THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

Abstract Book

5th Annual International Conference on **Engineering**

25-28 June 2018, Athens, Greece

Edited by
Gregory T. Papanikos

2018

Abstracts
5th Annual International Conference on Engineering
25-28 June 2018
Athens, Greece

Edited by Gregory T. Papanikos

First published in Athens, Greece by the Athens Institute for Education and Research.
ISBN: 978-960-598-207-2

8 Valaoritou Street
Kolonaki, 10671 Athens, Greece
www.atiner.gr

TABLE OF CONTENTS

(In Alphabetical Order by Author's Family name)

Preface		9
Organizing Committee		10
Conference Program		11
1.	**Quantifying the Effects of Vehicular Driving Cycles on Air Quality** *Hatem Abou-Senna & Essam Radwan*	15
2.	**Influence of Optimal Distribution of Dampers on Structural Vibration Control** *Brwa Ahmed Saeed*	16
3.	**Optimization and Evaluation of a Factory Layout Design Problem** *Zouhair Issa Ahmed Al-Daoud & Rasha Qasim Humadi*	17
4.	**Study of the Shallow Wake Characteristics of Emergent Slender Cylinders using DES** *Ram Balachandar, Vimaldoss Jesudhas & Ron Barron*	19
5.	**A Novel Feature Selection Method for Unsupervised Pattern** *Su-Qun Cao*	20
6.	**Designing Conversational User Interface for Artificial Intelligence Devices** *Kyung Jin Cha & Hwa Jong Kim*	21
7.	**Case Studies of a Project-Based Learning Course in Transdisciplinary Engineering Program** *Gyeunho Choi, Yongseob Lim & Mingyu Choi*	22
8.	**CFD Simulation of a Rotary Swing Chamber Machine** *Bin Cui, Martin Gottschlich & Ulrich Luedersen*	24
9.	**Using the Operations Process chart as a Platform for Integrated Process Design** *Moshe Eben-Chaime*	25
10.	**Big Data Opportunities: Prescriptive Analytics to Enhance Learning Programming in Higher Education** *Imad El-Zakhem & Marie Khair*	26
11.	**Strength Evolution of Concretes Made with Supersulfated Binders based on Volcanic Materials Exposed to two Media** *Jose Ivan Escalante-Garcia, Karina Cabrera-Luna, Erick E. Maldonado-Bandala & Demetrio Nieves-Mendoza*	28
12.	**Polymer Modified Pervious Concrete** *Ivanka Netinger Grubesa, Ivana Barisic & Ilijana Kljajic*	29
13.	**EnergyPlus vs. Monthly ISO 13790 for Israeli Climatic Zones** *Samuel Hassid*	30
14.	**Technology Influencers and the Culture of Mobility: Experimenting Self-Ruling Floating Cities** *Helene Jeannin*	31
15.	**A Study on the Disposal and Efficient Re-use of Water Treatment Sludge Generated in a Household: A Review** *Soumya Kar & Rajiv Gupta*	32

16.	**An Empirical Study of Effective Promotion System based on Big Data Analysis and Machine Learning** *Jeongbeom Kim*	33
17.	**Making Healthcare Green: The Role of Cloud, Green IT, and Data Science to Reduce Healthcare Costs and Combat Climate Change** *John Lamb*	34
18.	**The Evaluation of the Manufacturing and Functions of Complex Knitted Fabrics** *Chin-Mei Lin, Pei-Chen Hsiao, Chao-Tsang Lu, Hsing-Hua Cheng & Jia-Horng Lin*	36
19.	**Electrochemical Healing Techniques for Concrete Reinforcement Restoration** *Tomas Lovasi, Milan Kouril & Sarka Msallamova*	37
20.	**Talking Machines: How Big Data can help in Real-Time Anomalies Detection** *Ylenia Maruccia*	38
21.	**Synchro Software: Can be used to Enhance and Optimize the Performance of Urban Signalized Intersections with Queue Blockage?** *Arash Mazaheri & Amir Masoud Rahimi*	39
22.	**Architectural Challenges in Designing Big Data Solutions in Support of Laser-Plasma Interaction Experimental Investigations** *Andreea Mihailescu*	40
23.	**Best Practices for the Design Process for the Construction-Manager-as-General-Contractor Delivery System** *Edward Minchin, Giovanni Migliaccio, Lourdes Ptschelinzew & Yuanxin Zhang*	42
24.	**A Risk-based Logistic Regression Decision Support Model for the Selection from The World Bank Lending Instruments** *Mohamed Moussa, A. Samer Ezeldin & Sayed Ismail*	43
25.	**Review of Trends in System Resilience for Sustainable Future Transport in Megacities** *Suleiman Hassan Otuoze, Dexter Hunt & Ian Jefferson*	44
26.	**A New Demerit Control Chart for Monitoring the Quality of Multivariate Poisson Process** *Jeh-Nan Pan & Chung-I Li*	45
27.	**Clustering Techniques for Analysis of Load Factor Profiles** *Stefan-Gheorghe Pentiuc & Crenguta Bobric*	46
28.	**Designing Solution for Healthcare: A Case Study Combining Big Data and Blockchain Technologies** *Gloria Polimeno*	47
29.	**Turkish Red Crescent's Blood Collection and Blood Products Distribution Logistics Network Design** *Benhur Satir*	48

30.	**Limiting Viscosity Number in CED-solution - Verification of a New Method to Evaluate the Effectiveness of Paper Deacidification Processes** *Maren Schmuck, Erdenetuya Lepenies & Ulrich Luedersen*	49
31.	**Biomechanical Comparison of Parallel, Posterior, and Y Configuration for Treating Comminuted Distal Humerus Fractures** *Chien-An Shih, Ming-Long Yeh, Fei-Yi Hung, Chih-Kai Hung, Cheng-Li Lin, Chia-Lung Li, I-Ming Jou & Wei-Ren Su*	51
32.	**Influence of Carbonation on the Performance of Reactive MgO Cement-based Concrete Mixes** *Cise Unluer*	52
33.	**Quantifying Interactions in Manufacturing using Regression Tree Models – A Useful Inductive Step for Planning a Designed Experiment** *Timothy Young*	53

Preface

This book includes the abstracts of all the papers presented at the *5th Annual International Conference on Engineering (25-28 June 2018)*, organized by the Athens Institute for Education and Research (ATINER).

