

## IMA Seminar Series 2011/2012

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**22/05/2012, 12-2pm, Room C01**

### *Salvador Garcia Bernal: Multiple Exposure Video Merging*

Consumer digital cameras have limitations that make it impossible for them to capture scenes as we see them. This talk describes the basis theory and applications of high dynamic range imaging (HDRI). HDRI allow us to capture images with any camera and extended its dynamic range captured by them. HDRI in still images have been in the public domain for more than ten years, some research have been done recently in video. One of the focuses of this research is to apply these techniques to obtain a high dynamic range video (HDRV). In this talk I will present some preliminary results for obtaining a HDRV from a set of differently exposed frames, and compare them with traditional video recording.

### *Yujie Mei: Camera Shutter Speed Based Radiance Map Recovery and Photograph Fusion*

To fuse the multiple LDR images into a single radiance map, most previous methods just simply used each pixel's value in each frame to decide how heavy the weighting of a particular exposure should be. In the following particular cases, this approach will fail to produce sensible radiance values: In the extremely bright areas, in a spatial coordinate where the pixels across every frame are saturated, i.e., the pixel value is 255, all weightings for differently exposed pixels will be same. In extremely dark areas, in a spatial coordinate where all pixels across every frame are either 0 or 1, all weightings for differently exposed pixels are either 0 or 1. This means that in these cases, we cannot determine a reasonable estimation of the radiance values. In practice, when there is a need to use HDR imaging technology to record the real world scenes, these cases (saturated or dimly illuminated) will always present. To fix the defect I propose to explicitly exploit information contained in the shutter speeds. This idea can also be applied to photograph fusion.

**15/05/2012, 12-2pm, Room C01**

### *Hao Fu: Semantic Image Understanding: From Pixel to Word*

The aim of semantic image understanding is to reveal the semantic meaning behind each pixel. To achieve this goal, the first step is to represent the pixels using discriminative, as well as invariant features. Recent years have witnessed many new feature extraction methods. How to efficiently combine different features is non-trivial task. In the first part of this talk, I will introduce a new concept named Relative Kernel Distribution Invariance. Based on which we can consistently boost the performance of Multiple Kernel Learning method, which is deemed to be one of the most prominent methods in combining different features. We have also shown that this concept is also beneficial for unsupervised case.

Based on an efficient feature combination method, we believe that region is a more suitable choice as the processing primitives in image understanding against pixel or superpixel which is the dominating state-of-art, as regions contain much more information than that contained in a pixel or a superpixel. Previous methods tend to abandon this approach partly because the difficulty in generating object consistent regions. In the second part of this talk, I will introduce a semantic feature feedback mechanism, which tries to integrate low-level features together with semantic features in hopes of

generating object-like regions. Experiments on different datasets have confirmed that our approach can indeed generate regions that are more object consistent.

Instead of considering region proposal as a technique, we would rather consider it as a philosophy. Besides generic image understanding, we have also considered it for medical applications. We found this kind of philosophy works extremely well for detecting glands in medical image. This is in contrast with the traditional sliding window mechanism widely used in the object detection literature.

Although the idea of understanding the semantic meaning of each pixel in an image seems appealing, it is still too difficult at the current level of technology. If we give a step back, and only consider understanding the image in the image level, this task perhaps become more easier, while it is still of great practical meanings, especially in multimedia area. In the last part of this talk, we try to tackle the image understanding problem from the image level. We have proposed to use random forest, usually considered as a classification method, to explore knowledge from the huge amount of tags widely existed in the web currently. Experiments have shown that this method can significantly reduce the semantic gap problem, which lies in the core of image understanding, while still maintaining its scalability power.

