HERIOT WATT UNIVERSITY

Department of Electrical, Electronic and Computer Engineering
School of Engineering & Physical Sciences
Earl Mountbatten Building
Edinburgh EH14 4AS, UK

Engineering Schools Lectures 2021-22

This is our selection of talks about Engineering topics for pupils' and students' appreciation of the wide-ranging applications of Engineering.
These talks are delivered by experts or beginners in the field, and are completely free and held online or in your School (availability and geographical limitations apply).

For ALL Engineering talks initially contact us via J.Marques@hw.ac.uk

"Telecomms: Why do I sound different on the telephone?" for S1-S6

Dr Keith Brown

Telecommunications covers a huge range of activities including: radio; television; telephony and data communication. Different forms of communication technology alter what is being communicated in different ways. Through the use of demonstrations, this talk look at some of the influences in communication systems and how things may sound different depending upon the communication system, being used.

"The Incredible World of Micromachines" for S1-S6

Prof Marc Desmulliez / Dr Jose Marques-Hueso

From the film "Fantastic Voyage" made in 1966 to the latest advances in sensors for video game consoles and mobile phones, micromachines have fascinated the scientific community and the public alike. This talk will describe the challenges and opportunities offered by micromachines, from microelectronics to miniaturised medical devices.

"Nature Inspired Engineering: old lessons, new beginnings" for S1-S4

Prof Marc Desmulliez / Ms Elisa Ramil Brick / Mr Marti Verdaguer

Over the last 3.8 billion years, Nature has produced solutions for plants and animals to survive and prosper. Humanity could be inspired from Nature to solve problems such as scarcity of raw materials, climate change, water pollution and sustainability. This talk, through examples, will explain why Nature is so ingenious at making things cheaper, with low energy and in a sustainable way. The lecture will also present how engineers are able to transfer Nature's engineering principles into man-made products for the benefit of mankind.

"The future conquerors of Space will not be human" for S1-S4

Dr Matt Dunnigan

Current and future exploration of space will be increasingly reliant on the use of robotic space probes and landers as we investigate the outer reaches of our solar system and beyond. This talk will describe the use of robotics in space using examples such as the international Space Station, the Mars landers, and the projected use of robots for landing in comets and exploring the icy worlds of Jupiter and Saturn.

"Helpful Robots" for S3-S6

Dr Mauro Dragone / Dr Suphi Erden / Mr Scott MacLeod / Mr Alexandre Colle

Robots are being developed to help people living with long-term disabilities and those with conditions such as dementia, and also to assist the work of surgeons and healthcare professionals in our hospitals.
This talk will describe how all these applications exploit the latest advancements in Robotics, Artificial Intelligence and Internet of Things, and how they are enabled thanks to engineers working together with computer scientists, health experts, psychologists, and people with assisted living needs.

"Sending D@ta through Space" for S3-S6

Prof George Goussetis

Satellite systems have been delivering global TV coverage for several decades. Recently we are experiencing a rapid growth of internet and multimedia applications via satellite, which calls for new more broadband systems offering two way communications between the users and the satellite. In this talk we will review traditional satellite systems and discuss ongoing research at Heriot-Watt University towards delivering high speed coverage via satellite.

"To Infinity and Beyond!: Advanced Robotics in the Ocean" for S1-S6

Prof Yvan Petillot / Dr Keith Brown

New generations of robots are being used routinely to explore the ocean, help extract oil, study climate change and loss of biodiversity, ensure the security of ports and harbours and find underwater mines. Some of these robots are autonomous and operate without direct control from a pilot, understanding their sensors and making decisions for themselves. The talk will look at some of the advanced technologies needed to make such machines, drawing on work in the Ocean Systems Laboratory at Heriot-Watt University.

"The Tragic NASA Challenger Crash: Importance of Data Visualisation" for S4-S5

Dr. Saman Gule

The 28th of January 1986 was set to go down as a landmark in the history of space travel. The first civilian, high school social studies teacher Christa McAuliffe, was going to mark history by becoming the first civilian to go into space. A day before the launch of the Challenger space shuttle, the engineers at Morton Thiokol (the suppliers of Solid Rocket motors to NASA) recommended delaying the launch due to the forecasted cold weather which would affect the O-rings that held together the rockets. They provided numerous charts to NASA but their recommendation was overruled due to lack of persuasive evidence. The Challenger was launched, only to explode 73 seconds after lift-off due to the instability of the O-rings. There were no survivors.

"Had the correct scatterplot or data table been constructed, no one would have dared to risk the Challenger in such cold weather." Edward Tufte

The talk will look at the following aspects of data science: 1. Data visualisation is very important. 2. You need to use the right kind of visual and terms to convince your audience. 3. Do not get rid of data in a science project and 4. Present simply.

"Radio engineering and antennas - the ears and mouths of communication systems" S3-S6

Prof Mathini Sellathurai / Mr Maksim Kuznetcov

As long as there is radio communication, as long as people listen to the radio, watch TV, use cell phones, as long as we have burglar alarms, as long as we have to keep in touch with submarines and planes, radio engineers will be needed. In this topic, we will talk about existing systems, antennas that serve as ears and mouths, as well as about what we are currently doing at Heriot-Watt by combining the mouth and ears into one whole system to improve the quality of communication and data transmission.

"Revolutionary technology on the driveway: autonomous vehicles are here!" for S3-S6

Prof Mathini Sellathurai / Mr Cristian Alistarh

Autonomous vehicles are one technology which is developing at an extremely fast rate, with some companies launching robo taxis (such as Waymo and UBER) without any steering wheel at all. Is this the future, having cars without steering wheels? For most of us, it is still a long way until that becomes a reality, but we are certainly already seeing some autonomy with the following technologies today: autonomous driver-assisted systems (ADAS), automotive RADAR, LiDAR, high-precision machine learning algorithms and more. Join us in this talk on the exciting journey of discovering what autonomous technologies are all about and what we are working on at Heriot-Watt University!

"Computational Imaging: Combining smart sensors and algorithms for imaging" S3-S6

Signal and Image Processing Lab

Recent advances in imaging technologies have not only allowed discovering new physical phenomena, for example, seeing what a black hole looks like, but also improved our lives in several aspects, from diagnosing diseases with more accuracy via medical imaging to better navigation systems and new leisure devices that allow augmented reality. However, existing sensors or cameras often provide raw measurements which require to be interpreted by specialised processing tools. This presentation will illustrate how mathematical and image processing techniques can be combined with highly optimised sensors for real-world applications investigated at Heriot-Watt University.

"Smart Electricity" for S1-S6

Dr Jonathan Swingler

How is electricity generated? How do we move it to where we need it? Do we really need it?
This talk explores these questions and looks at future prospectives.
Heriot-Watt University is one of the leading universities pushing the frontiers of electrical power and energy research: investigating innovative sources of green electricity production, smart grids, and novel devices to make the world a better place. This talk highlights how you can be involved in the breakthroughs.