Naughton Internships for students from the University of Notre Dame

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The Intelligent Efficiency Research Group www.ucc.ie/ierg is an award winning team of PhD and Masters Researchers specialising in the advancement of the next generation of energy efficiency technologies.

The research focus of the group centers on four core areas:

- The development of intelligent analytics systems to support industrial energy management.
- The incorporation of fault detection and diagnostics to industrial energy systems.
- Building energy performance simulation.
- The application of next generation renewable and sustainable energy systems to industry.

Project 1. Application of Analytics Software for Building System Optimisation and Fault Detection

This project will involve extracting data from various existing systems, developing visualisation front ends for data presentation and developing rules for detection of faults in monitored systems.

Project 2. Opportunities for the application of Blockchain in the Energy Sector

Blockchain is a special technology for peer-to-peer transaction platforms that uses decentralised storage to record all transaction data. Blockchain technology has the potential to radically change energy as we know it, by starting with individual sectors first but ultimately transforming the entire energy market.

Dr. Kevin Cronin
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Project 3. Experimental quantification of dispersion in particle settling

Academic Supervisor: Dr. Kevin Cronin k.cronin@ucc.ie

Background

A population of size-dispersed solid particles falling through a liquid occurs in many chemical engineering unit operations. An important aspect of this phenomenon is to relate the residence time of these particles to their size as usually larger particles fall faster and have a longer residence time. However there is much uncertainty in this phenomenon owing to the fact that the falling velocity of any particle has a known steady-state component (the terminal velocity) and a random fluctuating component. This has the effect that there is considerable scatter in measured residence times.

Work Plan

- To set up an experimental system consisting of a tall tube holding a liquid and spherical particles of different sizes.
- To carry out experiments to measure the residence time of the particles in the fluid.
- To video the motion of the falling particles.
- To statistically characterise the measured data.
- To relate the data to the theory of Dispersed Plug Flow.

Weblink: https://www.ucc.ie/en/processeng/

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Project 4. Development of a customised electromagnetic sensor for tracking of medical catheters used in the diagnosis and treatment of lung cancer

Electromagnetic tracking is the gold standard for navigation in image-guided and robotic surgery where the surgeon is unable to visualise the surgical field. The biomedical design laboratory (http://biodesign.ucc.ie) is one of the world's leading research centres in the development of electromagnetic tracking for image-guided interventions and has recently begun creating customised tracking sensors to operate with its award-winning Anser electromagnetic tracking platform (http://anser.io, http://openemt.org).

This project will see the development of a customised electromagnetic sensor for tracking of medical catheters used in the diagnosis and treatment of lung cancer. The student will develop and test coil-winding techniques and characterise (electrical and mechanical characterisation) wound sensor coil performance leading to usable calibration data and integration within the Anser EMT platform. Successful project outcomes will be validated in pre-clinical testing, in collaboration with our clinical partners at Bons Secours Hospital, Cork and IHU Strasbourg, France.