations against terrorists in Columbia, assisting the Gardai, PSNI and UK police in the technical examination of special compromised retail PIN entry devices which had been placed by organised crime gangs in retail outlets in the UK & Ireland, and analysing attempted cybercrime attacks on Irish Banking institutions.

These collaboration initiatives has led to the CCI quickly establishing itself as a knowledgeable and trustworthy resource to law enforcement and industry alike. In Autumn, the CCI hosted a series of joint meetings designed to investigate ways in which academia, LE and industry can work together to fight cybercrime.



Members of the INTERPOL Working Party on IT Crime - Europe who visited UCD earlier this year

The result of these discussions will be the development of a position paper to be presented at the Council of Europe's Cybercrime Conference in March 2009. One of the recommendations is that the CCI will act as the pilot in an EU funded project that will see the creation throughout Europe of Cybercrime Centres of Excellence.

The CCI has also formed an agreement with OLAF, the fraud investigation arm of the European Commission to deliver a modular cybercrime education programme to Law Enforcement officials within Europe focusing more specifically on the developing countries.

The CCI will also partner with the Garda Bureau of Fraud Investigation in developing a fraud training module. The GBFI already have an accredited fraud investigation course and will work with the CCI to develop an accredited cybercrime and fraud education programme to be included in the CCI Masters Degree Programme.

## Training & Education

In its commitment to responding to the needs of LE in relation to training & education, the CCI has been involved in the design, development and delivery of various training events for both local and international law enforcement agencies.

## CCI News (cont'd)

In March the CCI were in India to deliver a 'Train the Trainer' programme. This programme had been designed by staff in the CCI and formed part of an INTERPOL capacity building initiative which would see cybercrime investigators go on to further train colleagues all over the South-East Asia region. The CCI has been asked and has committed to redevelop and run this programme again in Cyprus and Damascus in Spring 2009.

Within Ireland the CCI has delivered courses for the Gardai in Hi-Tech Crime and Single Point of Contact Training. The success of these programmes has led to the CCI being invited to extend our training in 2009 to the Police Service of Northern Ireland (PSNI), the Irish Financial Services Regulatory Authority, National Bureau of Criminal Intelligence and the Competition Authority.

The LE only MSc in Forensic Computing and Cybercrime Investigation continues to go from strength to strength and is fast building a reputation amongst the law enforcement community as the most sought after qualification in its field. The 2008 programme was oversubscribed, and we already have a waiting list for 2009.

### Research

While the CCI strives to produce quality training and education resources, research endeavours from the group have been equally productive. Research projects range from theoretical aspects of event reconstruction in cybercrime investigation, intelligent profiling of mobile phone interfaces for mobile phone forensics, to experimental analysis of cybercrime in peer-to-peer networks.

In 2008 CCI published papers covering a range of topics some of which include proposed methods for extracting comprehensive knowledge of past user activities on a given system, as well as a method to determine the legality of encrypted content under certain circumstances.



MSc FCCI students visiting UCD for the Europol Malware and Botnets Seminar

### Raising the profile of the CCI

The CCI received a special honour by being invited to speak about our activities at the Organisation for Security & Cooperation in Europe (OSCE) in Vienna. This organisation has links to many Balkan states and as a consequence we have been asked to look at developing a cybercrime training programme for Uzbekistani and Serbian police forces.

The Centre has also had the privilege of being selected by Microsoft to validate a special Law Enforcement forensics software package named COFEE. The tool has been written especially for Law Enforcement by Microsoft and will be distributed to every LE agency globally via INTERPOL. Validation of the COFEE tool will be carried out by the CCI who will then represent MS and INTERPOL globally; validating evidence in court in special and/or serious cases.

# CCI News (cont'd)

## Looking forward to 2009

The CCI is very excited at the prospect of working with 30 global LE and business partners on a joint project funded by the European Commission, Ireland, the UK and Germany. The project is part of the EC's ISEC programme and will cost €2.75 million over 3 years. The result will be the development and delivery of a taught Masters Degree in Forensic Computing and Cybercrime Investigation. This will culminate in the graduation of 30 police officers, (one from every member state within the EU) in UCD in September 2011. The programme will be developed using experts from LE and NGO's, and the CCI will lend their expertise on the form of training design, content expertise, academic oversight and accreditation.

