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Scientific Meetings

World Congress on

CIVIL, STRUCTURAL, AND ENVIRONMENTAL ENGINEERING

10-11 MARCH, 2025 | LONDON, UK

Venue:
Renaissance London Heathrow Hotel
Bath Rd, Hounslow TW6 2AQ, United Kingdom

Scientific Program

09:00–09:15: Registrations

09:15–09:30: Opening Ceremony

DAY 1

MARCH 10, 2025

Keynote Presentations

09:30-10:10	
Kiran Tota–Maharaj The Water Research Centre Ltd (WRc), UK	Title: Adapting Caribbean Hydrosystems to a Changing Climate: Resilient Water, Stormwater, and Wastewater Infrastructure

10:10-10:50	
Ismail Hakki Kara Karabuk University Engineering Faculty, Turkey	Title: Microstructure characterization and Corrosion Resistance of Zinc alloys modified by Sc

Group Photo | Coffee Break 10:50–11:10 @ Foyer

Oral Presentations

11:10-11:35	
Hadi Sarvari Birmingham City University, UK	Title: Perceived Critical Success Factors (CSFs) in the Development of Construction Small and Medium–sized Enterprises (SMEs) in Developing Countries

11:35-12:00	
Mingzhi Wang Harbin Institute of Technology, China	Title: Image–based Simulation of the Mesoscopic Environment–material Interaction

Session Introduction

Tracks

Construction Market Research and Industry Analysis | Environmental Engineering | Environment–Friendly Construction and Development | Civil Engineering and Architecture | Environmental Protection | Construction Safety Management

Session Chair: Kiran Tota–Maharaj, The Water Research Centre Ltd (WRc), UK

12:00-12:25	
Forrest Wu Lijou and Associates Consulting Engineers, Taiwan	Title: Innovative Eco–Friendly Housing Solutions Redefining Sustainable Living and Space Efficiency in Taiwan
Lunch Break 12:25–13:20	
13:20-13:45	
Michelle Maura Ribeiro Pontifical Catholic University of Minas Gerais, Brazil	Title: Geobim for Railroad Infrastructure – Modernizing Federal Public Management through the Adoption of BIM & GIS in the Context of Brazilian Cross–Investment and ESG
13:45-14:10	
Duane Tristan Lawal Melanized Limited, UK	Title: Solar Integration Innovation – A Revolutionary Approach to Building Infrastructure through Integrated Solar Roofing Systems
14:10-14:35	
Hadi Sarvari Birmingham City University, UK	Title: Bridging to a Safer Future: Strategies for Integrating Safety I and Safety II in the Construction Industry
14:35-15:00	
Feria Gharakhanzadeh Gharakhanzadeh Architecture, Austria	Title: Overbuild
15:00-15:25	
Anwaar Al Habsi UAE University, UAE	Title: Advancing Self–Healing Concrete with Microbial Technologies and Sustainable Calcium Extraction in the UAE
15:25-15:50	
Srinath Tangaragu GE Vernova, UK	Title: 40% Increase in House Efficiency by Preparing for Artificial Intelligence
15:50-16:15	
Matías A. Valenzuela Pontifical Catholic University of Valparaíso, Chile	Title: Will be announced soon
16:15-16:40	
Rui Pang Henan University of Technology, China	Title: Experimental and Analytical Study on Vertical Bearing Behavior of Discretely Connected Precast Concrete Floors with Four Sides Simply Supported

Panel Discussion & Certificate Falicitation

Day –1 Ends

DAY 2

MARCH 11, 2025

Zoom Meeting (GMT+1) Time in London

13:30-13:50	
Ashish Sawarn National Institute of Technology Kurukshetra, India	Title: Utilizing Crumb Rubber as a Partial Replacement for Fine Aggregate in Concrete
13:50-14:10	
Abdel Rahman Elbakheit King Saud University, Saudi Arabia	Title: Building Integrated Diffusers' Area Ratio Optimization
14:10-14:30	
Jose Luis Miranda Dias National Laboratory of Civil Engineering, Portugal	Title: Damaging Effects of Severe Wind Actions on Infill Masonry Walls of Reinforced Concrete Buildings and Respective Mitigation
14:30-15:10	
Bernd Blobel University of Regensburg, Germany	Title: Designing and Managing Intelligent and Ethical Transformed Health and Social Care Ecosystems
15:10-15:30	
Juliana Gehlen Universidade de Brasília, Brazil	Title: Enhancing Sustainability in Construction through Building Information Modeling (BIM)
15:30-16:10	
Paulo Cesar de Morais Catholic University of Brasilia , Brazil	Title: Investigating the Impact of Nanoadditives in Portland–based Cement
16:10-16:30	
Yashnil Mohanty Westmont High School, USA	Title: Predicting Droughts: A Comparative Study of ARIMAX, LSTM, XGBoost, and Random Forest Models
16:30-16:50	
Michelle Shah **Royal Agricultural University, UK**	Title: Renewable Energy Approach for Wastewater Reuse in Vertical Flow Constructed Wetlands and Solar Powered Drip Irrigation Systems in the Caribbean: A Case Study in the Caroni River Basin, Trinidad and Tobago, West Indies

Panel Discussion

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Civil, Structural, and Environmental Engineering

March 10-11, 2025 | London, UK

HYBRID EVENT

KEYNOTE PRESENTATIONS
DAY 1

Kiran Tota-Maharaj[1,2]
[1]The Water Research Centre Ltd (WRc), Technical Director for Water, Wastewater & Environmental Engineering, Frankland Road, Swindon, SN5 8YF, England, UK.
[2]Royal Agricultural University, Professor and Chair of Water Resources Management & Infrastructure, Stroud Road, Cirencester, Gloucestershire, GL7 6JS, England, UK

Adapting Caribbean Hydrosystems to a Changing Climate: Resilient Water, Stormwater, and Wastewater Infrastructure