#### *Michel Valstar (MRL): Next Generation Facial Expression Recognition Systems*

The past decade has seen a large number of publications on Automatic Facial Expression Recognition systems (AFERS). The first AFERS programmes are now publicly available, either non-profit from academics, or for sale by companies, giving an indication of what currently works and what doesn't. The first facial expression recognition challenge (FERA2011) and first two audio-visual emotion recognition challenges (AVEC 2011 and 2012) serve to shed further light on the efforts in this field, comparing many state of the art approaches in a controlled setting. What we now see is the advent of a second generation of AFERS. Building upon the successes and learning from the failures of the first generation, these new systems attempt to tackle all the open challenges in this field by combining different approaches, as well as integrating sources of information other than the face (e.g. head actions). In this talk I will describe two recent contributions towards such a second generation of AFERS, to wit the novel facial point detection algorithm Local Evidence Aggregation Regressors (LEAR) and a novel dynamic appearance descriptor called LPQ-TOP.

**08/05/2012, 12-2pm, Room C01**

#### *Stephanie Foan: Investigating T Helper Cell Subsets Throughout the Human Lifetime*

A body of evidence exists to support immunosenescence, where progressive alterations in the immune system contribute to its decline with advancing age. One consequence of immunosenescence is a tendency towards increasingly pronounced inflammatory responses that, conversely, are less able to destroy pathogens and may favour tumour growth. We hypothesise that Th17 and Th1 cells are key drivers of inflammation in older age as their frequency and function is preserved relative to regulatory subsets such as natural Treg and Tr1-like cells. In order to test this, we enumerated Th17 cells and studied their function in 74 donors (aged 20-82) of "normal" health status. In order to achieve appropriate statistical power we calculate this study requires another 58 donors be tested. More comprehensive data mining techniques will also be applied to this dataset to investigate if low-level incremental changes accumulate to give immunological patterns predictive of donor age.

#### *Aslam Ahmed: Variance in System Dynamics and Agent Based Modelling Using the Sir Model Of Infectious Disease*

Classical deterministic simulations of epidemiological processes, such as those based on System Dynamics, produce a single result based on a fixed set of input parameters with no variance between simulations. Input parameters are subsequently modified on these simulations using Monte-Carlo methods, to understand how changes in the input parameters affect the spread of results for the simulation. Agent Based simulations are able to produce different output results on each run based on

knowledge of the local interactions of the underlying agents and without making any changes to the input parameters. In this study we compare the influence and effect of variation within these two distinct simulation paradigms and show that the Agent Based simulation of the epidemiological SIR (Susceptible, Infectious, and Recovered) model is more effective at capturing the natural variation within SIR compared to an equivalent model using System Dynamics with Monte-Carlo simulation. To demonstrate this effect, the SIR model is implemented using both System Dynamics (with Monte-Carlo simulation) and Agent Based Modelling based on previously published empirical data.

**20/03/2012, 12-2pm, Room C01**

*Jie Shu: Colour Detection on Immunostaining Slide*

Abstract: Immunohistochemistry is the most commonly applied immunostaining techniques. Digital IHC image analysis allows the pathologists to use the computer assisted image analysis method to reduce the observer bias and increase measurement accuracy. To interpret an IHC slide is first to inspect the positive staining (colour) in the slide. We aim to develop a colour detection method to identify IHC stains. For this presentation, I will show the experimental results by comparing our method to colour deconvolution and ground truth.

**13/03/2012, 12-2pm, Room C01**

*Shabbar Naqvi: An investigation into the use of advanced computational methods for the automation of breast cancer grading with spectral data sets*

Abstract: Breast cancer is one of the most frequent occurring cancers among women throughout the world including U.K. Once the disease has been diagnosed, monitoring its progress with the passage of time is very important for future outcome of disease and it is called prognosis. Grading is one of the most important prognostic factors for breast cancer. Currently it is determined with the help of inspection of cancer sample under microscope by histopathologists. This method has got high element of human error. There is need to develop automated tools to help pathologists to determine the correct grade. In this seminar, I shall discuss about the potential of using advanced computational methods (unsupervised and supervised) with new spectral data sets for the automation of breast cancer grading.