The Centre has also been selected by the Europol Cybercrime Investigation Training Harmonisation Group as project managers and training designer for the upgrade of all the European cybercrime training material currently used to train LE officers throughout the European Union.



*Students participating in a recent CCI Training Course in UCD*

## Donations

Following a year of constant activity The UCD Centre for Cybercrime Investigation has ended 2008 on a high note by being the recipient of donations from several organisations. This money will be of great benefit in allowing the Centre to continue its development and research into resources that will assist in countering cybercrime.

This year the Centre has received the following donations:

>€145000 from the IBF. This is part of a 3 year support programme during which time the Irish Banking Federation (IBF) will donate €450,000 to assist the CCI achieve its aim of increasing awareness of online financial crime.

>€50000 from Microsoft.

>€10000 from INFAC. INFAC are a not for profit organisation representing the intellectual property rights of the National and International Motion Picture Industry in Ireland.

## Acknowledgements

The hard work and dedication of everyone associated with the Centre for Cybercrime Investigation has made 2008 a great year. The same promises to make 2009 even greater. However we are also aware that we wouldn't have been able to achieve this success without a great deal of support. Therefore we would like to say a warm thank you to all our supporters especially the Gardai, the IBF, INFAC, INTERPOL, Europol and Microsoft Corporation for making this venture such a success in 2008 and we eagerly look forward to the challenges that 2009 will bring.

# Other T&L News

## CSI Student Award Winners

A number of our students were the recipients of both academic and non-academic awards in 2008. The recipients were as follows:

**Stage 2 BA Scholar:** Magdalena Sabina Zieniewicz

**Stage 3 BA Scholar:** Jacob Dostal

**Stage 2 BSc Scholar:** Sigitas Monkevicius

**Stage 3 BSc Scholar:** Eva Darulova

**Stage 4 BSc Scholar:** Neil Cowzer

**Medalist:** Jacob Dostal

**President's Award for Excellence in Student Activities:** Jonathon Blackmore (Stage 2 Computer Science) : for his work on the "Please Talk" Campaign

## Elective Module Success Story

2008 saw the continued growth and success of a unique module within the School of Computer Science and Informatics, namely "Introduction to Cognitive Science" (COMP20090). Developed and coordinated by Dr. Fred Cummins, it is a pure elective, meaning that people only take it out of interest. When first run, in 06/07, it attracted about 30 students, predominantly from Computer Science. In the 07/08 academic year, a concerted effort was made to publicise the module's existence and availability and the numbers rose to 130, with students enrolling from all corners of the university.

The module offers a view into cognitive science, which is not an undergraduate discipline, and may otherwise be unknown to the students. In one brief module, the material covered includes topics such as brains, perception, movement, reasoning, vision, learning and consciousness, to mention a few.

One goal of the module is to make students in 2nd year aware of our taught masters programme at a stage that is early enough for them to build it into their future plans.

The course has also been embraced by the new undergraduate programme in neuroscience. There are about 30 students per year in that, and they all now take this module. With approximately 130 students taking the elective module in the 08/09 session, lectures have to be run twice to accommodate the numbers.

On behalf of the School, we would like to congratulate Dr. Cummins on the success of the module so far and wish him continued success over the coming years.





# Research

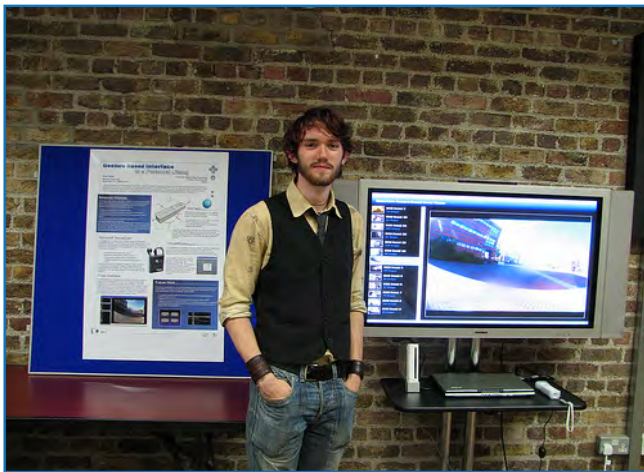


## ODCSSS News

Summer 2008 saw another successful intake of students to the ODCSSS Programme, an SFI funded EUREKA Site run between UCD and DCU.



