THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

Abstract Book

3rd Annual International Conference on AI and Data Science
20-23 June 2022, Athens, Greece

Edited by
Timothy Young & Olga Gkounta

2022

3rd Annual International Conference on AI and Data Science

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(In Alphabetical Order by Author's Family Name)

Preface

This book includes the abstracts of all the papers presented at the *3rd Annual International Conference on AI and Data Science* (20-23 June 2022), organized by the Athens Institute for Education and Research (ATINER).

A full conference program can be found before the relevant abstracts. In accordance with ATINER's Publication Policy, the papers presented during this conference will be considered for inclusion in one of ATINER's many publications only after a blind peer review process.

The purpose of this abstract book is to provide members of ATINER and other academics around the world with a resource through which they can discover colleagues and additional research relevant to their own work. This purpose is in congruence with the overall mission of the association. ATINER was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world can meet to exchange ideas on their research and consider the future developments of their fields of study.

To facilitate the communication, a new references section includes all the abstract books published as part of this conference (Table 1). I invite the readers to access these abstract books –these are available for free– and compare how the themes of the conference have evolved over the years. According to ATINER's mission, the presenters in these conferences are coming from many different countries, presenting various topics.

Table 1. *Publication of Books of Abstracts of Proceedings, 2020-2022*

Year	Papers	Countries	References
2022	26	15	Young T and Gkounta O (2022)
2021	12	5	Papanikos (2021)
2020	15	9	Papanikos (2020)

It is our hope that through ATINER's conferences and publications, Athens will become a place where academics and researchers from all over the world can regularly meet to discuss the developments of their disciplines and present their work. Since 1995, ATINER has organized more than 400 international conferences and has published over 200 books. Academically, the institute is organized into 6 divisions and 37 units. Each unit organizes at least one annual conference and undertakes various small and large research projects.

For each of these events, the involvement of multiple parties is crucial. I would like to thank all the participants, the members of the organizing and academic committees, and most importantly the administration staff of ATINER for putting this conference and its subsequent publications together. Specific individuals are listed after the Editors' Note.

Gregory T. Papanikos
President

Editors' Note

These abstracts provide a vital means to the dissemination of scholarly inquiry in the field of AI and Data Science. The breadth and depth of research approaches and topics represented in this book underscores the diversity of the conference.

ATINER's mission is to bring together academics from all corners of the world in order to engage with each other, brainstorm, exchange ideas, be inspired by one another, and once they are back in their institutions and countries to implement what they have acquired. The 3rd Annual International Conference on AI and Data Science accomplished this goal by bringing together academics and scholars from 15 different countries (Albania, Bulgaria, Germany, France, India, Italy, Japan, Mexico, Romania, South Africa, Spain, Taiwan, Turkey, UK, and USA), which brought in the conference the perspectives of many different country approaches and realities in the field.

Publishing this book can help that spirit of engaged scholarship continue into the future. With our joint efforts, the next editions of this conference will be even better. We hope that this abstract book as a whole will be both of interest and of value to the reading audience.

Timothy Young & Olga Gkounta
Editors

3rd Annual International Conference on AI and Data Science, 20-23 June 2022, Athens, Greece

Organizing & Scientific Committee

All ATINER's conferences are organized by the Academic Council. This conference has been organized with the assistance of the following academic members of ATINER, who contributed by reviewing the submitted abstracts and papers.

1. Gregory T. Papanikos, President, ATINER & Honorary Professor, University of Stirling, U.K.
2. Timothy Young, Director, Center for Data Science (CDS), ATINER & Professor, University of Tennessee, USA.
3. Theodore Trafalis, Director, Engineering & Architecture Division, ATINER, Professor of Industrial & Systems Engineering and Director, Optimization & Intelligent Systems Laboratory, The University of Oklahoma, USA.
4. Dimitrios Goulias, Head, Civil Engineering Unit, ATINER and Associate Professor & Director of Undergraduate Studies Civil & Environmental Engineering Department, University of Maryland, USA.

FINAL CONFERENCE PROGRAM

3rd Annual International Conference on AI and Data Science, 20-23 June 2022, Athens, Greece

PROGRAM

Monday 20 June 2022

09.00-09.30
Registration

09:30-10:00
Opening and Welcoming Remarks:

- **Gregory T. Papanikos**, President, ATINER

10:00-11:30 TIME SLOT 1 – MORNING PRESENTATIONS

Coordinator: Timothy Young, Director, Center for Data Science (CDS), ATINER &Professor, University of Tennessee, USA.

1. **Dimitrios Goulias**, Head, Civil Engineering Unit, ATINER and Associate Professor & Director of Undergraduate Studies Civil & Environmental Engineering Department, University of Maryland, USA.
   ***Title**: Incorporating Performance Requirements in Asphalt Mixture Design.*
2. **Hector Estrada**, Professor, University of the Pacific, USA.
   ***Title**: Comparative Analysis of the Embodied Energy and Carbon Footprint of Concrete Compared to Other Construction Materials.*
3. **Barry Hojjatie**, Professor, Valdosta State University, USA.
   ***Title**: Development of Smart and Efficient Traffic System in the City of Valdosta Georgia.*

11:30-13:30 TIME SLOT 2 – NOON PRESENTATIONS

Coordinator: Dimitrios Goulias, Head, Civil Engineering Unit, ATINER and Associate Professor & Director of Undergraduate Studies Civil & Environmental Engineering Department, University of Maryland, USA.

1. **Timothy Young**, Professor, University of Tennessee, USA.
   ***Title**: Digital Twins using Machine Learning for Optimization in the Sustainable Biomaterials Industries.*
2. **Yiannis Papadopoulos**, Professor, University of Hull, UK.
   ***Title**: Adaptive Decentralised Safety Monitors for Cooperative Intelligent Systems.*
3. **Glen Bright**, Dean of Engineering, University of KwaZulu-Natal, South Africa.
   ***Title** Autonomous Vehicle Sensors, Control Research and Development for Application in Industrial and Commercial Vehicles.*
4. **Johanna Gerlach**, PhD Student, University of Applied Sciences Jena, Germany.
   ***Title**: Selection of Standard Parts under the Influence of Deep Learning.*