The Caribbean region faces a critical challenge in adapting its vital water infrastructure to the intensifying impacts of climate change. Over the years far too often the multifaceted threats posed by rising sea levels, more frequent and intense hurricanes, and altered precipitation patterns to water supply systems, stormwater drainage, and wastewater treatment facilities have impacted the West Indies. The Caribbean's reliance on surface water sources and ageing infrastructure renders it particularly vulnerable to climate-related disruptions. Extreme weather events, such as hurricanes, have historically caused widespread damage to water supply systems, leading to contamination and service disruptions. Moreover, changing precipitation patterns, characterised by increased periods of drought interspersed with intense rainfall events, exacerbate these challenges. These shifts can strain water supplies, overwhelm stormwater systems, and increase the risk of flooding and pollution. This keynote presentation will delve into the strategies necessary to enhance the resilience of Caribbean hydrosystems. This presentation and key areas of discussion addresses the urgent need for critical infrastructure upgrades such as strengthening water supply systems through measures like diversifying water sources (e.g., rainwater harvesting versus desalination), improving water storage and distribution networks, enhancing leak detection and repair systems, and developing drought-resistant crops and water-efficient agricultural practices; implementing nature-based solutions (NbS) for stormwater management, such as green roofs and rain gardens, swales and bioswales, wetland restoration and creation, and improved stormwater drainage systems; and upgrading wastewater treatment plants to improve efficiency and resilience, exploring decentralised wastewater treatment options, such as on-site systems and constructed wetlands, and enhancing their capacity to handle increased rainfall volumes and potential flooding. Technological advancements are crucial, including utilising early warning systems for extreme weather events, real-time monitoring of water quality and quantity, remote sensing and Geographic Information Systems (GIS) for improved water resources management, and climate modelling tools to predict future water availability and demand. Developing and implementing robust water resource management policies and regulations, strengthening regional and national collaborations for knowledge sharing and resource mobilisation, and investing in research and development to advance climate change adaptation strategies for the Caribbean are essential. This presentation will emphasise the urgent need for a multi-faceted approach to building resilient water infrastructure in the West Indies. By integrating these sustainable engineering strategies and fostering strong partnerships among governments, researchers, and communities, the region can mitigate the impacts of climate change and ensure the sustainable availability of water resources for future generations.

Biography:

Professor Kiran Tota-Maharaj is a leading academic in Water Resources Management, Environmental Engineering, and Sustainable Infrastructure. He is Professor & Chair of Water Resources Management & Infrastructure at the Royal Agricultural University, Cirencester, England, UK as well as Technical Director of Water, Wastewater and Environmental Engineering at the Water Research Centre Ltd (WRc) based in Swindon, England, UK. Prof. Tota-Maharaj conducts pioneering research in water circularity, integrated water resources management (IWRM), and the Water-Energy-Food Nexus. His work focuses on developing nature-based solutions, enhancing urban water resilience, and advancing sustainable wastewater treatment. He has a strong track record of research publications, successful industrial collaborations, and prestigious awards. A passionate engineer and educator, Prof. Tota-Maharaj mentors aspiring scientists/engineers and is dedicated to fostering the next generation of water professionals.

Salem A. G. Saleh and Ismail Hakki Kara*
Karabuk University Engineering Faculty, Turkey

Microstructure Characterization and Corrosion Resistance of Zinc Alloys Modified by Sc

In this study, zinc-based alloys (Zn-Mg, Zn-Mg-Sc) were produced by conventional casting methods. The homogenization heat treatment for produced materials was applied for 4 hours at 300°C. Scanning electron microscopy (SEM) and X-ray Diffraction (XRD) methods investigated the microstructure of cast and homogenized materials. The corrosion of homogenized materials was measured in %3,5 NaCl solution at room temperature. SEM-EDX investigated the corroded surface of specimens to observe the corrosion mechanism. We observed the columnar and dendritic structure on the microstructure of homogenized materials. The addition of Sc on the Zn-Mg formed secondary phases that affected the corrosion resistance positively.

Biography:

SALEM A. G. SALEH is a PhD student at the Metallurgy and Materials Engineering Department at Karabuk University.

ISMAIL HAKKI KARA has completed his PhD study in 2019 at the Metallurgy and Materials Engineering Department at Karabuk University. He is the vice president of Department of the Metallurgy and Materials Engineering Department at Karabuk University. He has published more than 72 papers in reputed journals and Congress.

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SPEAKER PRESENTATION

DAY 1

Hadi Sarvari
Birmingham City University Department of Built Environment, B4 7XG, UK

Perceived Critical Success Factors (CSFs) in the Development of Construction Small and Medium-sized Enterprises (SMEs) in Developing Countries

An examination of the operations of small and medium-sized enterprises (SMEs) in developing countries demonstrates a strong and productive correlation between the socio-economic advancement of the nation and these entities. The increasing prevalence of SMEs in these countries, together with the implementation of supportive governmental policies in developmental issues, signifies that these enterprises present a distinctive opportunity for emerging societies. This study aims to analyse the critical success factors (CSFs) in the growth of construction SMEs in developing countries amidst the expansion of construction projects. The current research was carried out in 2024 utilising a descriptive survey methodology for applicable purposes. Consequently, the number of 40 experts from construction SMEs in developing countries was selected as a statistical sample based on snowball sampling. In this vein, a questionnaire encompassing four dimensions (project manager characteristics, project management and control, technology, and project environment) and comprising 38 CSFs was developed utilising two Delphi rounds following comprehensive literature review. The data analysis was done utilising SPSS and SmartPLS softwares through both descriptive and inferential statistics. The results demonstrated that all items and dimensions of the questionnaire are regarded as CSfs in the advancement of SMEs in developing countries. According to the Friedman test for dimensions ranking, the project manager's characteristics, technology, project management and control occupies, and project environment have the highest impact on the development of construction SMEs in developing countries. The study will assist major project stakeholders and SMEs in making development and innovation adoption decisions, particularly in developing countries.

Biography:

Dr Hadi Sarvari is presently a senior researcher at Birmingham City University. His research area focuses on construction safety and health and sustainability. He has also served as a researcher at the Hong Kong Polytechnic University and as an assistant professor in construction management at the Islamic Azad University Isfahan (Iran). In 2018, he was awarded the Best Lecturer Award in the educational field. He was also awarded as a distinguished researcher in 2021. He authored and co-authored more than 80 scientific articles and books in the following fields: PPP projects, safety and risk management, BIM, and maintenance management.

Mingzhi Wang*[1,2,3], Yushi Liu[1,2,3], Xu Yang[1,2,3], Liang Li[1,2,3]
[1]School of Civil Engineering, Harbin Institute of Technology, Harbin, C.N.
[2]Key Lab of Structures Dynamic Behavior and Control of the Ministry of Education, Harbin Institute of Technology, Harbin, C.N.
[3]Key Lab of Smart Prevention and Mitigation of Civil Engineering Disasters of the Ministry of Industry and Information Technology, Harbin Institute of Technology, Harbin, C.N.

