University College Dublin
School of Computer Science

MAY 2023

CS NEWS

TRAINING THE NEXT GENERATION OF
RESEARCHERS

University College Dublin
School of Computer Science

WELCOME

A MESSAGE FROM THE HEAD OF SCHOOL

Welcome to issue three of our magazine bringing the latest news from around the School to our students, alumni, collaborators, staff, friends, and the worldwide computer science community.

In this issue, we present the VICTEUR project, a European Research Council funded, multidisciplinary project between Professor Gerardine Meaney from the UCD School of English, Drama and Film and Associate Professor Derek Green from our school. It is a great example of how data analytics is extending its reach from science and technology into arts and culture, in this case being used to support the analysis of Victorian fiction.

Data analytics comes to the fore in three other projects, AIMVIE, AGEO and BIGO, that tackle health and environmental challenges. AIMVIE is a project funded by Science Foundation Ireland and Irish Aid that aims to apply AI and remote sensing technologies to map, monitor and restore the mangroves of Vietnam, which are key to protecting the coastline from storms and erosion. Citizen science is exploited to good effect in the AGEO project to prepare people for natural disasters, such as wildfire, tsunami and earthquake; and again in the BIGO project, which tackles childhood obesity.

The researcher spotlight is on Ad Astra Fellow Madhusanka Liyanage who tells us what motivates him in his computer science research. Dr. Pasika Ranaweera tells us about life as a post-doctoral researcher in the school. We spotlight the SFI Centres for Research Training, which are supporting many of the PhD students in the school. We have a diverse, international cohort of students across our multiple undergraduate and graduate programmes. Maintaining our teaching programmes during the pandemic was a challenge which required extra efforts from both academic staff and students alike. Associate Professor Henry McLoughlin, relates the story of the Beijing Dublin International College (BDIC) programme, in which teaching was carried out remotely over a number of trimesters, while the pandemic raged in Europe and China..

We catch up on our students' achievements beyond the classroom, in sports, in promoting diversity and inclusion, and contributing positively to university life. Finally UCD Alumnus and Internet pioneer, Dennis Jennings is interviewed by PhD student Jack Geraghty, to glean an interesting perspective on careers in technology. Many thanks to the editorial team of Rupert Bowen and Colm Ryan. Enjoy!

Neil Hurley, Head of School

RESEARCH CENTRES

Science Foundation Ireland Research Centres
UCD CS researchers are active in several SFI Research Centres, which link scientists and engineers in partnerships across academia and industry to address crucial research questions. See: www.sfi.ie/sfi-research-centres/

Insight – data analytics
High-impact research in data analytics, with significant benefits for the individual, industry and society. See: www.insight-centre.org/

LERO – software
Bringing together expert software teams from universities and institutes of technology in a centre of research excellence with strong industry focus. See: www.lero.ie/

ADAPT – AI-driven digital content technology
Pioneering new human-centric AI techniques and technologies including personalisation, natural language processing, data analytics, intelligent machine translation, and human-computer interaction. Setting standards for data governance, privacy, and ethics for digital content. See: www.adaptcentre.ie/
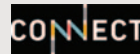
CONNECT – future networks and communications
World-class expertise from ten Irish academic institutes creating a one-stop-shop for telecommunications research, development and innovation. See: www.connectcentre.ie/

VistaMilk
Innovative precision pasture-based dairying for the environment, animal well-being and the health of consumers. See: www.vistamilk.ie

FutureNeuro – chronic and rare neurological diseases
Improving the health and healthcare of people with neurological disease through diagnostics, therapeutics and eHealth research. See: www.futureneurocentre.ie/

I-Form – advanced manufacturing research centre
Shaping the future of manufacturing through high-impact research into the application of digital technologies to materials processing. See: www.i-form.ie/

VICTEUR:
EUROPEAN MIGRANTS IN THE BRITISH IMAGINATION

The VICTEUR Project is a 5-year study, funded by the European Research Council (ERC), which is looking at the development and application of new digital methodologies to humanities research. This multidisciplinary project builds on a long-standing collaboration between Professor Gerardine Meaney from the UCD School of English, Drama and Film and Associate Professor Derek Greene from the UCD School of Computer Science.

