
THE CHARTERED
INSTITUTE OF BUILDING

YEAR 2016

INNOVATION AND RESEARCH AWARDS

YEAR 2016 WINNERS

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INNOVATION ACHEIVER'S AWARD

Premier Award Winner 2016

Leading the Way – Fulton Hogan's New Innovation Strategy

Research Abstract

In an increasingly competitive construction industry, more companies from outside New Zealand and Australia are entering the market, driving down margins and driving up delivery efficiency. To remain competitive, Fulton Hogan sought to attract and retain the best people, and effectively demonstrate to its customers how innovation and new technology delivers value. Through this, Fulton Hogan identified a need to lift the profile of innovation within the company, and therefore instigated a unique Innovation Strategy.

This Innovation Strategy is based around five pillars:

1. People: Fulton Hogan has created a framework for project support, a centralised fund for innovation, and a way to recognise its people for their ideas
2. System: Fulton Hogan has developed 'Blue Skies', an interactive communication platform for sharing ideas that can be accessed across the business
3. Collaboration: To grow existing and create new relationships to leverage international best practise
4. Business sustainability: Fulton Hogan is prototyping a series of workshops to identify potential future paths and alternative ways to respond
5. Group strategy: To align objectives with the group strategy

Fulton Hogan's Innovation Strategy has led to the development of a vibrating pneumatic tyre roller for an enhanced quality finish on small domestic jobs, and the recycling of water cutter waste into new asphalt pavements.

Winner's Bios



Chloe Smith

Fulton Hogan Ltd

Chloe was appointed to the position of National Innovation Manager for Fulton Hogan New Zealand in 2015, responsible for delivering a customer-centric innovation strategy to promulgate value-add innovations, improve safety, environmental and sustainability performance. She had joined the company in 2012, working on the Canterbury Earthquake Rebuild. Her diverse background in the arts, finance and construction, included several years working in the United Kingdom. Chloe has completed a BSc Environmental Science and a Masters in Engineering Management. She has presented at a number of National Industry Conferences and will be presenting at the 5th International SaferRoads Conference in May 2017.



Robert Jones

Fulton Hogan Ltd

Robert was appointed to the role of Fulton Hogan's Chief Executive Officer New Zealand in 2015, having previously held the position of Chief Operating Officer – Infrastructure. With over 40 years' experience in the construction sector, his career, which began in the UK, includes extensive experience in managing major engineering projects around the world. Robert is a Board member of Infrastructure New Zealand and the NZ Business Leaders H&S Forum. He is also a Fellow of the Institution of Engineers, Australia, the Chartered Institute of Building (UK), the Australian Institute of Building and the Institution of Professional Engineers, NZ.

Judge's comments

“This innovation has been carefully designed in response to growing competition and commercial need in the New Zealand construction market. In developing an exceptional innovation strategy, Chloe and Robert have made significant progress in a relatively short period; delivering real value for Fulton Hogan and its customers.”

Highly Commended Winner 2016

i-STP: Modular Sewage Treatment System for Remote Coastal Settlements

Research Abstract

Urgent intervention is needed to mitigate an estimated 8.6 trillion raw sewage disposals from remote water settlements directly into the coastal waters of Borneo Island. The i-STP (Independent Sewerage Treatment Plant) System technology is a design innovation which miniaturises the conventional anaerobic-aerobic-anaerobic centralised treatment plant system.

The coastal settlements require a technological solution that is the smallest possible, modular and aesthetically pleasant. Three chambers form two modular parts in a unique C-shape form. It is the first known system with a distinctive wrap-around-column feature designed for easy transportation by boat, easy installation directly below the toilets of timber water settlements, and easy maintenance by the communities. It uses a selected media and aerobic process to reduce the volumetric size to 350L from the regulatory required 2000L septic tank. Despite its smaller 350L size, the treated sewage discharge exceeds the minimum Standard B discharge quality for coastal and riverine waters in Malaysia.

The technology is expected to expedite water quality improvements by providing cleaner water discharge without drastically changing the lifestyle of indigenous communities living in those areas. With improved water quality, economic development for remote coastal communities can be developed involving aquaculture, seaweed industry and tourism activities.

