Workshop 1

29th - 31st October 2024, LSBU, London

Sustainable Human Building Behavioral Interaction:

Awareness Development Roadmap and Training Programme (SusHumBuild)

Theme: *Knowledge Exchange on Energy Analysis, Occupant Behaviour, Retrofit, Smart Energy Technologies and Delivering Excellent Comfort and Air Quality*

London South Bank University

The BRITISH UNIVERSITY IN EGYPT

Awakening call for environment and climate change

WELCOME

Dear Event Attendees,

Welcome to the very first workshop of 'Sustainable Human Buildings'

"Sustainable Development Goals: Translation between research and practice" is the title and topic of the Event. "Awakening call for environment and climate change" implies the concept of understanding the notion of 'Sustainable Design of the Built Environment' and how it implies with the today's society, related to time and the physical space.

Thanks to the contribution of professionals, educators and researchers we wanted to prompt reflection on the future fields of investigation in Sustainability and its impacts on the society in line with considering climate change, as well as to discover and to connect the our built environment and the experts who share common interests in research and practice. When the foundation of this event was built, we started to develop two important manifestos: what is the notion of 'Sustainability'? And what is the main research agenda of other scholars in their research project to combat with climate change? We invited the top-notch academics to reflect on the different natures of 'Sustainability': Engineering, Design, Society, Design, Technology, Thinking, Industry…

During this workshop, you will be engaged in an interdisciplinary debate and you have an opportunity to establish networking with the academics across the globe as well as the international leading academics on Sustainable Design, who will introduce a wide range of approach of their on-going research, practice and education experiences.

We hope you will enjoy the event and of course, enjoy the atmosphere of this great networking opportunity with academics across the globe.

Dr. Bertug Ozarisoy, Dr. Mubarak Elnour
Chair and Co-Chair of the Event

London South Bank University

The BRITISH UNIVERSITY IN EGYPT

Links for an online participation

SusHumBuild Workshop – Day 1 (morning session) on Wednesday 30th October 2024

Link: https://teams.microsoft.com/meet/362803836206?p=iaE0OzF4e4zSzSwYF4

SusHumBuild Workshop – Day 1 (afternoon session) on Wednesday 30th October 2024

Link: https://teams.microsoft.com/meet/375515178581?p=Gcz60ba1sQ1uBXZ3lO

SusHumBuild Workshop – Day 1 (morning session) on Thursday 31st October 2024

Link: https://teams.microsoft.com/meet/316161827104?p=diofySM95OEF7xUzVg

Principal Investigator

Prof. Issa Chaer

Prof. Issa Chaer, Associate Dean Research & Enterprise, School of the Built Environment and Architecture, London South Bank University, London, United Kingdom

Issa Chaer *is a Chartered Engineer with a BEng (Hons) degree in Mechanical Engineering, a PhD in enhanced heat transfer and over 25 years combined academic, research and industrial experience. Prof Issa is a great believer of research informed teaching and has published over 100 research articles, 4 books/book-chapters and developed over 10 academic and CPD courses. He is currently a Professor and Director of Research and Enterprise for the School of the Built Environment and Architecture. His research interests include heat transfer, thermal energy systems/networks, alternative and renewable technologies and energy management. His research portfolio span more than 25 years with evidence of significant contribution to the advancement of engineering knowledge at national and international levels including over 120 peer reviewed research articles plus the creation of novel research topics and technological development.*

Speaker 1: Biography

Dr. Bertug Ozarisoy

Dr. Bertug Ozarisoy, Lecturer in Architecture
School of the Built Environment and
Architecture, London South Bank University,
London, United Kingdom

Bertug Ozarisoy *s an architect and expert in building energy modelling both in the UK and Cyprus. His research focuses on understanding the theory between architecture and energy policy design in conjunction with exploring the impact of passive cooling systems on domestic energy use and households' thermal comfort. Dr. Ozarisoy has an intensive 10 years' experience in teaching, research, and architectural practice. He was initially involved in the BSc (Hons) in Construction Management programme at the University of East London (UEL) between September 2016–2018. He has developed teaching skills to demonstrate significant intellectual input to the students' technical drawings and monitor their learning adaptability and integration to the 'Construction Technology and Materials' module. He authored over 45 journals and conference papers relevant to the building engineering field.*

Synopsis - *This research aims to bridge the gap between energy performance of buildings and occupants' habitual adaptive behaviour in educational buildings. Data, indoor and outdoor temperatures, from a representative educational building in the City of London were collated and analysed. The building fabric thermal performance for the case study building was modelled and simulated by using the Integrated Environmental Solutions (IES) software suite. The findings revealed that different parts of lecture rooms have reached temperature which are beyond the acceptable limit during the summer and even when mitigating actions were used such as air movement fans and opening of the windows the overheating was still significant. This was difficult to pick in the modelling and was only picked in the actuals data monitored.*

