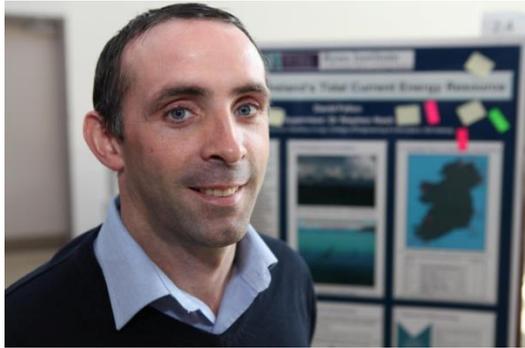


# NUI Galway & University of Limerick Alliance

## 1<sup>st</sup> Annual ENGINEERING AND INFORMATICS RESEARCH DAY

### Poster Prize Winners

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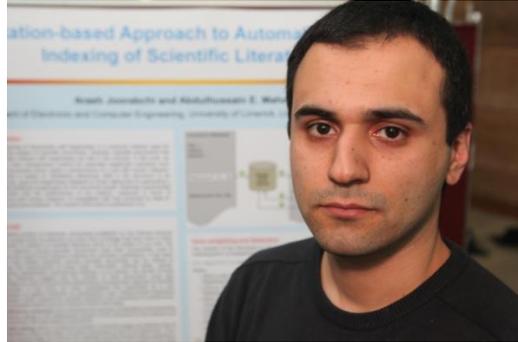
**Assessment of Ireland's Tidal Current Energy Resource – David Fallon**

*In 2008, fossil fuels accounted for 96% of Ireland's primary energy demand of which 95% were imported [1]. Careful exploitation of Ireland's indigenous renewable energy resources is required to help curtail this over-reliance on imported fossil fuels and to reduce greenhouse gas emissions. Tidal currents represent a substantial indigenous energy resource that is both sustainable and predictable. The accessible tidal current energy resource has previously been estimated at 2.63 TWh/y [2].*

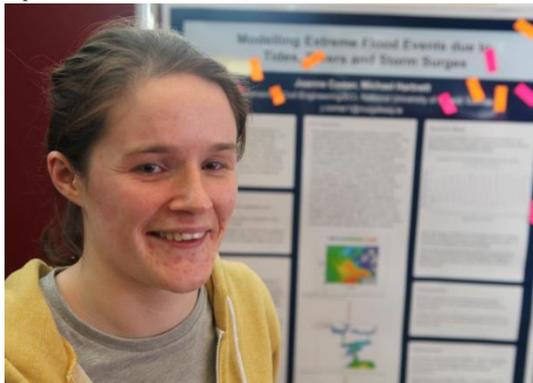
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**A Citation-based approach to automatic topical indexing of scientific literature - Arash Joorabchi**

*Topical indexing of documents with keyphrases is a common method used for revealing the subject of scientific and research documents to both human readers and information retrieval tools, such as search engines. This work proposed a new unsupervised method for automatic keyphrase extraction from scientific documents which yields a performance on a par with human indexers. The method is based on identifying references cited in the document to be indexed and, using the keyphrases assigned to those references for generating a set of high-likelihood keyphrases for the document. We have evaluated the performance of the proposed method. Reported experimental results show that the performance of our method is competitive with that achieved by state-of-the-art supervised methods.*



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**Modelling Extreme Flood Events due to Tides, Rivers and Storm Surges – Joanne Comer**

*Flooding in towns and cities is commonplace in Ireland, due to both coastal and river flooding. In the future this problem will increase due to the effects of climate change. The dependence between such factors as river flow, tides, and storm surges is a pertinent point of research. It must be known how these factors interact together before flooding can be accurately predicted. To model the effects of such flooding a complete modeling solution is sought. This shall include a 3D ocean model to predict storm surges, a 2D estuary model which uses input from the surge model to model water levels in the harbour, and a floodplain model used to assess water levels within the area concerned. This project will focus on Cork harbour.*

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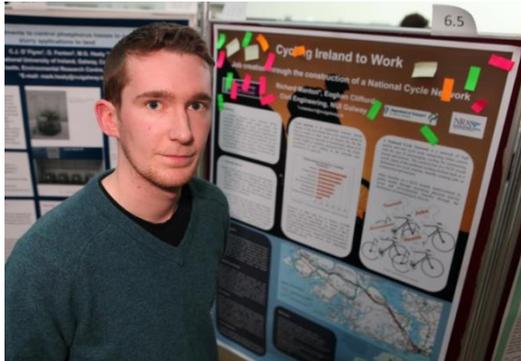
### Merging Business Process Models - Wassim Derguech

We propose an algorithm that allows for creating a configurable business process model given a set of business process variants.



### Cycling Ireland to Work: Sustainable job creation through the construction of a National Cycling Network - Richard Manton

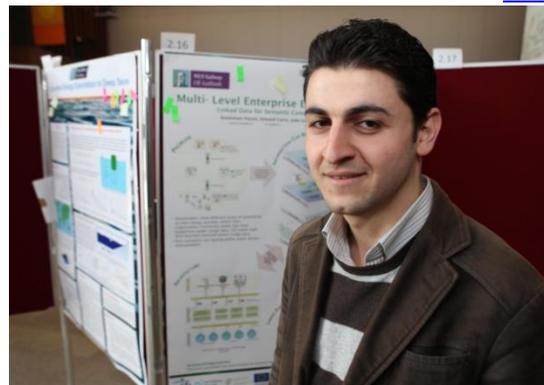
*A proposed National Cycle Network (NCN), connecting Ireland's major urban centres and potentially opening up rural, recreational and commuter cycling routes, could lead to significant job creation in the construction, maintenance and tourism sectors. This study will develop a framework for the establishment of a NCN and carry out a feasibility study of one major route corridor – Galway to Clifden – investigating: (i) route selection (ii) materials and design and (iii) cost benefit analyses.*



