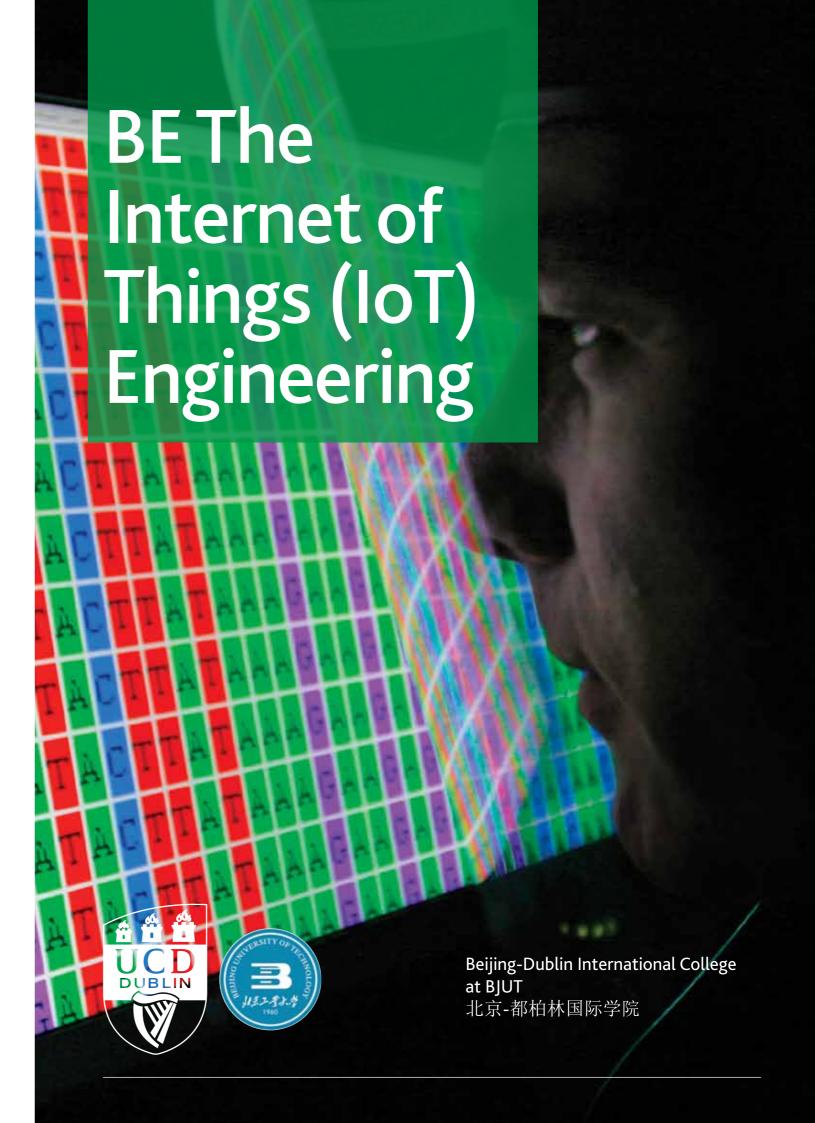# BE The Internet of Things (IoT) Engineering

Academic Profile

Professor Orla Feely
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B.E. (N.U.I.), M.S. (Calif.), Ph.D. (Calif.), FIEEE

Orla Feely received the B.E. degree in electronic engineering from University College Dublin (UCD) in 1986, and the M.S. and Ph.D. degrees in electrical engineering from the University of California, Berkeley, in 1990 and 1992. She joined UCD in 1992 and is currently a Professor and Head of Electronic Engineering in UCD School of Electrical, Electronic and Communications Engineering. Her research interests lie in the area of nonlinear dynamics of electronic circuits, and she teaches courses on the analysis and design of electronic circuits.