Winner's Bios



Dr Rahinah Ibrahim

University of Putra Malaysia

Rahinah Ibrahim, Ph.D. is Senior Professor and former Dean of Faculty of Design and Architecture, Universiti Putra Malaysia. She was awarded the "Top Research Scientists Malaysia 2012" by the Academy of Science Malaysia and the "National Academic Award (AAN) 2013" by the Malaysian Government. A trained architect, she received her Ph.D. degree in Construction Engineering and Management from Stanford University. Her Sustainable Design-Construction Informatics Research focuses on developing theories and emerging computer-integrated applications for developing sustainable product innovations. She led the Faculty's "Transformation Vision 2011-2014" fusing design thinking into R&D, which brought forward translational researches into successful real life applications.



Dr Navid Nasrolah Mazandarani

University of Automotive Malaysia

Navid Nasrolah Mazandarani, Ph.D., received his doctoral degree in Integrated Design Studies at the Faculty of Design and Architecture, Universiti Putra Malaysia (UPM). His thesis developed the smallest independent sewerage treatment system for remote settlements on timber structures. The i-STP project was awarded Gold Medal at UPM's Invention, Research and Innovation Exhibition in 2016. He received the DRB-HICOM Industry Award for Excellence at Lim Kok Wing University's Product Innovation 2009. With industrial designer background, his core interest is in solving problems with innovative design solutions. He is currently a Senior Lecturer at the Faculty of Engineering, DRB-HICOM University of Automotive Malaysia.

Judge's comments

"This innovation is impressive for the way it delivers multiple benefits to the economy and environment. Using data from Malaysia, Rahinah and Navid have devised a clever solution to a real-world problem. Given the importance of tourism to many rural villages and fishing communities, this innovation - which is designed to capture sewage more effectively - has the potential to transform not only livelihoods, but living standards."

Merit Award Winner 2016

NV LogIQ Wall Controller

Research Abstract

The "NV LogIQ" room controller has been designed to provide user friendly natural ventilation control in buildings. The controller takes advantage of pre-programmed control algorithms which have been developed based on four years of research collaboration between Loughborough University and SE Controls. The product controls both CO2 level (as an indicator of Indoor Air Quality (IAQ)) and room temperature by modulating natural ventilation flow using actuators and roof vents. The advanced temperature control strategy, in conjunction with IAQ algorithms, mitigate overheating and discomfort by regulating the ventilation rates. This ensures acceptable IAQ and thermal comfort while reducing energy consumption.

Winner's Bios



Dr Narguess Khatami

Hilson Moran Partnership

Narguess is currently a Sustainability Consultant at Hilson Moran. Prior to this, she was a research associate at Loughborough University and SE Controls where she developed Natural Ventilation control algorithms to improve Indoor Air Quality (IAQ) and energy efficiency in non-domestic buildings. Her research work formed the basis of her PhD studies where she developed retrofitted natural ventilation solutions and control strategies for existing office buildings, using a combination of dynamic thermal and CFD simulations. Narguess's main specialties are building performance evaluation, building physics and low carbon design in the built environment.

Judge's comments

"This is a very clever and validated system which ensures an optimised environment. This innovation has been constructed on a clear amount of research; the end result is simple, easy to use and gives the user the ability to programme optimal conditions at the outset."

DIGITAL INOVATION AWARD

Premier Award Winner 2016

3D Repo – Open Source BIM Platform

Research Abstract

3D Repo is an open source Software as a Service (SaaS) solution for large-scale collaborative Building Information Modelling (BIM) in the cloud. Instead of architects, engineers and stakeholders sharing proprietary files in a costly and time consuming manner, they can opt to point their web browser to an encrypted online repository in order to examine all project stages virtually, even on mobile devices. In the planning and design stages, 3D Repo is used by clients, planning authorities and the general public to evaluate the proposals. The same dataset can then evolve into a design coordination model that is iteratively refined by the consultants which transforms into as-built models through a dialogue between contractors and designers during construction. Upon delivery and handover, the same information can then be utilised by the facilities management team. Over 40 different file formats are decomposed and federated in 3D Repo's big data repository. This enables 3D Repo to mix and match various data blocks and stream them directly to web browsers, game engines and even virtual and mixed reality experiences. Using its novel open systems, companies such as Arup, Balfour Beatty, Canary Wharf Contractors and Crossrail are able to host their projects securely in the cloud.

Winner's Bios



Dr Jozef Dobos

3D Repo Ltd.