VICTEUR researchers are currently combining methodologies from data analytics and literary criticism to investigate representations of migrants and by migrants in Victorian fiction. Case studies include the ways in which Irish, Eastern European Jewish and Italian migrants are depicted, for example, mapping the association between immigrants and crime or romance in popular novels. The project also looks at the kind of stories produced by these immigrant communities in their turn, often with great success and long term cultural impact, such as Irish immigrant Bram Stoker's *Dracula* or Israel Zangwill, the child of Lithuanian and Polish refugees to England, whose play originated the concept of the US as 'The Melting Pot'. Meanwhile, Italian refugee Anthony Panizzi overcame significant prejudice to head the British Library, champion equality of access to learning and help build the great collection which enables this research.

Semantic network visualisation provided by the Curatr platform.

A key aspect of this work has been the development of the Curatr platform, which provides access to the British Library Digital Collection, consisting of over thirty-five thousand digitised texts published from 1700 to 1899. The platform is designed to make the collection more accessible, allowing humanities scholars to quickly find and analyse relevant material online without the need for extensive technical training. Curatr provides a comprehensive range of search and recommendation functions, building on modern natural language processing and information retrieval technologies. The system includes a searchable index on the equivalent of over twelve million individual pages of text. This allows users to identify content relating to specific themes within little known or very long, unwieldy texts in the collection. Techniques from the field of network analysis have also been

Digitised texts from the British Library Digital Collection.

adapted in Curatr to help scholars to explore the similarities and relations between concepts present in texts, using interactive semantic network visualisations.

VICTEUR opens up new possibilities in the application of machine learning to very large historical and cultural datasets, helping us to understand how cultures and societies develop and change and the role of migrants. The project will also examine the ways in which Victorian narratives and attitudes to migrants persist in the 21st century.

CUTTING-EDGE

TECHNOLOGY PROTECTING NATURAL CARBON CAPTURE RESOURCES

International research team led by UCD CS has won SFI funding to provide a tech solution for mapping and monitoring mangrove forests in Vietnam.

Vietnam's 138,000 hectares of mangroves provide the country with multiple tools in its fight against climate change. They protect the 8 million citizens living along the 3,000 km coastline from storms and coastal erosion, provide critical habitats for a wide range of species, and sequester carbon dioxide at rates that are up to five times higher than those of rainforests. But they are under threat from human activity and climate change. Vietnam has lost 38% of its mangroves in recent decades. AI Solutions for Mangrove Blue Carbon in Vietnam (AIMVIE), a new project funded by Science Foundation Ireland and Irish Aid and led by researchers from UCD School of Computer Science (UCD CS) and Can Tho University (CTU), is applying AI and remote sensing technologies to map, monitor, and restore the mangroves of Vietnam.

The AIMVIE interdisciplinary team includes Dr. Quan Le (UCD CS), Dr Tuan-Quoc Vo (CTU), Dr. Vu Vo (UCD CS), and Dr. Thuy Nguyen Thi Bich (SNV Vietnam, The Dutch Fund for Climate and Development). Its collaborator network includes Dr. Tien Dat Pham (Macquarie University), an expert in AI Blue Carbon, and Prof. Michela Bertolotto (UCD CS), who is leading the CAMEO project to build an Earth Observation platform for Ireland.

The project is among the six selected projects in the first of the three phases of the SFI Sustainable Development Goals Challenge: Concept, Seed and Prize Award. The team is

Left: False colour, near infrared, red, green, image of our mangrove study area in Ca Mau province, Vietnam. The areas that appeared in deep red are those covered by plants, mostly mangroves. The image is from Planet Scope.
Right: The image with distinctive arching roots shows how mangroves adapt to intertidal land and store carbon in their trunks, roots, and the soil below. The image is provided by Dr. Tuan Vo.

engaging with multiple stakeholders – government agencies, NGOs, local communities, Academics, and businesses – to understand their challenges when working with mangroves. Multiple impact pathways have emerged from these engagements, which will help the project validate its solution or revise it to address newly determined challenges. If it is judged as impactful and feasible by an SFI review panel, the project will receive €250,000 to carry out its seed phase for one more year.