**06/03/2012, 12-2pm, Room C01**

*Simon Miller: Modelling Survey Data with Type-2 Fuzzy Sets*

Abstract: In this talk I'll describe a method of using interval valued survey responses from multiple experts on multiple occasions to produce General Type-2 fuzzy sets. In the method we propose, both the intra- and inter-person variability are modelled, with no loss of information. The resulting sets are completely determined by the data, providing an accurate representation (in terms of being defined solely by the data) of the opinions being modelled. I'll give a description of the method, along with synthetic and real-world examples.

*Naisan Benatar: An Investigation into the Relationship between Type-2 FOU Size and Environmental Uncertainty in Robotic Control*

It has been suggested that when faced with large amounts of uncertainty in situations of automated control, type-2 fuzzy logic based controllers will outperform the simpler type-1 varieties due to the latter lacking a mechanism to model this uncertainty and adapt accordingly. This paper aims to investigate this problem in detail and analyse when and the magnitude by which a type-2 controller will improve upon type-1 performance. A sailing robot is subjected to several experiments in which the uncertainty and complexity of the sailing problem is increased in order to observe the effects on measured performance. Improved performance is observed, however not in every case. The size of the

FOU is shown to be very important in the creation of the type-2 system with potentially severe performance penalties for incorrectly sized footprints.

**28/02/2012, 12-2pm, Room C01**

*Jon Garibaldi: Addressing Uncertainty in Cyber-Security Experts' Perceptions of Risk*

Abstract: In the research described in this talk, ensembles of opinions from individual experts and groups of experts are examined in a cyber-security risk assessment scenario. Assessing the level of risk in information systems is a task of increasing interest as the threat from cyber-crime increases. The job of carrying out risk assessments is fraught with uncertainty, as data is limited on rare attacks, costs are difficult to estimate, and technology and tools are continually changing. Consequently, experts from different areas of the field (or even from the same area) may interpret the risks posed to a system in different ways, leading to variation in assessment. By looking at the group decisions made by these experts, it may be possible to improve decision making, and better understand the decision making process. This paper presents research into the variability in decision making between experts that is inherent in the problem of information security risk assessments. Using a scenario created by the UK government's National Technical Authority for information assurance (CESG), 39 cyber-security experts from 7 groups were asked to rank a set of attack vectors according to their difficulty. This study quantifies the level of agreement that is present in the opinions of the individual technical experts within each group, agreements between the groups, and the overall agreements. Cluster analysis is performed to provide a view of how k-means clustering groups the individuals, which we compare with the actual groupings. We then investigate the use of a simple aggregation technique to model the aggregation of individual's opinions and evaluate the possible benefits of ensemble decision making.

**21/02/2012, 12-2pm, Room C01**

*Christian Wagner: Crowd-sourcing, fuzzy meta-measures, integrals and where to have lunch on campus*

Abstract: Fuzzy measures (FMs) allow the capturing of specific notions of "worth" of subsets of information while fuzzy integrals (FIs) allow the fusion of information based on a given measure. The talk will include a brief introduction to fuzzy measures and their utility in particular in conjunction with fuzzy integrals. A novel approach to automatically specify individual FMs from data will be shown in the context of crowd-sourcing and contrasted to current approaches. The creation of application-specific measures, meta-measures and the "smart" fusion of information based on fuzzy integrals will be showcased to address the problem of where to have lunch on campus.

**14/02/2012, 12-2pm, Room C01**

*Peer-Olaf Siebers: A Brief Introduction to the Exciting World of Object Oriented Systems*

In this tutorial I will discuss the fundamental principles of object oriented systems and briefly introduce the process of object oriented analysis and design. This will be accompanied by some small exercises for you. Please bring pen and paper to be able to fully participate in the tutorial.

*Daphne Lai: Breast Cancer Data Classification using Semi-Supervised Fuzzy c-Means*

Semi-supervised Fuzzy c-means (ssFCM) algorithms have been popularly used to identify similarity in datasets using some labelled data patterns. In this work, two variations of ssFCM algorithms are used to classify the Nottingham/Tenovus Breast Cancer dataset. The motivation behind this work is that no automatic technique has been found to classify this dataset so far. Three experiments were conducted using the two ssFCM algorithms and the results evaluated using inter-rater agreement measures and cluster validity indices. The results are compared with those of popular unsupervised clustering

algorithms. Despite the low agreement values found in the ssFCM algorithms, they are promising and further work to investigate on these results and refine the techniques is required.