13:30-14:30
Lunch

14:30-16:00 TIME SLOT 3 – AFTERNOON PRESENTATIONS

Coordinator: Konstantinos Manolidis

1. **Chiun-Chieh Hsu**, Professor, National Taiwan University of Science and Technology, Taiwan.
   ***Title**: Neural Information Retrieval with Click-Attention Graphs.*
2. **Mihail Mateev**, Assistant Professor, University of Architecture, Civil Engineering and Geodesy, Bulgaria.
   ***Title**: Implementing Document Automation using Modern Data Lake and Automated Workloads for Big Environmental Projects.*
3. **Alwyn Hoffman**, Professor, North-West University, South Africa
   Crynos Mutendera, PhD Student, North-West University, South Africa.
   ***Title**: A Simulation Approach for Optimized Border System Design.*
4. **Indrit Enesi**, Professor, Polytechnic University of Tirana, Albania.
   ***Title**: Evaluation of the 3D Reconstruction Performance of Objects in Meshroom: A Case Study.*

20:30-22:30
Greek Night

Tuesday 21 June 2022

08:30-11:30 TIME SLOT 4 – MORNING PRESENTATIONS

Old and New-An Educational Urban Walk

The urban walk ticket is not included as part of your registration fee. It includes transportation costs and the cost to enter the Parthenon and the other monuments on the Acropolis Hill. The urban walk tour includes the broader area of Athens. Among other sites, it includes: Zappion, Syntagma Square, Temple of Olympian Zeus, Ancient Roman Agora and on Acropolis Hill: the Propylaea, the Temple of Athena Nike, the Erechtheion, and the Parthenon. The program of the tour may be adjusted, if there is a need beyond our control. This is a private event organized by ATINER exclusively for the conference participants.

11:30-13:30 TIME SLOT 5 – MORNING PRESENTATIONS

Coordinator: Timothy Young, Director, Center for Data Science (CDS), ATINER &Professor, University of Tennessee, USA.

1. **Dimitrios Goulias**, Head, Civil Engineering Unit, ATINER and Associate Professor & Director of Undergraduate Studies Civil & Environmental Engineering Department, University of Maryland, USA.
   ***Title**: Sustainability and Resilience of Civil Infrastructure.*
2. **Gregory T. Papanikos**, President, ATINER.
   ***Title**: The Economics of Sustainable Infrastructure.*
3. **Vasilica Vasile**, Scientific Researcher, National Institute For Building Research, Town Planning and Sustainable Territorial Development "URBAN – INCERC", Romania.
   ***Title**: Sustainable Development of the Built Environment and the Indoor Air Quality.*
4. **Marta-Cristina Zaharia**, Senior Scientific Researcher, National Institute for Research and Development in Constructions, Urban Planning and Sustainable Spatial Development – URBAN-INCERC, Romania.
   ***Title**: Psychoacoustics Perception of Noise in Civil Buildings, for Optimal Acoustic Design of Construction Elements – Study Questionnaire.*
5. **Kyriacos Polycarpou**, PhD Student, The Open University UK.
   ***Title**: Spatial Planning and Policy: An Enabling or a Procrastinating Actor of Sustainability Design Decisions?*
6. **Roberto Gomez**, Associate Professor, National Autonomous University of Mexico, Mexico.
   ***Title**: Load Tests of two Railway Viaducts.*

13:30-15:00 TIME SLOT 6 – NOON PRESENTATIONS

Coordinator: Konstantinos Manolidis

1. **Kamna Karan**, Assistant Director, Delhi Development Authority, India.
   ***Title**: Smart City Planning and Heritage – An IoT based Toolkit Framework.*
2. **Gaurab Das Mahapatra**, PhD Scholar, Hokkaido University, Japan, Suguru Mori, Professor, Hokkaido University, Japan.
   ***Title**: Role of Cognition in Pedestrian-Level Universal Mobility: Case of Central Kolkata, India.*
3. **Sayed Hashim Mohseni**, PhD Student, National Institute of Applied Sciences, France.
   ***Title**: Behavior of Polymeric and Oil Coated form Works through Demolding Force and their Effect on Surface of Cementitious Materials.*
4. **Francesco Spada**, PhD Student, University of Calabria, Italy.
   ***Title**: Dry Construction Systems for Sustainable Buildings in Mediterranean Context: An R&D Project in South Italy.*

15:00-16:00
Lunch

16:00-17:30 TIME SLOT 7 – AFTERNOON PRESENTATIONS

Coordinator: Konstantinos Manolidis

1. **Alperen Taha Demirbağ**, Researcher Assistant, Yıldız Technical University, Turkey.
   ***Title**: Identification of Factors Affecting Building Information Modelling (BIM) Adaptation for the Turkish Construction Industry.*
2. **Gabriela Calatan**, Senior Scientific Researcher, National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development, Romania.
   ***Title**: Environmentally Friendly Building Materials with Beneficial Potential for Indoor Air Quality.*
3. **Foteini Papadopoulou**, PhD Student, University of Hertfordshire, UK.
   ***Title**: Safe Houses: Design Principles, Potentials and Limitations – An Analysis through Data-Driven Approaches.*
4. **Vicente Ramos,** Associate Professor, University of Balearic Islands (SMARTIG), Spain.
   ***Title**: Pre and Post COVID-19 Analysis of Pedestrian Mobility at Urban Tourism Destinations.*
5. **Nur Yazdani**, Professor, The University of Texas at Arlington, USA.
   ***Title**: Quantifying Shallow-Depth Concrete Delamination Using Impact-Echo.*

20:00-21:30
Greek Home-Made Dinner (includes the traditional Greek household hospitality and quality)

Wednesday 22 June 2022
Educational Islands Cruise
Mycenae Visit

Thursday 23 June 2022
Delphi Tour

Glen Bright
Dean of Engineering, University of KwaZulu-Natal, South Africa

Autonomous Vehicle Sensors, Control Research and Development for Application in Industrial and Commercial Vehicles

Autonomous Vehicle Mechanical Modular Conversion is a design that can be approached using Industrial methods. The mechanical modules were designed to be implemented on a scale model, that is battery powered, imitating the functional requirements of a regular vehicle. The dimensions of the model vehicle, influenced the dimensions of the mechanical modules, as the dimensions utilized in the final design were developed to suit that of a regular vehicle.

Extensive research was required to complete a literature review on Autonomous vehicles and the components required to design and implement the mechanical modules, while also making notes of technologies currently in place. Conceptual designs based on the research were developed and design specifications were prescribed. Further requirements were fabricated using analytic software. The individual modules to operate the steering wheel, break and accelerator respectively were developed, keeping assembly and flexibility as top priorities.

