
THE CHARTERED
INSTITUTE OF BUILDING

YEAR 2015

INNOVATION AND RESEARCH AWARDS

YEAR 2015 WINNERS



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MASTERS DISSERTATION AWARD

Merit Award Winner 2015

Is The Declining Level of Homeownership Due to an Attitudinal Shift or Are Housing Aspirations Simply Incompatible With The Current UK Housing Market?

Research Abstract

This dissertation concerns homeownership levels in the UK. More specifically, it asks whether declining levels of homeownership are due to an attitudinal shift or to a housing market which fundamentally cannot support the level of homeownership aspiration.

Secondary analysis has been used to address this research problem. This primarily comprises of examining responses to the British Social Attitudes surveys conducted in recent years in order to ascertain how attitudes towards homeownership have changed and how perceptions of the housing market have changed.

The finding of this research is that it is the prohibitive nature of the housing market which has played the largest role in the decline of homeownership. However, there is also evidence to support the claim that the younger generation has different housing needs to previous generations, at least in the short-term, and this may be another contributing factor. Providing greater access to homeownership has been a focus of housing policy for successive generations of politicians. This research identifies a number of barriers to homeownership and consequently its findings could be used to inform the direction of future homeownership policies.

Winner's Bios



Miss Helen Jones

University of Reading, UK

Helen studied BSc Mathematics with Modern Languages at UCL before gaining work experience in the construction industry. In 2015, she graduated from the University of Reading with a distinction in MSc Construction Cost Management. Helen has a keen interest in the social impact of legislative decisions and her favourite aspect of postgraduate study was the chance to undertake independent research in this area. In the future, Helen hopes to pursue her interest in housing issues through a research role in the public sector, or for a charity.

Judge's comments

“This dissertation addresses a topical research question relating to the level of home ownership in the UK. It comprises an extensive review of relevant literature and related policies. The dissertation also makes exemplary use of appropriate secondary data. The quality of analysis and discussion is very high. The dissertation provides a strong showcase for the student’s research skills.”

Highly Commended Winner 2015

Room to Swing a Kid? An Exploratory Study Into End-User Engagement With “Spatially Constrained” UK Family Homes

Research Abstract

At a time when UK house building is once again gaining momentum, and ‘Garden Cities’ and ‘Eco Towns’ feature on Government and construction industry agendas, this study questions to what extent ‘spatially constrained’ new housing developments are in fact a socially sustainable solution. A significant number of studies have highlighted both the extent of consumer dissatisfaction with the space on offer, and also the high percentage of ‘under-sized’ properties.

The iterative process of data capture employed here renders valuable insights into family user engagement with the housing on offer. Primary research included the narrative interviewing of 10 couples in the early family life stage. Secondary research provided a socio-cultural framework, within which findings could be explored. It was shown that houses shape cultural and social practices, and that we re-shape our houses as cultural practices change. Emerging from this study is an insight from the building user which challenges the current industry model of providing small houses with dense internal layouts on small plots. Research participants offer a different, and arguably more sustainable, vision of a family home. Such allows for a staged spatial expansion, taking into account financial position, personal taste, and timing, and fosters the longer term integration of individuals within a ‘locale’, allowing the development of vibrant local communities.

Winner's Bios



Mr Tobias Vokuhl

Oxford Brookes University, UK

Tobias has gained international construction experience in Germany, Israel and the UK. Prior to completing his MSc in Project Management in the Built Environment at Oxford Brookes University, he managed teams and sites for McCurdy & Co, and was engaged in building conservation and reconstruction projects for clients such as Historic Royal Palaces and English Heritage. Following his graduation with Distinction in June 2015, Tobias now works for Beard Construction in Oxford as Assistant Contracts Manager. He continues to maintain a research interest in sustainable construction, with a particular interest in localised and wider sociological implications of the built environment, as it shapes the lives of end-users.

Judge's comments

"This is a highly topical piece of research which addresses an unusual but important topic. It draws well from a number of detailed case studies and interviews with house occupants. The occupants' views are extremely well presented, and the conclusions are thoughtful and provocative. The dissertation deserves to be read more widely."

Premier Award Winner 2015

Multi-Service Trunking System (MSTS) Heat Saving Potential in Buildings

Research Abstract

District heating systems are proposed as a key component on reaching the goals on carbon emissions reduction set by the Climate Change Act 2008. The limited use of such systems in the UK promises a substantial growth in district heating networks over the following years. However, studies have shown that the highest thermal energy losses in these networks are found at the distribution stages (28.96%). The effectiveness of the MSTS's geometry on recovering thermal losses makes it ideal for improving the efficiency of district heating networks.

