

Electronic/Computer Engineering the engineering of INFORMATION in electrical form

AND

Electrical Engineering the engineering of ENERGY in electrical form

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Some distinctive characteristics..

- ECE involves the engineering of both (charged) matter and (electromagnetic) radiation;
- ECE involves both hardware and software
- ECE is highly research-intensive with a strong coupling to mathematics and physics;
- For over 50 years implementation has been driven by an exponential underpinning technology trend ('Moore's Law')



ECE operates at the level of the physical world...

- Solid-State Electronics; Electromagetics; Electronic Circuits
 - Physics; Mathematical Physics...
- ... and at the abstract level of generating, storing, processing and transmitting information...
 - Circuit Theory; Control Theory; Communications Theory; Computer Engineering; Linear and Nonlinear Systems; Software
 - Mathematics; Statistics; Computer Science ...

Example: E-Safety in Vehicles

Cars of the future will be laden with electronics and sensors for safety, efficiency, minimal environment effects etc. The EU project ADOSE uses multiple technologies – 3D cameras, bio-inspired silicon retinas (SRS), Far Infra-Red (FIR) sensors, Multi-Function Optical cameras (MFOS i.e. visible & Near-Infra-Red), 79 GHz long range radars, tags on pedestrians etc.)



What's the next Big Thing ...?

- We have seen extraordinary progress in Information & Communications Technologies (ICT) in the past 20 years, much of this driven by Electronic & Computer Engineering. Have we reached saturation?
- No! The Internet-of-Things (IoT) will be next profoundly disruptive ICT-based revolution, connecting maybe 50 Billion objects to the Internet by 2020
- Concepts such as e-Health, Smart Cities, e-Grid... may be viewed as just special cases of the IoT
- We are now just at the beginning of a period of huge and dramatic change that will transform our lives
- Electronic/Computer Engineers will play a fundamental role in the realisation of this vision 10



Job Opportunities

- Electronic Engineers operate at the cutting edge of exciting technologies that continue to transform and enrich our lives
- Many exciting opportunities in prospect: 'thinking' radios, ultra-fast optical networks, personal health phones, 'smart dust' (wireless sensors everywhere), holographic 3D television, artificial brains... the IoT
- Ireland now hosts major design centres for the world's leading electronic and communications centres, offering varied, wellpaid work with excellent progression opportunities



Electrical Engineering

- ENERGY supply is one of the biggest challenges facing humanity in the 21st century
- Energy in electrical form is critical to our society: it powers most of the things we do
- Electrical Engineers are the professionals who make all this happen
- The demand for Electrical Engineers is now off-the-scale in Ireland and elsewhere!!
- Starting salaries for Electrical Engineers in overseas project work currently up to 100k€ per annum tax-free



Electrical Engineering

- Strong opportunities in core technology: renewables (wind, tidal, biofuels...), energy scavenging, storage, transportation..
- Huge challenges in power system operation with very high levels of renewable energy
- Strong multi-disciplinary focus: economics, sustainability, climatology...
- ESB to invest 22B€ in Ireland's power infrastructure up to 2020







What do ECE/EEs Do...?

- The jobs are enormously varied, challenging and interesting;
- Most EEs in Ireland are engaged in product development and design;
- Many work in large multinationals (Intel, Xilinx, Analog Devices, ABB ...) or in new Irish companies created in recent years (S3, Redmere, Decawave, Airtricity...)
- The products could range from components (ICs/sensors) to subsystems (e.g. adding TV functionality to an i-phone) to complete applications in energy, consumer electronics, health, industrial electronics

New Companies Formed by ECE/EE Graduates from UCD

• Massana

- High speed integrated circuits, data communications;
- Cylon Controls (25 years)
- Industrial/energy control systems
- InTune Networks
 - Advanced optical switching technology
- VoxPilot
 - Interactive telecommunications services
- Electroute
 - Energy trading
- · ECAR
 - Energy consulting
- Biancamed (now Resmed)
 - Remote wireless-based monitoring of health functions

Electrical/Electronic Engineering

a sample of last year's BE project titles

- · Impact of plug-in hybrid electric vehicles on the electric grid
- Development of a Flying Robot
- Photonics: planar lightwave circuits.
- Micro electro-mechanical systems (MEMS) for Systems Biology
- Filter banks for Multicarrier Cognitive Communications
- Estimation of time series of wind farm power output
- Portable Electroencephalography (EEG) based Cognitive Assessment
- The feasibility of grid connected PV for a residential house
- Voltage stability assessment of grid connected offshore wind farms
- Harvesting DC Power from Microwave Signals
- Reliable Wireless Sensor Networks for Energy Management in Buildings.
- Digital Post-Correction of Analog-to-Digital Converters
- The costs and benefits of large scale smart energy metering

To conclude

- You need only choose the combination of Electronic/Electrical at this stage - you can decide freely between them later on
- These branches of Engineering are at the forefront of change where many of the most exciting things are happening in the world of the 21st century
- They offer well-paid, highly varied and interesting work in Ireland and overseas
- If you like mathematics and like using your maths in fascinating real-world problems (climate change, healthcare, communications...) consider us!