In total 33 papers were submitted by 36 presenters, coming from 21 different countries (Canada, China, Croatia, Czech Republic, Egypt, France, Germany, India, Iran, Iraq, Israel, Italy, Lebanon, Mexico, Romania, Singapore, South Korea, Taiwan, Turkey, UK and USA). The conference was organized into 10 sessions that included a variety of topic areas such as manufacturing, sustainability, design optimization and more. 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.

The purpose of this abstract book is to provide members of ATINER and other academics around the world with a resource through which to 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 could meet to exchange ideas on their research and consider the future developments of their fields of study.

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 regularly meet to discuss the developments of their discipline and present their work. Since 1995, ATINER has organized more than 400 international conferences and has published nearly 200 books. Academically, the institute is organized into seven research divisions and 37 research units. Each research 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 on the following page.

Gregory T. Papanikos
President

5th Annual International Conference on Engineering, 25-28 June 2018, Athens, Greece Organizing and Academic Committee

ATINER's conferences are small events which serve the mission of the association under the guidance of its Academic Committee which sets the policies. In addition, each conference has its own academic committee. Members of the committee include all those who have evaluated the abstract-paper submissions and have chaired the sessions of the conference. The members of the **academic committee** of the 5th Annual International Conference on Engineering were the following:

1. Gregory T. Papanikos, President, ATINER.
2. Nicholas Pappas, Vice President of Academic Membership, ATINER & Professor of History, Sam Houston University, USA.
3. Panagiotis Petratos, Vice-President of Information Communications Technology, ATINER, Fellow, Institution of Engineering and Technology & Professor, Department of Computer Information Systems, California State University, Stanislaus, USA.
4. Nicholas N. Patricios, Vice President of Strategic Planning & Analysis, ATINER and Professor & Dean Emeritus, School of Architecture, University of Miami, USA.
5. Theodore Trafalis, Director, Engineering & Architecture Division, ATINER, Professor of Industrial & Systems Engineering and Director, Optimization & Intelligent Systems Laboratory, The University of Oklahoma, USA.
6. Timothy M. Young, Director, Center for Business & Manufacturing Excellence (CBME) & Professor and Graduate Director, Center for Renewable Carbon, The University of Tennessee, USA.
7. Jeh-Nan Pan, Professor and CSQ Fellow, National Cheng Kung University and Chinese Society for Quality, Taiwan.
8. John Lamb, Adjunct Professor, Pace University, USA.
9. Zouhair Issa Ahmed Al-Daoud, Academic Member, ATINER & Assistant Professor, Al-Bani University College, Iraq.
10. Hatem Abou-Senna, Assistant Professor, University of Central Florida, USA.
11. Kasim Korkmaz, Assistant Professor, Eastern Michigan University, USA.

The **organizing committee** of the conference included the following:

1. Fani Balaska, Researcher, ATINER.
2. Olga Gkounta, Researcher, ATINER.
3. Hannah Howard, Research Assistant, ATINER.
4. Eirini Lentzou, Administrative Assistant, ATINER.
5. Konstantinos Manolidis, Administrator, ATINER.
6. Kostas Spyropoulos, Administrator, ATINER.

FINAL CONFERENCE PROGRAM
5th Annual International Conference on Engineering,
25-28 June 2018, Athens, Greece
PROGRAM

Conference Venue: Titania Hotel, 52 Panepistimiou Street, 10678 Athens, Greece

Monday 25 June 2018

08:00-08:45 Registration and Refreshments

08:45-09:30 Welcome and Opening Address (Room A - 10th Floor)

Gregory T. Papanikos, President, ATINER.
Nicholas Pappas, Vice President of Academic Membership, ATINER & Professor of History, Sam Houston University, USA.

09:30-11:00 Session I (Room B - 10th Floor): Manufacturing

Chair: Theodore Trafalis, Director, Engineering & Architecture Division, ATINER, Professor of Industrial & Systems Engineering and Director, Optimization & Intelligent Systems Laboratory, The University of Oklahoma, USA.

1. Timothy Young, Professor, University of Tennessee, USA. Quantifying Interactions in Manufacturing using Regression Tree Models – A Useful Inductive Step for Planning a Designed Experiment.
2. Moshe Eben-Chaime, Professor, Ben-Gurion University of the Negev, Israel. Using the Operations Process chart as a Platform for Integrated Process Design.
3. Chin-Mei Lin, Professor, Asia University / Quanzhou Normal University, Taiwan, Pei-Chen Hsiao, PhD Student, Asia University, Taiwan, Chao-Tsang Lu, Associate Professor, Central Taiwan University of Science and Technology, Taiwan, Hsing-Hua Cheng, Lecturer, Asia University, Taiwan & Jia-Horng Lin, Professor, Feng Chia University, Taiwan. The Evaluation of the Manufacturing and Functions of Complex Knitted Fabrics.

11:00-12:30 Session II (Room B - 10th Floor): Big Data and Machine Learning

Chair: John Lamb, Adjunct Professor, Pace University, USA.

1. Jeongbeom Kim, Professor, Namseoul University, South Korea. An Empirical Study of Effective Promotion System based on Big Data Analysis and Machine Learning.
2. Stefan-Gheorghe Pentiuc, Professor, University Stefan cel Mare Suceava, Romania & Crenguta Bobric, Associate Professor, University Stefan cel Mare Suceava, Romania. Clustering Techniques for Comparative Analysis of Load Factor Profiles.

12:30-14:00 Session III (Room B - 10th Floor): Big Data in Professional Practice: Challenges, Solutions and Future Prospects

Chair: Timothy Young, Professor, University of Tennessee, USA.

1. John Lamb, Adjunct Professor, Pace University, USA. Making Healthcare Green: The Role of Cloud, Green IT, and Data Science to Reduce Healthcare Costs and Combat Climate Change.
2. Imad El-Zakhem, Assistant Professor, University of Balamand, Lebanon & Marie Khair, Associate Professor, Notre Dame University, Lebanon. Big Data Opportunities: Prescriptive Analytics to Enhance Learning Programming in Higher Education.
3. *Andreea Mihailescu, Research Scientist / Development Engineer, Lasers Department / National Institute for Lasers, Plasma and Radiation Physics, Romania. Architectural Challenges in Designing Big Data Solutions in Support of Laser-Plasma Interaction Experimental Investigations.