This research topic is being done in conjunction with a study on the design of Autonomous Vehicle Sensors and Control Research and Development, where the machine learning and sensory devices utilized are outlaid in further detail. The sensors used are predominantly Radar and Vision (camera). Stimulus detected by the sensors are converted into electrical signals sent to and interpreted by the microcontroller, which in turn controls the motor turning the steering wheel and the electric actuators controlling the pedals. To test the functionality of the mechanical modules a remote-control system will be used to control the motion of the vehicle, in an industrial environment.

Gabriela Calatan
Senior Scientific Researcher, National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development, Romania
&
Carmen Dico
Senior Scientific Researcher, National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development, Romania

Environmentally Friendly Building Materials with Beneficial Potential for Indoor Air Quality

Following the obvious increasingly interest for environmental protection and pollution reduction, worldwide, there is a strong orientation for identification and use in buildings some materials that require low power consumption and to determine a pollution low level in all stages of their production and exploitation. These energy and environmental protection criteria can be met successfully by a combination of unburned masonry bodies made of clay, mixed with various other natural materials, and sheep wool thermal insulation mattresses.

This paper presents the possibility of improving some physical and mechanical characteristics of sandy clay (axial shrinkage, density, mechanical strength, water resistance, thermal conductivity) used for construction elements, simultaneously with thermal insulation possibilities using natural materials of animal origin (sheep wool).

The use of some addition materials as lime fillers or bone glue improved workability and allowed the using of optimal quantity of sand in mixture, thus obtaining superior physical and mechanical characteristics. The vegetal materials, some of them have positively influenced the mechanical resistances and some, the heat transfer resistance. Specific procedures of surface treatment with specific materials (wax, natural oils, refined petroleum products) caused increased water resistance in terms of keeping water vapor permeability.

These construction elements have a beneficial influence on the air quality of the interior space, ensuring, through the permeability to water vapor, the regulation of the relative humidity of the air and, through ability to store thermal energy in warm periods and release it in the cold ones, a uniform temperature distribution inside and avoiding high temperature fluctuations between seasons.

On the other hand, the thermal insulation made of natural fibers of animal origin, sheep wool, besides the main function of thermal insulation, contributes to maintaining the permeability of the walls to water vapor reducing the risk of high humidity. The genetic characteristics of the sheep wool yarn contribute essentially to the humidity of the indoor air through the capacity of sorption/desorption of atmospheric moisture. The keratin structure of the wool fissure allows the absorption and neutralization of air pollutants, volatile organic compounds and formaldehyde.

Based on the experimental research results, we can identify solutions for achieving a vernacular housing (resistance walls, partition walls, floors, plasters, water protection, thermal insulation and finishing) in terms of safety, comfort and current aesthetic criteria. At the same time, the materials analyzed offer the possibility of making constructions easier to integrate into the natural environment, with little impact on the change of the general lines of the landscape and contribute to increasing the possibilities of hygiene and health for users.

Gaurab Das Mahapatra
PhD Scholar, Hokkaido University, Japan
Suguru Mori
Professor, Hokkaido University, Japan
&
Rie Nomura
Associate Professor, Hokkaido University, Japan

Role of Cognition in Pedestrian-Level Universal Mobility: Case of Central Kolkata, India

There are 26.8 million differently-abled people in India as per the last census in 2011. Additionally, there are 103.8 million elderly people. In similar lines, the "United Nations Sustainable Development Goals" (UN-SDG) number 11 "Sustainable Cities and Communities" becomes more significant than ever in the Indian context. Universal Mobility is a fundamental component of "Sustainable Cities and Communities", which suggests equal mobility preferences for all devoid of the users' physical conditions. Pedestrian (including wheelchair-bound users) level use of urban areas is a relatively challenging domain of Universal Mobility in India. Specifically in old urban areas of India, the Universal Mobility scenario is more complicated due to organic urban development, low temporal changes, and high density. Amongst the numerous factors of pedestrian-level Urban Mobility, "Cognition" is significantly important. Cognition is important for differently-abled and elderly people alike; since it (Cognition) ensures legibility, orientation, and sense of place. Despite multiple international, national, and state-level guidelines related to Universal Mobility in India, the aspect of cognition has been disregarded in these guidelines. Although there has been immense research in accessibility and Universal Design in India, the impact of cognition in Universal Mobility at the pedestrian-level of old Indian cities is a relatively newer research topic.

In this research, the role of cognition in Universal Mobility at the pedestrian-level has been investigated. A stretch of approximately 850m in the core of Kolkata Municipal Corporation, India has been delineated as the case area for this research. The data sets considered for this research are: 1) Physical data: Pedestrian Count and Vehicular Traffic Volume, 2) Cognitive data: Light Intensity, Sound Intensity, and Temperature. The data were collected from the case area by the authors in the years 2020 and 2021. This paper initially involves determining the pedestrian "Level of Service" (LOS) based on the pedestrian count. Furthermore, the authors co-relate the LOS data with the light intensity,

sound intensity, and temperature data; for establishing a relationship between them. The paper further links five senses in humans to their pedestrian behavior in the context of old Indian cities. Along these lines, the authors attempt to explain the role of hormones in facilitating cognition in streetscape for differently-abled and elderly people. The importance of Assistive Technology in achieving "Service Level Benchmark" (SLBs) by fostering cognition in Universal Mobility is also discussed in this paper.

The result of this research indicates that the improvement of cognition in pedestrian-level Universal Mobility can lead to a better physical environment for the differently-abled and elderly. Furthermore, the findings shall be beneficial for researchers while designing/planning for pedestrian-level Universal Mobility in other old cities of India.

Alperen Taha Demirbağ
Researcher Assistant, Yıldız Technical University, Turkey
Hande Aladağ
Assistant Professor, Yıldız Technical University, Turkey
Gökhan Demirdöğen
Yıldız Technical University, Turkey
&
Zeynep Işik
Associate Professor, Yıldız Technical University, Turkey

Identification of Factors Affecting Building Information Modelling (BIM) Adaptation for the Turkish Construction Industry

The construction industry is of great importance for both human life and the national economy. Although the quality and efficiency of the buildings produced with the developing technology have increased, it is frequently stated in the literature that the construction industry remains in the lower ranks in terms of digitalization and technology adaptation compared to other sectors. Building Information Modeling (BIM) is seen as a new opportunity that can move the construction industry forward in this race. However, BIM adaptation in Turkey is not at the desired level taken into the account of BIM use benefits for construction industry. In this context, the aim of the study is to determine the factors affecting BIM adaptation in the Turkish construction industry and to identify importance level of these factors on the BIM adaptation level in the Turkish construction industry respectively. Within the scope of the study, a total of 59 factors that affect BIM adaptation were found under 10 categories such as organizational factors, personal factors, technology quality, financial factors, environmental factors, perceived ease of use, consensus on BIM use, perceived benefit, personal intention, and organizational intention. Interviews were carried out with BIM experts from construction industry to validate identified factors. Gathered data from expert evaluation was then analyzed with Relative Importance Index (RII) method to identify the significance of identified factors on the BIM adaptation level in the Turkish construction industry. According to the findings, the effects of factors under the categories of personal factors, perceived ease of use, and consensus are found out high. The study is of vital importance in terms of revealing factors affecting BIM adaptation for the Turkish construction industry. In addition, the

findings of the study will provide industry professionals a perspective on which factors should be considered to improve BIM adoption.