#### **07/02/2012, 12-2pm, Room C01 (1st and 2nd Year PhD Presentation Day)**

##### ***Bozhi Liu: Color Constancy***

Color constancy is an example of subjective constancy and a feature of the human color perception system which ensures that the perceived color of objects remains relatively constant under varying illumination conditions. Color Constancy is the ability to perceive colors of objects, invariant to the color of the light source. My research is about Computational Color Constancy to maintain stable color appearance across light sources.

##### ***Salvador Bernal: HDR Video***

High Dynamic Range (HDR) is a versatile area in computer graphics and photography. It is a complex problem, because involve different parts as a whole. This presentation gives a general view about what are the differences among high dynamic range images and high dynamic range video. Also, the main goals of the project are reviewed, a preliminary pipeline is presented and related projects as well.

##### ***Orod Razeghi: Understanding Visual Content with Human in the Loop***

For many years researchers around the world have tried exceptionally hard to propose practical solutions to the problem of understanding visual content of an image. One might think of the problem as an effort to emulate human visual system. Despite all the efforts, the simplest of visual tasks to us humans like optical segmentation of objects in an image remain a significant challenge for computers. In a few cases, where the computer processing power is reliable enough to accomplish the task, the issue of the public distrust in capability of machines to solve their critical problems remains untackled. The purpose of this project is to combine the latest visual pattern recognition and machine learning techniques with high level knowledge of human beings in a probabilistic model. The abstract knowledge of humans will improve accuracy of computer algorithms. At the same time, computer algorithms will reduce human labour by altering results and doing mundane tasks. The proposed model is planned to be tested with medical applications in mind. The examples of such applications would be dermatology datasets with skin disease recognition tools or pathology datasets with cancerous and benign cells recognition capabilities. Once the proposed model reaches its maturity, it may be developed into a practical application and may be installed on smart mobile phones or smart tablets.

##### ***Robert Miles: Applying Artificial Immune System Approaches to New Domains***

Artificial Immune Systems (AIS) are algorithms and AI techniques inspired by the structure and behaviour of the human immune system. They have shown themselves to be useful for various applications including anomaly detection, security, and classification. My work currently involves exploring and building on the Dendritic Cell Algorithm, an AIS algorithm developed by my supervisor Julie Greensmith. The exact direction of my work in future is undecided, but may involve applying artificial immune system approaches to new domains. Some possible new applications include architectural systems, and 'Affective Computing', a field which involves systems that deal with human mood and emotion.

#### **31/01/2012, 12-2pm, Room C01**

##### ***Sameh Zakhary: Erasure Coding with Replication to Defend Against Malicious Dropping Attacks in DTNs***

Abstract: Privacy and security in delay-tolerant networks (DTNs) have been an active research topic in the recent years, especially, as people can be involved in these networks and use their mobile devices to

forward each others messages. Such communications require forwarding algorithms that often include replication or context awareness. In this paper, we study the security impact on specific forwarding protocols in both simulated City Scenario and using real connectivity data traces. We propose a hybrid technique combining Erasure Coding and distributed replication to defend against packet dropping malicious attack. We show that replication-alone technique - that is typically expected to improve performance and robustness - is greatly affected by such simple attacks. We show that an attacker can cause up to 50% drop in the success ratio when compromising about 30% of nodes across various scenarios. We use mobile nodes with different speed, transmission range and processing capability, fixed infrastructure access points in our experiments. Results show that using Erasure Coding and message replication at intermediaries achieves up to 250% improvement in the message success ratio compared to using replication only.