This year, seventeen students from seven countries took part in this twelve week internship programme. Between June and August each student worked, supervised by a member of the academic staff, on a project around the theme of "The Global Family, The Global Workplace - Technologies for Social Connectedness".



Highlights from years projects included best overall project winners John Reddin for his work with Dr. Michael O'Neil and Dr. Tony Brabazon which applied grammatical evolution to semi-automated contemporary music composition, and Evan White's work with Dr. Cathal Gurrin and Liadh Kelly which used -

Nintendo's Wiimote to create a gesture based interface to for navigating though "Lifelogs" taken with the Microsoft SenseCam.

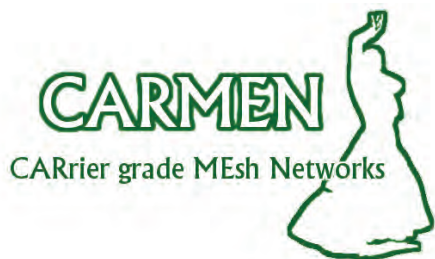
Two projects were also accepted as workshop research papers at UbiComp 2008. Eugene Kenny's "Stay-In-Touch: a Testbed for Ambient Social Reminders" with Dr. Aaron Quigley and Ross Shannon - an application to monitor social activity and alert the user to lulls in their interaction with any of their social connections. And German Lado Insua's "User Generated Ambient Presence" with Prof. Paddy Nixon and Mike Bennett which explored the intersection of individual and user generated customization with ambient presence displays.

As well as project work the Programme also involved several days offsite including visits to both Intel and Microsoft as well as Oireachtas Eireann and Trim Castle.



Dr. Aaron Quigley the UCD director for ODCSSS said "ODCSSS has now had over 60 student take part in the program since 2006. For all the academics, postdocs and postgrads involved it's an opportunity to infuse the idea of research to students from Ireland and abroad. This helps to further bridge the gap between undergraduates and our academic research activities."

## PEL kicks off UCD's involvement in EU FP7



The Performance Engineering Lab (PEL) began the first EU Framework Programme 7 Collaborative Project - a Strategically Targeted Research Project (STREP) - in UCD. The project, CARMEN, is a 3-year joint project comprising of 8 European partners which focuses on issues associated with wireless mesh networks. The overall objective of the CARMEN project is to develop a solution for delivery of carrier-grade communications services to mobile devices over wireless mesh networks. Such networks are receiving a lot of attention within the research community right now, as they have the potential to support network deployment at much lower cost, as well as offering much greater flexibility. However, they pose many complex challenges and realising an efficient mesh network is highly non-trivial.

CSI researchers Dr. Hamid Nafaa and Dr. Sean Murphy are leading the UCD involvement in this project with support from Prof. Liam Murphy, Dr. John Murphy and Dr. John Fitzpatrick. The project has an overall budget of €6.25M and includes influential partners such as BT, DeutscheTelekom, NEC and Alcatel-Lucent. The project commenced on January 1st 2008 and will run until the end of 2010. In mid-January 2009 PEL will host a 4-day meeting in the School of Computer Science and Informatics which representatives of all CARMEN partners will attend. This meeting will review progress and map out the next phase of the CARMEN work-plan.