This study investigates the heat transfer between fluids in the MSTS, determining its effectiveness on reducing thermal energy losses. An experimental investigation was carried out on a test rig of uPVC pipes. Measurements were compared from 216 different combinations of hot water temperature, discharge value and flow direction.

On average, 64% of the heat lost by the hot water was recovered by the cold water at equal opposite flows, compared to the 6.2% by other double piping systems. Furthermore, the MSTS without thermal insulation performs better than single pipe insulated systems, but poorer than double piping insulated systems. However, with the application of thermal insulation the MSTS is expected to demonstrate higher efficiencies.

Winner's Bios



Mr Sotiris Eftychiou

Loughborough University, UK

Sotiris has recently graduated from Loughborough University with a Distinction in Construction Project Management. Working in a family business in Cyprus from a young age, he realised his interest in construction

and went on to undertake a Bachelor's Degree in Civil Engineering at Nottingham Trent University. His enthusiasm for building saw him returning to the UK for his postgraduate studies and after graduating is now pursuing a career in the construction industry.

Judge's comments

"This dissertation is outstanding as measured against the judging criteria. It is structured around a well-articulated research question which is addressed by a well-designed research method. A wide range of factors about the efficiency of the MSTS district heating system were analysed comprehensively and the conclusions were succinctly drawn. The judging panel was impressed by the student's excellent research capability."

INNOVATION IN EDUCATION AND TRAINING AWARD

Merit Award Winner 2015

BIM Collaborative Working Extracurricular Activity For The AEC Students in a Large UK University

Research Abstract

With the UK Government drive to implement Level 2 BIM on all UK centrally procured public sector projects by 2016, it became essential for built environment students to be familiar with BIM so that they are fully equipped for the future employment in the construction industry sector. To enhance students' employability skills, we developed BIM collaborative working extracurricular activity for the second year built environment students at LBSU which ran over the second semester of the 2013/2014 and 2014/2015 academic year. The extracurricular activity was developed to provide the students not only with the awareness of BIM, but also with the experience to work together collaboratively within a multi-disciplinary environment.

Feedback gathered from tutors and students who participate in the extracurricular activity have been very positive. The extracurricular raised their awareness of BIM and provided them with the valuable multi-disciplinary team working experience, something that is not a common practice yet within their formal curriculum. It also enhanced their awareness of other professionals' roles and responsibilities within the industry. It creates a positive attitude to work collaboratively and eliminate the silo working mentality. In order to ensure this legacy continues, we hope to incorporate this as part of our formal curriculum across all built environment courses within London South Bank University and potentially collaborate further with other universities.

Winner's Bios



Ms Jennifer Hardi

London South Bank University, UK

Jennifer is the Course Director for Architectural Technology and Architectural Engineering at LSBU. Jennifer is a full Chartered member of CIAT, an Incorporate Member of CIOB and a Fellow of the Higher Education Academy. Prior to joining LSBU, Jennifer was a Senior Sustainability Consultant for BRE. Between September 2012 and September 2013, Jennifer was seconded as the Business Innovation Manager for Adapt CBE at University of East Anglia. Before joining BRE, she was a lecturer for University of Brighton and City College Brighton and Hove. She was awarded an MPhil in January 2009 for her thesis work in assessing the embodied transport energy of prefabricated timber wall panelling unit.

Judge's comments

“The entry provides an excellent example of an early-career academic having a strong commitment to collaborative and multidisciplinary education in a BIM-enabled context. The judging panel would encourage Ms Hardi to persevere with this approach and to bring it into the formal taught curriculum. The panel would also encourage the University to give her every support in this endeavour. It is now widely accepted that the ability to work in interdisciplinary teams is of crucial importance and the development of the necessary skills will improve the employability of the students.”

Highly Commended Winner 2015

iHR: Immersive Hybrid Reality for Construction Trade Training

Research Abstract

Virtual Reality technology (e.g. CAVEs or immersive goggles like the Oculus Rift) have great potential for training of professionals. However, current solutions cannot support the needs of manual trades that require the execution of real tasks, such as ‘touching’ and ‘manipulating’ real objects. Yet, immersive virtual reality could benefit trade training immensely by safely delivering a variety of realistic worksite experiences in challenging or hazardous working conditions.