Indrit Enesi
Professor, Polytechnic University of Tirana, Albania

Evaluation of the 3D Reconstruction Performance of Objects in Meshroom: A Case Study

3D reconstruction of objects is with interest nowadays, mainly in production industry. The field of photogrammetry realizes the 3D reconstruction of objects through 2D photos. Different software, free or non-free exist, providing different quality and performance. Accurate 3D reconstruction is important in cloning objects, especially in the industry of spare parts or in the production of prostheses in medicine, etc. Determining accurately the sizes of the object, especially those with complex geometric shapes is very important in the 3D printing process. The purpose of this paper is the analysis of the accuracy of 3D reconstruction of objects against the number of its photos and the time evaluation of this process. The 3D reconstruction will be performed by free software Meshroom, measurement will be done in MeshLab. Experimental results show that quality and performance of 3D reconstruction depends on the number of photos of the object, concluding in finding the optimal balance between these parameters.

Hector Estrada
Professor, University of the Pacific, USA
&
Luke Lee
Professor, University of the Pacific, USA

Comparative Analysis of the Embodied Energy and Carbon Footprint of Concrete Compared to Other Construction Materials

It is well understood that the main objective of infrastructure design code specifications is to protect the public's welfare, health, and safety. None of these appear to be directly related to sustainability, which as a movement has focused attention on protecting the natural environment, conserving resources, and minimizing the toxicity of construction materials and processes. Some jurisdictions have adopted language related to sustainability based on the United States Green Building Council to curtail the adverse effects of global climate change and minimize environmental impact of new construction; and in some cases, to improve air quality in the community as well as increase the long-term viability of the local construction industry. In this chapter we provide a comparative analysis of the embodied energy and carbon footprint of concrete compared to other construction materials, such as steel, timber, masonry, and composites. We will concentrate on structural materials and discuss other peripheral uses of these materials as they relate to buildings, such as thermal and acoustic mass. We also discuss new innovative cements that were developed to reduce the adverse environmental impact of Portland cement-based materials – they are broadly classified as green concretes. We focus on a cement that simulates the geological processes to produce Si/Al based cement, which can result in a clean and environmentally friendly cement, with abundant precursor materials, low energy consumption, and low carbon dioxide (CO_2, or carbon) emission.

Johanna Gerlach
PhD Student, University of Applied Sciences Jena, Germany
Alexander Riedel
Scientific Assistant, University of Applied Sciences Jena, Germany
&
Frank Engelmann
Professor, University of Applied Sciences Jena, Germany

Selection of Standard Parts under the Influence of Deep Learning

Despite the automation trend, manual assembly still represents an essential manufacturing step for companies, which is associated with high time and cost expenditure. To meet these challenges, various optimization approaches for manual assembly are investigated. New potentials exist through the integration of object recognition algorithms.

Object detection is a subfield of computer vision and is concerned with determining the content and position of objects based on image properties (features). Deep learning applies when these features are detected in complex structures by deep neural networks [1]. Convolutional neural networks (CNNs) can be used for this purpose. A CNN is trained on images containing all relevant information about the object to be recognized. In this way, images of all components and typical assembly defects can be integrated into an object detection model to monitor the assembly process.

Overall, the application of Deep Learning holds great optimization potential for manual assembly. However, the question arises whether current products are appropriately designed for the use of such systems. Only if object recognition algorithms can identify assembly components, their use in manual assembly is reasonable. Existing design guidelines do not consider this aspect yet. For this reason, this research project investigates which properties standard parts (especially screws) should have, to enhance the accuracy of object detection algorithms.

First, the following hypotheses are defined:

1. Screws of the same type are confused if their nominal size differs by only one size increment.
2. Screws with similar screw heads will be confused.

Then, cylinder head, countersunk head, lens-head and grub screws in nominal sizes M3 to M10 were procured. To test the hypotheses,

pictures of the screwed-in standard parts were taken, the objects positions and classes were annotated, the models listed in Table 1 were trained and finally the models ability to detect the screws was evaluated.

To train the models the detectron2 program library was applied. As object recognition model a Faster-R-CNN model coupled with a Feature Pyramid Network was used, which was trained for ≈160 epochs and validated every 4th epoch [2]. As a value for the accuracy of the object recognition models, the "Mean Average Precision" (mAP) was considered. The higher the mAP, the better the prediction accuracy regarding to object class and position.

The experiments results show that all screws can be identified by the object recognition system. Even though in the models containing countersunk head screws or grub screws with different nominal diameters, the screws are recognized better the larger the nominal diameters are (countersunk = 92.21 < 94.80 < 96.42 and grub screw = 82.18 < 87.23 < 91.09). However, even the model with the lowest mAP (82.18) achieves a high value, which indicates a successful detection. Accordingly, the present investigation does not result in any design restrictions with regard to the selection of standard parts.

In addition to the considered hypotheses, there are further product features, which are not taken into account in the present investigation. Since the screws in the present investigation were tested in simple aluminum cubes in order to minimize interfering influences, it must also be determined whether the results can be transferred to standard parts in real products.

Overall, the research project represents a first step towards defining design guidelines for the use of Deep Learning in manual assembly, which will be followed by further experiments.

Roberto Gomez
Associate Professor, National Autonomous University of Mexico, Mexico

Load Tests of two Railway Viaducts

The construction of the intercity railway Mexico-Toluca includes the construction of different type of railway viaducts. Some of these viaducts are unique. In this paper we will describe different health monitoring tasks carried out by a group of structural engineers in order to validate some structural design assumptions of two metallic bridges: an arch bridge, 100 m length and a three spans continuous viaduct of 120 m total length.

Tests under static loads of the viaducts were carried out to evaluate the response of the superstructures using loads similar in magnitude to which they will be subjected. An overview of the viaducts, the methodology designed for the experimental study of the superstructures, the sensors to be used, as well as their arrangement are presented. We describe the activities performed for instrumentation, load configurations used for testing, as well as the results obtained. The latter is made based on graphs of stresses and deformations.