CARMEN was just one of the funding highlights for the PEL group in 2008. When Dr. Yassine Hadjadj Aoul started his EU FP7 Marie Curie Intra European Fellowship in September, on "MeshTV - Delivery of DVB content over wireless mesh networks", it was the second of these prestigious awards for PEL Fellows, after Dr. Hamid Nafaa's award in 2006. PEL also has 2 new IRCSET Post-doctoral Fellows, Dr. Trevor Parsons and Dr. Viliam Holub, both supervised by Dr. John Murphy. PEL were also awarded funds from the SFI CSET "CTVR" to study issues in "Broadband Wireless Access". In total these funded projects are worth almost EUR 1M, and the outlook for 2009 is even brighter: PEL researchers are currently in negotiations with a number of funding agencies including SFI, the European Commission, and the NDRC, for projects worth over EUR 1.5M, which will hopefully kick off early in the New Year.

## 2008 QUP Award of Distinction



Dr. Sean Murphy and Vasken Genc, a Ph.D. student of Dr. John Murphy's, were honoured recently with a "2008 QUP Award of Distinction" by [Scalable Network Technologies](#) for their work on developing an IEEE 802.16j Simulation Model for QualNet. Only 3 awards were made in 2008 to university researchers, and the UCD PEL team were the only awardees outside the U.S.

## BioMOBIUS Research Platform Launched.

# BioMOBIUS™

The Technology Research for Independent Living (TRIL) Centre has developed the BioMOBIUS™ Research Platform which will enable researchers to help clinicians detect and prevent or improve certain conditions related to ageing, such as falls and cognitive decline. "Very often, technology research is driven by technologists," says Professor Paddy Nixon, Director of the TRIL Centre. "The BioMOBIUS research platform has been specifically realised the other way around. We start by understanding older people's needs, then we design and test the technology, ask if it's helping them, and modify the design and adapt the platform if needed." Applications built using the BioMOBIUS Research Platform can be deployed in a wide variety of settings, from the clinical lab to the home. A typical application comprises wireless sensors that monitor markers such as gait stability, heart rate, and alertness. This sensor data is converted into meaningful data and a user interface enables the clinician to view the information and adjust application settings.



'Today there are 600 million people over the age of 60, and the UN projects that this figure will grow to almost two billion by 2050,' said Dr Aaron Quigley, UCD School of Computer Science and Informatics and Principal Investigator for the TRIL Technology Platform research strand. 'Home-based applications that use the BioMOBIUS Research Platform could potentially help those two billion people to monitor their own health, remain in their own homes, and maintain their independence for as long as possible. That's a huge opportunity to do good in the world,' said Quigley. TRIL is a groundbreaking research collaboration involving researchers from Intel, UCD, Trinity College Dublin and NUI Galway to explore technology to help older people to continue living independently in the homes of their choice.

## TRIL wins Irish Healthcare Award

The Irish Medical Times awarded TRIL the 'Best Use of IT in Healthcare' at the annual Irish Healthcare Awards. The prestigious awards took place on 16th October. The awards began in 2002 and have attracted increasing number of entries from individuals and groups all around the country. Companies and organisations that develop innovative IT solutions which are applicable in healthcare delivery were invited to send an outline of their services and products into the panel of judges.

The award TRIL received was for "the innovative use of information technology in a healthcare context to improve efficiencies in the health service and deliver better patient care". This is an amazing achievement for TRIL as a whole and specifically for the TRIL clinic. On behalf of everyone in the TTP in TRIL we would like to congratulate everyone in TRIL who helped make the winning entry for this award possible.

## Minister Martin announces €16.4 million investment for adaptive sensing and information discovery

Mr. Micheál Martin, T.D, the Minister for Enterprise Trade and Employment announced the establishment of CLARITY a new Science Foundation Ireland Centre for Science, Engineering and Technology (CSET) on 15 April 2008. This ground breaking research centre will focus on the so-called 'Sensor Web', which captures the intersection between two important research areas - Adaptive Sensing and Information Discovery.

Led by Professor Barry Smyth, the CLARITY CSET is a partnership between University College Dublin and Dublin City University, supported by research at the Tyndall National Institute (TNI) Cork. CLARITY is a collaboration between a number of specialist teams across the institutions who have already strong track records in sensor technology. It builds on work undertaken by the SFI-funded Adaptive Information Cluster, which is led by 7 principal investigators from UCD and DCU. Six of these PIs, including the director of CLARITY, Barry Smyth, and deputy director, Professor Alan Smeaton (DCU) are core participants in the new CSET.