The iHR system uniquely overcomes this challenge by uniquely integrating the visual and 3D structure of both the virtual world and the real world closely surrounding the user. This uniquely enables users to see their own body as well any other real object in their vicinity immersed within the virtual environment (no avatars). For construction trades, this means that trainees can see their hands, tools and materials altogether immersed in any virtual environment of relevance to their training. The iHR, currently being piloted in two further education colleges in Scotland, will enable trainees to, for example, train at significant heights without being exposed to the risks associated to such contexts.

The iHR project’s multi-disciplinary team also included Dr Enrique Valero (Heriot-Watt University). The project would like to acknowledge the project funders, CITB and the Energy Skills Partnership, and stakeholders, Edinburgh College and Fife College.

Winner's Bios



Dr Ludovico Carozza

Heriot-Watt University, UK

Ludovico received an MSc degree in Electronic Engineering, Biomedical Course, from the University of Bologna, Italy and a PhD in Information Technologies (Systems for Information Processing) from the Advanced Research Centre on Electronic Systems (ARCES), University of Bologna, Italy. Ludovico is currently a Research Associate at Heriot-Watt University, where he conducts research on the application of computer vision and computer graphics for localisation, enhanced visualisation and immersive human-computer interaction in various multidisciplinary contexts (e.g. Construction, Urban Design, Energy and Environment, Psychology).



Dr Frédéric Bosché

Heriot-Watt University, UK

Frédéric is an associate professor and leader of the CyberBuild research lab at Heriot-Watt University. He has 15 years of experience in conducting research at the interface between construction engineering & management, construction IT and computer vision. Currently, he focuses on the application of 3D imaging (e.g. laser scanning) to the survey of built facilities including historic buildings, visualisation technologies for professional and stakeholder engagement, and wearable technologies for worker health monitoring. Frédéric is associate editor of the international journal of Automation in Construction and member of the board of directors of the International Association for Automation and Robotics in Construction.



Dr Mohamed Abdel-Wahab

Heriot-Watt University, UK

Mohamed is lecturer in Construction Technology at Heriot-Watt University in Edinburgh. He is also a member of the Royal Academy of Engineering Centre of Excellence in Sustainable Building Design and a Fellow of the UK Higher Education Academy. He has extensive research experience in construction skills/training issues with over 40 publications. His work is cited by the UK CES, OECD and informed the Regulatory Impact Assessment (RIA) of the Industrial Training Levy Order 2009-2012. Mohamed's portfolio of applied research is in excess £0.5million which is funded by various organisations, such as: CITB, Scottish Government, & European Regional Development Fund.

Judge's comments

"iHR is an excellent addition to the spectrum of approaches that are currently available for training operatives to be aware of the potential dangers of working in exposed and adverse environments. It is highly innovative in combining the dexterity of manual operations with an appreciation of the context within which such tasks are performed. It is still in the relatively early stages of proof of use,

but the judging panel envisages that it will attract much attention in the near future.”

Premier Award Winner 2015

The Situation Engine: Driving Change in On-Site Health and Safety Behaviour Through a Virtual Personal Experience of Safe and Unsafe Practices

Research Abstract

The Situation Engine provides a managed, practical experience of construction using hyper-immersive virtual reality technologies, tailored to individual site settings. It allows workers to experience potential site accidents; thereby engaging more effectively with them than an explanation and so is more memorable and likely to change personal behaviour on-site. It provides a fundamentally different learning outcome and assessment tool than is possible using traditional, information-based training methods.

This technology delivers the very highest quality of first-person virtual experience available on a range of devices, from iPad to state-of-the-art displays such as the Oculus Rift. It ensures an authentic virtual presence of exceptional quality based on actual project models. A key feature is the proprietary system of controls that can freeze or replay a given situation whilst the user moves freely through the space experiencing the same situation multiple times and from multiple perspectives. Powerful analytics ensure all activities can be registered and conditions adapted dynamically to suit individual users.

The business model delivers open-source software and technical capability transfer through in-house training. The Situation Engine has been implemented successfully in training facilities from Australia to Hong Kong, in both industry and academic settings.

Winner's Bios



Professor Sidney Newton

University of New South Wales, Australia

Sidney is a Chartered Quantity Surveyor and Associate Professor of Building Economics at UNSW Australia. He has particular expertise in managing uncertainty and safety education. In 2014, he established NewtonLowe Ltd. with offices in Sydney and Hong Kong to promote the application of emerging digital technologies to the construction and engineering industries.



Mr Russell Lowe

University of New South Wales, Australia

Russell is an Architect and Senior Lecturer in Digital Design at UNSW Australia. He has particular expertise in visualisation and process modelling. In 2014, he established NewtonLowe Ltd. with offices in Sydney and Hong Kong to promote the application of emerging digital technologies to the construction and engineering industries.