Dr Jozef Dobos is the founder and CEO of 3D Repo Ltd, a spin-out from his doctoral research at University College London (UCL). After graduating as Master of Engineering in Artificial Intelligence from Imperial College London, he went on to obtain his Engineering Doctorate in Virtual Environments, Imaging & Visualisation (VEIV) from UCL. Throughout his studies, Jozef also completed Entrepreneurship at Imperial College Business School and New Venture Development at London Business School. In 2014, he was shortlisted for the Royal Academy of Engineering ERA Foundation Entrepreneurs Award. Jozef is a Chartered Engineer of the British Computer Society.



Tim Scully

3D Repo Ltd.

Tim Scully is the Chief Technical Officer at 3D Repo Ltd. In 2005, he received his BSc in Computer Science from University of Kent and is currently finishing his Engineering Doctorate in Virtual Environments, Imaging & Visualisation at University College London. As part of his doctorate, he was awarded the Fellowship of the Royal Commission for the Exhibition of 1851 Award. In 2010, his research in rendering of human skin was featured on the front cover of SIGGRAPH Asia proceedings. Prior to studying at UCL, Tim worked in the financial sector supporting traders in the ABN AMRO Bank offices in London, New York and Hong Kong.

Judge's comments

“This open data source innovation is an example of an open source approach to improving best practise in data management and analysis. This innovation is particularly impressive for the way it uses open source software as a basis for improving the accessibility to and utilisation of data that has already been created - allowing greater interaction and better quality decision making for different parties including; engineers, clients and construction professionals in any one project.”

Highly Commended Winner 2016

A Real-Time Monitoring, Assessment and Alarming System for Construction-Induced Vibration Impact on Hospital Buildings

Research Abstract

Construction projects near existing hospitals present an unprecedented challenge to the construction industry because of small separation distance and extremely stringent vibration limits for ultra-precision medical equipment. In collaboration with Hong Kong's Hospital Authority, the research team developed the first real-time vibration monitoring, assessment and alarming system in Hong Kong by leveraging the recent advances in sensing and software techniques. The System consists of four major components: (a) a sensory network with high-fidelity accelerometers and microphones; (b) continuous data acquisition and processing module; (c) real-time vibration impact assessment module based on a pre-established database of vibration limits; and (d) autonomous alarming module that issues visual and audio alarms and email notifications in case of exceedance of vibration limits.

The System was successfully implemented in an ongoing hospital expansion project in Hong Kong in order to ensure the functionality of a large amount of crucial medical equipment during the four-year construction period. The recent adjustment in construction schedule based on the accumulated knowledge from the System shortened the whole piling period by 2.5 months and saved around 2 million Hong Kong dollars. The interface could enable the System to be conveniently employed in future construction projects supervised by Hong Kong's Hospital Authority.

Winner's Bios



Dr Songye Zhu

Hong Kong Polytechnic University

Dr. Songye Zhu is an Associate Professor in the Department of Civil and Environmental Engineering at The Hong Kong Polytechnic University. He received his BEng and MSc degrees in Structural Engineering from Tongji University (China) and his Ph.D. degree in Civil Engineering from Lehigh University (USA). He is currently Editor of *Advances in Structural Engineering*, and President-elect of the American Society of Civil Engineers (Hong Kong Section). His major research interests include vibration monitoring and mitigation, structural health monitoring, and smart materials and structures. He was awarded Takuji Kobori Prize in 2014 from the International Association for Structural Control and Monitoring.



Mr Shiguang Wang

Hong Kong Polytechnic University

Shiguang Wang is currently a PhD candidate in the Department of Civil and Environmental Engineering at The Hong Kong Polytechnic University. He got his Bachelor degree in Structural Engineering from Shandong Jianzhu University, China, in 2015. His current research topic is on construction-induced vibration assessment and its impact on vibration-vulnerable objects.



Mr Gary Hui

Chevalier (Construction) Co., Ltd.

Gary Hui is a Project Manager of Chevalier (Construction) Co., Ltd. He obtained a Bachelor of Science degree in Construction Engineering and Management from the City University of Hong Kong. He is also a member of the Hong Kong Institution of Engineers and a Registered Professional Engineer. He is a building engineering profession having 15 years experience in construction management as well as site supervision, design coordination, site logistics and pre-construction planning in relation to foundation works, ELS works, drainage construction works, pile cap & superstructure works, finishing and fitting-out works, window and curtain wall installation, etc. ranging from government projects to private property development.

Merit Award Winner 2016

AssetScape World Management System

Research Abstract

AssetScape® is an asset management solution with a difference. It takes large, complex data sets such as LiDAR, photogrammetry, mapping, inventory and live data which it uses to automatically create a 3D virtual world. This world provides a platform for immersive data analysis and interaction. It combines a 3-dimensional data-management approach with a 3-dimensional graphics engine.