The biggest prize is the one million Euro award which will give the team two more years to develop and deploy its solution.

The project is expected to advance the application of AI in remote sensing and to provide multiple stakeholders in Vietnam with an accurate and up-to-date mangrove information system. It aims to fuse multiple sources of

images in its mangrove mapping models, where the resolution of drone images is hundreds of times higher than those of satellite images. The project's second challenge is to resolve the scarcity of in situ ground truth data to be used as labels to train supervised AI models. The project will take advantage of the automatic updates of satellite images to implement its continuous mangrove monitoring features.

To learn more about the project, contact Dr. Quan Le at quan.le@ucd.ie.

See: https://aimvie.org/

Quan Le was also a member of the HealthyAir project that was a Runner Up in the UCD Research Impact Case Study Competition this year. See:

https://www.ucd.ie/research/impact/casestudies/healthyairaddressingtheimpactsofairpollutioninvietnam/

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USING CITIZEN SCIENCE TO PREPARE FOR NATURAL
DISASTERS

Applying computer science tools and techniques for new solutions to complex problems.

The Atlantic region is at risk of rare but severe natural events that could cause a lot of damage. Examples are landslide, wildfire, tsunami, earthquake, rockfall, sinkhole, eruption, and river and marine flooding. These events are hard to predict and prepare for, so it's important to find new ways for people and local authorities to work together to reduce the risks. That's where the AGEO project comes in. It wants to involve citizens in monitoring and preparing for these events by starting pilot programmes in Portugal, Spain, France, and Northern Ireland. These programmes will help

show how involving citizens can make a region better prepared for future events. The project wants to use what it learns from these pilots to create recommendations for future programmes that can help prepare for a wider range of natural and human-made disasters in the Atlantic region. The AGEO project – Platform for Atlantic Geohazard Risk Management

(https://ageoatlantic.eu/) is funded by the Interreg Atlantic Area programme

(https://www.interregeurope.eu/).

Left to Right: Eleni Mangina (UCD), Konstantinos Bafra (UCD), Levent Görgü (UCD), Eoghan Holohan (UCD), Rui Carrilho Gomez (from Técnico Lisboa).

BIGO: **BIG** DATA AGAINST CHILDHOOD **O**BESITY

The number of children and adolescents with obesity is rising and they have a higher risk of developing various diseases, compared to children without obesity. The reasons why some children become obese are complex and not well understood, and there remains a lack of data. This EU Horizon 2020 programme provided funding to a European consortium, including a team from UCD, to collect and analyse anonymous data on children's behavioural patterns and environment to find out what factors influence obesity. It then used this to support clinicians and public health authorities to develop and plan effective programmes, policies and interventions.

Citizen Science
Using an app, nearly 6,000 students collected anonymous data on their behaviour and environment using sensors on devices such as
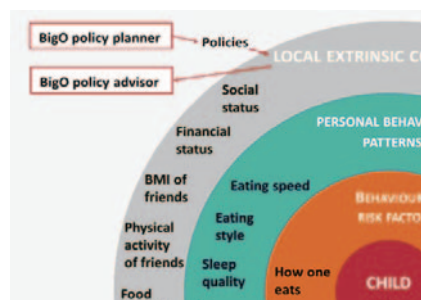
Local extrinsic conditions, personal behaviour patterns and risk factors all affect child BMI.

smartphones and smartwatches. BigO scientists combined it with publicly available data and used advanced analytics to extract evidence on which factors are involved, and how these influence obesity. This helped create a framework and tools to visualise, assess and provide insights for public health authorities and schools to design and monitor programmes, and simulate and predict outcomes. Health professionals gain evidence to

help them with their patients at the point of care. Numerous innovative scientific techniques were developed to model causal relations between local conditions, behaviour patterns, and obesity behavioural risk factors and to extract useful obesity related behaviour indicators from heterogeneous, streaming, noisy data.