14:00-15:00 Lunch

15:00-17:00 Session IV (Room A - 10th Floor): Special Topics in Civil Engineering	**15:00-17:00 Session V (Room B - 10th Floor): Design and Optimization**
Chair: Kasim Korkmaz, Assistant Professor, Eastern Michigan University, USA.	**Chair:** Nicholas Pappas, Vice President of Academic Membership, ATINER & Professor of History, Sam Houston University, USA.
1. Edward Minchin, Professor and Interim Associate Director, M.E. Rinker School of Construction Management, University of Florida, USA, Giovanni Migliaccio, Associate Professor, University of Washington, USA, Lourdes Ptschelinzew, Graduate Research Assistant, University of Florida, USA & Yuanxin Zhang, Assistant Professor, Guangzhou University, China. Best Practices for the Design Process for the Construction-Manager-as-General-Contractor Delivery System. 2. Ram Balachandar, Professor, University of Windsor, Canada, Vimaldoss Jesudhas, Research Associate, University of Windsor, Canada & Ron Barron, Professor, University of Windsor, Canada. Study of the Shallow Wake Characteristics of Emergent Slender Cylinders using DES. 3. Mohamed Moussa, Graduate Student, The American University in Cairo, Egypt, A. Samer Ezeldin, Professor and Chair, Department of Construction Engineering, The American University in Cairo, Egypt & Sayed Ismail, Assistant Professor, Ain Shams University, Egypt. A Risk-based Logistic Regression Decision Support Model for the Selection from The World Bank Lending Instruments. 4. Brwa Ahmed Saeed, Lecturer, A. S. Brwa / Ishik University, Iraq. Influence of Optimal Distribution of Dampers on Structural Vibration Control.	1. Benhur Satir, Assistant Professor, Çankaya University, Turkey. Turkish Red Crescent's Blood Collection and Blood Products Distribution Logistics Network Design. 2. Bin Cui, PhD Student, Hochschule Hannover, Germany, Martin Gottschlich, Professor, Hochschule Hannover, Germany & Ulrich Luedersen, Professor, Hochschule Hannover, Germany. CFD Simulation of a Rotary Swing Chamber Machine. 3. Maren Schmuck, Research Assistant, Hochschule Hannover, Germany, Erdenetuya Lepenies, Research Assistant, Hochschule Hannover, Germany & Ulrich Luedersen, Professor, Hochschule Hannover, Germany. Limiting Viscosity Number in CED-solution - Verification of a New Method through Round Robin Test to Evaluate the Effectiveness of Paper Deacidification Processes. 4. Gloria Polimeno, Data Scientist, Exprivia SpA, Italy. Designing Solution for Healthcare: A Case Study Combining Big Data and Blockchain Technologies. 5. Ylenia Maruccia, Data Scientist, Exprivia SpA, Italy. Talking Machines: How Big Data can help in Real-Time Anomalies Detection. 6. Zouhair Issa Ahmed Al-Daoud, Assistant Professor, Al-Bani University College, Iraq & Rasha Qasim Humadi, Lecturer, Al-Nahrain University, Iraq. Optimization and Evaluation of a factory Layout Design Problems.

17:00-19:00 Session VI (Room A - 10th Floor): ATINER's 2018 Series of Academic Dialogues A Symposium Discussion on *Future Developments and Prospects of Engineering and Science Education & Research in a Global World*
Chair: Nicholas Pappas, Vice President of Academic Membership, ATINER & Professor of History, Sam Houston University, USA.
1. Dimitrios Goulias, Head, Civil Engineering Unit, ATINER and Associate Professor & Director of Undergraduate Studies Civil & Environmental Engineering Department, University of Maryland, USA. University of Maryland's Civil Engineering Education & Research Activities in the Global World. 2. Ram Balachandar, Professor, University of Windsor, Canada. Recent Developments in Engineering Education and Research – The Canadian Experience. 3. Fouad Mohammad, Senior Lecturer, Nottingham Trent University, UK. Teaching Civil and Structural Engineering for the Next Generation. 4. Jeh-Nan Pan, Professor and CSQ Fellow, National Cheng Kung University and Chinese Society for Quality, Taiwan. Quantitative Education for Creating an Interface between

Statistics and Engineering.
5. Timothy M. Young, Director, Center for Business & Manufacturing Excellence (CBME) & Professor and Graduate Director, Center for Renewable Carbon, The University of Tennessee, USA. The Importance of Data Quality Management in the Era of Predictive Analytics.
6. Theodore Trafalis, Director, Engineering & Architecture Division, ATINER, Professor of Industrial & Systems Engineering and Director, Optimization & Intelligent Systems Laboratory, The University of Oklahoma, USA. Future Developments of Engineering and Science Education & Research in a Big Data Era.

21:00-23:00 Greek Night and Dinner

Tuesday 26 June 2018

07:45-11:00 Session VII: An Educational Urban Walk in Modern and Ancient Athens

Chair: Gregory A. Katsas, Vice President of Academic Affairs, ATINER & Associate Professor, The American College of Greece-Deree College, Greece.

Group Discussion on Ancient and Modern Athens.
Visit to the Most Important Historical and Cultural Monuments of the City (be prepared to walk and talk as in the ancient peripatetic school of Aristotle)

11:15-13:00 Session VIII (Room A - 10th Floor): Sustainable and Resilient Infrastructure - Environmental Issues

Chair: Jeh-Nan Pan, Professor and CSQ Fellow, National Cheng Kung University and Chinese Society for Quality, Taiwan.