Amongst many other potential uses AssetScape is currently being licensed as a large-scale data-management solution for national infrastructure projects.

Research and development for AssetScape started as a self-funded project. AssetScape recognised that there was a need for an intuitive product that could:

- Simplify users' interpretation of increasingly complex data sets
- Increase efficiency
- Dramatically reduce training time

AssetScape were also aware that software evolution within infrastructure management can be relatively slow, which provided the inspiration to produce something potentially "game-changing". These factors substantially contributed towards AssetScape's decision to build prototypes of various system modules, working versions of which allowed the company to promote the system to potential early adopters.

Take-up by a number of major customers has allowed AssetScape to fund further development, meaning it can now offer a fully-functioning "World" Management System.

Winner's Bios



Simon Kaufman

AssetScape Ltd.

Simon started his professional life as a construction surveyor working on a variety of structural and civil engineering projects. In the mid-1990s, an untapped market and one customer's requirement for a technical solution gave him the opportunity to exploit his computer programming hobby and build his first piece of commercial software.

In the years since Simon has built a business which supplies the construction industry and infrastructure managers with low-maintenance software solutions with a particular emphasis on user-friendliness. A considerable proportion of Simon's time is now spent on R&D, through which products such as AssetScape have evolved.



Richard Baker

AssetScape Ltd.

Richard has a background in, and passion for, writing computer gaming software. His programming talents and his ability to innovate were the main factors that resulted in him being chosen as lead programmer for the AssetScape project.

Richard's involvement in AssetScape has been pivotal and he has influenced every aspect of the way that the system functions. His ability to simplify the complex has been invaluable during the creation of the system.

Judge's comments

"This is a very elegant approach to solving a real-world problem. The innovation is highly transferrable and helps asset managers to manage their assets more effectively, and with greater accuracy. This is a promising innovation which has the potential to transform the way data for a major project is mapped and configured."

INNOVATION IN EDUCATION AND TRAINING AWARD

Premier Award Winner 2016

The First Massive Open Online Course (MOOC) in Digital Construction

Research Abstract

The construction industry is one of the last industries to be influenced by the digital revolution and everyone from architects through to the suppliers involved in production, and facilities managers engaged with operating the built assets, will be affected. Raising awareness and educating the industry about digital construction represents a significant challenge for the industry and for educators. It is estimated that there are more than 3 million people engaged within the architecture, engineering and construction sector in the UK alone.

The Massive Open Online Course (MOOC) in Digital Construction ran over a five-week period in June and July 2016. It was open to anyone, free of charge and was completed entirely online. The objective was to create an experience that would have wide appeal to anyone engaged in construction. The emphasis was on understanding the benefits, drivers and enablers of a digital working environment and on recognising how the University of Westminster can equip itself to participate in digital construction.

The MOOC attracted over 1000 participants worldwide. Feedback was overwhelmingly positive and indicates that the flexible approach to learning was appreciated, and also that the content challenged participants to consider what digital construction means.

Winner's Bios



Tony Burke

University of Westminster

Tony is a Principal Lecturer and University Teaching Fellow at the University of Westminster. As Programme Leader for the Undergraduate Construction Studies Programme for over ten years, he was responsible for a large suite of professionally accredited degree courses, including construction management, quantity surveying and building surveying. He then led a university-wide project to transform learning and teaching practices across the institution. The outputs from this project have provided the basis for the University's new Centre for Teaching Innovation. Tony is an enthusiastic advocate for the effective use of learning technologies in higher education.



Rob Garvey

University of Westminster

Rob is a Senior Lecturer and University Teaching Fellow at the University of Westminster. Teaching on the undergraduate and postgraduate courses in the Department of Property and Construction, Rob is responsible for the Faculty's MSc in Building Information Management as well as ensuring that BIM is embedded within the Faculty's curriculum. Rob is on the Leadership Group for the UK BIM Alliance; Chair of the London BIM Region and Core Team Member of BIM4SME. In addition, he is also part of the UK Government Trial Projects Working Group for procurement. He is working towards a doctorate investigating the influence of government policy in the adoption of BIM.