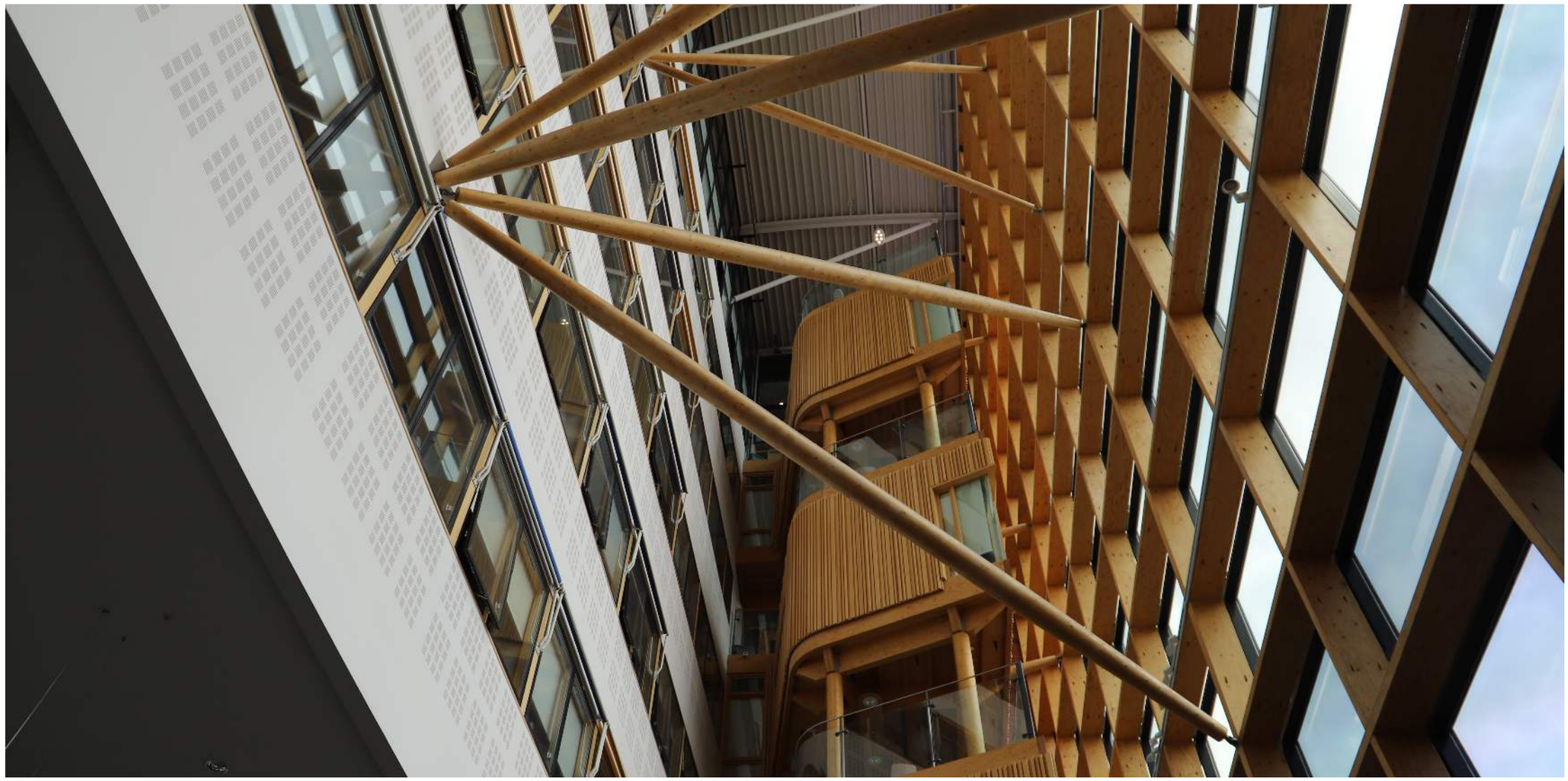
Speaker 2: Biography

Dr. Mubarak Elnour

Lecturer in Building Services Engineering, School of the Built Environment and Architecture, London South Bank University, London, United

Mubarak Elnour, *is enthusiastic researcher and academic who completed a PhD in solid state heat pumps in 2023, in London South Bank University. Originally graduated in Electrical Engineering (Power and Machines), worked in Industry for 5 years before returning to academia to pursue postgraduate studies. Recent focus has been on renewable energy, namely Geothermal Energy from experimental and CFD simulation points of view; as well as working on solar projects under the sustainable innovation scheme. Currently working as a full-time lecturer in Building Services Engineering for the School of the Built Environment and Architecture at London Southbank University.*

Global Warming and its Effect on the Overheating within Educational Building in London



Keyworth Centre, LSBU Campus.