1. Samuel Hassid, Associate Professor, Technion – Israel Institute of Technology, Israel. EnergyPlus vs. Monthly ISO 13790 for Israeli Climatic Zones.
2. Hatem Abou-Senna, Assistant Professor, University of Central Florida, USA & Essam Radwan, Professor / CATSS Director, University of Central Florida, USA. Quantifying the Effects of Vehicular Driving Cycles on Air Quality.
3. Suleiman Hassan Otuoze, PhD Student, University of Birmingham, UK, Dexter Hunt, Senior Lecturer, University of Birmingham, UK & Ian Jefferson, Professor, University of Birmingham, UK. Review of Trends in System Resilience for Sustainable Future Transport in Megacities.
4. Soumya Kar, Research Scholar, BITS Pilani, India & Rajiv Gupta, Senior Professor, BITS Pilani, India. A Study on the Disposal and Efficient Re-use of Water Treatment Sludge Generated in a Household: A Review.
5. Helene Jeannin, Sociologist, Orange Labs, France. Technology Influencers and the Culture of Mobility: Experimenting Self-Ruling Floating Cities.

13:00-14:00 Lunch

14:00-16:00 Session IX (Room A - 10th Floor): Special Topics in Technology & Engineering

Chair: Timothy Young, Professor, University of Tennessee, USA.

1. Kyung Jin Cha, Associate Professor, Kangwon National University, South Korea & Hwa Jong Kim, Associate Professor, Kangwon National University, South Korea. Designing Conversational User Interface for Artificial Intelligence Devices.
2. Jeh-Nan Pan, Professor and CSQ Fellow, National Cheng Kung University and Chinese Society for Quality, Taiwan & Chung-I Li, National Cheng Kung University, Taiwan. A New Demerit Control Chart for Monitoring the Quality of Multivariate Poisson Process.
3. Su-Qun Cao, Professor / Vice Dean of Mechanical & Material Engineering Faculty, Huaiyin Institute of Technology, China. A Novel Feature Selection Method for Unsupervised Pattern.
4. Gyeunho Choi, Professor, Daegu-Gyeongbuk Institute of Science and Technology (DGIST), South Korea, Yongseob Lim, Assistant Professor, Daegu-Gyeongbuk Institute of Science and

Technology (DGIST), South Korea & Mingyu Choi, Assistant Professor, Daegu-Gyeongbuk Institute of Science and Technology (DGIST), South Korea. Case Studies of a Project-Based Learning Course in Transdisciplinary Engineering Program.

5. Chien-An Shih, Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan, Ming-Long Yeh, Associate Professor, National Cheng Kung University Hospital, Taiwan, Fei-Yi Hung, Professor, National Cheng Kung University Hospital, Taiwan, Chih-Kai Hung, Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan, Cheng-Li Lin, Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan, Chia-Lung Li, Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan, I-Ming Jou, Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan & Wei-Ren Su, Chairman of Orthopedic Department, National Cheng Kung University Hospital, Taiwan. Biomechanical Comparison of Parallel, Posterior, and Y Configuration for Treating Comminuted Distal Humerus Fractures.
6. Arash Mazaheri, PhD Candidate, University of Zanjan, Iran & Amir Masoud Rahimi, Associate Professor, University of Zanjan, Iran. Synchro Software: Can be used to Enhance and Optimize the Performance of Urban Signalized Intersections with Queue Blockage?

16:00-17:30 Session X (Room A - 10th Floor): Innovative Concrete Materials

Chair: Hatem Abou-Senna, Assistant Professor, University of Central Florida, USA.

1. Ivanka Netinger Grubesa, Associate Professor, Josip Juraj Strossmayer University of Osijek, Croatia, Ivana Barisic, Assistant Professor, Josip Juraj Strossmayer University of Osijek, Croatia & Ilijana Kljajic, Civil Engineer, Croatia. Polymer Modified Pervious Concrete.
2. Cise Unluer, Lecturer, Nanyang Technological University, Singapore. Influence of Carbonation on the Performance of Reactive MgO Cement-based Concrete Mixes.
3. Tomas Lovasi, Student, University of Chemistry and Technology, Prague, Czech Republic, Milan Kouril, University of Chemistry and Technology, Prague, Czech Republic & Sarka Msallamova, University of Chemistry and Technology, Prague, Czech Republic. Electrochemical Healing Techniques for Concrete Reinforcement Restoration.
4. Jose Ivan Escalante-Garcia, Research Scientist, Cinvestav Unidad Saltillo, Mexico, Karina Cabrera-Luna, Postdoc, Universidad Veracruzana, Mexico, Erick E. Maldonado-Bandala, Academic, Universidad Veracruzana, Mexico & Demetrio Nieves-Mendoza, Academic, Universidad Veracruzana, Mexico. Strength Evolution of Concretes Made with Supersulfated Binders based on Volcanic Materials Exposed to two Media.

20:00- 21:30 Dinner

Wednesday 27 June 2018
Mycenae and Island of Poros Visit
Educational Island Tour

Thursday 28 June 2018
Delphi Visit

Friday 29 June 2018
Ancient Corinth and Cape Sounion

Hatem Abou-Senna
Assistant Professor, University of Central Florida, USA
&
Essam Radwan
Professor/CATSS Director, University of Central Florida, USA

Quantifying the Effects of Vehicular Driving Cycles on Air Quality

Transportation is one of the primary sources of air pollution and GHG emissions. On-road mobile sources account for a third of the total air pollution in the US. Furthermore, the type of analysis and the level of detail utilized (macroscopic or microscopic) to calculate traffic emissions affect the results extensively. Traditional methods for creating emission inventories utilized annual average estimates. Instead, travel demand models were utilized to provide an intermediate level of detail using daily values. Currently, more accuracy has been established using microscopic analyses through the reduction of time and distance scales and utilizing second-by-second operations. The need to accurately quantify transportation-related emissions from vehicles is essential.

The latest United States Environmental Protection Agency mobile source emissions model, MOVES can estimate vehicle emissions on a second-by-second basis creating the opportunity to integrate it with a microscopic traffic simulation model (VISSIM). This research analyzed different levels of detail for predicting emissions from vehicles and shows how the various approaches affect predicted emissions of CO, NOx, PM and CO2. The results demonstrated that vehicle activity characterization in terms of different driving behaviors was shown to have a significant impact on air quality. Specifically, emission rates were found to be highly sensitive to stop-and-go traffic and the associated driving cycles of acceleration, deceleration, frequent braking/coasting and idling. Obtaining accurate and comprehensive operating mode distributions on a second-by-second basis is essential for predicting emissions. The proposed emission rate estimation process can provide policymakers with more accurate information when deciding on environmental transport policies for air pollution control.