Judge's comments

“The Situation Engine provides an innovative approach to improving health and safety training. It is at the leading edge of current applications of gaming technologies for practical training in the construction sector. Through the use of the Situation Engine, quantitative data can be collected and analysed to help improve the performance of trainees. The judging panel was impressed that it has already been adopted and evaluated in Hong Kong, and was confident that it will be widely adopted elsewhere.”

RESEARCH PAPER AWARD

Highly Commended Winner 2015

Infection Control in Design and Construction Work Health

Research Abstract

Published in Health Environments Research & Design Journal, Vol. 8/3; pp. 68-79, 2015

The paper aims to clarify how infection control requirements are represented, communicated, and understood in work interactions through the medical facility construction project life cycle, and to assist project participants with effective infection control management by highlighting the nature of such requirements and presenting recommendations to aid practice. This consisted of a four-year study on client requirement representation and use on NHS construction projects in the United Kingdom to provide empirical evidence of infection control requirement communication and understanding through design and construction work interactions.

An analysis of construction project resources (e.g. infection control regulations and room data sheets) was combined with semi-structured interviews with hospital client employees and design and construction professionals to provide valuable insights into the management of infection control issues. Infection control requirements are representationally indistinct, but also omnipresent through all phases of the construction project life cycle: failure to recognize their nature, relevance, and significance can result in delays, stoppages, and redesign work. Construction project resources can mask or obscure the meaning of infection control issues.

A pre-emptive identification of issues combined with knowledge sharing activities among project stakeholders can enable infection control requirements to be properly understood and addressed. Such initiatives should also reference existing infection control regulatory guidance and advice.

Winner's Bios



Dr William Collinge

University of Reading, UK

Bill is a researcher in the School of Construction Management & Engineering at the University of Reading, UK. He is currently working on the Innovate UK funded 'Rethinking the Build Project', having completed his PhD at the University of Reading in 2014. Bill's background covers information management, IT systems design, design communications and construction project stakeholder management. In addition to his PhD, Bill also holds degrees from Warwick (BA), Liverpool John Moores (MA) and Reading (MSc).

Judge's comments

“An interesting longitudinal research paper that outlines infection control requirements at different phases of construction project life cycle of hospital projects. The writing is lucid and the insights provided would be of interest to all stakeholders working on healthcare projects.”

Merit Award Winner 2015

Implementing Innovation: A Stakeholder Competency-Based Approach for BIM

Research Abstract

Published in Construction Innovation: Information, Process, Management, Vol. 14/4; pp.433-452, 2015

The purpose of the paper was twofold: to review established literature to define and classify Building information modelling (BIM); and to identify gaps in current BIM literature with respect to stakeholder competency. Construction projects adopt innovation to address client requirements. BIM has been cited as one such innovation. However, there is concern that the industry lacks the mechanisms to effectively implement BIM. It is proposed that the problem lies in that BIM is currently being delivered as a project rather than an innovation; and the failure to address stakeholder competency as the key delivery agent of BIM.

A qualitative study using literature and gap analysis techniques was undertaken to establish the “state of the art”. Using an established Competency Framework 31, studies on BIM were assessed. A matrix was developed aligning the BIM studies with the Competency Framework and the findings systematically evaluated to identify gaps in the current literature.

BIM should be defined as a technical innovation and classified as a “System” of multiple innovations. Aligning the literature identified that BIM literature has largely focussed on strategic competence with some evidence of technical competence. However, there was scant investigation of information and communication competence which ranks as the most critical competency for BIM implementation. The study identified that whilst the competency-related literature on BIM was not yet rich enough to provide a sound conceptual foundation for investigation; it was evident that BIM implementation aligns closely with the innovation process.

Winner's Bios



Dr Martina Murphy

Ulster University, UK

Martina is a Lecturer in Construction and Project Management at Ulster University since 2010. A Chartered Architect by profession, she had 14 years in practice in the UK and Far East working on a range of projects from commercial buildings to large-scale infrastructure. Martina obtained a PhD degree from the Ulster University in 2004 on the implementation of innovations in the construction procurement process. She has sat on a number of advisory, public and charity boards, including the Royal Society of Ulster Architects (RSUA). More recently, Martina has taken over as Course Director for the Masters (MSc) programme in Construction Business and Project Management in the School of the Built Environment, Ulster University.