Image-based Simulation of the Mesoscopic Environment-material Interaction

The latest development of 2D and 3D image recognition suggests a new path to investigate environment-material interaction during remediation. Porous media modelling is now available through image-based reconstruction, which provides a realistic boundary condition for chemical processes including dissolution, precipitation and reaction. This presentation demonstrates the algorithmic techniques including image segmentation, particle packing, computational fluid dynamics and computational chemistry in mesoscopic environment-material interaction. An innovative architecture is presented to efficiently establish a natural rock database with individual 3D printable volumes and surfaces. The database can be used to perform heterogeneous modelling with realistic aggregate input and distributive analysis of a specific constituent of interest. The necessity of customizing computer vision in the application of concrete composite is discussed with evidenced digital damage in the non-destructive measurement. A comparison with available reconstruction methods with feasibility is performed to demonstrate that characterizing practical porous media with detailed information on each constituent can provide a more realistic representation of the composite. The feasibility of such a proposal is evidenced by a discrete particle packing simulation scheme, which enables the generation of random 3D pore structures. The discrete packing model adopts a pre-existing algorithm and an improvement of pseudo-contact mechanics is introduced. An image-based model of heavy metal immobilization in wooden media is further presented as a well-established example. Digital testing methods are presented to calculate the surface area, specific surface area, density, porosity and immobilization amount. Three types of media are constructed for a comparison of immobilization capacity and efficiency. The computational approach provides a quantitative evaluation of the immobilized ions in arbitrary media. The proposed digital testing is feasible for both experimentally obtained images and structures from algorithm generation. In the end, the perspective of artificial intelligence is generally discussed based on data compatibility.

Keywords: Porous Media; Heavy Metal Immobilization; Heterogeneous Model; Image Segmentation; Multiphase Fluid.

Biography:

Dr. Wang studied Civil Engineering at the Harbin Institute of Technology (HIT) and the University of Birmingham. He received his double B.Eng in 2012. He then joined the Geotechnical and Environmental Research Group under the supervision of Prof. Abir Al-Tabbaa at the Engineering Department, University of Cambridge. After receiving his Cantab PhD degree in 2017, he began to conduct research and teaching under the supervision of Prof. Wei Wang in the School of Civil Engineering, HIT. He is now serving as an Associate Professor at HIT. He has published more than 20 research articles in SCI (E) journals.

Forrest Wu
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Innovative Eco-Friendly Housing Solutions Redefining Sustainable Living and Space Efficiency in Taiwan

The housing market in Taiwan reflects a critical need for affordable housing, compounded by a shortage of available land and an increasing demand for living space, which have caused housing prices to skyrocket. Despite these challenges, the growth of recent building technologies offers a distinctive opportunity to explore modular design as a potential solution. Such a design approach focuses on space-saving, affordability, and sustainability, providing a fresh perspective on addressing the housing crisis.

This research aims to address housing more thoughtfully, exploring new living styles that allow users to transform and personalize their spaces within budget and need constraints. By emphasizing rapid and affordable construction, this approach provides an innovative solution capable of relieving some of the current housing crisis symptoms. It enables households to access affordable, mobile, and environmentally friendly housing modules that suit their needs. Additionally, this modular design model promotes home ownership while simultaneously offering an attractive, profitable investment.

In the future, this modular housing concept could evolve into prefabricated housing to meet the growing demand for efficient living spaces in urban areas that are becoming increasingly crowded. A critical element of this design process is the inclusion of consumers in both design and assembly, creating new opportunities for personalizing living spaces. This consumer-focused strategy ensures that these homes are tailored to individual lifestyles while maintaining practicality and affordability.

Ultimately, the modular housing system is designed to allow occupants to live comfortably in relatively small spaces without compromising on essential conveniences such as a kitchen, bathroom, and bedroom. By combining sustainability, affordability, and adaptability, this project aims to redefine urban housing and create inclusive, innovative solutions that respond to modern needs.

- Enhanced Design Efficiency: Learn how modular design techniques can simplify the construction process, reduce costs, and save time while maintaining quality.
- Practical Sustainable Solutions: Understand how modular housing integrates environmentally friendly practices, addressing the demand for sustainable and responsible construction.
- Teaching and Research Applications: Faculty and researchers can use this framework to expand their studies or enrich curriculum materials related to urban housing, sustainability, and innovative design methods.
- Scalable Urban Housing Solutions: Discover how modular housing offers scalable solutions to meet growing urban housing demands, providing an approach that is adaptable to various market needs.

Keywords: Innovative Housing Technologies, Prefabricated House, Sustainable Housing, Compact Living, Green Construction

Biography:

Dr. Forrest Wu earned an MSc (1996) and PhD (2000) in Civil and Structural Engineering from the University of Sheffield. With over 20 years of experience, he is the Executive Director at Lijou Engineering Consultants and Assistant Professor at Minghsin University of Science and Technology. He specializes in foundation and bridge design, having worked as a structural engineer on Taiwan High-Speed Rail projects. Dr. Forrest Wu also holds leadership roles in professional associations, including President of the Hsinchu County Civil Engineering Association and Executive Director of the Taiwan Soil and Water Conservation Association, contributing significantly to academia and industry.

Michelle Maura Ribeiro
Pontifical Catholic University of Minas Gerais, Brazil

Geobim for Railroad Infrastructure – Modernizing Federal Public Management through the Adoption of BIM & GIS in the Context of Brazilian Cross-Investment and ESG

The Ferrovia de Integração Centro-Oeste (FICO), a strategic center west Brazilian railway spanning 383 kilometers, forms a key segment of Transcontinental Railway project, which aims to connect the Atlantic and Pacific Oceans, fostering economic integration and regional development across South America. The construction of FICO is enabled by an innovative cross-investment model involving Infra S.A. (Valec), ANTT, and the private mining company VALE. This groundbreaking financing approach blends public and private efforts to realize large-scale railway projects in Brazil.

Digital transformation in public management has become indispensable, particularly in this context, enhancing transparency and efficiency in project execution. Central to this transformation is the application of GeoBIM, integrating Building Information Modeling (BIM) and Geographic Information Systems (GIS). For FICO, GeoBIM consolidates technical, legal, environmental, and construction data through the Portal GeoBIM FICO+, an innovative platform that enables centralized and transparent lifecycle management of the project.

The adoption of these methodologies and technologies goes beyond innovation, aligning with ESG (Environmental, Social, and Governance) principles to promote environmental and social responsibility while modernizing governance in both public and private sectors. This digitized and integrated model optimizes processes related to engineering and environmental management, meeting the logistical demands of a growing economy.

The FICO GeoBIM successful use case exemplifies how technological innovation combined with strategic PPP public-private partnerships can transform Brazil's railroad infrastructure, establishing a new benchmark for future projects.