Brwa Ahmed Saeed
Lecturer, A. S. Brwa/Ishik University, Iraq

Influence of Optimal Distribution of Dampers on Structural Vibration Control

At the end of last century, dampers were designed to absorb seismic energies in multi-story buildings at high seismic zones. Dampers are cost effective, so reducing number of dampers certainly decreases construction costs without having a significant effect on the structural performance, if and only if all the dampers are well distributed. The approach of optimal distribution is to implement dampers in places that the structure benefits from the full damping capacity of dampers to mitigate structural vibration.

The objective of this paper is to find the optimal placement and distribution of limited number of dampers to minimize the top story displacement, minimize the top and inter-story drifts, and minimize the top story acceleration. These objectives are achieved by absorbing most of the velocity at the first story.

This paper proposes a set of mathematical methods, a combinatorial formula is used to find the number of all possible cases for arranging three dampers in a ten story building. Exhaustive Search Method is used to find the optimal distribution of dampers based on the minimum response of the structure. A State Space Model is used to describe a system with a set of linear differential equations which they represent the equation of motion of the structure. Then, the system is simulated and solved in MATLAB software. Three real ground motions have been used to examine the method.

The results show that the distribution of dampers has a significant effect on the structural performance. The first story damper absorbs the most velocity generated from the seismic load. So, that to obtain the best results dampers should be implemented at the lower stories. In this study, three dampers implemented at the first three stories were more effective than five randomly placed dampers in terms of the study objectives.

Zouhair Issa Ahmed Al-Daoud
Assistant Professor, Al-Bani University College, Iraq
&
Rasha Qasim Humadi
Lecturer, Al-Nahrain University, Iraq

Optimization and Evaluation of a Factory Layout Design Problem

The study of factory layout design is not an easy task because there is no standardized or unified way to solve the layout problems of location planning and the use of modern management methods for production represents the necessary step for a successful industrial project. The choice of optimal production method, represented by selection of necessary machines for production, relies on the best planning and locating of workstations. The success of this step requires the determination of a set of information such as (machine size, operation planning type, layout type, department necessary space etc.).

The objectives of this research is to study the variables and requirements that are needed in the factory planning then achieving the optimum work elements, in order to obtain lowest handling cost of materials and the least possible transmission distance or any other standard approved to evaluate the identification of work elements and to allow workers, materials or customers to move within the work space more easily and effectively also find the best technological methods to work in production sites through optimal distribution of various production sites, minimum distance possible through which the material has to move. The least possible paths of required materials between operations, the optimal utilization of the available land area, reduce the congestion points and accumulation in the workstations. The planning of events in the fields of production plays an important role in facilitating the production processes by drawing a clear picture of the paths movement for (parts, semi-finished materials, finished products), also workers between different productions activities with minimum distance as possible.

The research included two aspects, the theoretical which includes the classification of production, the objectives of the planning processes and factors affecting it, types of planning and production processes and movement paths. The theoretical part also includes the steps of production planning location and the technical, engineering methods and tools used. The second side includes a case study in the General Company of Leather in Baghdad, Iraq. Where the focus was on studying and evaluating the planning, the current situation is now on the requirements and variables of the planning process of the number 7 factory for developing modern men's shoes. In this research, scientific and mathematical methods were applied to

assist in decision-making .Many mathematical models are used to contribute to the best ranking of workplace assets, considering that there is no algorithm, mathematical method or simulation model that ensures access to the best design of the workplace, but provides approximate solutions. There are two basic criteria on which the current design and determination of the plant have been assessed: Standard cost of material handling and the standard of the total distance between materials between different machines according to the general steps to produce different parts.

Due to the evolution of modern industry features and the tremendous progress in computing capabilities, Microsoft Visual Basic C++ 6.0 has been used in the current planning problem to achieve the best possible decision in the least time, effort as well as accuracy of distances and clarity of results. The design and current situation of the factory plant has been evaluated on the basis of the total distance standard. Thus, the value of the total distance between the machines used to produce each part of the men's shoe parts run by the raw material and semi-finished material on its way to reach a complete manufacturer part is 286.9 meters. A new design for the factory sites was reached. Through the proposed optimization results and comparing those with current location noticed that the total transit distance becomes 196.9 meters, thus reducing the transport distance by 68.63% for design also the total distance of the sewing division was reduced by 50.276% from 181 m to 91 also, reduce cost, increase productivity and increase profits.

Ram Balachandar
Professor, University of Windsor, Canada
Vimaldoss Jesudhas
Research Associate, University of Windsor, Canada
&
Ron Barron
Professor, University of Windsor, Canada

Study of the Shallow Wake Characteristics of Emergent Slender Cylinders using DES

Flow past vegetation in rivers and streams have received considerable attention in recent years due to their ecological and environmental impact. Vegetation patches interact with the flow and generate complex flow patterns that influence sediment, pollutant and nutrient transport in water bodies. Several researchers have attempted to study this complex flow field experimentally by modelling the vegetation as slender emergent cylinders. However, due to the limitations in experimental techniques, the measurements were often limited to the central (vertical) plane and transverse (horizontal) planes. While these measurements are adequate to provide valuable insights on the vertical variability of the wake characteristics due to the influence of bed and the free-surface, it was not sufficient to provide information on the location, shape and influence of the coherent structures present in the flow field. In order to address this shortcoming and fill the gaps in experimental results, 3D detached eddy simulation (DES) of the flow past emerged slender cylinders was carried out at Department of Civil and Environmental Engineering, University of Windsor. The free-surface deformations were captured using VOF multiphase model with high-resolution interface capturing (HRIC) technique. The present paper presents the results of the simulations of the flow past emergent cylinders at two Reynolds numbers. The velocity and turbulent characteristics of the flow field are validated with experimental results and are presented with additional analysis. The coherent structures in the flow are captured using λ_2 criteria. The influence of the free-surface and the bed on these coherent structures is presented with pertinent analysis. The advantages and shortcomings of using DES to simulate such flow fields is also evaluated.