Judge's comments

"This paper offers a novel approach to arguing that BIM implementation should be considered as a process of innovation and thus stakeholder competency should be taken into account to assess the implementation efficiency. It provides an improved understanding of BIM implementation and makes a demonstrable contribution to knowledge."

Premier Award Winner 2015

Daylighting and Solar Shading Performances of an Innovative Automated Reflective Louvre System

Research Abstract

Published in Energy and Buildings, Vol. 82; pp.607-620, 2014

Traditional windows, as the major source of daylight, have a common problem which is uneven distribution of daylight in the room. Several innovative daylighting systems such as: light shelves, fixed and movable reflective louvres, reflective sills, and prismatic glazing, have been developed to address this problem. This paper reports on a research programme that investigates retrofitted solutions to uneven distribution of daylight in deep-plan office buildings.

The work presented follows initial investigations into the design and applicability of an automated retrofitted panel thermal shutters which can also act as a sunshade and daylighting system. The system has a patented function which allows each shutter/louvre to be controlled and placed separately from other louvres.

This study evaluates the effectiveness of the system when acting as a sunshade, light shelf, reflective louvre, and reflective sill under clear, overcast, and sunny sky conditions. According to the results, the system significantly improved daylight distribution and reduced the need for artificial lighting by 60%.

Winner's Bios



Dr Arman Hashemi

University of Brighton, UK

Arman is a Senior Lecturer in Architectural Technology at University of Brighton. Prior to this, he was a Postdoctoral Research Associate at University of Cambridge. He has worked on a range of award-winning architectural projects and led or contributed to several research projects on sustainable housing, building performance evaluation/simulation, offsite construction and product design and development. Arman has also received the Highly Commended Awards of the CIOB International Innovation and Research Awards 2015 in the Innovation Achiever's Award category. Arman graduated from University of Tehran in 2002 with an MSc in architecture and completed his PhD at Cardiff University in 2009.

Judge's comments

"This paper is well written with a good logical structure. The new louvre system is innovative and is clearly introduced in the paper with appropriate illustrations. The integration of physical testing with computer simulations provides good evidence in support of the proposed louvre system. The advantages of the system over conventional approaches are also well analysed. The paper provides a significant contribution to current knowledge relating to retrofitted solutions for daylight distribution in office buildings."

UNDERGRADUATE DISSERTATION AWARD

Highly Commended Winner 2015

The Strength Development of GGBS Concrete With Metakaolin

Research Abstract

The use of supplementary cementitious materials (SCM) can reduce the incorporated CO₂ content of concrete by replacing a proportion of the ordinary Portland cement (OPC) content, as well as producing concrete with enhanced properties. Ground, granulated blast-furnace slag (GGBS) is an SCM produced as a by-product in the manufacture of iron, and is known to produce high strength and durability concretes. However, GGBS gain strength more slowly than OPC, although given time can produce a higher long-term strength concrete. This currently precludes GGBS from use in fast-track applications such as pre-cast facilities and short construction programmes.

Metakaolin is another SCM, produced by heat-treatment of china clay, which has recently seen interest due to its rapid early strength gain. Used in lower replacement ratios than GGBS, some studies have shown that it can produce beneficial effects when used in combination with other SCM such as GGBS.

This dissertation seeks to clarify the relationship between the metakaolin replacement ratio and the compressive strength gain of GGBS concrete in order to determine whether metakaolin can be used to produce a GGBS concrete with early strength gain comparable to that of OPC concrete.

Winner's Bios



Mr Samuel Boys

Leeds Beckett University, UK

Samuel ran a successful small landscaping and building firm with a partner for 10 years, before enrolling to study BSc Construction Management at Leeds Beckett University in 2011. A successful 18-month placement with GMI Construction followed, along with a myriad of prizes: The Shepherd Construction Prize for best overall student, the CIOB prize for Advanced Construction Technology, the CIOB QEII scholarship, and the CIOB prize for Outstanding Graduate. After graduating with a first class honours degree in 2015, Samuel now works as a site manager for GMI Construction, where he is part of a small team overseeing the construction of a new-build luxury hotel in central Leeds.

Judge's comments

“It is an excellent dissertation based on laboratory-based research justified by an extensive and appropriate literature review. Rather than rerunning old experiments, the research offers up-to-date testing which would not look out of place in a commercial laboratory. It was especially refreshing to see such a clear reflection on the research limitations which is unusual for an undergraduate dissertation. The dissertation is well written and structured with extraordinary clarity.”