In addition, ambient vibration test results are displayed to identify the dynamic parameters of the superstructure and calibrate the developed mathematical models. Conclusions and recommendations on the structural safety of the superstructures are presented.

Dimitrios Goulias
Head, Civil Engineering Unit, ATINER and Associate Professor &
Director of Undergraduate Studies Civil & Environmental Engineering Department, University of Maryland, USA
&
Anjuman Akhter
Graduate Research Assistant, University of Maryland, USA

Incorporating Performance Requirements in Asphalt Mixture Design

Objective of this study was to define a Balance Mix Design approach, BMD, for asphalt mixtures. Such approach is the focus of state highway agencies in the US due to the challenges encountered over the years in the adoption of performance testing to complement the Superpave volumetric analysis. The defined BMD incorporates in the design process performance tests pertinent to common distresses, such as fatigue cracking and permanent deformation (i.e., rutting), that pavements experience in the region. Including performance testing in mix design provides the opportunity to design mixtures that will have the required properties for long lasting pavements. Furthermore, such performance tests should be simple and accurate enough so that both producers and agencies can implement them during mix design, acceptance, and construction. The paper presents the BMD framework for Maryland materials and mixtures. Initial results on the performance tests for fatigue cracking and permanent deformation are presented with the most common mixtures used in the state. Example results from a laboratory and plant mixtures are presented for showcasing the performance testing response. The suggested approach can be transferable elsewhere where similar materials and asphalt mixtures are used.

Dimitrios Goulias
Head, Civil Engineering Unit, ATINER and Associate Professor & Director of Undergraduate Studies Civil & Environmental Engineering Department, University of Maryland, USA

Sustainability and Resilience of Civil Infrastructure

Objective of this paper was to first provide a brief overview of the sustainability and resilience requirements for the civil infrastructure. Specifically, the progress in assessing sustainability and the development metrics are presented. Similarly, the direction in developing resilience analysis and metrics are presented with the effort undertaken by the US resiliency council. Next the three major initiatives of sustainability and resilience for the city of Athens were presented. These include: "Rethink Athens," Athens Urban Resilience & Sustainability Challenge – 100 Resilient Cities," and, "Athens Integrated Climate Action Plan C40." Then, a proposed methodology for assessing the sustainability of rehabilitation solutions for roadway projects was presented and tested with case studies from the US, Italy, Greece, Czech Republic and Poland. Thus, the steps and benefits of using such approach were presented, while its transferability is evident from the economic and environmental impact analysis of case studies around Europe.

Alwyn Hoffman
Professor, North-West University, South Africa
&
Crynos Mutendera
PhD Student, North-West University, South Africa

A Simulation Approach for Optimized Border System Design

Imports and exports have steadily increased in recent times as fraction of the global economy. Border posts therefore form a vital link between the economies of trading partners residing on different parts of the globe. The application of just-in-time (JIT) logistics practices by global trading partners implies that borders should not create unpredictable delays to the movement of cargo. Two of the primary performance criteria for JIT logistics operations is the time consumed by the overall process and the utilization levels of assets and infrastructure required to process goods through the value chain. While most developed economies have streamlined their customs and border processes, this is not yet the case in most developing countries, including on the African continent. In the case of Sub-Sahara Africa (SSA) border post delays for cargo still vary between 1 and 14 days, compared to global benchmarks of less than an hour. These delays add cost to the supply chain; as a result, transport as fraction of the total cost of landed goods is about twice in SSA compared to the rest of the world. This places countries within SSA in a disadvantageous position compared to competitors from continents like South America and Australia that also largely export raw materials and import manufactured goods.

Improving the efficiency of such corridors is complicated by the inefficient management of border crossings. The factors that add to long border delays include the variability of vehicle processing times, the lack of sufficient capacity at critical service desks during peak traffic periods, and the fact that vehicle classes with different levels of compliance are processed through the same channels, resulting in long delays even for compliant traffic. This paper proposes improvements to the border management systems that were previously presented in literature, using a simulation approach to quantify the impact of the proposed solutions. A simulator was developed that accurately models each important aspect of the cross-border process. The simulator was calibrated against data collected during cross-border surveys. We quantified the potential for reduction in border delays through

improved quality control over service delivery by measuring the sensitivity of total border crossing time with respect to the variability of process times. A dynamic adjustment model was developed to enable an optimal compromise between the number of service desks for each process, utilization levels of available capacity and average delay time. The benefit of our proposed approach to capacity adjustment compared to previous approaches is that it does not depend on data that must be collected from traffic in transit to the border but relies only on data that can be collected inside the border area. We compared different approaches to dynamically restrict border access for vehicle classes experiencing high traffic levels, thus preventing the creation of bottlenecks for all border traffic. The optimal division of service capacity between a drive-through Green Lane for compliant vehicles and a Red Lane for non-compliant vehicles was determined. Recommendations are made towards improved policy to regulate the future design of One Stop Border Posts.

Barry Hojjatie
Professor, Valdosta State University, USA

Development of Smart and Efficient Traffic System in the City of Valdosta Georgia

A team of researchers and engineers from VSU, Georgia Tech, City of Valdosta and two engineering companies are working on a Smart City Project to make all 128 signalized intersections to be connected through the use of the TravelSafely App. Also, have developed CAD drawings of these intersections to employ visualization in our analyses to describe the flow of traffic specifically during the times that cars are making turns at each intersection while pedestrians are simultaneously crossing. Along with CAD drawings, we have progressed in creating the blueprints into real life, tangible models using a 3-in-one printer capable of 3D printing, laser engraving, and CNC. We have also developed a survey and analyzed the data to determine the attitude of the community on the effectiveness of our smart traffic system. Our models provide more in-depth visualization and helped set a clear ground for these concepts. These analyses have been used to compare the conditions before and after the use of TravelSafely App to determine the improvement made to the traffic safety and efficiency using the TravelSafely App. Our community enhancement project was among the three smart city projects nominated to receive the Word Smart City Award in 2021 in Barcelona Spain.

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Neural Information Retrieval with Click-Attention Graphs

To deal with the lack of labeled training data, many researches of neural-network-based information retrieval use click logs to train models, which are easier to obtain and often seen as implicit relevance feedback left by users. However, most of the neural-network-based information retrieval methods take this kind of data as a substitute of labeled data. Therefore, they often ignore the rich information hidden in the users' clicks and the problems of noise and sparsity hidden in the click logs.