Building a framework that can be exploited across Europe, with all its differences in legal, ethical, technical, behavioural, user acceptance, and costs, remains challenging. However, the project developed novel approaches for data pre-processing, handling and a modern data warehouse to cope with some of them.

The project has had a huge impact in terms of the system implementation and deliverables, winning an award for innovation. https://bigoprogram.eu/ For more information please contact Professor Tahar KECHADI, UCD PI Lead tahar.kechadi@ucd.ie

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RESEARCHER SPOTLIGHT

Madhusanka Liyanage is an Assistant Professor/Ad Astra Fellow and Director of Graduate Research at the UCD School of Computer Science.

Q. What are your current research interests?

I lead the Network Softwarization and Security Labs (NETSLAB) research group at UCD that focuses on the security and privacy of future mobile networks, including 5G and 6G. NETSLAB conducts research on network softwarization and security, including Software-defined networking (SDN), edge computing, and network slicing. We are particularly interested in utilising blockchain and artificial intelligence (AI) to enhance network security. Our research has positioned us as a leading research group in this field. I am leading Ireland's involvement in two large EU H2020/Horizon Europe projects: SPATIAL aims to establish a trustworthy European cybersecurity sector, while CONFIDENTIAL-6G develops cryptographic quantum-resistant protocols for confidentiality in 6G. Through our research, we hope to contribute to the development of secure mobile networks of the future.

Q. What big scientific challenges are there?

The novelty, complexity of 6G networks and their pervasiveness across all aspects of life bring new security and privacy problems. Adversaries become more powerful, intelligent, and capable of creating new forms of security threats, even using AI techniques. It is envisaged that mobile networks will be the main infrastructure to interconnect other Internet of Things (IoT)-based critical services including in the healthcare, transport, and energy sectors. So, advanced security and privacy are critical for 6G to be the main communication platform for a Networked Society in 2030.

Q. How did you start out in computer science?

My undergraduate studies Final Year Project sparked my interest in technology's potential to solve real-world problems. During my graduate studies, I delved deeper into the research process and became even more passionate about the impact it could have on society. This fuelled my desire to pursue a career in research, with a focus on developing innovative solutions to pressing issues faced by people across the world.

Q. Tell us a bit about your life and interests outside work!

I'm passionate about traveling, photography, and cooking. I've been to 81 countries and love exploring new cultures, meeting people and taking photos. In my free time, I also enjoy spending time with friends.

NEW MEMBERS OF OUR COMMUNITY

Dr Dimitris Chatzopoulos is an Assistant Professor. His research interests include privacy-preserving and AI-enabled decentralised applications for mobile and distributed systems.

Dr Rob Brennan is an Assistant Professor. His main research interests are data and AI governance, data protection, data value, data quality, and knowledge graphs.

Dr Alzubair Hassan is an Assistant Professor teaching in the Beijing-Dublin International College (BDIC). His research interests include cryptography, network security, privacy-preserving in machine learning, and adaptive security.

Dr. Mohamed Saadeldin joined us as Assistant Professor. His research interests are in deep learning and computer vision.

Dr Ray Genoe has been appointed as Director of the UCD Centre for Cybersecurity and Cybercrime Investigation (CCI).

The Royal Irish Academy welcomed eleven UCD members into the new 'Young Academy of Ireland', a network for early career researchers and innovators. Among them were 3 from UCD CS: Assist. Prof. Fatemeh Golpayegani, Assist. Prof. Madhusanka Liyanage and Assoc. Prof. Mark Scanlon.

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TRAINING THE NEXT GENERATION OF
RESEARCHERS

Many PhD students in the School of Computer Science are part of a Science Foundation Ireland (SFI) Centre for Research Training (CRT).

The focus of these Centres is to build on research excellence and they all follow a cohort based model. This means that all the students in a Centre start their PhDs at the same time and receive intense research training at the start. Currently we host PhD students from three different CRTs – in machine learning (ML-Labs), in digitally enhanced reality (d-real), and in genomics data science.