Merit Award Winner 2015

Evaluating Alternative Project Financing Models for Upscaling Grid-Connected Solar Photovoltaics Procurement in Singapore Public Buildings

Research Abstract

Solar Photovoltaics (PV) have been seen globally as an alternative to fossil fuels due to being a clean and sustainable source of energy with lower carbon emissions. Singapore’s government, through several test bed projects, has been exploring the viability of solar generation in Singapore. However as solar PV projects require high capital investments and generate limited revenues, the current financing models used by the public sector are not sustainable for upscaling solar productions and are only suitable for small scale projects. This indicates a need to explore new alternative financing schemes which allow the leveraging of private capital thus allowing the public sector maximize its solar generating potential in the most cost effective manner.

This study evaluates and compares the financial feasibility of five project financing models for large scale solar PV installations, namely self-financing, power purchase agreement (PPA), solar leasing, hybrid PPA, and hybrid solar leasing. This study is set in the context of Singapore public housing, using the largest public building owner, the Housing Development Board (HDB), as a case to illustrate the potential implications of all models.

Winner's Bios



Mr Rubenrajoo Sri Rengarajoo

National University of Singapore

Ruben graduated from the National University of Singapore with a BSc in Project & Facilities Management. He is currently pursuing his PhD, specialising in renewable energy and project finance, with the hopes to tackle large scale issues such a global warming and climate change through his research. He enjoys keeping up with current affairs and reading during his free time.

Judge's comments

“The student has demonstrated excellent research skills by completing a rigorous evaluation of five financing models for solar photovoltaics (PV) installations in Singapore. The dissertation is well presented, engaging, thorough and clearly communicated. It also offers highly relevant recommendations for practical decision making.”

Premier Award Winner 2015

Life Cycle Costing - Have We Got It Right?

Research Abstract

This dissertation provides a critical analysis of the effectiveness of life cycle costing (LCC) as a decision-making tool at design stage, including a literature review focused on identifying and critically discussing the theoretical benefits of LCC and the main obstacles to practical application of the technique.

A fieldwork study of 11 semi-structured interviews was conducted with construction professionals who have experienced the application of LCC in industry. Based on their feedback and the main findings of the literature review the dissertation concludes that LCC can, with specific projects and clients, be effectively used to aid design decision-making. A series of guidelines have been developed to avoid the technique being used simply as a budgeting exercise, but rather as a bottom-up decision-making strategy, underpinned by building operation and maintenance regimes.

Employing LCC was found to benefit clients by helping them appreciate the impact that early stage design decisions can have on long-term performance of the facility. Using LCC as a decision-making framework compels construction clients to think of the building from an operational point of view at an early stage in the design process, resulting in more thought out solutions, which enhance fitness for purpose.

Winner's Bios



Mr Giacomo Mastantuono

University College London, UK

Giacomo graduated with first class honours in Project Management for Construction from University College London and is currently attending an MPhil in Real Estate Finance at the University of Cambridge. He is passionate about all aspects of the built environment and is especially interested in being able to get involved in projects throughout their whole development cycle from early inception phases to completion and operation. Giacomo is also an RYA Skipper with a life-long passion for sailing and the nautical industry.

Judge's comments

“The depth of knowledge shown in this dissertation is highly exceptional at the undergraduate level. The research questions are carefully justified and highly relevant. Based on a set of semi-structured interviews with senior practitioners in the industry, the dissertation offers a mature analysis of the realised qualitative data. It is exemplary in its presentation and sets a standard to which all undergraduates should aspire.”

INNOVATION ACHEIVERS AWARD

Highly Commended Winner 2015

Advanced Thermal Shutter System

Research Abstract

This is an advanced, automated thermal shutter system which can also act as a natural light reflector, sunshade and secondary security device. The system can reduce heat-losses through windows by an average of 63% and considerably improve daylight distribution in deep-plan office buildings reducing the need for electric lighting by an average of 60%.

The patent-pending 'pick and place' function of the shutter allows each panel to be controlled and positioned separately from other panels. This function makes the shutter exceptionally flexible addressing many of the known problems of similar products in the market. Depending on environmental conditions and user preferences, the system is automatically adjusted to act as a thermal shutter, daylighting system or security device facilitating night ventilation in buildings. In daylighting mode, it may act as a light-shelf, reflective louvre, reflective sill and/or sunshade. The shutter can also be fully retracted at the bottom or top of windows for maximum view out.

The developed product is the outcome of four years collaborative research between SE Controls and the Bartlett School of Architecture, University College London.