This paper proposes a new Neural IR method IRCGNN (Information Retrieval with Click Graph based on Neural Networks). It integrates the principle of the click graph model with the Neural IR's framework, which obtains representation with richer and more complete information through users' clicks in the click graph and reduces sparsity in the click logs. It also considers the interaction between queries and documents, which can output the representations in advance for improving retrieval performance.

The architecture of the Click-Attention Graph is based on GAT (Graph Attention Networks) and further extended. GAT uses the weighted average strategy to aggregate information from neighbors. In contrast to common practice, attention mechanism is applied to determining the weights between nodes, which are calculated by a neural network based on the contents of nodes. NN-based Attention allows GAT to measure proper weights for neighboring nodes dynamically based on their contents, but the weights of edges are not considered in the process. Therefore, it loses some parts of information in the click graph and has the "black box" problem, which makes it difficult to interpret. Henceforth, this paper introduces the original edge weights (clicks) and cosine similarity additionally to deal with such problems, forming Click-based Attention and Similarity-based

Attention. Then, the three types of attention are integrated by the multi-view attention mechanism, which forms one layer of the Click-Attention Graph.

When compared with the traditional model of the click graph, IRCGNN can also perform the aggregation in a more refined way from multiple perspectives. In experiments, IRCGNN is verified that it has better performance than those of the others, and it is also proved that it can grasp the second-order proximity of the click graph. Hence, if given a query, it can promote the ranking of clicked documents and those close with it in the click graph as well as can measure relevance more smoothly and reasonably.

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Smart City Planning and Heritage – An IoT based Toolkit Framework

The aim of this paper is to review and assess national and international developments in smart cities and their contribution in preserving the cultural heritage, thus facilitating the policy makers to embrace the concept of Smart Heritage. Smart city planning majorly focuses on IoT, ICT, big data, real time data and monitoring. This gives an opportunity to the policy makers to adopt the dynamic concept of IoT for heritage and integrate past and future through policy intervention, while managing the challenges faced by heritage and minimizing or negating the damage or decay of heritage assets of a city. The focus of this paper is upon integration of Smart Heritage in Smart City embracing a bottom-up approach from local level to national level. The objective encompassed herein is to explore the use of IoT in providing End-to-End (E2E) Solution using various smart tools, in a form of standard toolkit, which could be modified on a case by case basis. This toolkit will help enabling the capabilities of local bodies in monitoring and maintenance of heritage assets, thus assisting them to incorporate the smart heritage concept as a part of smart city planning.

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Implementing Document Automation Using Modern Data Lake and Automated Workloads for Big Environmental Projects

Data Lakes provide a modern approach to persist data with heterogenous structure for different types of analysis. It offers centralized repository that allows to store all structured and unstructured data at any scale.

Big environmental projects nowadays include data from different sources, that need to be approved, managed, processed and later shared for specific analysis. One huge part of analysis is related to document processing.

Nowadays for such cases often is used a democratized artificial intelligence approach, represented via low code/no code AI services like AI Builder - the Microsoft Power Platform capability that provides AI models that are designed to optimize different business processes.

With document processing, organizations can build a custom AI model to extract information from documents and use it for different types of analysis.

This paper demonstrates a methodology how to build modern repository and implement automation flows to process documents - extract, approve, process, analyze and share data from documents in big environmental projects. In the research are included real life cases, demonstrated with prototypes using Azure Data Lake and automated flows with Microsoft Power Platform, AI Builder and Azure Data Factory.

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Behavior of Polymeric and Oil Coated form Works through Demolding Force and Their Effect on Surface of Cementitious Materials

Concrete is the most commonly used building material. It has to be poured into the formwork to take the appropriate shape of a structural element. Therefore, the used formwork affects the surface parameters and final properties of cementitious materials. This study aims to analyze the effect of formwork's surface texture parameters on the surface of cementitious materials. A reference formwork beside various release agents such as mineral oil, vegetable oil, and two different polymeric coating materials were used. To explore the impact of surface roughness parameters and release agents on the demolding force, experimental test called Pre-crack demolding tests were conducted on cement paste samples. Regardless of the surface characteristics of the form works or applied release agents, the obtained experimental data indicate a brittle fracture behavior. The experimental tests show that the PET and vegetable oil coated form works presented low adhesion force. In terms of release agent's functionality, the vegetable oil showed significantly better behavior compared to mineral oil. The visual aspect reveals that the cementitious surfaces against polymeric-coated formworks are smooth and shiny when comparing with those against oil-coated. The same conclusion were obtained when the cement samples' surface were analyzed under Interferometric microscopy. The microscopic pattern (topography) of the formwork surface were observed on the cement. Finally, due to formworks 'surface adhesive properties and the behaviour, it appears that PET-coated formwork can be recommended as an alternative to release agents.

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Adaptive Decentralised Safety Monitors for Cooperative Intelligent Systems

Cooperative intelligent systems such as cooperative robots and autonomous vehicles pose new unprecedent challenges for safety.

These systems are often loosely connected enabling them to form and dissolve configurations dynamically. Assessing the effects of failures of all possible configurations is an intractable problem. Intentional or inadvertent interactions between MRS members, as well as learned new behaviour and environmental factors may lead to unpredictable or emergent behaviour. Such systems exhibit many sources of uncertainty including partial environment observability, unreliable sensors and data collection components, stochastic effects, and imperfect inferences drawn by AI components. An additional problem is that there is typically no hierarchy within a cooperative system, which is often a collective of systems that do not impose authority. Consequently, system safety cannot be interpreted in a classical way as a set of safety goals related to the behaviour of one system and to which other systems contribute. Expressing, modelling, and quantifying uncertainty is imperative to establish the limits to assurance of safety. The characteristics of these systems also suggest that full assurance of safety at design time is impossible. And, therefore, part of the assurance must be moved during the operational phase.

This paper presents a novel framework for dynamic safety assurance of cooperative intelligent systems which integrates design time models and runtime techniques to provide continuous assurance for the cooperative ensemble and its systems during operation. The approach uses a network of intelligent safety monitoring agents to deliver safety assurance within a cooperative system of systems. An agent for a system carries information about the safety assurance of the system in the form of dependability models called Executable Dependability Identities and uses information shared by the agents of other cooperating systems in conjunction with information from the environment to provide dependability management at runtime, e.g., event monitoring, diagnostics, certification, risk prediction and action planning. The approach aims to facilitate safe operation even when the system behaviour evolves during operation.