The largest cohort is in ML-Labs, which is co-directed by Assoc. Prof. Brian Mac Namee, who reports that 2023 will be an exciting year for ML-Labs (www.ml-labs.ie). In September our first cohort of PhD candidates will complete their research work and graduate. These PhD

At our PhD Research Poster event on 18 January, 25 students prepared and displayed posters.

candidates are working on areas across the spectrum of machine learning and their research has the potential to make significant contributions to fields such as healthcare, finance, and transportation, as well as to help solve some of the world's most pressing problems. We are proud to have supported these bright and talented researchers throughout their PhD journeys and we look forward to seeing the impact their work will have on society. As Cohort 1 enters the final phase of their PhD work, 2023 also saw 25 new PhD candidates in Cohort 4 begin their research journeys.

This group brings the total number of PhD candidates in the centre to almost 100, all of whom are undertaking cutting edge research, creating impactful research outputs, and working together with over 30 industry partners. We are excited to see what they will do together this year and beyond.

INTERVIEW

Pasika Ranaweera is a Post-Doctoral Researcher in the School of Computer Science. This is an extract from his recent Blog Post.
https://www.ucd.ie/cs/blog/

Tell us about your research

My research is a combination of telecommunication and computer science around emerging 5G technology... my thesis introduces a security management mechanism that is a vital research contribution to emerging autonomous vehicles and unmanned aerial vehicle applications.

What's it like doing a PhD?

It's like a journey towards a once-in-a-lifetime achievement in four years. The effort, dedication, focus, commitment, confidence, and attitude matter highly during this journey... being part of state-of-the-art research that will contribute to the world's progression always made me feel contented.

What keeps you motivated in your studies?

My prime motivation is the fact that I am doing what I love. My PhD topic amalgamates my favourite research fields: mobile communication /networking and security.

What's it like to live in Ireland?

I was mesmerized by Dublin when I first came here. As an international student in a new city, it was welcoming for me, as there were more international people than locals.

What advice would you have for anyone considering doing a PhD?

I urge anyone with an idea to do a Ph.D. to know the research topic you should work on. If the topic is in a field you are interested in, it is a good choice.... Doing a PhD is a lifestyle similar to a profession and the sooner you adapt to it, the sooner you can thrive in it.

STUDENT ACHIEVEMENTS

Celebrating our students' achievements and contributions to university life.

Ava Canning (first year BSc Computer Science) was given her UCD Ad Astra Academy Elite Sports Scholar award at a formal ceremony in UCD O'Reilly Hall. Ava plays cricket for Ireland and is a member of the Women's National Performance Squad and Leinster.

Israel Olatunde (fourth year BSc Computer Science with Data Science) won Gold in the 60m final at the National Senior Indoor Championships, setting a new national record with a time of 6.57s. Israel is a UCD Ad Astra Elite Sports Scholar. At just 20 years of age he is the fastest man in Irish history having set a new Irish record of 10.17 in the 100m final round at the 2022 European Athletics Championships.

In the National Senior Indoor Championships Bori Akinola (third year BSc Computer Science with Data Science) came sixth in the Senior Men 60m Sprint final with a time of 6.74s.

Career Ambassador Idil Bilgic (third year BSc Computer Science) was awarded the prestigious UCD President's Award for Excellence in Student Activities. Recognising her work in UCD's diversity & inclusion societies, Idil was awarded the Intel Women in Technology Scholarship that supports under-represented groups in tech with opportunities of mentorship and industry experience.

Eoin Delaney, a third year PhD student at the Insight Centre for Data Analytics & VistaMilk SFI Research Centre in UCD won the Best Application of AI in a Student Project award in the AI Ireland Awards for his research on Explainable AI (XAI), on how black-box AI
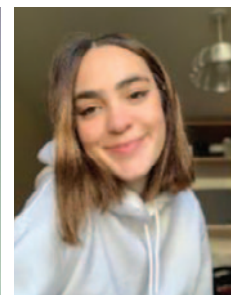

Israel Olatunde.

Bori Akinola.

Eoin Delaney (left).