Keywords: GeoBIM, GIS, ESG, PPP, Railroad

Biography:

Michelle Maura Ribeiro, BIM Specialist, Master BIM Infra, Civil Engineer, Global BIM Manager, Digital Engineer. She is a Researcher, Professor, and Coordinator of the GeoBIM Infrastructure Postgraduate Program in Brazil and a speaker at renowned international institutions. She manages Multidisciplinary BIM Projects for High-Speed Trains in Europe in 4 languages, residing in Paris, France. She was Head of BIM and GIS Manager at Infra SA (VALEC) Ministry of Transport, implementing GeoBIM for Road-Rail Infrastructure in the Brazilian Federal Government. She wrote the first BIM Appendix for Rail Tendering in Brazil (Ferrogrão) by EPL and launched the first BIM Manual for Railways in Brazil in Public Consultation by Infra SA. She works directly with OpenBIM in the CoPIL of buildingSMART France and is part of BuildingSmart PT&BR, a BIM mentor at Infra Women BR, WIB Europe, IRAP's Women in Engineering, and SAEBrasil.

Duane Tristan Lawal
Melanized Limited, United Kingdom

Solar Integration Innovation - A Revolutionary Approach to Building Infrastructure through Integrated Solar Roofing Systems

The global transition to sustainable energy faces a critical challenge: the integration of solar technology into existing infrastructure without compromising architectural integrity or economic feasibility. This paper introduces the Integrated Solar Roofing System (ISRS), a revolutionary approach that transforms conventional roofing by seamlessly incorporating solar generation capabilities. The innovation lies in a proprietary roof casing system that doubles as both structural roofing and an energy generation platform, accommodating both operational solar panels and aesthetic dummy panels. This modular design allows for scalable implementation, enabling users to expand their energy generation capacity as needs grow by simply converting dummy panels to operational ones.

Our research demonstrates that this integrated approach achieves 20-22% solar conversion efficiency while maintaining complete architectural harmony. The system's power output of 400-600W per panel, combined with its weather-tight design and 25–30-year lifespan, presents a compelling solution for both developed and developing markets. The paper discusses how this technology addresses key market barriers, including initial cost constraints through innovative financing models, aesthetic concerns through seamless integration, and accessibility challenges through modular expansion capabilities.

Ongoing simulation and testing data indicates that the ISRS can reduce energy costs by 60-80% while increasing property values by 4.1%. Furthermore, the system's potential impact on global energy justice is significant, with particular relevance for the 789 million people currently lacking electricity access. The paper concludes by examining the technology's role in achieving sustainable development goals and its potential to revolutionize building-integrated photovoltaics.

Biography:

Duane embarked on his doctorate studies in Aerospace Science and Engineering at the University of Glasgow in 2011, and also holds Master degrees in Satellite Engineering and Geographical Information System from the Universities of Surrey and Manchester Metropolitan University respectively. He is the founder of Melanized Limited, a startup company heralding the sustainable engineering construction sector. He has published more several journal papers and remains committed to driving the presence and relevance of developing and emerging nations in space related activities. His current innovative work in sustainable energy solutions focuses on bridging the global energy access gap through technological innovation. Leading the development of the Integrated Solar Roofing System (ISRS), his vision combines technical excellence with social impact. Mr. Lawal's expertise spans renewable energy integration, sustainable infrastructure development, and innovative financing solutions for clean energy access.

Hadi Sarvari*[1], David J. Edwards [2], Iain Rillie [3]
Birmingham City University Department of Built Environment, B4 7XG, UK

Bridging to a Safer Future: Strategies for Integrating Safety I and Safety II in the Construction Industry

The construction sector is among the most hazardous sectors, with workers facing several dangers and hazards on a daily basis. Industrial safety management has conventionally emphasised a reactive strategy, referred to as Safety I, which seeks to mitigate accidents and incidents by identifying and controlling dangers. Safety II has a proactive approach on safety by emphasising the strengths and competencies of workers while promoting ongoing enhancement. Both Safety I and Safety II have faced criticism for their excessive emphasis on compliance (Safety I) and for the constraints imposed by executives (Safety II). This article intends to review, classify, and assess the potential integration of Safety I and Safety II within the construction industry. Therefore, a comprehensive literature review was done to identify and analyse the strategies for the integration of Safety I and Safety II. This evaluation emphasises the beneficial results attainable through the amalgamation of Safety I and Safety II within the construction sector. Furthermore, obstacles to implementing Safety I and Safety II plans were identified and examined. Extensive global research is necessary to comprehensively understand the obstacles to implementing Safety I and Safety II in practice; neglecting to investigate these factors will lead to a failure to reduce incidents. Adopting both Safety I and Safety II approaches is an optimal approach for the construction sector to guarantee worker welfare and project success..

Biography:

Dr Hadi Sarvari is presently a senior researcher at Birmingham City University. His research area focuses on construction safety and health and sustainability. He has also served as a researcher at the Hong Kong Polytechnic University and as an assistant professor in construction management at the Islamic Azad University Isfahan (Iran). In 2018, he was awarded the Best Lecturer Award in the educational field. He was also awarded as a distinguished researcher in 2021. He authored and co-authored more than 80 scientific articles and books in the following fields: PPP projects, safety and risk management, BIM, and maintenance management.

Anwaar Al Habsi[1,2]*, Salah Al Toubat[3]
[1] Department of Geoscience, UAE University
[2] National Water and Energy Center, UAE University
[3] College of Engineering, University of Sharjah

Advancing Self-Healing Concrete with Microbial Technologies and Sustainable Calcium Extraction in the UAE

The construction industry plays a pivotal role in global structure, yet it faces challenges such as material inefficiencies, maintenance costs, and environmental impact. One significant advancement is self-healing concrete, a transformative technology that enhances durability and reduces the need for repairs. In UAE, with its commitment to sustainable innovation and resource efficiency, this concept aligns perfectly with national development strategies such as UAE Vision 2030.

Traditional approaches to microbially induced calcium carbonate precipitation (MICP) technique in concrete crack repair rely on chemical calcium sources, which can be costly and environmentally taxing. Moreover, the management of by-products from microbial healing processes remains underexplored. Addressing these gaps, this research investigates the potential of MICP bacteria in conjunction with a natural, abundant calcium source from Jebel Hafeet—a unique geological feature of the UAE. Calcium ions are extracted through an innovative process using ammonium chloride, synthesized from recycled ammonium by-products generated during the MICP process. This closed-loop approach not only reduces waste and reliance on external chemicals but also enhances the environmental sustainability of self-healing concrete technologies.

To optimize bacterial viability and efficiency, this study employs freeze-drying techniques to encapsulate the bacterial spores, as this encapsulation ensures activation only upon crack formation, preserving the integrity of the concrete mix while maintaining the self- healing mechanism. The methodology integrates MICP with sustainable calcium extraction, ammonium recycling, and encapsulation techniques, creating a robust framework for green construction practices.

The proposed system is expected to significantly reduce material costs, environmental impact, and maintenance demands. By leveraging local resources and circular economy principles, this research aligns with the UAE's commitment to innovation and sustainability, offering a scalable solution for enhancing structure resilience. This study provides a unique framework for integrating local resources with microbial technologies, advancing self-healing concrete as a key contributor to the future of sustainable construction.