The approach is outlined and illustrated with examples drawm from the SESAME Horizon 2020 European Research Project (2021-2024) which is developing technologies for Safe and Reliable Multi-Robot Systems. The project will provide advanced software design and deployment capabilities that handle the uncertainty, variability, and interplay of safety and security assurance challenges posed by Multi-Robot Systems (MRS). This will enable a new generation of MRS to deliver solutions for sectors including Healthcare, Manufacturing, Agri-food, and Infrastructure Inspection, where groups of interconnected robots are better able to carry out critical tasks such as disinfecting hospitals or managing farms and crops.

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Safe Houses: Design Principles, Potentials and Limitations - An Analysis through Data-Driven Approaches

This paper presents findings on the use of computational design techniques to develop a safe house based on a set of defined design principles. In this study, we explored and established the design principles of safe houses for female victims of sex trafficking that contribute to the overall recovery and reintegration of these women into society. Additionally, we examined and evaluated the use of parametric design as a computational tool, which led to the development of a model for the design of these safe houses. We address this issue by creating a set of desired guidelines based on data research and literature review, and test several data-driven techniques, including generative design and models for self-organising floor plans. The paper explores the benefits as well as the possible drawbacks of several design approaches by comparing to this set of desired guidelines. We present preliminary findings from this analysis and suggest further research directions.

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The Economics of Sustainable Infrastructure

This paper examines some cases concerning the economics of sustainable infrastructure. Sustainable infrastructure is a trivial economic matter if the cost is lower than the cost of non-sustainable infrastructure. However, this is not the case, and a tradeoff exists between the economic growth rate of non-sustainable infrastructure and the economic growth of sustainable infrastructure. In this study, eurozone data show that infrastructure is positively related to economic growth. However, data do not exist to estimate the difference between non-sustainable and sustainable infrastructure on economic growth. One may only assume that the costs of sustainable infrastructure is higher, retarding economic growth. On the other hand, sustainable infrastructure may have positive long-term economic effects as well as short-term beneficial social effects. However, exceptions do exist which is demonstrated by infrastructure-induced gentrification.

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Spatial Planning and Policy: An Enabling or a Procrastinating Actor of Sustainability Design Decisions?

Building design is a highly complex process and design decisions are subjected to both technical and social influences, either from external or internal parameters. Decisions taken during the design of buildings are a vital factor in determining their carbon impact throughout their whole life cycle.

A growing literature has dealt with the significance of the building design process, highlighting its influence on the carbon impacts and identifying the most important stages and stakeholders which affect these impacts.

Spatial planning and policy is one of the first limitations that designers have to consider, and is often out of their control since it is based on local and national plans. Interviews with practitioners reveal that those plans are one of their most important influences or limitations in shaping the carbon impact of a project. Moreover, the level of detail prescribed by those plans can have a different influence on the behaviour of the designer.

This article aims to understand the interactions of practitioners and the planning policy documentation in two very distinct European cultures and contexts, Sweden and Cyprus, and the effect of different planning and policy models on the designers' activities.

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Pre and Post COVID-19 Analysis of Pedestrian Mobility at Urban Tourism Destinations

The innovative application of information and communication technologies to tourism is a necessary and constant challenge for destinations that aim to be positioned as an intelligent, sustainable and competitive tourist destinations. This paper explores some of the findings of the TecMoTur project, which provides a technological approach to the analysis of tourist mobility in public and pedestrian transport.

The current COVID-19 crisis has emphasized the possibilities of using nowadays ubiquous mobile devices' geolocalization capabilities. This approach has been globally proposed as a major technical solution to manage and monitor the movement of people (Ahas et al., 2008; Shoval et al., 2020). During these last two years, we have also learned how it can be incorporated into tracking Apps (Ex: self-quarantine safety protection in South Korea), or how it can be used to monitor the general movement in Spain at the regional level (MTMAU, 2020).

The origin of the data used in this research is the communication between the public WiFi networks deployed through the territory of an urban tourism destination and the mobile devices in its coverage area. Its main characteristics are: an average 3.7 million observations per day (it constitutes what is considered as Big Data).

The real-time and precise geolocation characteristics guarantee that the research objectives describe in the previous section can be fulfilled. The methodologies include bigdata management procedures and GIS.

Specific geographical context and replicability: The research is applied to the city of Palma de Mallorca, the capital of Balearic Islands, and one of the main tourism destinations in Spain. We monitor the effects of different covid related events, as the declaration of emergency, the opening of the borders.

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Dry Construction Systems for Sustainable Buildings in Mediterranean Context: An R&D Project in South Italy

The proposed paper refers to construction engineering research and regards the development of sustainable building technologies for the Mediterranean area.

This study presents the final results of the R&D project "*Ac.Ca. Building: Progettare e costruire in sicurezza con l'acciaio e la canapa. Tecnologie innovative per edifici ecosostenibili*" (Ac.Ca. Building: safe design and construction with steel and hemp. Innovative technologies for sustainable buildings). It was financed with European funds and was completed in 2020 (FESR e FSE 2014-2020). This work obtained a Technology Readiness Level (TRL) close to 7 out of 9 points. University of Calabria researchers and producers joined the R&D project: Metalcarpenteria s.r.l. (steel structure producer), Metalinea s.r.l. (hemp fibercomponents producer) and Irenova -Energy Solution (design and management of energy systems). The research involved a prototype construction.

The work concerns the design of a modular and customizable construction system through the use of a steel structure and hemp and lime fiber components, suitable for residential buildings and offices. The system is based on dry layered technologies useful for the reuse and recycling single components (referring to circular economy principles); it contemplates the use of sustainable materials, like hemp. In fact, studies concerning its LCA (Life Cycle Assessment) highlights a negative $C0_2$ emissions balance. The plant has a speedy growth, so its biomass balances out carbon emissions caused by lime process production (it is used as a binder for hemp fibers) and the transport of finished products. The use of two biodegradable materials (hemp and lime) allows the production of construction components disposable in the soil, which increases basicity.

The R&D project aimed to increase the adaptability of lightweight construction system to Mediterranean climatic conditions, that usually prefer heavy systems (masonry and reinforced concrete), with reference to the performance of external walls, suggesting a solution to control summer overheating.

Hemp fiber construction components have mainly been referred so far to blocks for walls and panels for insulation. Instead, the Ac.Ca. project has experienced the practice of approximately 120x290 centimeters panels for preassembled external walls and 60x270 centimeters slabs for internal partitions, both assembled by mechanical connections. This has favoured a reduction time for production and assembly as well as the recycling of components, without mortar connections.