Idil Bilgic.

models can be explained to developers and end-users using counterfactual explanations. UCD Computer Science students were among a team including the committee of UCD Netsoc, UCD's Internet and Computer Science Society, who organised Ireland's biggest student run tech conference at UCD this year which raised over €2000 for TENI (Trans Equality Network Ireland). They managed to win sponsorship from multiple tech companies such as MasterCard, Stripe, and SIG and attract

big speakers such as game designers John and Brenda Romero. The SISTEM conference's mission is to inspire the next generation of tech leaders and enthusiasts and provide a way for students to engage professionally with some of the largest companies in the tech space. SISTEM2023 was the sixth edition of this conference which has grown in scale and ambition and this year was attended by 200 people.

https://sistemconf.com

BACK TO
CHINA

The Covid pandemic severely disrupted our teaching in China, but we are now almost back to normal. Henry McLoughlin tells the story.

Beijing Dublin International College (BDIC) is a collaboration between UCD and Beijing University of Technology. BDIC opened in 2013 with an initial intake of 24 students. Currently it has 1300 students and an annual intake of 330. UCD CS have been involved from the start and we teach on 3 of the 4 degree programmes. In early 2020 Covid hit the world and we were told we couldn't travel to Beijing to teach in the Spring Trimester. We had to somehow deliver classes at a distance with an 8 hour time difference. The whole team had to learn new skills, overcome technological problems and figure out how to store our recorded material on servers in China so the students could access them. It was a huge effort but together we got it to work. Sadly the pandemic lasted longer than we all imagined and for over 2 years all teaching was online. In early 2022, a group of six from UCD: David Lillis, Ruihai Dong and Henry McLoughlin from UCD CS, with Declan Delaney and John Healy from UCD School of Electrical and Electronic Engineering and Zuzanna Studnicka from the UCD School of Economics, set out on a adventure to try to return to teaching in person in Beijing. We did Covid tests in Dublin and Amsterdam and 3 weeks in solitary quarantine in Xiamen before we finally reached Beijing. Henry's community insisted he do another 2 weeks quarantine in Beijing while the others just had a week of medical observation before they could at last go in to the campus. Then two days before they were to go in, the campus was locked down. Restrictions gradually lifted but the campus remained off

On St. Patrick's Day 2023 we were delighted to welcome Minister Eamonn Ryan on a visit to BDIC where he met with staff and addressed students.

limits. In June everyone except Henry returned to Ireland. On 6 July, 106 days after leaving Dublin, Henry was allowed to enter the BDIC campus. Throughout the Autumn trimester the city had periods where life returned to normal and some periods where daily testing was required. Gradually, the situation improved. Early in 2023 the international travel situation improved, and more staff were able to return to Beijing. Now over 90% of the academic staff are back and after a break of 3 years we are having face to face classes again. We should be back to normal for the coming academic year. We are looking forward to welcoming some of our BDIC students to Dublin to do stage 4 this autumn. **Henry McLoughlin served as the Deputy Provost when Covid forced the switch to online delivery and during the period when we moved**

out of Covid and prepared to return to face to face teaching. He has recently been appointed as Vice-Principal for Teaching and Learning for the three UCD China Joint Colleges of BDIC in Beijing, GDIC in Guangzhou and CDIC in Xi'an.

UCD CS teaching in far flung places

Traveling to far off places to teach has been part of our school for a very long time. Many UCD CS staff have taught in China, some of them spending 6 months of the year there.

We had a successful partnership with Fudan University in Shanghai for over a decade. In the 2010s, we ran a degree programme with NSBM university in Colombo, Sri Lanka, following on from a relationship that stretched back to the late 1980s with what was then the National Institute of Business Management.

STUDENT EXPERIENCE

Idil Bilgic's internship with MSD.

For my third-year internship module, I interned with Merck, Sharp & Dohme (MSD) in their Biotech site as a Data Analysis and Project Management intern where I had the opportunity to improve both my technical and soft skills. The Biotech site itself is the newest out of 6 sites MSD has in Ireland that work with the mindset of a start-up. They operate in an extremely agile manner while also having ambitious and precise goals to meet. As a result of this, my role was very versatile, allowing me to interact with different teams and departments which overall, taught me a lot about the project process and change management.