Keyword: Self-Healing Concrete, Microbially Induced Calcium Carbonate Precipitation (MICP), Calcium Sources, Ammonium Recycling, Encapsulation Techniques

Biography:

Anwaar Alhabsi, a master's student and research assistant at the United Arab Emirates University, has made her mark in material science and environmental sustainability. Her passion lies in exploring the interplay between concrete technology, soil formations, and bacterial processes, reflecting her drive to tackle pressing environmental challenges. Anwaar's academic journey has been shaped by her dedication to bridging disciplines, from hydrology to sustainable construction. A researcher at the National Water and Energy Center (NWAEC) at the UAEU, she aspires to reshape the future of civil engineering by promoting innovative, eco-friendly practices that inspire progress and address real-world challenges globally.

Srinath Tangaragu
Senior Project Engineering Manager – GE Vernova, United Kingdom

40% Increase in House Efficiency by Preparing for Artificial Intelligence

Artificial Intelligence, we have seen massive growth with many solutions being shared and provided. In reality all the organizations are relying on the contractors or 3rd party software provider to get it moving. The basic of Ai is to ensure all the basic are ready and incorporate to Ai when the time allows.

There are many factors and ways this can be achieved. The readiness of Ai will be able to optimize the cost to launch or introduce Ai in the organization. Additionally, the readiness will able to share the ultimate truth of the organization. This enables visibility of areas of improvement.

The readiness and preparation will than gain OPEX and CAPEX savings. This will generate a lean operating organization.

Biography:

UK chartered engineer with advisory (UK and US standards) and senior leadership experience of more than 20 years in experience in Oil & Gas, Renewables Energy & Engineering. Extensive working with diverse culture & leadership. Strong data analytical skills & proven track record in operations, maintenance, engineering & projects.

Rui Pang*[1,2], Tianpeng Zhang[1], Guangkai Song[1], Lanbo Zhang[1], Longji Dang[1], Wenkang Wang[1]
[1]College of Civil Engineering, Henan University of Technology, No. 100 Lianhua Street, Gaoxin District, Zhengzhou, China
[2]Henan Key Laboratory of Grain and oil storage facility & safety, No. 100 Lianhua Street, Gaoxin District, Zhengzhou, China

Experimental and Analytical Study on Vertical Bearing Behavior of Discretely Connected Precast Concrete Floors with Four Sides Simply Supported

Floor is a horizontal load–bearing member in a building designed to bear and transmit gravity and lateral loads to the vertical load–bearing members. In order to transmit internal forces generated by vertical and horizontal loads through its slab joint connections, a creative discretely connected precast concrete floor (DCPCF) was proposed. The slab joint connections utilize hybrid connectors containing hairpin connectors (HPC) and cover-plate connectors (CPC). The validity of this design concept was confirmed through Previous studies. However, the mechanical properties of DCPCF are not very clear.

In order to further investigate the load transfer mechanism and vertical bearing capacity of DCPCF, and the influence of factors such as the number of connectors, the number of PC slabs, and the type of connectors, a two-stage research program was conducted. The first step involved assessing the vertical bearing capacity of DCPCF in the OSL direction under the condition of simple support at two ends. Six DCPCF specimens and two cast-in-situ (CISS) specimens were tested and analyzed. During this stage, the influence of parameters such as the number of slab joints and connectors on the force transfer performance of DCPCF in the OSL direction was analyzed, providing a basis for establishing the bending stiffness of DCPCF in the OSL direction. The second step focused on assessing the vertical bearing capacity of DCPCF under the condition of simple support at four sides. Two DCPCF specimens and one CISS specimen were tested and analyzed. During this stage, the primary focus was on the two-way load transfer mechanism and vertical bearing capacity of DCPCF, with the main goal being to establish the calculation method for DCPCF's bearing capacity and deformation under four-sided support conditions. This paper primarily presents the results of the second stage of research.

The results showed that DCPCF had high bending stiffness and bearing capacity, which the same as those of CISS basically. The discrete slab connectors of DCPCF specimens exhibited good force transmission performance throughout the loading process, and no obvious local failures were observed. The flexural deformation shape, failure mode, and crack distribution of DCPCF were similar to those of CISS, which indicating that the slab joint connections can effectively transfer internal force in the orthogonal slab laying direction (OSL direction), and giving DCPCF the characteristics of a typical two-way slab floor. In addition, the initial stiffness and deformation of DCPCF specimens was slightly smaller than that of the CISS specimen, which shown that DCPCF had better deformation recovery ability. Compared with the CISS specimen, DCPCF specimens exhibited no obvious plastic stage and entered the nonlinear working stage earlier. A problem worthy to be pointed out was that simplified formulas for the equivalent bending stiffness

of DCPCF in the OSL direction were derived by using the conjugate beam method. Furthermore, the vertical bearing capacity and deflection equations of DCPCF with simply supported on four sides under a uniform distributed load were derived based on the small deflection theory of orthotropic elastic thin slabs, and the theoretical calculation values were in good agreement with test values.

Biography:

Prof. Rui Pang received his Ph.D. from Southeast University in January 2012. He is now the deputy director of the science and Technology Department of Henan University of Technology. His research focuses on prefabricated concrete structures, steel structures, super-high-rise buildings, and new warehouse structures. He has led 3 National Natural Science Foundation projects, 3 provincial-level projects, and over 10 industrial research projects. He has published more than 80 papers, including over 40 SCI/EI-indexed articles, and holds over 10 national invention patents. He has also edited and co-authored several national standards and textbooks.

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HYBRID EVENT

Zoom Meeting (GMT+1) Time in London, UK

VIRTUAL PRESENTATIONS

DAY 2

Ashish Sawarn
National Institute of Technology Kurukshetra, India

Utilizing Crumb Rubber as a Partial Replacement for Fine Aggregate in Concrete

Waste tires create substantial environmental challenges for the tire industry when disposed of improperly. Crumb rubber, finely ground particles less than 4.75 mm in size derived from waste tires, has been introduced as a partial replacement for natural fine aggregates in concrete, effectively addressing the issue of tire waste management. This study evaluates the performance of concrete containing crumb rubber as a fine aggregate substitute, providing valuable insights for the design and application of crumb rubber concrete (CRC). Crumb rubber is lighter than natural fine aggregate, hydrophobic, and prone to air entrapment, which significantly reduces the workability of fresh CRC and weakens its bonding with the cementitious matrix. The review needs more focus on reduced strength and workability of crumb rubber concrete (CRC) due to its hydrophobic nature. The construction industry is facing sustainability issues due to the depletion of natural aggregates and the environmental concerns associated with waste tire disposal. Crumb rubber, produced from recycled tires, provides a sustainable alternative by partially replacing fine aggregates in concrete. This not only helps in reducing the environmental impact but also conserves natural resources. However, using crumb rubber in concrete presents challenges such as reduced strength and workability due to its lower stiffness and hydrophobic nature. This research focuses on compairing the compressive strength of M40 grade of concrete with 0.4 water cement ratio was investigated in which crumb rubber shall be used at varying percentage of 0%, 10%, 20%, 30% as a partial replacement of fine aggregate at the duration of 7 days, 14 days and 28 days. The study analyzes mechanical properties of crumb rubber concrete. Research should focus on optimizing crumb rubber recycling methods and enhancing its performance in concrete applications.