**06/12/2011, 12-2pm, Room C60**

*Julie Greensmith: From Inspiration to Application: A Tutorial on Artificial Immune Systems*

Abstract: Artificial Immune Systems (AISs) are a collection of algorithms inspired by the human immune system's cells and their functions. AISs developed as a result of the natural idea of creating computer immune systems to fight computer viruses, via an initial interdisciplinary collaboration between computer scientists and theoretical immunologists. This concept was appealing as an idea given the parallels between computer viruses and natural viruses, and the –at the time- perceived similarities in complexity between the human immune system and computer networks. Resulting from the success of this initial approach, the field has expanded over the past 15 years. A range of different immune inspired algorithms have been produced, all based on metaphors of different immune cells. While computer and network security is the original application domain of AISs, this family of algorithms has been applied to a wide range of problems domains including clustering, classification, optimisation, anomaly detection, robotics, protein structure prediction, film recommender systems and ATM fault tolerance. The current state of the art consists of four mainstream AIS methodological frameworks including negative and clonal selection methods, immune networks and dendritic cell algorithms. In this tutorial we will cover the fundamentals of AIS algorithms, look at the dendritic cell algorithm as an interdisciplinary-derived anomaly detector and place AIS in context with other computational intelligence techniques. An overview will be given on the state of the art in artificial immune systems including advances in computational immunology and the development of artificial immune ensemble methods.

**29/11/2011, 12-2pm, Room C60**

*Yihui Liu: Dimensionality Reduction and Main Component Extraction of Mass Spectrometry Cancer Data*

Abstract: Mass spectrometry data have high dimensionality. Dimensionality reduction is a very important step to greatly improve the performance of distinguishing cancer tissue from normal tissue. In this study multilevel wavelet analysis is performed on high dimensional mass spectrometry data. A set of orthogonal wavelet basis of approximation coefficients is extracted to reduce dimensionality of mass spectra and represent main components of mass spectrometry data. The best level of wavelet decomposition of mass spectrometry data is selected based on energy distribution of approximation coefficients. Compared to traditional principal component analysis (PCA) method, which depends on training samples to build feature space, our proposed method is using wavelet basis to extract main components of mass spectrometry data, keeping local properties of data, and computing efficiently. Experiments are conducted on three datasets. The competitive performance is achieved compared to other methods of feature extraction and feature selection.

**22/11/2011, Energy-Complexity Day, 12-2pm, Room C60**

***Joel Fischer (Mixed Reality Lab, The University of Nottingham): Living with energy monitoring***

Abstract: Raising awareness of personal energy consumption is seen as a key element of many national initiatives to reduce emissions. Previous work has shown that individual interventions to reduce energy consumption tend not to be broadly effective, and also lacks studies that provide a varied, interactive ecology of information for homes to engage with their energy consumption. In this talk, we will present the design and findings of deploying four interventions as a technology probe in 20 homes for eight weeks. We particularly focus on challenges for future work that may be of interest to the IMA audience, including recommending tariffs based on usage profiles, and disaggregation of aggregate data feeds to provide appliance-level information.

***Nick McCullen (School of Mathematics, Leeds University): Investigating energy efficiency interventions using a network-diffusion model***

Abstract: The aim of our project is to tackle the issue of city level energy strategy from a complex-systems perspective. Part of this work has been to develop models of energy consumer behaviour using a variety of approaches. One of these approaches is to look at the spread of energy efficiency measures by modelling it as diffusion via the social network connecting individuals. Different network structures are investigated using a multi-parameter model for the dynamics, which represent the decision-making behaviour of the individuals. Varying network characteristics or model parameters can be interpreted in terms of real-life interventions that can be made by local governments. The outcomes and their sensitivities are thus investigated to determine the best strategy to achieve the stated objectives.

***Tao Zhang (Intelligent Modelling and Analysis Group, The University of Nottingham): Modelling the effects of user learning on smart metering technology adoption***

Abstract: Technology adoption theories assume that users' acceptance of an innovative technology is on a voluntary basis. However, sometimes users are forced to accept an innovation. In the case of being forced to accept an innovation, users have to learn how to use it. This learning process will enable users to transit from zero knowledge about an innovation to making the best use of the innovation. So far the effects of user learning on technology adoption have received little research attention. In this seminar, I will talk about using the case of smart meter deployments to develop a simulation model for studying the effects of user learning on technology adoption.