Synopsis - *Bridging the energy performance gap of buildings plays a crucial role to assess occupants' habitual adaptive behaviour on energy use in educational buildings. Many newly built educational buildings are characterised by high indoor air temperatures and thermal comfort issues, because these buildings were designed and built without considering the warming climate conditions in the summer. The aim of this study is to evaluate the building performance and develop an evidence-based building energy simulation in a representative higher educational building in the City of London. This study presents the results from the longitudinal field survey was conducted both in the winter and summer. The study adopts a quantitative methodology, including indoor and outdoor environmental monitoring, in-situ measurements and building energy simulation. The building fabric thermal performance of a case study was modelled and simulated by using the Integrated Environmental Solutions (IES) software suite. The findings revealed that different parts of the lecture rooms have been deemed uncomfortably warm with a lack of air movement in the summer months and unacceptably cold and draught indoor air conditions in the winter months. This is expected to be due to the lack of effective natural ventilation in some areas, and the lack of adequate heating and cooling in occupied spaces. Furthermore, the results of the modelling and simulation show a significant improvement in the building thermal performance with the installation of phase change materials on the building envelope where the indoor air temperature reduced from 29.3°C to 23.5°C.*

Speaker 3: Biography

Dr. James Bishop

Senior Lecturer in Built Environment, School of the Built Environment and Architecture, London South Bank University,

Dr. James Bishop, *Bishop is a Chartered Building Engineer, Fellow of the Chartered Association of Building Engineers (FCABE), and a Senior Fellow of the Higher Education Academy (SFHEA). He is a Senior Lecturer in Built Environment and course leader for the construction management and commercial management (with quantity surveying) degree programmes at London South Bank University. He has teaching and research interests across a range of subjects including construction technology, emerging technologies and sustainability. James' work has a particular focus on environmental sustainability and decarbonisation of the built environment.*

Understanding occupancy and behaviour to influence heating system design and specification

Indoor air quality assessment of a representative higher education building, Keyworth Centre, LSBU Campus.

Image copyright: https://www.oliverheinemann.de/projects/lsbu/444.html

Synopsis - *This presentation will give a short overview of a current research project looking at occupancy-based heating analysis and efficiency, and some context around earlier projects looking at the impact of occupant behaviour around energy consumption, particularly across communities of young people.*

Currently, Dr Bishop is working with LoRaWAN-based technology providers to monitor the internal environment of a case study building, based on the London South Bank University campus.

This type of IoT-based hardware has the potential to extend Building Management Systems (BMS) to the occupied spaces of a building to a degree that has not been previously feasible, due to the high installed cost of wired controls and poor knowledge of space utilisation, which limits BMS control strategies.

This project uses the installation of LoRaWAN wireless sensors to facilitate a data-driven approach to assessing and identifying the optimum demand reduction and heat decarbonisation pathway for a building. The aim is to inform retrofit decision-support/optimisation, for creating an investable net zero action plan for the (case study) building, informed by the data generated.

Currently, accessing quality data to accurately characterise the performance of existing buildings can be highly challenging, and inhibits the modelling of improvement options. Retrofit is handled case-by-case, losing any economies of scale across portfolios. The approach utilised on this project uses novel sensor technology to create better datasets charactering building assets and performance.

Speaker 4: Biography

Prof. Hesham Safwat

Senior Lecturer in British University in Egypt

Prof. Hesham Safwat *has charted a distinguished career over the last two and a half decades, deeply immersed in the intricacies of Mechanical Power Engineering with a focused lens on HVAC systems, energy efficiency, and the sustainable design of building infrastructures. Educated at Cairo University, where he obtained both his Ph.D. and Master's in Mechanical Power Engineering, Dr. Safwat has built a robust foundation in both the theoretical and practical aspects of the discipline, underscored by his significant academic role as a Senior Lecturer at the British University in Egypt since 2014. In his professional journey, Dr. Safwat has seamlessly blended academic rigor with industry relevance, marked by his tenure as a Technical Manager at Miraco – Carrier, Egypt, where he led initiatives to advance HVAC system designs and energy efficiency measures from 1996 to 2014.*