Keywords: Optimum dose of crumb rubber, Compressive strength, Weak bonding, Impact loading, Durability.

Biography:

I Ashish Sawarn studied Civil Engineering at the Guru Gobind Singh Indraprastha University, New Delhi, India and graduated as B-Tech in 2018. After the completion of B-Tech I decided to do teaching in Diploma Collage for 4 years. Now, from 2023 I am persuing M-Tech in Structural Engineering from National Institute of Technology (NIT), Kurukshetra, Haryana, India and going to complete in year 2025. I am doing research under the guidance of Professor of Civil Engineering Department of NIT Dr. SM Gupta.

Abdel Rahman Elbakheit
King Saud University, Saudi Arabia

Building Integrated Diffusers' Area Ratio Optimization

Wind energy is one of the very cleanest and readily available energy resources within the built environment1. With high growth of cities globally that necessitates increase in energy demand and ensued CO2 emissions; Building integrated wind turbines provides opportunities for providing valuable renewable energy within the built environment. Thus, satisfying energy demand in a sustainable way and reducing CO2 emissions within the built environment. Furthermore, reducing power transmission losses. The amalgamation of these efforts would hope fully reduce the production of CO2 and slow global warming and climate change. However, many challenges are faced in this process due to the variability of wind patterns and the low magnitude of wind speeds posed by the presence of buildings and other obstacles. Diffuser's, shroud's and aero foil's wind augmented turbines provide an opportunity to solve these problems by accelerating wind flows to confined spots in a controlled manner. Thus, reducing the effect of low velocities and turbulences around buildings. Many researchers provided experimental and theoretical studies on these diffusers and shrouds their components, types, optimizations and underlying principles.

This paper presents an investigation into the effect of area ratio parameter of diffusers on its energy output through power coefficient Cp. This parameter has effect both on diffusers' energy yield, besides diffuser's size for architectural integration prospects. A systematic increase in diffusers area ratio is adopted following standardized diffuser profile presented by NACA 1244 aerofoil. A series of area ratios were investigated (i.e., 1.25, 1.5, 1.75, 2, 2.5, 3 and 3.5). Area ratio of 1.5 (i.e., outlet/inlet, 0.75 m/0.50 m) exhibited the highest power coefficient Cp of 4.2, in addition to achieving highest resulting velocity of 25.8 m/s under incident velocity of 16m/s. Considerable wind separation inside inner walls of diffusers occurred from area ratio 1.75 onwards, which impacted resulting velocities. Simulations performed with ANSYS CFD Academic to standalone diffusers. A series of incident velocities employed from 1 to 16 m/s that resulted in velocity increase by 120–156% respectively.

Keywords: Diffuser area ratio, Wind energy augmentation, Building integrated diffusers, Diffuser sizing, Wind energy optimization in buildings, Diffuser optimization

Biography:

Dr. Elbakheit is an associate Professor at the Dept. of Architecture and Building Science, King Saud University, Riyadh, Saudi Arabia. He is also a registered consultant in sustainable Architectural design majoring Photovoltaic and wind turbine integration into buildings. Obtained his doctorate degree at the University of Nottingham, UK 2007. The research topic was ' Enhanced Architectural integration of Photovoltaic and wind turbines into building Design'. It aimed at utilizing the architectural design forms to create favorable conditions for integration of photovoltaic and wind turbines to maximize their performance as well as the architectural environment. In 2002, he graduated with a first class (Distinction) MSc. In Renewable energy and Architecture from Nottingham University, UK. BSc. 1994 in Architecture. In addition, he has produced numerous publications in international refereed journals, (Clarivate Analytics) listed journals and scientific conferences revolving about solar and wind technologies and integration into buildings, Tall buildings sustainable design, Including natural lighting, energy efficiency, passive systems, and other sustainability issues.

Jose Luis Miranda Dias
[1]Department of Buildings, National Laboratory of Civil Engineering (LNEC), Av. do Brasil 101, Lisboa, Portugal.

Damaging Effects of Severe Wind Actions on Infill Masonry Walls of Reinforced Concrete Buildings and Respective Mitigation

The external envelope of reinforced concrete buildings (RCS buildings) is subjected to external environmental actions, particularly those related to wind action, which could expose their unreinforced masonry (URM) infill walls, in case of high winds, to intense out-of-plane loads (OOP loads), and in-plane loads (INP loads). These URM infill walls of the building facade, for applied high wind loads (OOP loads), could be subjected to adverse out-of-plane bending Furthermore, the out-of-plane (OOP) capacity of URM infill walls associated to wind action could be affected by vertical deformations. The wind is commonly associated with normal climatic actions, nevertheless, it has lately been connected to the effects of climate changes (changes in temperature and sea-level rise, precipitation change, droughts, and floods), which have already considerable impact on human and natural systems. The global variations of the planet´s climate are mainly linked to global warming, mostly caused by the release of "greenhouse gases", which are presumably associated, largely, with human activity. In this paper, firstly, the previewed increase of wind actions due to the expected effects of climate change is analyzed, mainly in terms of their possible impact on the service life of these RCS buildings, with premature degradation of materials and construction elements. Subsequently, basic elements about wind action in facades and cross walls of the building´s vertical envelope are presented here. Relevant characteristic behavior of URM infills and their supports in the case of OOP loads and INP loads due to wind were analyzed. Finally, the influence of previous vertical deformations of the supporting elements on the out-of-plane (OOP) capacity of the URM infill walls, related to wind action (OOP loads due to the wind) is also analyzed.)

Biography:

Jose Luis Miranda Dias obtained his graduation in Civil Engineering (1984) and PhD in Civil Engineering (1998), both at IST Técnico Lisboa/Universidade Técnica de Lisboa (UTL), and currently works as Research Officer at the Department of Buildings, National Laboratory for Civil Engineering. José does research in Civil Engineering and Materials Engineering.