The construction of a 52 square meters prototype in Crotone (Calabria region, South-Italy) allowed the assembly system to be tested and measurements to be taken regarding: construction component performance, indoor air quality, the systems which are powered almost exclusively by renewable sources. The results obtained were positive and encourage the use of light dry components even in the Mediterranean area.

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Sustainable Development of the Built Environment and the Indoor Air Quality

Health and sustainable development are strongly interconnected, because human health concerns are at the core of the mission of sustainability. Many previous worldwide studies specify that occurrence or severity of health problems such as allergic and skin diseases, asthma, respiratory and cardiovascular problems, even potential carcinogenicity, after long-term exposure, is associated with the concentration of air pollutants, one of the environmental risk factors. Therefore, the approaches towards more sustainable buildings or products must take into consideration potential human exposure to pollutants and associated health effects.

In this context, the purpose of our study was to identify the volatile organic compounds (VOCs) and inorganic compounds from indoor air of four office spaces, of which in one of them smoking, located in urban area of Bucharest – Romania. Thus, a number of sixteen volatile organic compounds, selected based on the effect they may have on the human health, were monitored by using the equipment based on a photo-ionization detector (PID) that detects and records, in real time, the concentrations of compounds. Moreover, inorganic gaseous pollutants such as nitrogen oxides (NO, NO_2), sulphur dioxide (SO_2), ozone (O_3), carbon dioxides (CO, CO_2), were monitored, by using the equipment based on electrochemical sensors, that detected and recorded, in real time, their concentrations. Factors like the dimensions of the office spaces, the emissions from the existing equipment and furniture, the number of occupants, and the time of the ventilation varied among the four office environments. The study demonstrated the presence of volatile organic compounds in examined offices, the detected compounds in indoor air are within acceptable limits, with the exception of acrolein, a compound from the class of aldehydes, whose concentration exceeds permissible exposure limit of three to six times. The highest values of the average concentrations of SO_2 (2728.5 $\mu g/m^3$), CO_2 (1428 $\mu g/m^3$), CO (0.9 $\mu g/m^3$), O_3 (5.84 $\mu g/m^3$) were recorded in office number 2, while in the smoker's office were recorded the highest values for the NO concentration (24.4 $\mu g/m^3$).

The aim of the monitoring activity of organic and inorganic pollutants was, on the one hand to obtain useful information on air quality from office spaces, and on the other hand, for the awareness of acute necessity for action to improve the quality of the indoor environment toward the development of sustainable buildings.

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Quantifying Shallow-Depth Concrete Delamination using Impact-Echo

Corrosion-induced concrete deck delamination is one of the most common forms of deterioration in reinforced concrete bridges. Locating these embedded delaminations is important to assess the extent of the damage, the remaining member capacity and undertake any necessary rehabilitation work. The impact-echo (IE) method is a simple and straightforward non-destructive testing (NDT) technique by which the depth and the extent of concrete delaminations may be estimated. It is effective in detecting the location and accurately determining the depth of relatively deep delaminations in concrete members. Delaminations that occur near the concrete surface can also be detected by the IE method, but the exact depth cannot be quantified due to difficulties in analysing the flexural mode that dominates the vibration response over the corresponding delaminated region. The objective of this study was to develop a procedure to quantitatively estimate the depth of shallow depth delaminations in concrete slab members, using the IE method. Four slab specimens were prepared, each with three artificial delaminations with varying shapes and sizes placed at shallow depths. The frequency contour maps drawn from the IE scan data sets showed good agreement with the actual location of the delaminations. It was determined that the perimeter-to-depth ratio of the delaminated region can be used to analyze the flexural mode vibration frequency, leading to accurate estimates of the delamination depths. Two equations are proposed that relate the depth of arbitrarily shaped delaminations to the flexural mode vibration frequency measured over the shallow-depth delaminations.

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Digital Twins using Machine Learning for Optimization in the Sustainable Biomaterials Industries

Machine learning and AI are revolutionizing manufacturing and the general business world. For the sustainable biomaterial industries, it is the newest technology to optimize processes, reduce costs, and ensure long-term business success. The concept of 'Industry 4.0' with its origins from Germany, attempts to broadly define the new industrial revolution as an *'information-intensive transformation of manufacturing in a connected environment of big data, people, processes, services, and systems as a way to realize smart manufacturing.'* One key technology in ensuring success in implementing Industry 4.0 is supervised machine learning. Supervised machine learning enables analyses of massive quantities of data where learning algorithms (*e.g.,* random forests, boosted trees, etc.) apply what they learn from past data to new data to predict future events. A key first step in implementing machine learning and AI is implementing the concept of 'digital twins'. Digital twins mimic processes and human interactions by using simulations of the machine learning predictions. For example, a control room operator relies on PLC logic from sensor data and human intuition from experience to optimize throughput while maintaining product conformance. A digital twin from machine learning algorithms mimics the decisions of control room operators for validation and may provide enlightenment for improved process optimization.

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Psychoacoustics Perception of Noise in Civil Buildings, for Optimal Acoustic Design of Construction Elements - Study Questionnaire

Starting from the fact that in building acoustics domain, it is necessary to apply the human psychoacoustics perception principles, for designing and judiciously realization of the construction elements of a building, in buildings where people conduct various types of housing activities, we made some studies and analyzes based on questionnaires and psychoacoustic methods of investigation by collecting psychoacoustics noise tests. We developed a questionnaire study to determine socio-specific psychoacoustic sound perception of people in residential buildings, which was given for completion to 19 men and 23 women.

The questionnaire contains information and questions related to: name of the institute investigation; identity and personal data of those who living in residence and respond to the questionnaire: name, sex, age, work schedule; preliminary data on building: building type of housing, in terms of the type of building family housing, number of people in housing; explanations on how to answer the questions posed in the questionnaire and how to mark answers scale; various types of existing noise sources in the building, their origin (from the neighborhood, etc.) and mode of transmission to the receiver; information specific psychoacoustic noise tolerance respondent reception; detailed information on the building, compliance inside of the building, number of apartments on one level, the types of construction elements of the building is made, the type of equipment and heating systems; information about home/apartment.

Analyzing the responses received to the 42 questionnaires, was carried out considering several variants, such as: data resulting from synthesis of responses: number of total respondents; data resulting from synthesis of responses: number of men + number of women; data

resulting from synthesis of responses: number of respondents living at home/villa/number of respondents who live down the block; data resulting from synthesis of responses: Total number of respondents living at home/villa/ Total number of respondents who live down the block.

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