Fred Mills

The B1M

Fred is co-founder of The B1M, the world's leading video channel for construction. Having worked with two of the UK's leading main contractors, Fred initially established The B1M to help educate and upskill the construction industry on BIM. The B1M's award winning "BIM for Beginners" series has gone on to be used by organisations and project teams across six continents and is deeply embedded within HS2's BIM Upskilling Portal. The B1M now cover a broad range of construction topics sharing documentaries, interviews, live streams and explanatory videos every week. Their content is watched in 144 countries by over 110,000 people a month. Fred's passion is to inspire a better construction industry through engaging video content.

Judge's comments

"This innovation is a practical, online course which has generated significant interest and enthusiasm in digital construction - at a time when the industry is required to modernise and fully embrace the opportunities for digital construction and technology. This innovation is timely and cleverly demonstrates the value of utilising social media, video and other on-line content to conceive, develop and deliver educational needs at a pace that matches the rate of change in the industry."

Highly Commended Winner 2016

The Breaking Down Barriers Project at Reading: Educating for twenty-first century lives

Research Abstract

The Breaking Down Barriers project at the University of Reading responds to the need to address ethical, legal and moral imperatives to promote an inclusive society through innovation in built environment professional education. It achieves this by going beyond current expectations of best practice in provision of teaching and learning relating to the construction, design and management of inclusive environments.

The BdB project responds to the need for improvement in built environment professional education in inclusive design identified by the joint Government/Mayor of London Paralympic Legacy Built Environment Professional Education (BEPE) Project, and addresses new and emerging accreditation requirements of a range of professional bodies and QAA Subject Benchmark Statements relating to various disciplines.

It also responds to the needs of employers. As the incidence of disability and impairment increases with age, and people are living and working longer, inclusive design of products and services is of increased importance, and high on the corporate agenda for many employers.

The University of Reading prioritises investing in shared resources, developing experiential learning activities suitable for a wide range of applications. It aims to make access and inclusion second nature amongst students and colleagues, and seeks to develop a culture of responsible citizenship relevant to 21st-century lives.

Winner's Bios



Mrs Christina Duckett

University of Reading

Christina Duckett BA DipArch RIBA MRTPI SFHEA is an experienced architect, planner and higher education professional, Christina was until recently Deputy School Director of Teaching and Learning in the School of the Built Environment at the University of Reading UK with special responsibilities for Architecture, and a Lecturer on the University's undergraduate Surveying and Construction Management programmes, with inputs to the MSc in Conservation of the Historic Environment at the Henley Business School. Breaking Down Barriers initiator and project lead, Christina is now a Visiting Fellow to the University of Reading, combining academic work with practice.



Dr Geoff Cook

University of Reading

Dr Geoff Cook BSc(Hons) PhD CEng FRSA FRICS FCIOB MCIBSE MIESNA is an Associate Professor in the School of Construction Management and Engineering at the University of Reading, UK. The findings of his extensive research portfolio are embedded in BS8300: 2009; Design of buildings and their approaches to meet the needs of disabled people the BS committee and ISO 21542 Building construction – Accessibility and usability of the built environment.

Geoff is a Past-President of the Society of Light and Lighting (UK), a Board Member of the Built Environment Professional Education Board and chair of the BS8300 Committee and the Accreditation Panel of the CIOB.

Judge's comments

“This innovation in education is a practical, engaging and demonstrable way to bring to life a real social challenge with widespread value and application. The innovation shows a genuine commitment to invest in the UK’s building stock and educate the next generation of professionals to ensure the needs of all users of a facility are firmly met.”

RESEARCH PAPER AWARD

Premier Award Winner

Implementation of eco-engineering design into existing slope stability design practices.

Research Abstract

Published in Ecological Engineering, Vol. 92; pp.138-147, 2016

Eco-engineering techniques involve the use of both plants and inert materials where, in the latter, non-treated wood is usually present. The two different elements will evolve with time and change their mechanical properties. On one hand, the wood will degrade decreasing its effective cross sectional area with time. On the other hand, the live plant material will grow and propagate new roots as time progresses. Both root development and inert material changes must be accounted for in order to realistically simulate a bioengineered slope and design effective eco-engineering solutions.

The dynamic nature of bioengineered works sets different scenarios throughout the slope design life. In this work, we propose an adaptation of the existing routines and procedures of both geotechnical practice and civil engineering design scheme in order to closely reflect the inclusion of bioengineering methods in the classic geotechnical engineering problems.

By detecting critical points at the design stage, the proposed methodology was proven to offer an improved eco-engineering work design scheme. With the use of the proposed method both external and internal stability checks with their corresponding safety factor values increase with time and there are no conflicts between the two evolving processes involved in this kind of works.