**15/11/2011, 12-2pm, Room C60**

***Lauri Lättilä (Lappeenranta University of Technology, Finland): Multi-Method Simulations in Logistics***

Abstract: Logistics is one of the few sectors where the amount of greenhouse gas emissions have been steadily increasing since the 1990s in the EU-area. One of the reasons behind this is the higher amount of trade between countries. At the same time one should have both resilient supply chains, as well as lower carbon emissions. Novel approaches are required to study these issues and come up with solutions. During this presentation results from two research projects are introduced. The first one concentrates on estimating resilience of maritime supply chains, while the latter focuses on minimizing distribution costs and emissions.

***Chris Roadknight: Classifying Tumours from Biological, Chemical and Immunological Attributes***

Abstract: When cancer patients have their tumours surgically removed an important opportunity arises to gather key measurements of attributes associated with the tumour, this in turn should enable better post-operative treatment. Currently though the relationships between the resulting suite of biological measurements and post-operative wellbeing is opaque at best. This presentation will discuss early approaches to extracting valuable information from a dataset that could possibly be described as "difficult"

**08/11/2011, 12-2pm, Room C60**

***Ian Dent: Background on the UK electricity market, some issues, and a clustering approach to demand side management interventions***

Abstract: I will give a background briefing on the current situation with the UK electricity market and some of the challenges that will arise in the near future and discuss some possible approaches to creating solutions. This will include a focus on demand side management (DSM) and how DSM can possibly replace the need for infrastructure investment. I will then review my work on clustering electricity usage profiles of domestic households in order to determine "similar" households. The clusters found can be used as the basis for interventions by, for example utility companies, to change household electricity usage behaviour using DSM techniques.

***Uwe Aickelin: Potential Future IMA Research Projects***

Abstract: In my talk I will give an overview of recently submitted and currently ongoing grant applications, to show what the future might hold for our research group.

**01/11/2011, 12-2pm, Room C60**

***Jamie Twycross: Modelling ABA perception: From water to networks***

Abstract: In this talk, I will give an overview of recent work carried out by myself and colleagues in the Centre for Plant Integrative Biology, University of Nottingham, aimed at understanding how plants sense and respond to drought conditions.

***Linda Fiaschi: Establishing a routinely updated maternal-child linkage system in The Health Improvement Network database***

Abstract: The possibility to select very large populations from the primary care records allows researchers to conduct extensive analysis upon the possible exposure to different types of drugs for epidemiological research. In the particular field of pregnancy study, the detection of women exposed to treatments during gestation would provide a helpful tool for an established assessment of how drugs taken during pregnancy can affect the mothers and the children health.

Within the different primary care datasets available in the UK, The Health Information Network (THIN) is one of the largest datasets of information collected from several GP practices around UK, covering more than 5% of the UK population (446 General Practices in the current version).

In this presentation I will show the strategy we are proposing to build a pregnancy dataset composed by longitudinal medical records for women aged 12-49 years registered in UK general practices. This includes the selection of the actual end of pregnancy events, the recovering of the mother-child link, deleted for ethical reasons, and other relevant information upon gestation and delivery.

**25/10/2011, 12-2pm, Room C60**

***Graziela Figueredo: A Beginner's Guide to Systems Simulation in Immunology***

Abstract: Simulation techniques are powerful decision-support tools, which allow us to mimic the real-world in order to investigate how system elements progress over time. Furthermore, these techniques offer the means to understand and control a system model, test different scenarios and provide further insights about processes. The main system modelling and simulation approaches are system dynamics (SD), discrete-event modelling and simulation (DEMS) and agent-based modelling and simulation (ABMS).

An important point when choosing a modelling method is the required level of abstraction. It specifies the level of detail to be included in the modelling system. SD is widely applicable at a high level of abstraction. ABMS, on the other hand, is a paradigm used at any level of abstraction. A range of simulation problems, therefore, can be solved either by both approaches.