State of Art on the Energy Efficiency of Air Conditioning Systems in buildings in Egypt

Synopsis - *The document titled* ***State of Art on the Energy Efficiency of Air Conditioning Systems in buildings in Egypt*** *explores strategies for optimizing air conditioning systems in hot and arid regions, emphasizing energy efficiency. It discusses the evolution of air conditioning, highlighting how advancements in HVAC technologies can lead to significant energy savings. The focus is on an integrated building design approach that reduces HVAC loads by optimizing factors like lighting, envelope efficiency, and outside air management. Additionally, the document delves into key energy conservation policies, starting from the 1974 standards to the latest ASHRAE updates, outlining advancements in equipment efficiencies, fan and pump controls, and heat rejection technologies. It also explores the adoption of standards such as ASHRAE 90.1, demonstrating their impact on improving commercial building performance by optimizing systems like water-cooled chillers and hydronic setups. The document underscores the importance of comprehensive planning and policy compliance to achieve sustainable cooling solutions.*

Speaker 5: Biography

Dr. Ahmed ElShamy

Lecturer in British University in Egypt

Dr. Ahmad Elshamy *obtained his B.Sc. in Mechanical Engineering from Higher Technological Institute, in 2007. Afterwards, he worked as a firefighting design engineer for an electro-mechanical contractor company in Egypt. He was responsible for designing of the firefighting network and the supervision on the commissioning for multiple mega-hotels in Alexandria, Hurghada and Sahl Hashish. In 2009, he joined the BUE as a teaching assistant in Mechanical Engineering department. He earned his PhD in "Energy efficiency buildings and solar thermal cooling systems" from Loughborough University, UK in 2021. During the period of 2022-2023, Dr. Elshamy has participated as a research member in two research funded projects. The first project was funded by The British Council and focused on Challenges and Opportunities for Integrating Renewable Energies in Egypt.*

Human-to-Building Behaviour: An Energy Efficiency Approach

Synopsis - *This presentation explores the concept of human-to-building behaviour and its critical role in enhancing energy efficiency within built environments. As energy consumption continues to rise, understanding how occupants interact with their surroundings is essential for developing effective strategies to reduce energy use. The session highlights key factors influencing occupant behaviour. By which, promoting occupant education and implementing feedback mechanisms are possible to achieve. Thus, buildings can encourage energy-efficient practices. Additionally, thoughtful architectural features such as natural lighting and smart technologies can create environments conducive to sustainable behaviors.*

Speaker 6: Biography

Eng. Mahmoud ElGharib

Research Assistant in British University in Egypt

Eng. Mahmoud ElGharib *is a teaching and research assistant in the Faculty of Engineering at the British University in Egypt (BUE) since 2021. I have obtained a B.Sc. degree in mechanical engineering from BUE validated by London South Bank University in 2020. I'm a Master student in Renewable Energy field at The British University in Egypt. Currently. I am working on my thesis titled "Experimental Investigation of a Multi-rotor Shrouded Wind Turbine for Small Scale Applications. Throughout my academic working as a teaching assistant at The British University in Egypt, I have worked on projects related to Energy Efficiency Buildings such as improving the efficiency of 3 stages evaporative air cooler.*

Evaporative Cooling for Sustainability and Energy Efficiency in Buildings

Synopsis - *This presentation explores the importance of evaporative cooling in buildings for sustainability, energy efficiency and environmental conservation. The presentation will present research conducted on different types of cooling pads. Also, the presentation will present a case study conducted using 3-stages chilled water evaporative air cooler in the BUE wind tunnel lab*

Speaker 7: Biography

Dr. Ayman Yousef

Dr. Ayman Yousef *is an experienced information technology manager with over 20 years of expertise in IT projects and management. He has a comprehensive understanding of various IT domains and has been actively involved in teaching and training in IT and project management for more than five years. Dr. Yousef holds a Bachelor of Engineering (BEng.) in Electronic and Electrical Engineering, a Master of Science (MSc.) in Data Communication Systems, and recently earned a PhD from the School of the Built Environment and Architecture at London South Bank University.*

Smart Energy Management in Hotels- Leveraging IoT and Smart Meter Data , (The Role of Human Behaviour).

Synopsis - *The research explored the integration of IoT and smart energy metering to enhance energy efficiency in the hotel sector. It identified a significant gap in the use of real-time measurement tools and submeter data. The absence of accurate and detailed energy consumption data has not been adequately recognized as a barrier to energy optimization. Furthermore, the study highlighted misconceptions regarding the role of human behaviour in energy consumption, as well as the underutilized potential for IoT technologies to improve energy management.*

Using real energy consumption data from the past ten years across 12 hotels in London, the research examined both static factors, such as building floor area, characteristics, and the condition of energy systems, and dynamic factors, including weather and occupancy, which influence energy use.