Juliana Gehlen
Universidade de Brasília, PEEC/UnB, Brazil

Enhancing Sustainability in Construction through Building Information Modeling (BIM)

Building Information Modeling (BIM) is increasingly pivotal in advancing sustainability within the construction industry, offering significant benefits in optimizing efficiency, reducing waste, and promoting sustainable development. This document delves into the integration of BIM with sustainability assessments, emphasizing its critical role in life cycle assessment (LCA) and building sustainability assessment (BSA). BIM facilitates the efficient management of materials and components, thereby promoting circular economy principles and significantly reducing waste. By enabling energy modeling and simulation, BIM enhances decision-making for both new and existing structures, particularly in energy-intensive environments like hospitals. Implementing BIM-based improvements can lead to energy savings of up to 50%, with lighting systems alone contributing up to 13% in savings. The document also discusses the potential of BIM-based tools to automate and streamline LCA and Life Cycle Cost (LCC) analyses in early project stages, providing real-time decision support for evaluating environmental, economic, and functional performance. Despite its transformative potential, the integration of BIM in sustainable construction faces challenges such as non-uniform data formats, insufficient training, and a lack of experts, which remain significant barriers. The study advocates for further research and policy development to address these challenges, aiming for a future where BIM and sustainability are seamlessly integrated. This integration is crucial for enhancing energy efficiency, improving project quality, and managing lifecycle data for green buildings, thereby revolutionizing sustainable construction practices and contributing to global environmental goals.

Keywords: Building Information Modeling, Sustainability, Life Cycle Assessment, Circular Economy, Construction Industry

Biography:

Juliana Gehlen is a professional in sustainable architecture, with a Master's degree in Sustainable Construction from Universidade de Brasília. Her career is marked by key positions as a sustainability consultant and LEED Manager, where she has focused on climate change and sustainable practices. In addition to her consultancy work, Juliana has extensive teaching experience at the Faculdade de Arquitetura e Urbanismo at Centro Universitário Unieuro. Currently, she is a doctoral candidate in Civil Construction at Universidade de Brasília, concentrating her research on innovative building technologies.

Paulo C De Morais
Genomic Sciences and Biotechnology, Catholic University of Brasilia, Brasilia, DF, Brazil
Institute of Physics, University of Brasilia, Brasilia, DF, Brazil

Investigating the Impact of Nanoadditives in Portland-based Cement

This talk will focus on the present status of how nanosized supplementary cementitious material (NSCM) can be used to improve the mechanical properties and durability performance of cementitious composites (cement paste, mortar and concrete). The emphasis here will be on the use of nanosilica (NS), which has been taken cement composites to higher performance levels. Despite the performance improvements in many properties, NS has a great agglomeration tendency, which makes it a difficult material to handle beneficially in a broad perspective. In addition, there is the occurrence of autogenous shrinkage of cementitious materials caused by the accelerated development of mechanical strength in a short period of time. In view of these challenging aspects, recent achievements in monodisperse NS via surface functionalization methods have provided a significant development of silica-decorated nanomaterials (among the functional groups: amine, carboxyl, and glycol), leading to functionalized nanosilica (FNS). FNS can be developed with chemically grafted functional groups that can improve their properties as NSCM. Therefore, a comprehensive evaluation of functionalized NS using amino-terminated 3-aminopropyltriethoxysilane (APTES) and based on the silica gel process with different levels of functionalizing agent will be presented. Data extracted from representative samples and using different experimental techniques, will be presented and discussed. The performed analyses show that typical FNS samples reveal sophisticated surface changes involving chemical reactions, proton transferring and hydrogen bonding, leading to different end products and presenting different surface coating composition, hydrodynamic particle size profile and zeta potential. Finally, the performed analyses emphasize the signatures of the onset of the first dressed closed shell while using APTES.

Biography:

Professor Paulo César De Morais (H60), PhD, was full Professor of Physics at the University of Brasilia (UnB) – Brazil up to 2013. Appointed as UnB's (Brazil) Emeritus Professor (2014); Visiting Professor at the Huazhong University of Science and Technology (HUST) – China (2012-2015); Distinguished Professor at the Anhui University (AHU) – China (2016-2019); Full Professor at the Catholic University of Brasília (CUB) – Brazil (2018); CNPq-1A Research Fellow since 2010; 2007 Master Research Prize from UnB. He held two-years (1987-1988) post-doc position with Bell Communications Research, New Jersey – USA and received his Doctoral degree in Solid State Physics (1986) from the Federal University of Minas Gerais (UFMG) – Brazil. With more than 13,000 citations, He has published more than 500 papers (Web of Science), delivered more than 200 international invited talks, and filed more than 15 patents.

Yashnil Mohanty
[1]Westmont High School, Campbell, CA, United States

Predicting Droughts: A Comparative Study of ARIMAX, LSTM, XGBoost, and Random Forest Models

Droughts pose significant challenges to global water resources, agriculture, and ecosystems, necessitating accurate prediction tools. This study evaluates four advanced modeling techniques—ARIMAX, LSTM, XGBoost, and Random Forest—using a novel dataset from the Gunnison River Basin (1979–2023). Integrating meteorological, hydrological, and oceanic predictors, augmented with lagged variables and seasonal encodings, the framework predicts streamflow six months in advance, a key proxy for drought conditions. LSTM outperformed other models, achieving the lowest RMSE (317.71) and MAE (164.83), excelling in capturing nonlinear and temporal dependencies. ARIMAX provided interpretability but struggled with linearity and overfitting, while XGBoost and Random Forest balanced feature interactions and overfitting reduction. Cross-validation highlighted dataset limitations, with future spatially resolved data offering opportunities for improved robustness. Key features like precipitation, temperature, and reference evapotranspiration emerged as critical, emphasizing lagged effects and ocean-atmosphere teleconnections, such as those captured by the Multivariate ENSO Index (MEI). This research advances drought prediction by integrating diverse predictors, addressing dataset challenges, and offering actionable insights for resource management and policy development to mitigate the impacts of hydrological extremes.

Biography:

Yashnil Mohanty is a junior at Westmont High School with a deep interest in natural disaster prediction and forecasting, particularly in forest fires and droughts. His research focuses on leveraging deep learning and geospatial modeling to address these critical issues. Currently, he collaborates with the National Center for Atmospheric Research (NCAR), where he conducts meteorological research. Yashnil's work aims to advance predictive capabilities for natural disasters by integrating cutting-edge machine learning techniques with environmental science.