Winner's Bios



Guillermo Tardio Technical University of Madrid

Guillermo is a researcher at Technical University of Madrid, a Chartered Engineer and he also works as a private consultant engineer. He is trying to develop integrated design schemes by enriching traditional engineering design protocols and routines with ecosystem services and eco-engineering approaches. He has specialist expertise in ground bio- and eco-engineering solutions and erosion protection. He has a broad experience in river restoration and slope stabilization projects. Guillermo holds a PhD and Msc degrees in Forestry Engineering from the Technical University of Madrid (Spain).



Dr Slobodan Mickovski

Glasgow Caledonian University

Slobodan is a Reader in Civil Engineering at Glasgow Caledonian University, a Chartered Engineer and Scientist. He is trying to bridge the gap between academia and industry and worked on both sides of the divide in Macedonia, Hungary, England, France and Scotland. Specialist expertise in ground bio- and eco-engineering solutions and erosion protection through sustainable use of vegetation including vegetated natural or man-made slopes, green roofs and walls, and natural hazard remediation. Slobodan holds a PhD and MSc degrees from the University of Manchester and a BSc in Civil Engineering from the Sts Cyril and Methodius University in Macedonia.

Highly Commended Winner 2016

What makes an 'Innovation Champion'?

Research Abstract

Published in *European Journal of Innovation Management*, Vol. 19; Issue 1, pp. 72-89, 2016

The purpose of the paper was to explore how an "innovation champion" identity is formulated in the context of the UK construction sector. A conceptual model of "innovation champion" themes is derived from the literature on social identity and then validated through empirical research. In total, 30 semi-structured interviews were conducted with UK construction sector practitioners including Constructing Excellence – the UK construction sector's network-type organisation for driving innovation. Findings indicate that practitioners socially constructed "innovation champion" identities through narratives about "self" or others. While some practitioners saw themselves as "innovation champions", many others recognised CEOs as such. "Innovation champions" are commonly recognised as key individuals who promote innovations across businesses.

Socially constructed identities are seen important to strategic decisions and future actions. The potential contribution to practice is to help current and new generations of practitioners to learn about how to be or become "innovation champions". The concept of social identity presents opportunities to enrich our understanding of the "innovation champion" label can stimulate people's reflections on who they are and what they do.

The present paper has extended upon prior research and theory by exploring the ways practitioners perceive themselves or others as "innovation champions". While this research has focused on the UK construction sector, the findings are potentially useful for other sectors where "innovation champion" labels are commonly used.

Winner's Bios



Dr Natalya Sergeeva University College London, UK

Dr Natalya Sergeeva is an academic and consultant in the area of innovation and project management. She holds a PhD degree in the subject of innovation narratives in the built environment context. Natalya's research interests include applications of organizational theories including sensemaking, social identity, narrative and storytelling in understanding innovation at firm and project levels.

Merit Award Winner 2016

The Impact of Regulations on Overheating risk in Dwellings

Research Abstract

Published in *Building Research and Information*, Vol. 44; Issue 5-6, pp. 520-534, 2016

Many new and emerging regulations and standards for buildings focus on climate change mitigation through energy and carbon reduction. In cool climates, such reductions are achieved by optimizing the building for heat retention. It is increasingly recognized, however, that some degree of climate change is now inevitable. New and existing buildings need to consider this to ensure resilience and an ability to adapt over time. In this context, the current approach to regulation that largely remains focused on the 'point of handover' may not be fit for purpose.

This paper focuses on a 'typical' dwelling designed to a range of standards, representing current or emerging approaches to minimising energy use, using a range of construction methods, where a number of adaptations are available to occupants. It considers, through the use of building performance simulation, how each configuration is likely to perform thermally over time given current climate change predictions. It is demonstrated that the current approach to assessing overheating risk in dwellings, coupled with the regulatory focus on reducing energy consumption, could result in significant levels of overheating. This overheating could, in the near future, present a risk to health and result in the need for significant interventions.

The paper can be accessed [here](#).

Winner's Bios



Mark Mulville

University of Greenwich, UK

Mark is Academic Leader of the MSc portfolio of built environment programmes and a member of the Sustainable Built Environments Research Group (SBERG) at the University of Greenwich. Before joining the University of Greenwich in 2010 Mark had industry based roles in surveying, architectural practice and technical consultancy focused on the building fabric and systems. Mark's research interests focus on the delivery of long-term buildings performance particularly in relation to the potential impacts of climate change, the role of occupant behaviour in energy efficiency and wider building performance and the impact of the building environment on health, wellbeing and productivity.