The CLARITY team includes: Director, Professor Barry Smyth, UCD and founder of ChangingWorlds; Deputy Director, Professor Alan Smeaton, DCU; Dr Noel O'Connor, DCU; Professor Paddy Nixon, UCD, Mr Greg O'Hare; UCD, Dr Simon Dobson, UCD; Professor Dermot Diamond, DCU; Dr Cian O'Mathuna, Tyndall Institute; Professor Niall Moyna, DCU and Dr Brian Caulfield, UCD.

In total, over 90 highly skilled personnel will be working to deliver the CLARITY research programme.



Professor Barry Smyth, UCD Director of CLARITY CSET (right)  
Professor Frank Gannon, Director General SFI (centre) and  
Professor Alan Smeaton DCU, Deputy Director of CLARITY CSET (left)

In addition, CLARITY will collaborate with leading multinationals and SMEs including: IBM, Vodafone, Ericsson, Foster-Miller, ChangingWorlds, Fidelity Investments and Critical Path, as well as national agencies, such as the Environmental Protection Agency, the Marine Institute and the National Museum of Ireland. Total investment in CLARITY will amount to €16.4 million, of which Science Foundation Ireland through the CSET programme will contribute €11.8 million. CLARITY's primary industry partners will make a significant contribution collectively of over €4.6 million by contributing personnel, funding, equipment, infrastructure and services.

The core aim of this innovative research centre is 'bringing information to life'. In effect, it will use sensors to bridge the gap between the physical world and digital information. "Sensors help us to learn more about ourselves and the world in which we live, and the next generation of sensor technologies will be cheap, connected and reliable, enabling exciting new application areas," said Professor Barry Smyth, Director of CLARITY.

## CLARITY News (cont'd)

"Already we have developed wearable sensors which are built into clothes that can monitor the posture of the wearer, helping back-pain prone people who spend long periods hunched over pcs to improve their seated posture," he explained. "We also have networks of sensors that are capable of monitoring water quality with a view to identifying and signaling potential pollution. One of our next projects is to work with Tennis Ireland to develop a sensor environment to monitor the movement of players. This will be of great training benefit to athletes and coaches and will lead to new opportunities in public health as well as elite sport."

"The centre will focus on empowering citizens through new technologies to harvest, refine and make use of the deluge of different kinds of information in the modern world," said DCU's Professor Alan Smeaton. "CLARITY will develop a new generation of smarter, simpler and more proactive information services as well as commercial products which are set to improve our quality of life, from monitoring the impact of exercise on health, new technologies to support our aging population, and innovative ways to protect the quality of our environment."

"This investment will establish CLARITY as a truly unique world-class multidisciplinary research centre," said Minister Martin announcing the funding. "By linking academic researchers with industry partners in Ireland, SFI CSETs such as CLARITY will play a significant role in building Ireland's new knowledge-driven economy. By graduating 45 PhD students, CLARITY will provide Irish based companies with access to highly skilled individuals that will play a key role generating new products and innovations in industry".

"This unique SFI CSET will develop innovative new information technologies of critical importance to Ireland's future industry base in areas such as personal health, digital media and in the management of our environment. CLARITY will seek to develop new tools to address the issue of information overload and assist people in accessing information," continued the Minister.

"The team we have brought together in CLARITY provides a unique combination of multi-disciplinary expertise that is essential to make significant progress in this new field."

"To succeed in our research efforts it is not enough to strengthen our academic capability and output," said Professor Frank Gannon, Director General of SFI. "It is also necessary to develop more research performing companies with a sharper focus on the commercialisation of publicly-funded research."

"All SFI CSETs have been established to create highly competitive academic research linking academia and industry as part of our effort to create and sustain a lasting indigenous research base. Expectations are high for CLARITY and I am confident they will be met under the distinguished leadership of Professor Barry Smyth whose track record with ChangingWorlds is certainly a cause for optimism," he said.