Professor Feely is a Fellow of the IEEE, in recognition of her contributions to nonlinear discrete-time circuits and systems. She received the Best Paper Awards of the International Journal of Circuit Theory and Applications, 2007, and the European Conference on Circuit Theory and Design, 1997. Her Ph.D. thesis won the D. J. Sakrison Memorial Prize for outstanding and innovative research, awarded annually by the Department of Electrical Engineering and Computer Sciences at U. C. Berkeley. She serves / has served on the Editorial Boards of the IEEE Transactions on Circuits and Systems, the International Journal of Circuit Theory and Applications and the IEICE Journal of Nonlinear Theory and its Applications. In 2011-12 she is Chair of the IEEE Technical Committee on Nonlinear Circuits and Systems. She is a member of the Irish Research Council.

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UCD DUBLIN

Beijing-Dublin International College at BJUT
北京-都柏林国际学院

The UCD Schools of Engineering are the top engineering schools in Ireland and their programmes are accredited for Chartered Engineer eligibility by Engineers Ireland and IChemE. Engineering in UCD is also internationally accredited through the Washington Accord (1989). Engineers are responsible for leading the way in finding solutions to real problems, in applying creativity to turn dreams into reality. UCD is an acknowledged leader in engineering studies internationally, providing a first-class education in a wide range of engineering disciplines.

Considerable emphasis is placed on the mastery of analytical skills and the use of quantitative methods. Study is based on solid mathematical, scientific and engineering principles, essentially the fundamentals of engineering, which will enable you to navigate successfully through the challenges you will face in your career.

The rigorous education provided in UCD Engineering is recognised internationally, with our graduates securing key positions in many of the world's leading companies. We work with industry to ensure that our programmes produce graduates who are highly skilled and trained to address the problems that organisations and society face. This, coupled with the fact that your lecturers are recognised experts in relevant fields, makes UCD the first choice for anyone interested in engineering.

Electronic and Communications Engineering

Electronic Engineering is concerned with transmitting and processing information. The information could be anything from a sequence of zeros and ones to a heartbeat. You may want to transmit it along an optical fibre stretching between Beijing and Shanghai, or across a room from a computer to a measurement system through wireless connection. And processing it might involve converting data from a blu-ray disc into a virtual 3D world on a games console or matching fingerprints in a worldwide computer database. What enables electronic

engineers to achieve these tasks with such success is their ability to analyse complex problems, to devise creative solutions and then to implement these solutions, exploiting the processing power of tiny integrated circuits that can contain millions of electronic devices.

Communications engineering is an emerging major field within electronic engineering. Activities range from circuit design to strategic network architecture. Communications engineers invent novel methods to transfer increasing amounts of data to support modern applications. They also design the necessary equipment to implement these methods - such as switches, routers and compression technologies. Their work has applications in many fields: broadband internet, mobile telecommunications and video broadcasting.

The Internet of Things (IoT) Engineering

The Internet of Things (IoT) is a new revolution of future networks that will connect all objects ('things') in our everyday life; watches, keys, appliances, cars, buildings. With the support of the internet and wireless communication infrastructure, these objects can 'think', 'feel', and 'talk' with each other and communicate with humans. It will enable us to monitor and control them anytime anywhere and enjoy their intelligent service, making the idea of a 'Smart Planet' a reality.

Why is this programme for me?

The Internet of Things is likely to have a staggering impact on our daily lives as it evolves to become an essential part of many systems such as the smart grid, intelligent transportation, environment management and safety, healthcare, retail, logistics, and smart homes. The IoT is listed as top priority on the information-related development strategies for many countries, from USA and Europe to Japan and Korea. The IoT was incorporated into the 12th Five-Year National Development Plan in June 2010 in China. Chinese Premier Wen Jiabao made a speech in the city of Wuxi on 7th August 2010 calling for the rapid development of Internet of Things technologies. He claimed: Internet + Internet of Things = Wisdom of the Earth. The IoT market in China is expected to exceed RMB 1 trillion in 2015. Unsurprisingly, there is a huge demand worldwide for professionals to work in this emerging and exciting field.