Dr Spyridon Stravoravdis

University of Greenwich

Dr Spyros Stravoravdis is a senior lecturer of sustainable design and construction at the University of Greenwich. His interests lie in the fields of environmental and sustainable design, building performance modelling, tool development, BIM, daylighting and comfort. He has extensive research and consulting experience having worked in these fields for the past 14 years from small scale to large scale international projects.

Undergraduate dissertation awards

Premier Award Winner 2016

A Comparative Study of the Physical Properties of Natural Hydraulic Lime and Ordinary Portland Cement Binders for the Application of External Renders

Research Abstract

The intention of this research was to identify whether Natural Hydraulic Lime (NHL) binders are a suitable alternative to Ordinary Portland Cement (OPC) binders in the application of external renders by comparing a number of their performance characteristics within laboratory conditions. By examining the performance of 1:3 binder to aggregate mixes using NHL 2, NHL 3.5, NHL 5 and OPC binders this dissertation explores the potential for reducing the dominance of OPC within the UK construction industry.

A variety of tests were performed in laboratory conditions including flexural strength, depth of carbonation, compressive strength and adhesive/bond strength. Further to this the porosity, density and absorption of the samples was also established during this research. Testing was undertaken at 7, 28 and 91 day periods with a number of recommendations for further study identified.

This research has discounted NHL 2 binders as a suitable alternative to OPC binders however considering the factors highlighted in this research it has been concluded that it would be reasonable to expect NHL 3.5 and NHL 5 binders to perform sufficiently as an alternative to OPC binders in the application of external renders.

Winner's Bios



Mark Lee

Sheffield Hallam University, UK

Mark graduated in 2016 with a first class honours degree in Building Surveying from Sheffield Hallam University.

Mark was identified as a future industry leader when named winner of the G4C Award in 2015 and the winner of the national JCT Student Essay Competition in 2013. Following these successes, in 2016, Mark was further awarded the RICS Regional Prize for Building Surveying and CIOB Certificate of Excellence for Building Surveying.

Mark is currently a member of the RICS Matrics Greater Manchester Committee and currently works as a Building Surveyor at Savills in their Manchester office.

Highly Commended Winner 2016

An Exploratory Investigation of Earth Printing

Research Abstract

Earth construction and 3D printing appear to lie at opposite ends of the spectrum of human advancement, yet a union of these methods has the potential to respond to housing demands of the modern age. While there is a growing recognition of the durability, strength and sustainability of stabilised rammed earth construction, the use of the technique in the mainstream industry is inhibited by the time and labour intensity of the process.

To address this issue and to revitalise the world of earth construction for more widespread interest, the emerging methods of rapid manufacturing and 3D printing have been applied to earth building to develop the 'earth printer'. The earth printer concept uses roller compaction to systematically bind layers of earthen material, in a pattern automated by a computer-aided design. To explore this novel idea, a small scale, non-automated experimental device capable of simulating the central mechanisms was developed. The current project has utilised the simulator to investigate this process, assessing its capability to form load-bearing walls within the confines of using inexpensive equipment and common materials. The result has been a characterisation of the fundamental material properties and an understanding of the factors critical for success, setting the foundation for further research and advancement.

Winner's Bios



Grace Di Benedetto

University of Western Australia

Grace graduated from the University of Western Australia in 2016, with a Bachelor of Engineering (Civil)(Hons1) and a Bachelor of Commerce (Management). During her degree she had the opportunity to study abroad at University College London and the University of Bologna.

Grace is currently working in London as a graduate structural engineer for consulting firm, Arup. In this role she is involved in interesting projects in the rail and air sector and participates in a number of community engagement programs. In the future, she would like to champion the use of natural and sustainable materials in mainstream construction.

Merit Award Winner 2016

Experimental Study on Recycled Concrete Behaviour

Research Abstract

A problem that today's society as well as tomorrow's society will face is the effective application of recycling. Construction and demolition waste is attributed to a large portion of landfill space when compared to other waste. There is surely a superior approach in order to utilise this waste, one possible solution being the usage of construction and demolition waste as aggregate within concrete.