Su-Qun Cao
Professor / Vice Dean of Mechanical & Material Engineering Faculty,
Huaiyin Institute of Technology, China

A Novel Feature Selection Method for Unsupervised Pattern

A novel feature selection method for pattern classification is proposed to provide a kind of unsupervised pattern based on unsupervised optimal discriminant vectors to achieve data reduction feature selection method for pattern classification technology. Fuzzy Fisher criterion as the objective function is used to obtain unsupervised optimal discriminant vector. According to each dimension value of the vector, the weights of features are sorted and according to the size of the given threshold, the feature subset is selected. Then the data dimensionality reduction can be realized which can be widely used in image recognition, data mining and so on.

Kyung Jin Cha
Associate Professor, Kangwon National University, South Korea
&
Hwa Jong Kim
Associate Professor, Kangwon National University, South Korea

Designing Conversational User Interface for Artificial Intelligence Devices

Recently there were many Artificial Intelligence speakers that got established and introduced such as Amazon Eco and Siri. Despite their popularity, worldwide promotion and high awareness, previous research has found that usage of such voice based Artificial Intelligence assistants did not reach its expectations. Such can be attributed to the fact that people started to feel and perceive conversational User Interface to be a bit overwhelming to interact. The primary emphasis of our research is motivated by the fact that UI/UX design for Artificial Intelligence devices should be studied differently with traditional UI/UX research, and voice-based Chabot interaction design process is quite complex phenomena to be investigated.

In this paper we provide key importance UI factors for successful Voice Chatbots design based on case example of kids watch and AI speaker designed by one of the telecommunication device companies in Korea. In addition, we also provide a UI design process framework that is aimed at creating service scenarios that can potentially improve user experience in conversational chatbot environment.

Gyeunho Choi
Professor, Daegu-Gyeongbuk Institute of Science and Technology (DGIST), South Korea
Yongseob Lim
Assistant Professor, Daegu-Gyeongbuk Institute of Science and Technology (DGIST), South Korea
&
Mingyu Choi
Assistant Professor, Daegu-Gyeongbuk Institute of Science and Technology (DGIST), South Korea

Case Studies of a Project-Based Learning Course in Transdisciplinary Engineering Program

We propose a unique educational program – Undergraduate Group Research Program (UGRP) - reflecting the megatrend of the rapidly changing 21st century on the era of the Industry 4.0. The UGRP is an innovative curriculum that enables students to become productive contributors to the future of society. We introduce the process and achievement of the UGRP through several cases. The first case was to understand the operating principle of the main hardware components of the autonomous vehicle (i.e., braking, steering, power and controller) and to develop autonomous driving algorithms by processing various sensors (i.e., Camera, GPS and LiDAR).

The main research contents have two parts: First, it is to study various sensor signal processing, vision and image processing technologies. Second, it is to develop control algorithm and verify autonomous vehicle driving performance. The vehicle verification follows two processes: (a) design and development of algorithms such as obstacle, lane, path recognition, (b) perform the optimization based on the hardware and software validation. The achievement was not only that submitted technical report was recognized as the highest level of perfection but also that the autonomous vehicle with developed algorithms successfully accomplished autonomous driving missions on the road in the 2017 International Student Car Competition. The second case was to search the domestic and overseas patents to find the patents of technologies. Students was to perform technical analysis of patents based on the keywords of interest and to obtain the patent-map for the strategy of developing technologies on business. In this case, students have learned the comprehensive processes of patents, such as patent searches with keywords, technical-based conversation about advantages and disadvantages of related patents through the patent technical analysis table and discussion about how to avoid patents by other technologies. Through this process, students have also learned how to acquire the patents and to build the business model through the acquired patents. Several ideas of three students in UGRP participants were selected as

outstanding ideas at the Domestic Convention Contest in 2017. Therefore, it is convinced that the proposed UGRP, which is a project-based collaborative program, has proven to be a creative subject requiring comprehensive and critical thinking.

Bin Cui
PhD Student, Hochschule Hannover, Germany
Martin Gottschlich
Professor, Hochschule Hannover, Germany
Ulrich Luedersen
Professor, Hochschule Hannover, Germany
&
Josef Meyer
PhD Student, Hochschule Hannover, Germany

CFD Simulation of a Rotary Swing Chamber Machine

Refrigerants for compressor air conditioners like R-1234yf, which is replacing R134a, are either polluting or highly flammable and highly toxic. If this gas burns, it can be very dangerous for human beings and the environment. Therefore, new technologies with environmentally friendly refrigerants are developed and tested.

An air conditioner, that can produce refrigeration without any chemical CFC-component is developed at the University of Applied Sciences and Arts Hanover. The engine is based on a rotary swing chamber system, which can be used for expansion and compression under high efficiency and consists of two interlocking rotors with four blades each. Due to the characteristic oscillating motion of the rotors, four moving chambers are created within the housing in which air can be expanded and compressed as a refrigerant. The machine operates in Joule process without phase change with a high volume turnover, fulfilled by 32 chamber fillings each rotation.

To evaluate and optimize the compression and expansion ratio and performance of the engine, a CFD simulation is carried out. Therefore different approaches are tested in order to find the right geometry and get more information about process parameters such as mass flux, temperature and pressure field within the chamber. The simulation will be used for first insights, before a prototype is constructed and built for further measurements and investigations.

Moshe Eben-Chaime
Professor, Ben-Gurion University of the Negev, Israel

Using the Operations Process chart as a Platform for Integrated Process Design

Since its introduction, the operations process chart (OPC) was heavily used for process design. As noted about half a century ago, "The OPC is one of the most useful techniques in manufacturing planning. Actually, it is a "diagram" of the manufacturing process." Yet, in recent decades it disappeared from the operations management literature. In this presentation, few elements are added to the OPC: the assembly ratios, the defect rates of each operation, and inspection error rates. The assembly ratios are the number of units of each component type in an assembly and are usually associated with the bill-of-materials of the material requirements planning. Major determinants of the processing volumes are the amounts of defective items that are produced, but very few works consider this issue in the literature and only in serial processes. The proposed integration enables to account for the defective items in estimating capacity requirements and actual loads in production systems of assembly product (like many products are), which are not serial. This opens the way for improved design of production systems.