As a result, the study proposed a customized framework for energy management, tailored to the specific needs of each hotel based on comprehensive energy analysis. The framework consists of five key components aligned with the hotel's unique energy consumption patterns. Strategies focus on minimizing energy waste by optimizing lighting and HVAC systems according to occupancy levels in various areas, for both guests and staff, without compromising service quality.

Speaker 8: Biography

Prof. Aaron Gillich

Civil and Building Services Engineering

Professor Aaron Gillich *specialises in the interaction of the technical and non-technical aspects of decarbonising the building stock. He focuses on how we can improve the overall value proposition for net zero and the policy and technology pathways for delivering this transition. He has led research projects on retrofit programme design, behaviour and communication, building performance analysis, and novel approaches to heat pump and heat network technologies.*

Speaker 9: Biography

Prof. Tony Day

Energy Research Consultant

Professor Day *is an independent consultant and academic specialising in low carbon solutions in the built environment. He is a Fellow of both CIBSE and the Energy Institute, and the immediate past chair of the CIBSE HVAC Systems Special Interest Group. He currently chairs the CIBSE working group on Electrical Engineering for Net Zero Buildings, and has recently been appointed Chair of the BSI Committee on Standards for Energy Management.*

A New Simplified Energy Analysis Model for Residential Heat Pump Retrofits

Synopsis - *The work is part of a Heat Pump Ready funded project in partnership with retrofit providers in the UK. We are analysing measured data from a number of houses to characterize their energy performance (heat loss coefficients, thermal capacity, heat gains, system efficiencies) to predict how heat pump retrofits are likely to perform. We use a simplified model to predict energy use, and are comparing this with actual values. The aim is to quantify the uncertainties and errors in such a model.*

Speaker 10: Biography

Dr. Katherine Morris

Research Associate, London South Bank University

Dr Katherine Morris *is currently a research associate at London South Bank University engaged on the DESNZ 'Heat Pump Ready' stream 2 project. This research is assessing the thermal performance of real homes to develop evaluation tools for prediction of heating system energy performance. This follows the completion of the MSc in Building Services Engineering (LSBU, 2023) which stimulated an interest in contributing to the Net Zero challenge. Prior to starting the Masters course she has had a 25 year career in construction (onshore wind farms, water industry process plants, mixed use developments, high rise buildings, structural steel, bridges) with project management responsibilities for project delivery including design coordination, subcontractor management, project and programme management and latterly expert report writing for construction dispute resolution.*

Heat Pump Ready research: Data analysis to characterise domestic energy use

Synopsis - *The work is part of a Heat Pump Ready funded project in partnership with retrofit providers in the UK. I present the detailed analysis for one of the domestic properties in the study portfolio. This part of the research investigates the monthly variance of thermal capacitance, heat loss coefficient by analysis of measured internal temperatures based on the building physics applied to Newtonian algorithms. The initial findings from the development of a simplified prediction model based on Newtonian heating / cooling algorithms (TM41) to characterize the property are also illustrated.*

Speaker 11: Biography

Dr. Shen Wei

Associate Professor, Building Services Engineering, University College London

Dr Shen Wei *is currently an Associate Professor in Building Services Engineering at UCL, UK. In the 10 years lecture career in UK higher education institutions. Dr Wei's main research interests include occupant behaviour, thermal comfort, thermal storage (e.g. PCM) and BIM technology in buildings. He is currently an Associate Editor for the Journal of Intelligent Buildings International. He is committee members of CIBSE, IBPSA-England, and ASHRAE UK. He is also the international coordinator of CIB W098 – Intelligent and Responsive Buildings. In the research area of energy efficient buildings, Dr Wei has published over 170 articles, including 130+ journal papers.*

Occupant Behaviour - A Key Factor in Building Performance

Synopsis - *The title of the presentation is 'Occupant Behaviour - A Key Factor in Building Performance'. In the presentation, Dr Wei will justify the importance of occupant behaviour in building performance through a systematic way and explain the current useful methods that have been used to collect behavioral related data.*

Speaker 12: Biography

Dr. Richard Fargus

Occupant-driven building control using IoT - theory and practice

Synopsis *- We discuss the fusion of Building Management Systems (BMS) with wireless IoT (Internet of Things) sensors and actuators in order to reduce building energy usage through the implementation of occupant- and demand-driven control strategies. We present results and experiences from the large-scale deployment of such a solution in Somerset House in London.*