The funding commitment was made in accordance with the highest standards of research investment and follows a rigorous review process by international scientific experts and a strategic review process involving representatives from Enterprise Ireland, IDA, Forfás, the Health Research Board and the Higher Education Authority.



# CLARITY News (cont'd)

## HeyStaks Official Launch

A new approach to Internet searching that helps people to share their search experiences with friends and colleagues has been developed by researchers at University College Dublin. HeyStaks, the new web browser plug-in, works with Google and provides users with the ability to create so-called "search staks" as a way of organising and sharing their searches. For example, using the new technology a group of friends planning a holiday abroad might create and share a "Holiday 2008" search stak. As each person searches for travel, accommodation and entertainment options, their search selections will be automatically shared with the other group members during future searches as specially highlighted search results. In this way the group members benefit from each others' searches as they plan for the perfect holiday. Likewise, a group of students collaborating on a project might create a search stak to capture their individual searches and share what they have found with the group, leading to more productive research.



The patent-pending HeyStaks technology, developed by a team of researchers led by Professor Barry Smyth is being commercialised through NovaUCD. "Seeing research graduate from the laboratory to the marketplace is always a big step, but a very exciting one. It's an important part of the innovation cycle within CLARITY," says Professor Barry Smyth from the UCD School of Computer Science and Informatics and Director of CLARITY, a €16m Science Foundation Ireland research centre combining researchers from University College Dublin, Dublin City University, and the Tyndall National Institute.

HeyStaks is one of four new initiatives to share the Eircom €100,000 Web Innovation Fund. With the award, each company enters into an agreement with Eircom to develop their concepts through to production and, if appropriate, initial launch on the eircom.net platform. The award winners also receive business development training and advice by Enterprise Ireland, as well as additional six month post-launch funding and assistance with marketing and advertising. "We are very excited about the potential of HeyStaks," says Dr Maurice Coyle, one of the co-founders of HeyStaks and a recent UCD graduate. "It is a unique take on Web search that we believe will greatly improve how people mine for information online. The Eircom Innovation Award gives us a real opportunity to accelerate the commercialisation of the new technology." "Right now we are moving to an invitation based beta release of the service. Interested parties will find more information on HeyStaks.com in the coming days and weeks and we are very interested in hearing from people who would like to participate in this beta release," says HeyStaks co-founder Peter Briggs, who has recently completed his Ph.D. under the supervision of Professor Barry Smyth.

# CLARITY News (cont'd)

## SFI Short Term Travel Fellowship

Dr. Robert Byrne, a CLARITY post-doctoral fellow in Prof. Dermot Diamond's Adaptive Sensors Group, pictured left, has been awarded a Short Term Travel Fellowship (STTF) from Science Foundation Ireland (SFI). The STTF supplement is designed to enable team members in an SFI funded group to collaborate on research projects in laboratories outside the Republic of Ireland. This award in conjunction with Prof. David Officer, will allow Robert to travel to the Intelligent Polymer Research Institute, University of Wollongong, Australia. Robert plans to spend two months working with Prof. Officer's research team on the synthesis and characterization of photochromic polythiophenes. Photochromic switches are an intriguing class of organic molecules which allow the control of molecular structure and function with light. This offers the possibility of effecting dramatic changes to the bulk properties of a system by photonic irradiation. It is hoped that this research visit will help to strengthen research collaboration between the two groups.

Because of the distance between Earth and Mars, when an ESA mission lands on the Martian surface it must make all decisions autonomously, without direct control from Earth. Choosing a landing site is based on many factors including topology, slope, and scientific curiosity. But what is this scientific curiosity, what makes one image of the Martian surface more interesting than another, can we detect such curiosity and then can we program it into a Martian lander. This study that CLARITY are running with the ESA will investigate if we can automatically sense and detect what makes one image more curious than another and is part of the research area known as brain computer interfaces. If the study is successful then follow-on work could lead to the development of software to control Mars landings, which will really take CLARITY's impact out of this world !