This research aims to assist recycling and sustainability by way of strengthening recycled aggregate concrete in an inexpensive and practical process. The process of Carbon-conditioning is a successful method for increasing recycled concrete strength in a cost effective and practical way. This method involves placing recycled aggregate inside a sealed chamber before exposing it to pressurised CO₂ gas. The CO₂ gas, by way of chemical reaction creates calcium carbonates, a compound that fills smaller holes in the concrete structure and heals cracks within the old aggregate, therefore, generating a tougher concrete. This research indicates that the process of carbon-conditioning is a fruitful supplementary concrete strengthening method; however, there is a plethora of variables that can be explored which can assist the process to become even more prosperous.

Winner's Bios



Anthony Butera

Western Sydney University

Anthony graduated a bachelor of construction management with a first class honours as well as the highest grade point average of his class at Western Sydney University. He is currently furthering his study of Carbon-conditioned concrete through the medium of a PhD in engineering philosophy.

He is passionate about his field and wishes to help create a recycled concrete which is economical, strong and practical.

Masters dissertation award

Premier Award Winner 2016

Engineered Cardboard Origami Floor Joists: Part 2

Research Abstract

Domestic flooring systems are based on traditional techniques and for the majority have remained unchanged for centuries. Timber is most commonly used for floor joists, despite its manual handling requirements and difficulty in ensuring its sustainability. The aim of this research is to investigate the use of GatorDuct, a cardboard product used for ducting, as a feasible alternative to traditional timber floor joists. The joists have been created using rigid foldable origami techniques, a type of origami that allows folds to be created in a thick material without causing local deformation. The folding pattern was formed using CNC cutting procedures and optimised through the use of a numerical algorithm to minimise waste material.

Preliminary mechanical tests were carried out to establish the material properties of the cardboard in pure compression and tension; this allowed the design of a more detailed test procedure. Joists were then tested in a four point bending arrangement; whilst strain gauges, LVDT's and PIV analysis created a detailed picture of how the joists behaved under both static and cyclic tests. The understanding gained from these tests enabled the design of a cardboard joist and developed an appreciation of the feasibility of a novel engineered cardboard joist.

Winner's Bios



Gemma Small

University of Salford, UK

Gemma is from Preston, Lancashire and in 2016 graduated from the University of Salford with a First Class MEng in Civil Engineering. Whilst studying at University she also completed summer placements and an industrial year placement with Costain. She worked on a range of projects including; a Tunnel Remediation scheme at Heathrow Airport, a Managed Motorway Contract and the Heysham to M6 Link Road.

After graduating she has taken a full time role with Costain, she is currently working on the A556 Knutsford to Bowden Improvement scheme and will soon be moving into a structural design role.

Merit Award Winner 2016

Variation in Price of Preliminaries in Construction Projects during Tender Stage

Research Abstract

Preliminaries are unanimously accepted as an integral part of the Bills of Quantities (BQ) and their accuracy had been the interest of many researchers in the past decades. Generally, variation in the price of Preliminaries is taken as the contractors' risk. The understanding of Preliminaries determines the accuracy of price and value of the construction project. This indirectly reduces the chance of construction to fail.

The aim of the research is to establish non-conclusive general guides in the price of Preliminaries. The main objective is to minimize variation in the construction Preliminaries during tender stage. The research identified pertinent causes of price variation in Preliminaries, impacts, and solutions to benefit the present and future construction industry in Malaysia. The research applied mixed method comprised of Content Analysis, Questionnaire Survey, and Semi-structured Interview. The research findings are triangulated; hence the more reliable results are established based on unanimous decisions. The research key findings are; (1) Establish the range of Preliminaries for the Civil Engineering work between 3.26% and 6.38% of the tender sum, and (2) Establish non-conclusive guides to minimize price variation in Preliminaries. The findings are envisaged to provide some form of a checklist for the betterment of the Malaysian construction industry. The research was supervised by Associate Professor Ruslan Affendy Arshad MCI Arb.

Winner's Bios



Abdul Aziz Abas

University Teknologi Mara, Malaysia

Abdul Aziz completed his Master Degree in Integrated Construction Project Management from Universiti Teknologi MARA (UiTM), Malaysia in July 2016. He is currently pursuing a PhD in Built Environment from the same university. Prior to that he graduated from Universiti Teknologi Malaysia (UTM) in 1984 with Diploma in Civil Engineering and Polytechnic of The South Bank, U.K. in 1988 with Bachelor of Civil Engineering (Commendation). He is a Professional Civil Engineer with Practising Certificate, Member of Board of Engineers Malaysia and Fellow of Institution of Engineers, Malaysia (FIEM). He is currently attached to Jacobs Engineering Group Malaysia as a Technical Director in Civil Infrastructure.