Michelle Shah[1]*, Professor Kiran Tota-Maharaj [2], Professor Hazi Azamathulla

[1] Ph.D. Scholar, Department of Water Resources Management and Infrastructure, Royal Agricultural University, Cirencester, England, United Kingdom

[2] Professor & Chair, Water Resources Management & Infrastructure, Royal Agricultural University, Cirencester, England, United Kingdom

Renewable Energy Approach for Wastewater Reuse in Vertical Flow Constructed Wetlands and Solar Powered Drip Irrigation Systems in the Caribbean: A Case Study in the Caroni River Basin, Trinidad and Tobago, West Indies

Water and wastewater management, a key topic of immense significance, encompasses various initiatives such as reuse, recycling, reclamation and discharge, all aimed at promoting responsible water utilisation, treatment, and disposal. The research study seeks to collaborate with the Ministry of Public Utilities of Trinidad and Tobago, Water and Sewerage Authority and other stakeholders to reuse treated wastewater for agricultural irrigation. Significant efforts have already been made toward establishing national standards for wastewater reuse, culminating in the Cabinet-approved National Voluntary Wastewater Reuse Standard TTS 664-2022. With an anticipated increase in irrigation demand due to projected agricultural needs, the research study aims to explore the approaches suitable for the effectiveness of permeable geotextile materials and filter material comprised of Coated Chitosan (CS) on Coconut Shell Activated Carbon (CAC), Biochar-Based filters and Construction Waste Gravel. This will be assessed by using a Wastewater Reuse Prototype (WWR) for determining improvements in the wastewater treatment performance, increased water supply and reducing wastewater pollution. The study will also demonstrate how Vertical Flow Constructed Wetlands, planted with Phragmite Australis plant species, can be used for the treatment of municipal wastewater. The main objective of this study is to evaluate the efficiency of the system for pollutants removal and nitrification. Furthermore, to select the most appropriate wetland configuration that can be used as an affordable eco-technology based treatment system suitable for on-site and decentralized domestic wastewaters in rural communities. The Constructed Wetland System follows directly from the pilot study done previously by researchers at the Guanapo Landfill Project Site. The previous research demonstrated that specialised plants can slow down water to allow solids to settle, convert contaminants into less harmful substances and support microorganisms that filter and purify water. A Vertical Flow Constructed Wetland System (VFCWS) was used for the treatment of the leachate. The plants were observed to adapt to the liquid effluent's composition and flourished in the organic medium. The micro-organisms performed as expected and the water quality standard improved according to World Health Organisation (WHO) Standards. The treatment resulted in environmentally acceptable effluent quality. The study will also demonstrate how a Solar Powered Automated Drip Irrigation (SPDI) system using pumps and solar panels for drip irrigation of Lettuce Crop can be used for efficient irrigation. The system will be divided into six (6) blocks (for the six crop plots) operated separately. The seventh zone will be for the fertigation system. The final assessments will conclude that the Wastewater Reuse Prototype (WWR), Vertical Flow Constructed Wetland System (VFCW) and Solar Powered Automated Drip Irrigation (SPDI) system

are appropriate technologies for safe water reclamation oriented to agricultural production that can be complemented by a proper irrigation method to reach environmentally safe and sustainable targets. The research will conduct assessments of Knowledge, Attitudes and Practices (KAP) and Willingness to Pay (WTP) to inform the national voluntary standard for wastewater reuse and for implementation of treated wastewater and water management strategies for effectively mitigating environmental hazards and risks on agricultural lands, thereby supporting sustainable agricultural practices in the Caribbean.

Key Words: Wastewater Reuse, Permeable Geotextile Membrane, Constructed Wetland, Solar Power, Irrigation

Biography:

Ms. Shah is a Ph.D. Research Candidate at Royal Agricultural University, Cirencester, United Kingdom, Department of Water Resources Management and Infrastructure Development supervised by Professor Kiran Tota-Maharaj. Awarded a Postgraduate Degree PgCERT in Research/Research Methods at the University of Gloucestershire, United Kingdom, 2024, M.Sc. Degree in Water and Wastewater Services Management, 2017, B.Sc. Degree in Agricultural Engineering, 1992, Faculty of Engineering, University of the West Indies, St. Augustine, Trinidad and Tobago. She had several Abstracts and Manuscripts published in Conference Proceedings and Special Journals. Holds the position of Director, Land and Water Development Division, Ministry of Agriculture, Land and Fisheries, Trinidad and Tobago, West Indies

Prof. Dr. habil. Bernd Blobel, FACMI, FACHI, FHL7, FEFMI, FIAHSI[1,2,3,4]

[1]University of Regensburg, Medical Faculty, Regensburg, Germany
[2]Charles University Prague, First Medical Faculty, Prague, Czech Republic
[3]Faculty European Campus Rottal-Inn, Deggendorf Institute of Technology, Deggendorf, Germany
[4]University of Genoa, DIBRIS, Genoa, Italy

Designing and Managing Intelligent and Ethical and Ethical Transformed Health and Social Care Ecosystems

For meeting the financial, quality and safety challenges as well as expectations of the patients, health and social care systems around the globe currently undergo a transformation towards personalized, preventive, predictive, participative precision medicine (5PM), supported by technology. It considers individual health status, conditions, genetic and genomic dispositions in personal social, occupational, environmental and behavioral context, understanding the pathology of diseases and turning health and social care from reactive to proactive. The aforementioned transformation is strongly supported by technologies such as micro- and nanotechnologies, advanced computing, artificial intelligence, autonomous systems and robotics, knowledge representation and management, etc. Beside their opportunities, those advanced technologies also bear risks to be managed, requiring the detailed consideration from a humanistic, moral and ethical perspective. For enabling communication and cooperation between all actors from different disciplines involved, using different methodologies, perspectives, intentions, languages, we shall understand and formally and consistently represent the multidisciplinary, highly complex and dynamic 5PM ecosystem. The outcome is a system-theoretical, architecture-centric, ontology-based, policy-driven approach for designing and managing intelligent and ethical 5PM ecosystems. The necessary model and framework has been developed by the author and meanwhile standardized as ISO 23903 Interoperability and Integration Reference Architecture. The formal representation of any ecosystem and its development process including examples of practical deployment of the approach are presented in detail. This includes correct systems and standards integration and interoperability solutions.

Biography:

Dr. Bernd Blobel received a multi-disciplinary education, covering mathematics, physics, systems engineering, electronics, medicine, informatics and medical informatics, including habilitations in medicine and informatics. He was Head of the Institute for Biometrics and Medical Informatics at the University of Magdeburg, and thereafter Head of the Health Telematics Project Group at the Fraunhofer IIS in Erlangen. Thereafter, he acted until his retirement as Head of the German National eHealth Competence Center at the University of Regensburg. He was leadingly involved in many countries health digitalization as well as electronic health record strategy. He was and is still engaged in international standardization at ISO, CEN, HL7, OMG, IEEE etc. Furthermore, he still engaged in international higher education. He is Fellow of several international academies

Index

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