Internet + Internet of Things = a Wisdom of the Earth

The Internet of Things (IoT) Engineering is an interdisciplinary bachelor degree programme. It is a mix of electronic engineering and computer science, with emphasis on internet technologies, wireless communications, sensor devices, and cloud computing, that are key underpinning technologies necessary to run applications over the physical infrastructure of the Internet of Things.

The programme teaches you how to apply electronics and computing technologies to design, test and troubleshoot advanced devices and systems in IoT applications. It trains you in basic circuit theory and information technology with hands-on applications, subsequently moving on to increasingly complex systems, platforms and telecommunication networks.

The programme enables you to acquire skills in relevant areas in scientific research, technological development, product design and professional management in the IoT field.

What will I study?

Programme Structure
This is a 4-year bachelor degree programme in Engineering. The curriculum includes lectures, laboratory exercises, tutorials/seminars and project work. The programme starts with a strong foundation of mathematics in the first year, and continues with basic theory of electronics and computer technology in the second year. In the third and fourth years, core modules in electronics, computers and communication networks will be emphasised.

Core modules include:
• Electronic Circuits, Digital Logic
• Computer Programming, Software Engineering
• Computer Architectures, Operating Systems
• Communication Theory, Computer Networks
• Digital Signal Processing, Wireless Communications
• RFID, Sensor Networks, M2M
• Microcontroller, Embedded Systems
• Cloud Computing, Information Security

Programme Objective

Based on a wide scope of the profession, this degree programme aims to train students to be equipped with a solid theoretical foundation, systematic professional knowledge and strong practical skills in the fields of electronics engineering, computer technology and communications networks, that underpin a wide range of applications in the Internet of Things. The programme sets out to provide you with:
• A thorough knowledge of electronic engineering and computer science
• A firm foundation of wireless communication and computer networks
• A thorough knowledge of IoT devices, systems, networks and infrastructure
• A strong skill for sensor network design and network planning for IoT

Assessment

You will be assessed using a wide variety of assessment techniques. Assessment will vary between modules. Many modules may be assessed through a combination of coursework and formal exams. Coursework may include laboratory reports, individual and group assignments, written essays and individual or group presentations.

How will I benefit?

This degree programme has a wide technical range, allowing you to study a variety of topics including electronic circuits, communication theory, computer programming, software engineering, sensor networks, cloud computing, information security and many more. You will gain a thorough understanding of the principles and theory of the foundation of electronic engineering and computer networks, which underpin the architecture of the Internet of Things. Practical skills are developed through laboratory and project work.

All core modules of this programme are taught through English, and the majority of modules are given by academic staff from UCD who are often experts in relevant research areas, which enables you to access state-of-art technologies and interact with the frontline development of the Internet of Things. Years 1 and 2 will include 50% more English language tuition than currently required by the Chinese educational system. You will graduate with a dual degree from BJUT and UCD, both of which will be recognised around the world.

Career Opportunities and Prospective Employers

With the broad range of skills you will acquire from this degree, you will have excellent career prospects in areas as diverse as circuit design, software development, mobile communications, network planning, system integration and related areas. With the rapid development and a wide range of applications of IoT in China, graduates from this degree will find excellent opportunities in various companies, from ICT giants, such as IBM, Intel and Microsoft, to big network operators, such as China Mobile and China Telecom, as well as many medium and small size companies. Graduates from this degree also can move into technology management in the field of IoT, such as public service management for local government.

Further Study

The international nature of this degree also enhances the opportunities for graduates who may want to pursue further postgraduate programmes. In UCD exciting opportunities exist in areas such as electronic or computer engineering. Areas to be considered might include designing new means of communication and the next generation of multimedia devices or developing new imaging techniques. Many graduates may also continue to PhD study within UCD and work with some of the world's leading experts within this area of research.

This high standard English-taught degree will provide you with a distinct advantage in applying for PhD studies overseas, e.g. in the USA, Canada and the UK.

Application

Applicants will be reviewed on basis of academic merit and English language standard. Years 1 and 2 will include 50% more English language tuition than currently required by the Chinese educational system. There will be significant competition for programme places. Applicants should obtain the first division line in Gaokao.