My main commitment during the 6-month internship was to a particular project where our aim was improving the decision-making and problem-solving processes within the site by developing digital dashboards as well as implementing physical infrastructures of these dashboards to support hybrid meetings. I was working with the Engineering Team to analyse and visualise data to track certain key performance insights where I got the chance to learn from experts in the industry, mostly focusing on SQL and MS Excel as well as learning about building impactful reports using Business Intelligence tools such as PowerBI and Spotfire. From a

project management point of view, this project involved engaging with more than 33 stakeholders within the site in relation to cost, production and construction matters. Natural to any project with an impact as significant as this one, there were problems along the way we had to work through. However, being involved in the full lifecycle of the project gave me a good opportunity to improve my communication skills as well as sharpen my abilities in adaptability, attention to detail and conflict-resolution.

I was encouraged to take initiative and my decisions were supported throughout my internship where I was treated as an equal by my co-workers. Working in an industry that is not directly related to tech, such as pharma, was an eye-opener for me in discovering more about MSD's and Ireland's contribution in general to the world's health solutions, more specifically, cancer treatments. I was motivated to do my best and felt fulfilled with the opportunities I was given, knowing that I have made even a small contribution to the development of treatments that will not only save many patients' lives but also will bring hope and joy to their loved ones.

ALUMNUS INTERVIEW

Internet Pioneer, UCD alumnus and former Director of UCD Computing Services, Dr Dennis Jennings talked to PhD candidate Jack Geraghty.

Jack: Tell us about your early days in UCD?

Dennis: I had a wonderful time in university. Primarily, I learned how to think and how to analyse. I did a PhD in gamma-ray astronomy where I needed to use computation to analyse the data and programming fascinated me. I got offered a postdoc in Bristol but I decided to quit being a researcher, and I joined a computer consultancy in Dublin. I learned an extraordinary amount there - how to express myself, keep to the point, and effectively communicate what I intended, and much more.

Jack: Next thing, you are director of Computing Services in UCD. Quite a career path!

Dennis: Well, it's illustrative of the amount I learned in five years in a business consultancy. Not only about technology, but accounting, project and financial management, communication, writing, all the skills to be a consultant. My ideal job was to run computing in a university, and when the job came up in UCD, I interviewed for it, and somewhat to my amazement and delight, I got it! We started in the punch card era and when I left 22 years later, we were in the internet era, with thousands of computers on desktops, a campus network linked to the internet, and so on. Very early on, I became interested in computer networking, and, in 1982, I made the first proposal for what became HEANet.

Jack: At some point during your time in UCD, you were offered the secondment to the

National Science Foundation.

Dennis: I was in California benchmarking an Amdahl computer and heard the National Science Foundation was looking for a director of networking. I interviewed and got the position as Program Director for Networking in the Office of Advanced Scientific Computing. The job was to build and fund a network to allow supercomputer users to remotely use the National Supercomputer Centers.

I decided that what was really needed was a network of networks with a common communications protocol so that any workstation on any network could communicate to any other workstation, or indeed to a supercomputer, on a different network. I gave a presentation about my vision for this internet, this network of networks, based on the DARPA standards. So, with that start, I became Mr. TCP/IP in Washington. I mandated that any new network funded by the NSFNet programme had to adopt these technologies. I spent my 15 months in the US going around the country, and telling people about this tremendous new opportunity, and soliciting proposals for funding.

Jack: Where do you see things going? What is the next big thing?

Dennis: Well, AI, machine learning in particular, is hot right now. Unfortunately, the latest and greatest ChatGPT has been trained on data on the internet: It is built on lots of good data, but also terrible data, including inaccurate, false, personal, copyright, confidential data. The next big thing, I believe, is the regulation of those applications and social media on the internet.

Jack: Would you have any advice for those considering computer science?

Dennis: Follow your instincts. Do what interests you. In any good university, you get an education that teaches you how to think, to take ideas and facts and develop some sort of coherent view. Having an educated mind, trains you for anything, and there is always something new. Be brave and embrace change. Computer science students are tremendously privileged to be at the forefront of technology and at the forefront of the impact of technology on society.
So, enjoy it.

This is a short extract from their wide-ranging discussion. A fuller version can be found on our website and YouTube Channel.

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