ABMS explicitly represents individuals in space and time. Moreover, this approach indicates how the system behaviour emerges from the interactions of individual elements. ABMS, however, require more computational power than SD simulations and may produce large sets of data, which could be difficult to analyse. In addition, ABMS requires all system's properties to be modelled discretely. SD, however, deals with continuum approximations.

Although ABMS is very useful for simulations in areas such as systems biology, there are circumstances where they cannot be applied. For instance, when the reaction network process is not well understood, or experiments are known not to be able to reproduce the real-world reactions (given the environmental differences such as temperature, for example). Furthermore, top-down modelling strategies are closer to the spirit of systems biology exactly because they make use of systems-level data, and thereby there is no best approach as it is preferable to view them as complementary. With the advent of multi-scale and multi-paradigm simulation, an in-depth understanding of the outcome differences of distinct paradigms and how to translate from one approach to another is imperative.

As it is acknowledged that most simulation efforts in immunology are mathematical, we seek to develop an algorithm for the translation of mathematical models to a SD environment, as immunologists would very much benefit from this tool. We also believe the conversion of SD to ABMS would be a first step towards adding emergence and individual tracking in a system model. Moreover, with the advent of research on combining both techniques, some models could benefit from a multi-paradigm simulation.

**18/10/2011, 12-2pm, Room C60**

***Tao Zhang: A Three-Dimensional Model of Residential Energy Consumer Archetypes for Local Energy Policy Design in the UK***

Abstract: In this seminar I will talk about my recent paper about residential energy consumer archetypes. This paper reviews major studies in three traditional lines of research in residential energy consumption in the UK, i.e. economic/infrastructure, behaviour, and load profiling. Based on the review the paper proposes a three-dimensional model for archotyping residential energy consumers in the UK by considering property energy efficiency levels, the greenness of household behaviour of using energy, and the duration of property daytime occupancy. With the proposed model, eight archetypes of residential energy consumers in the UK have been identified. They are: pioneer greens, follower greens, concerned greens, home stayers, unconscientious wasters, regular wasters, daytime wasters, and disengaged wasters. Using a case study, these archetypes of residential energy consumers demonstrate the robustness of the 3-D model in aiding local energy policy/intervention design in the UK.

***Jenna Reys: Comparison of the Disproportionality methods for Pharmacovigilance in the THIN Database***

Abstract: The Health Improvement Network (THIN) database offers a wealth of information not available in other databases currently used in pharmacovigilance. In this seminar I will start off with a brief introduction of the THIN database and then summarise the different 'disproportionality' methods and present initial results obtained by applying them to the THIN database. The strengths and weaknesses of each method when applied to the THIN database will be discussed and suitable modifications proposed.

**22/08/2011, 12-2pm, Room C60**

*Linxuan Zhang, Mian Wang, Hongwei Qin (Tsinghua University, Department of Automation, National CIMS-ERC): Research on Simulation and Virtual Manufacturing at CIMS-ERC of Tsinghua University*

Abstract: National Computer Integrated Manufacturing Systems Engineering Research Centre (CIMS-ERC), established in Tsinghua University in 1992, is one of the first State Engineering Research Centres approved by the Ministry of Science & Technology (MOST) of China. Simulation and Virtual Manufacturing (Sim&VM) is one of the centre's key research divisions. This talk will be mainly related to the research efforts of Sim&VM division in the recent years, including architecture of research base for VM in CIMS-ERC, VM-based innovation practice for product R&D, ASP-based collaborative design platform, and federation-style integration for ASP platforms. Three developed prototype systems, namely Virtual Assembly Support System (VASS), GIS-based Visual System of Energy Trade Simulation (for the Central Chinese State Grid), Hardware-in-loop Simulation System for Crane Operation, will be presented. Finally some possible research collaborations between Sim&VM of CIMS-ERC and IMA of Nottingham University will be discussed.