Imad El-Zakhem
Assistant Professor, University of Balamand, Lebanon
&
Marie Khair
Associate Professor, Notre Dame University, Lebanon

Big Data Opportunities: Prescriptive Analytics to Enhance Learning Programming in Higher Education

Big data is an evolving research area in several fields such as healthcare, finance, and business applications. The main characteristics of Big data are: its volume which is growing fast with the time, the variety of types (both structured and unstructured) inherited from its different data sources, the velocity of incoming data, and the high value derived from that data. This topic is still immature in the higher education sector and this leaves several opportunities to explore in areas like student performance, curriculum tuning, and institutional effectiveness. However, the collection of data from different heterogeneous sources and the need for near real time actions are the main challenges facing the application of analytics in the higher educational sector.

On the other hand, Educational Data Mining (EDM) is a developing discipline which explores methods and tools to analyse data within the educational sector whether related to students and/or to the learning environment. Data Analytics process incorporates the following basic steps: data collection, analysis, modelling and deployment.

Data analytics can be of several types. The descriptive analysis explains what is happening, the predictive analysis explains what would happen in the future based on the history, and the predictive analysis which explains what should be done to attain the goal set. Prescriptive analytics is the most promising type since it can take active corrective action in real time or near real-time but it needs the descriptive and the predictive analytics to be done previously in order to drag solutions.

The application of Big Data principles and the prescriptive analysis can benefit instructors and students to highlight the difficulties and problems in university courses and specially the introductory course of programming which is one of the major challenging courses for students. This problem has been already tackled by many researchers from different perspectives, like language learning, concepts acquiring and methodologies of teaching and learning.

In this context the data needed has a significant volume; it is structured and unstructured and is constantly varying through time. The types of data are heterogeneous because it should be collected from many sources like the student information system, course management system, social media, student assessment forms, and student reflective writing. In addition, social

network analysis, which was successfully implemented to analyse students' inter-relations, based on demographic, pre admission, students' origin schools, student enrolment, and family related information data is another important feeding source.

Using the prescriptive analytics on the information collected will help instructors to take actions to ameliorate the achievement of students in learning programing course and to initiate a student centred learning approach by making interventions and taking measures in a near real time before it is too late.

Jose Ivan Escalante-Garcia
Research Scientist, Cinvestav Unidad Saltillo, Mexico
Karina Cabrera-Luna
Postdoc, Universidad Veracruzana, Mexico
Erick E. Maldonado-Bandala
Academic, Universidad Veracruzana, Mexico
&
Demetrio Nieves-Mendoza
Academic, Universidad Veracruzana, Mexico

Strength Evolution of Concretes Made with Supersulfated Binders based on Volcanic Materials Exposed to two Media

The sustainability of concrete can be improved by using low emission binders, such as the supersulfated cements (SSC), which are commonly formulated using blastfurnace slag, and activators of calcium sulfate and an alkaline activator commonly clinker of Pórtland Cement. This investigation presents results on concretes fabricated using an SSC with a binder based on volcanic materials which are an abundant and cheap in many parts of the world; the binders were composed by up to 75% pumice (PM) and the activators were combinations of hemihydrate (HH) and anhydrite (An), as well as lime (CaO) and Portland cement (CP). The cementitious content was about 700kg/m3 of concrete, and the highest CP load was only up to 140 kg/m3. The concretes were cured for 22h at 60°C and then at 25°C. The specimens were exposed to two conditions, dry open conditions in the laboratory and also submerged under water in a solution with 3.5% CaSO4 at 25°C for up to 180 days. The Taguchi method was employed to define the composition of the binder using three factors with two levels and an orthogonal array L4 (23). After 180 days, the concrete using a binder composed of 5%An-10%CP-10%CaO-75%PM exposed to the CaSO4 solution reached a compressive strength of 46 MPa y and 44 MPa under dry laboratory conditions, with an effective porosity (%□e) of about 4% at 28 days. The microstructure, analyzed by scanning electron microscopy, indicated a relatively dense microstructure, suggesting that the pumice had participated in the hydration reactions. The chemical analysis, by energy dispersive spectroscopy, of the cementitious matrix that the main hydration products were C-S-H and ettringite finely intermixed. These new SSC binders are a new possibility towards less use of Portland cement while maintaining good mechanical properties and durability.

Ivanka Netinger Grubesa
Associate Professor, Josip Juraj Strossmayer University of Osijek, Croatia
Ivana Barisic
Assistant Professor, Josip Juraj Strossmayer University of Osijek, Croatia
&
Ilijana Kljajic
Civil Engineer, Croatia

Polymer Modified Pervious Concrete

Pervious/permeable/no-fines concrete is a material with the same basic components as the standard concrete but designed to have high porosity. A pervious concrete mixture is composed of cement, water, and coarse aggregate, with or without a small amount of fine aggregate. Pervious concrete as a material was used for the first time in 1852 and patented in 1980. Although it is not a new technology, pervious concrete is receiving renewed interest today. The typical properties of pervious concrete are: good drainage properties, high noise absorption properties, ability to reduce urban heat islands, poor mechanical properties, low abrasion and freeze-thaw resistance. This paper deals with improving mechanical properties of pervious concrete by using polymer. Several mixtures of pervious concrete without and with polymer incorporated will be prepared and their properties in hardened state compared to each other.

Samuel Hassid
Associate Professor, Technion – Israel Institute of Technology, Israel

EnergyPlus vs. Monthly ISO 13790 for Israeli Climatic Zones

The energy efficiency, as predicted using on one hand the comprehensive building energy calculation program EnergyPlus and on the other hand the simplified monthly method of Standard ISO (EN) 13790, is compared for the four climatic zones of Israel. In two of those zones (Coastal and Negev Zones) cooling is dominant but heating is important; in another one, the Mountain Region, heating is dominant but cooling important and in the fourth one (Syrian-African Rift) there is essentially only cooling. The energy efficiency predicted by the two models is quantified as the percent reduction of annual heating plus cooling energy per unit area with respect to a pre-defined reference building. It is shown to be in fair agreement - with the simplified model being consistent with slightly better energy efficiency. The comparison is thought to be of relevance not only for the climates of Israel, but also for other climates in which cooling energy is as important as heating energy or more. The limitations of the comparison are discussed – especially the 24 hour heating/cooling assumption and the neglect of cooling latent heat in some regions.