Winner's Bios



Dr Arman Hashemi

University of Brighton, UK

Arman is a Senior Lecturer in Architectural Technology at the University of Brighton. Prior to this, he was a Postdoctoral Research Associate at the University of Cambridge. He has worked on a range of award-winning architectural projects and led or contributed to several research projects on sustainable housing, building performance evaluation/simulation, offsite construction and product design and development. Arman has also received the CIOB International Innovation and Research Awards for the best research paper in 2015. Arman graduated from the University of Tehran in 2002 with an MSc in architecture and completed his PhD at Cardiff University in 2009.

Judge's comments

"The Advanced Thermal Shutter System is an elegant piece of engineering which has the potential to improve building performance. The system recognises the

importance of reflective daylight, but also offers flexibility in response to localised conditions. The judging panel was impressed by Dr Hashemi's individual achievement in developing this innovation. A great degree of experimentation has been carried out to test and evaluate the system. The panel wishes Dr Hashemi every success with the system's prototype development."

Premier Award Winner 2015

Anti-Heat Stress Clothing for Construction Workers in Hot and Humid Weather

Research Abstract

Hong Kong is a typical city, with subtropical climate and high urbanisation. The nature of atmosphere and urbanised conditions poses irreversible environmental stress on human health. The construction industry is more susceptible to heat stress because construction work often involves highly demanding physical tasks. The frequency of verifiable heat-related incidents in the construction industry is higher than many occupational settings.

Current guideline recommends that construction workers should wear thin and light clothes with good permeability when working in hot weather. However, the guideline lacks precise criteria for designing "appropriate" summer work clothes. Moreover, inappropriate dress behaviour and insufficient personal protection may pose a high risk of skin cancer because of direct exposure to solar ultraviolet (UV) radiation.

This study adopted a scientific approach to design an anti-heat stress clothing (AHSC) and evaluate its effectiveness. Findings of laboratory experiment manifested that AHSC was effective in alleviating thermo-physiological and reduction of heat storage by 28.8%. The well-being of construction workers would be enhanced with AHSC when working in hot weather, and so does productivity.

Winner's Bios



Professor Albert P. C. Chan FCIOB

Hong Kong Polytechnic University

A Chartered Construction Manager, Engineer, Project Manager, and Surveyor by profession, Albert has worked in a number of tertiary institutions both in Hong Kong and overseas. He joined Hong Kong Polytechnic University in 1996, and is currently Head of Department of Building and Real Estate. Albert's research interests include project management, construction procurement, construction management and economics, and construction health and safety. He holds an MSc in Construction Management and Economics from the University of Aston in Birmingham, and a PhD in Project Management from the University of South Australia.



Professor Francis K. W. Wong FCIQB

Hong Kong Polytechnic University

A Chartered Builder, Surveyor and Building Engineer by profession, Francis is a Professor in the Department of Building and Real Estate of Hong Kong Polytechnic University. He was the Head of the department from 2005/6 to 2007/8. He has 36 years of academic and practical experiences, and his research interests include construction safety & health, and affordable housing. He obtained his BSc in Building from the Brighton Polytechnic, MSc in Architecture from the London University, and a PhD from the South Bank University. Francis is Chairman of the CIOB Health and Safety Advisory Sub-Group in Hong Kong.

Judge's comments

“The judging panel was impressed with the originality of this anti-heat stress uniform and the way the product has been developed in Hong Kong. Prof Chan and Prof Wong have succeeded in pulling together an innovative interdisciplinary team. The judging panel was further impressed by the physiological testing and resultant quantitative evidence in support of the product’s benefits. It is no small achievement to receive endorsement by the Construction Industry Council in Hong Kong.”

DIGITAL INNOVATION AWARD

Merit Award Winner 2015

BiMUp 5D: Using BiMUp™ and SketchUp® as a BIM Platform

Research Abstract

The need for the innovation was created by a sequence of events associated with a large feasibility study of 1100 residential units where substantial amount of design required several options to be drawn and quantified in a timely manner including schedules of residential tenures, mixed-use commercial spaces including soft and hard landscape areas. The problem could be solved by a simple BIM plugin for the most popular 3D modelling software called SketchUp®. BiMUp 5D could be used to quantify building materials at the early stages of housing design (e.g. RIBA Plan of Work Stage 2).

The idea of BiMUp 5D was born, which was subsequently brought to market because of a belief that it is the crucial 'missing part to the jigsaw' that enables 5D BIM using SketchUp® to become a reality. It is a simple, but quite remarkable, software that enables quantities to be taken off in the SketchUp® model. This means that quantities, schedules and cost-modelling can be auto-generated from the earliest design models and that each time there is a change, the spreadsheets are also updated automatically. BiMUp 5D has been used on several construction projects to quantify various construction elements.