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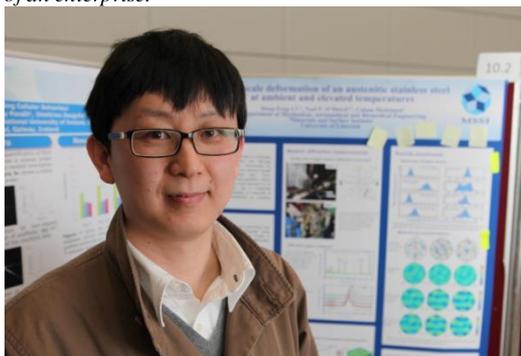
### Multi-Level Enterprise Energy Management - Souleiman Hasan

*Energy monitoring usually takes place on a very low level in enterprises such as sensors. However, different people in an enterprise would be interested in different conceptual levels and granularities of activities and thus energy monitoring in its current state-of-the-art lacks the ability to bridge the vertical information gap between hierarchical levels (e.g. maintenance, operational, upper management) in an enterprise. Our research is aimed at exploiting semantic web technologies and complex event processing technology to strengthen energy monitoring task and associate energy aspects with activities and business processes in different operational and management levels of an enterprise.*



### On the microscale deformation of an austenitic stainless steel at ambient and elevated temperatures - Dong-Feng Li

*In this study, three dimensional crystal plasticity based finite element models are presented to examine the multi-scale deformation behaviour of austenitic stainless steels at ambient and elevated temperatures. The predicted lattice strains are in good agreement with those measured in both longitudinal and transverse directions. Effects associated with the latent hardening of multiple slip systems are also identified as a result of altered work hardening on the micro-scale level.*

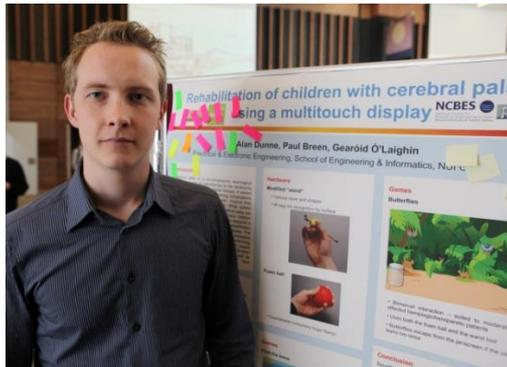


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### Seismic Design of Concentrically Braced Steel Frames – Suhaib Salawdeh

Analytical model of concentrically braced steel frames (CBFs) with rectangular hollow section bracings is studied and validated by experimental data (pseudo dynamic cyclic tests for braces and shake table tests for one-story one-bay CBF). Direct displacement based design methodology is being developed for CBFs and dual systems with vertical irregularities with many different configurations and validated by non-linear time history analysis (NLTHA).

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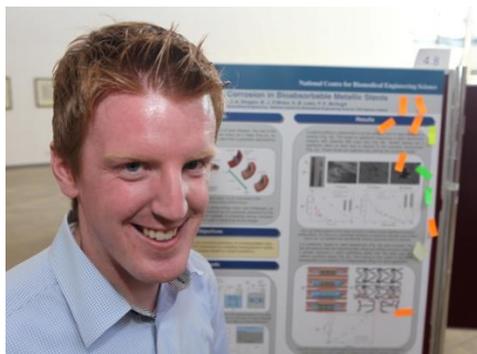
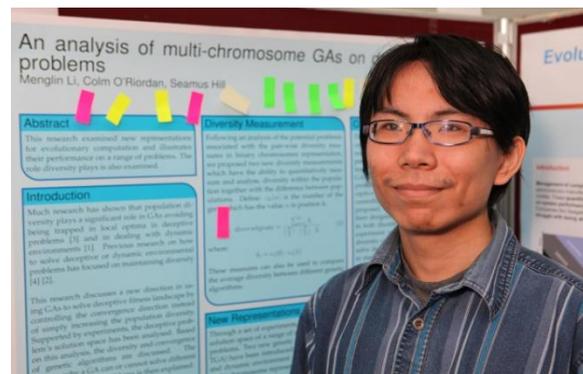


### Rehabilitation of Children with Cerebral Palsy using a Multi-touch Display – Alan Dunne

Cerebral palsy is a non-progressive neurological disorder caused by disturbances to the developing brain. While current forms of therapy for children with cerebral palsy are effective in minimizing symptoms, many children find them boring or repetitive. We have designed a system for use in upper-extremity rehabilitation sessions. The system presents patients with custom-designed video games on a multitouch display to encourage and motivate the correct completion of therapeutic motions.

### An analysis of population diversity and multi-chromosome GAs on deceptive problems - Menglin Li

This research examined new representations for evolutionary computation and illustrates their performance on a range of problems. The role diversity plays is also examined.



### Modelling Corrosion in Bioabsorbable Metallic Stents – James Grogan

The design of bioabsorbable stents, tiny absorbable scaffolds that are used in the treatment of heart disease, is highly challenging due to the complex mechanical and chemical interaction between them and their surroundings in the body. The aim of this work is to facilitate the development of these devices through the development and experimental calibration of a finite element based stent assessment and design tool.