The work will be led by Prof Alan Smeaton and will involve CLARITY researchers Peter Wilkins, Graham Healy and Aiden Doherty.

## CLARITY to work with ESA

The CLARITY team has just signed a contract with the European Space Agency, through the Advanced Concepts Team at the European Space Research and Technology Centre in Noordwijk, the Netherlands, to carry out a 6-month study into how human perception of images and our ability to determine what is novel, interesting or curious, can be sensed automatically. The study is entitled "Curiosity Cloning - Neural Modelling for Image Analysis" and will examine how our brainwaves can be used to indicate when an image we see looks interesting. The work is part of a long-term project the ESA are running on developing intelligent software to run the Mars lander missions.



# Other Research News

## SenseTile - SFI Equipment Grant Award

A group of researchers from the KindSoftware Group in the UCD CASL were awarded €620,000 as part of a successful grant application under the 2007 SFI Equipment Call. The grant involves researchers from 4 different schools (Computer Science & Informatics, Mathematical Sciences, Electrical, Electronic & Mechanical Engineering, and Geological Sciences). The core SenseTile component of this equipment grant is an invention of Drs. Aaron Quigley, Simon Dobson and Paddy Nixon. The larger SenseTile system is the focus of this grant.

Sensor networks are widely seen as an essential technology for supporting next-generation scientific and engineering challenges, including environmental monitoring, climate change, assisted living, national security and intensive agriculture. Addressing these problems requires two complementary strands of research:

1. to understand the specific physical and/or social phenomena of interest against which to fit data collection and analysis;
2. to understand the general scientific and technological principles governing scalable sensor networking in order to maximise the leverage gained from on-going developments.

Amongst the core general challenges are the collection of large volumes of multimedia data, its storage, cataloguing, retrieval and processing in such a way as to minimise physical and intellectual costs of accessing the available data. This is especially important in pursuit of cross-disciplinary projects involving different analysis methodologies and constraints. At the same time, it is impossible to study sensor networking completely separate from practical applications which provide real-world validation and verification of the techniques being developed.

The SenseTile system supports large-scale experiments with complex multimedia sensing and processing at terabyte scales. The equipment under development consists of a rich and reusable sensor platform easily deployable into the built environment for easy experimentation and representative of platforms suitable for wider uses, together with data storage and processing capacity and associated high-speed interconnect.

### Lead PIs:

Dr. Scott Rickard  
Dr. Joe Kiniry

### Supporting Scientists:

Prof. Chris Bean  
Prof. Gary McGuire  
Prof. Paddy Nixon  
Dr. Simon Dobson  
Dr. Marcus Greferath  
Dr. Aaron Quigley

## SFI Travel Fellowship

Dr. Mel Ó Cinnéide (Lero@UCD) has been awarded an SFI Short Term Travel Fellowship following nomination by Lero. Dr. Ó Cinnéide is in the School of Computer Science and Informatics at UCD where he also leads UCD's involvement in the Lero Graduate School in Software Engineering. He will spend 3 months in the Laboratoire d'Informatique de Paris 6 (LIP6) collaborating with Dr. Mikal Ziane of the Modeling and Verification Group. His project, entitled 'Augmented Automated Design Improvement', will use Search-Based Software Engineering techniques augmented with Code Smell detection in order to improve the design of a program under refactoring.



## Other Research News (cont'd)

### SFI Principal Investigator Award



*Dr. Michael O'Neill, SFI Principal Investigator for the EDGE project*

Dr. Michael O'Neill has been awarded an SFI Principal Investigator grant for the EDGE Project (Evolution in Dynamic Environments with Grammatical Evolution).

Many of the most challenging problems facing researchers and decision makers are those with a dynamic nature in which the optimal solution changes over time. The process of evolution has been particularly successful at producing organisms that can survive and adapt to ever-changing environments. Inspired by the workings of biological evolutionary processes, this project develops a novel method and associated software tools which can be applied to solve hard dynamic problems.