Winner's Bios



Mr Gregory Malek

BiMUp Limited, UK

Gregory has extensive experience in design, planning and construction management, acquired from working at the Top 100 world's largest multidisciplinary architectural practice and the AJ120. He has been involved in the design of various residential, commercial, educational and healthcare projects, starting from inception - through tender - to practical completion with contract values between £100K to £85M and urban projects in excess of £100M. His long track record in IT and software implementation for professionals goes back to the 90s, where he was at the heart of the first BIM products like MicroStation, ArchiCAD and ArchiTECH.PC. He has over 20 years of experience in using CAD systems.

Judge's comments

"BiMUp 5D recognises a gap in the market for small and medium-sized companies to access and work in a BIM environment. By means of a simple plugin

for a readily available 3D modelling software package, BiMUp5D is able to quantify building materials and elements during the early stages of housing design. The beauty of the innovation is that it makes BIM become easily accessible for SMEs.”

Premier Award Winner 2015

AT-BAN: Activity Tracking and Body Area Networks

Research Abstract

Musculoskeletal disorders (MSD) are often developed among workers carrying out non-sedentary jobs from: performing forceful exertions, lifting or carrying loads, getting exposure to vibrations, undertaking repetitive bending, twisting, or crouching. Long term MSDs are developed by exerting excessive and repetitive strain to a specific muscle or bone which is generally linked to workers' daily physical activities.

The AT-BAN system is developed for tracking physiological activities through various sensors and devices, networked around the human body. This system is intended to detect and analyse MSD risks by capturing accurate physical activities, thereby contributing to prevention and early diagnostics of work-related MSDs. The AT-BAN system allows integrating a wide range of wearable electronic devices into an operational wireless body area network, where data can be captured, analysed in real-time, or stored for post-process. Integrating cutting edge sensors and devices, AT-BAN enables acquisition of accurate, quantitative and repeatable data. This data can be used for providing personalised feedback, and creating a currently non-existent, yet widely usable benchmark.

AT-BAN project's multi-disciplinary team also includes Dr Enrique Valero. The project would like to acknowledge the project funders, CITB, and stakeholders, in particular Forth Valley College and Scottish Water.

Winner's Bios



Dr Aparajithan Sivanathan

Heriot-Watt University, UK

Aparajithan is a post-doctoral researcher at Heriot-Watt University, Edinburgh. He comes from a multidisciplinary background of mechanical, electronics and computing. Aparajithan received an MSc in Mechatronics engineering from King's College London and a PhD from Heriot-Watt. The Ubiquitous Integration and Temporal Synchronisation (UbiITS) Framework developed through his PhD has been implemented in systems from various domains such as Neurocybernetics, Gaming, and Computer Aided Design. Before entering the research career, he worked as an R&D engineer in the UK electronics manufacturing industry. His

current research interests are in the area of real-time cyber physical systems and wireless body area networks.



Dr Mohamed Abdel-Wahab

Heriot-Watt University, UK

Mohamed is a lecturer in Construction Technology at Heriot-Watt University in Edinburgh. He is also a member of the Royal Academy of Engineering Centre of Excellence in Sustainable Building Design and a Fellow of the UK Higher Education Academy. He has extensive research experience in construction skills/training issues with over 40 publications. His work is cited by the UK CES, OECD and he has informed the Regulatory Impact Assessment (RIA) of the Industrial Training Levy Order 2009-2012. Mohamed's portfolio of applied research is in excess £0.5million which is funded by various organisations, such as: CITB, Scottish Government, & European Regional Development Fund.



Dr Frédéric Bosché

Heriot-Watt University, UK

Frédéric is an associate professor and leader of the CyberBuild research lab at Heriot-Watt University. He has 15 years of experience in conducting research at the interface between construction engineering and management, construction IT and computer vision. Currently, he focuses on the application of 3D imaging (e.g. laser scanning) to the survey of built facilities including historic buildings, visualisation technologies for professional and stakeholder engagement, and wearable technologies for worker health monitoring. Frédéric is associate editor of the International Journal of Automation in Construction and member of the board of directors of the International Association for Automation and Robotics in Construction.

Judge's comments

“Occupational health in the construction sector is a huge issue and much of the iceberg remains below surface. There is an urgent need to take the issue more seriously. Although AT-BAN is still in the proof-of-concept stage, it could potentially have a significant impact on occupational health. The panel was especially pleased to an example of digital innovation which promises to contribute to the longevity and wellbeing of construction workforce.”
