

Applications of Intelligent Engineering Systems: From Medical Design to Energy

Lecture by: Professor Amin Al-Habaibeh

Professor of Intelligent Engineering Systems at Nottingham Trent University, UK

Proposed Date: March 2015 (To Be Confirmed)

This lecture will highlight several multi-disciplinary industrial and research case studies in the application of intelligent engineering systems concept in the areas of product design, energy savings in buildings, wave energy generation analysis, intelligent cities/buildings, renewable energy and condition monitoring of manufacturing processes.

The lecture will outline the importance of multidisciplinary research in solving practical problems and the challenges involved in this type of research.

What is 'Intelligent Engineering Systems' ?

An **engineering system** is a set of interacting or interdependent components forming an integrated performance or a specific task; this could take a physical form of a mechanical, electrical or mechatronic characteristic or non-physical such methods and procedures.

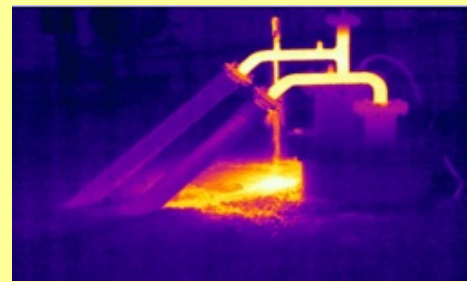
An **intelligent system**: is a system that could respond with minimum human interference to a change in the external or internal environments to optimise its intended performance or characteristics.

Case Studies

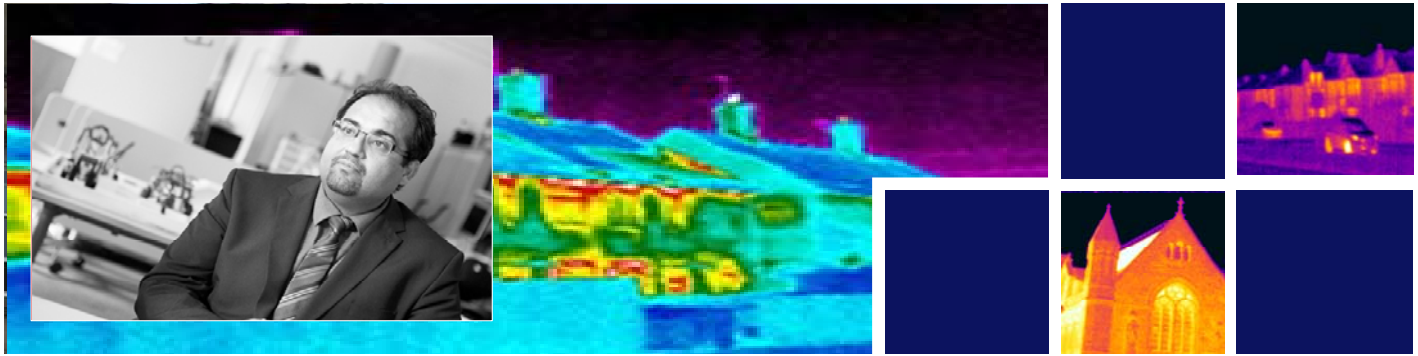
The lecture will present several research and industrial case studies including:

- The new intelligent self-retracting needle, invented at Nottingham Trent University. The lecture will present the technology and the design challenges. It will also show how the technology has been developed further as a medical trocar for key hole surgeries.

- Exploring how water in abandoned coal mines could provide a low cost environmentally-friendly energy source, addressing the issue of low carbon heating and cooling, one of the key energy challenges for the UK.
- Intelligent cities will be presented with a case study for crowd density monitoring for intelligent cities. An example for using the technology in Makkah during Hajj will be presented.
- The use of infrared thermography to detect energy questions and insulation in buildings will be presented to articulate how the technology can be beneficial for addressing energy inefficiency issues.
- Condition Monitoring of manufacturing Processes will be presented to show how the machine can be provided with the intelligence to monitor its health and/or the health of the process.
- Wave and wind Energy Generation will also be presented to show the research in this important area to develop the next generation of renewable energy technology.



Abandoned coal mines could provide a low cost environmentally-friendly energy source



Professor Amin Al-Habaibeh BSc, MSc, PhD, CEng, MIET, PGCHE, FHEA

Biography

Professor Amin Al-Habaibeh is a Professor of Intelligent Engineering Systems at Nottingham Trent University, UK. He is currently leading the Innovative and Sustainable Built Environment Technologies research group (iSBET) and co-founder of the Advance Design and Manufacturing Engineering Centre (ADMEC). Amin received his BSc degree from the University of Jordan in Industrial Engineering (Manufacturing and Design) with distinction in 1995. Following a period of research work in the robotics labs at Tampere University of Technology in Finland, he worked in the plastic industry before moving to Nottingham to study an MSc degree in Manufacturing Systems and a PhD degree in Advanced Manufacturing Technologies at the University of Nottingham. After graduation, he worked at Rolls-Royce University Technology Centre at the University of Nottingham and the Mechatronics Research Centre at Loughborough University before joining The School of Computing and Technology at Nottingham Trent University in 2004 as senior lecturer with teaching and research duties related to Product Design, Mechanical Engineering, Electrical Engineering and computer science courses. In 2010 he was appointed as a reader in Advanced Design and Manufacturing Technologies within the Product Design team at the newly named School of Architecture, Design and the Built Environment. Al-Habaibeh is a Chartered Engineer and has acted as Chairman of the Institution of Engineering and Technology (IET) for the UK's East Midlands Region in 2007-2008 and as the Chairman of IET Derbyshire/Nottinghamshire Local network panel between 2007 and 2010. He has over 100 international journal and conference publications in the area of intelligent engineering systems including advanced design and manufacturing technologies, medical design, condition

monitoring, energy / sustainability, infrared thermography, artificial intelligence, mechatronics and image processing.

Amin has two patents to his name in the medical and energy sectors. Amin's work has been recognised at the Institution of Engineering and Technology (IET) Innovation Awards 2012, the awards that recognise the most outstanding innovations across science, engineering and technology. Amin's work and his industrial collaborators received two 'Highly Commended' certificates in the Product Design and Healthcare Technologies categories. Professor Al-Habaibeh has strong links and collaboration with industry including eight years as the industrial placement advisor and over 20 years of industrial research and collaboration.

Amin has supervised to completion over seven PhD students in his area of research and currently supervising over 10 PhD students. He has acted as PhD external examiner in numerous occasions for many UK and international universities. Amin also acts as a referee of many high impact journal publications and has been member of numerous national and international conferences. Further details and list of publication can be found at www.ntu.ac.uk

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