The EDGE project will analyse and improve the ability of Grammatical Evolution (GE) to find solutions in these challenging real-world problem environments. GE breeds solutions to problems using an artificial evolutionary process exploiting computing power to speed up the search. These Evolutionary Algorithms are now capable of routinely producing solutions to problems which are competitive and in some cases superior to those produced by human experts.

The funding has been approved to the value of €582,043 in direct costs over four years (48 months).

### CSI Research Officer Appointed

Nicola Stokes was appointed in June as CSI's Research Officer, a role which will mainly involve assisting staff with research grant proposal submissions. Before returning to UCD, Nicola spent 3 years working as a postdoc at the University of Melbourne. During this time, she worked with Information Retrieval and Language Technology researchers on the development of a novel search engine capable of addressing the specific search needs of Life Science researchers. She says that despite tough economic and weather conditions she's happy to be home!



*Dr. Nicola Stokes, UCD CSI Research Officer*

### Other CSI CSET and SRC Collaborations

**CNGL CSET:** Prof Julie Bernsden (PI)

**Collaborators:** UCD, UL, DCU, TCD, IBM, SpeechStorm, University of Stuttgart and the University of Bonn

**Project Aim:** "Our work is guided by the vision of enabling people to interact with content, products and services in their own language, according to their own culture, and according to their own personal needs." <http://www.cngl.ie/>. Specifically, the UCD group is involved in the development of speech technologies for speech-to-speech translation in a hands-busy, eyes busy scenario.



## CSI CSET and SRC Collaborations (cont'd)

### LERO CSET :

Prof Paddy Nixon, Dr. Mel O'Cinnéide, Dr. Joe Kiniry, Aaron Quigley and Simon Dobson (PIs)

**Collaborators:**UCD, UL, DCU, TCD, Analog Devices, Ashling, Bosch, BrightWork, IBM, Intel, Iona, Kugler Maag, Motorola, Piercom, QAD, S3

**Project Aim:** "Lero focuses on specific domains, especially those where reliability is crucial, including automotive, medical devices, telecommunications and financial services. We develop models, methods and tools that make it cheaper, faster or easier to produce this crucial software." [www.lero.ie/](http://www.lero.ie/)

### EEDSP for Mobile Digital Health SRC:

Dr Chris Bleakley (PI)

**Collaborators:**UCD, UCC, UCG, UL, Analog Devices, Intel, S3, Tyndall

**Project Aim:** "To investigate secure wireless monitoring of patients at home to reduce the number of in-patients in acute hospitals."

### SFI SRC on Advanced Geotechnologies:

Dr. Michela Bertolotto (PI)

**Collaborators:**NUI Maynooth, UCD, TCD and DIT

**Project Aim:** The project is focussed around the generic theme of Geospatial Monitoring and Early Warning and consists of four interlinked research strands:

- >Geospatial sensor technology and spatial data fusion.
- >The development of algorithms for spatial data processing and modelling.
- >The development of advanced visualisation techniques for spatial data.
- >The delivery of integrated processed and filtered spatial data to locationally aware devices.

## NWERC Success

UCD CSI's "O'Team" put in a highly commendable performance at the recent Northwest European Regional Championship. 47 teams from 9 countries descended on Utrecht, Holland for the annual programming competition from Friday 21st November 2008 to Sunday 23rd November 2008.

The team, comprised of Kirill Ignatiev, Eugene Kenny, Rashid Bhamjee and coach Radu Grigore, managed a very impressive 17th place overall. A video blog of their journey can be found at <http://2008.nwerc.eu/>.



Member of UCD's "O'Team" participating in the NWERC Programming Competition

## ERCIM Vice-President Appointment

Simon Dobson has been appointed to be one of the three vice-presidents of the European Research Consortium for Informatics and Mathematics (ERCIM, <http://www.ercim.org>). ERCIM brings together the major ICT research labs across the EU to provide a single voice for influencing EU research policy, acts as a broker for proposal consortia and provides project management for successful proposals, and has a turnover of over EUR24m/year. ERCIM also runs a number of working groups to help co-ordinate research across Europe, with Ireland taking a leading role in the recently-formed Sensor Web group looking at integrating sensor networks into wider distributed systems.