Helene Jeannin
Sociologist, Orange Labs, France

Technology Influencers and the Culture of Mobility: Experimenting Self-Ruling Floating Cities

For some libertarians, 'aquapreneurs' or 'seasteaders', creating floating cities in international waters could be a way to experiment with new forms of government and create 'start-up' countries. This spirit and the ethos of the modern-tech industry inspired the Californian founders of the Seasteading Institute. Their endeavors to promote their ideas led to an agreement signed in early 2017 with the French Polynesian government.

We propose to retrace the genesis of this project, starting with its influences, inspirations and high level contacts, as well as the various uses and purposes that were initially reviewed.

Then we will look at the communicational aspects that have contributed to give visibility and assist in its promotion. Architectural competitions have disseminated strong and recognizable visuals. How do technology influencers mix different types of campaigns to raise money and attract investment?

Regardless of the future form it takes (a platform, a huge ship or an artificial island), political, legal, and technical aspects are at stake – each with their pros and cons. Among those are the beliefs in a changing American Frontier, a new culture for urban mobility, and the paradisiacal yet ambivalent image of the island.

From the original point of view up to now, the principle of reality has prevailed. The Seasteading Institute has reoriented its strategy to move towards the blue economy and the creation of a Special Economic SeaZone near the islands of Tahiti as per the Polynesian government's desire. Whatever the issue, what lessons can be learned from this project?

Soumya Kar
Research Scholar, BITS Pilani, India
&
Rajiv Gupta
Senior Professor, BITS Pilani, India

A Study on the Disposal and Efficient Re-use of Water Treatment Sludge Generated in a Household: A Review

Water is an integral part of this universe and plays a critical role in the functioning of the Earth's ecosystems. With an ever growing population's insatiable demand for clean water and increasing pollution of existing water resources, it has become a major challenge for authority to provide people with potable water.

Water treatment sludge (WTS) is the waste that is generated when raw water is passed through different treatment processes. It contains the pollutants present in the water along with the chemicals used for treatment.

With numerous initiatives aimed at providing people with safe water, several household treatment techniques have been developed like adsorption and Reverse Osmosis. Both these methods produce waste during the treatment process. RO produces around 40 to 50 percentage of waste water and the filtrate generated during adsorption has a high concentration of the contaminants removed. The WTS generated needs to be disposed off effectively to prevent leaching into the environment and re-contamination. This paper reviews the existing methods for disposal and beneficial reuse of water treatment sludge and identifies certain knowledge gaps, which will assist in the efficient disposal of the sludge produced in a water treatment unit at a household.

Jeongbeom Kim
Professor, Namseoul University, South Korea

An Empirical Study of Effective Promotion System based on Big Data Analysis and Machine Learning

Recently, various strategies have been established and implemented to increase sales through public relations in corporations and public institutions. Recommendation systems are proposed and proposed based on user's data, such as internet recommendation and friend recommendation on Facebook. There are not many systems that extend the concept of recommendation and recommend users' taste. Based on the information provided by the user, it is possible to emphasize the need for services provided by identifying areas not provided and providing recommendations for them.

The purpose of this study is to study about the efficient prediction system that enhances the effectiveness of marketing promotion based on big data analysis and machine learning empirically.

From the perspectives views of competitive edge, effective promotion system using big data analysis can contribute to increase of sales and market position definitely.

John Lamb
Adjunct Professor, Pace University, USA

Making Healthcare Green: The Role of Cloud, Green IT, and Data Science to Reduce Healthcare Costs and Combat Climate Change

Climate change is a big issue. It has been discussed and continues to be discussed in major forums across the world. This paper gives practical information on how green healthcare (whose major sub-segment is "hospitals") can contribute to solving the Climate Crisis by adopting Green IT practices. The recent UN Climate Agreement on reducing carbon emissions reached in Paris during December, 2015, helps continue to raise awareness to the need to reduce electricity use through efficiency. Green Healthcare, Green Computing, and Green IT (Information Technology) are all excellent ways to reduce electricity use and save money doing it.

Globally, the healthcare sector is growing in importance and plays a key role in world economics. The healthcare sector makes heavy use of technology including social media. Technological advances have revolutionized the healthcare industry worldwide – from modern testing techniques to improved surgical equipment, remote health monitoring technologies with the help of modern digital equipment, etc. There are many online healthcare portals. The complexity of the healthcare industry helps account for the large environmental footprint. Healthcare accounts for 8% of the U.S. carbon footprint.

The environmental impact of the healthcare sector has become an important factor globally. The energy use of the healthcare sector is growing due to many factors, including the rapid growth and adoption of Information and Communication Technology (ICT) in healthcare. The new IT technologies and applications used in healthcare include 'cloud computing', 'mMedicine', i.e. 'mobility in Health', eHealth, and tele(health) care for 'remote delivery of healthcare services'. In general, the healthcare industry needs to reap the benefits of emerging technologies such as data science, Big Data, Analytics, mobile computing and cloud computing, along with the use of Health Information Technology (HIT) to help solve the ever growing operating cost problems. A big challenge facing the healthcare sector is how best to improve the energy efficiency and sustainability of this very complex system. Efforts over the past few years to analyze and create highly efficient data centers presents an excellent opportunity for cost effective Green IT at hospitals.

This paper presents examples and case studies on how Data Science, Big Data, Analytics, and Cloud Technology can be used in healthcare to significantly improve a hospital's IT Energy Efficiency along with

information on the best ways to improve energy efficiency for healthcare in a cost effective manner.

Chin-Mei Lin
Professor, Asia University/Quanzhou Normal University, Taiwan
Pei-Chen Hsiao
PhD Student, Asia University, Taiwan
Chao-Tsang Lu
Associate Professor, Central Taiwan University of Science and Technology, Taiwan
Hsing-Hua Cheng
Lecturer, Asia University, Taiwan
&
Jia-Horng Lin
Professor, Feng Chia University, Taiwan

The Evaluation of the Manufacturing and Functions of Complex Knitted Fabrics

With the development of technology, the electronic communication equipment brings a lot of convenience for human life nowadays. However, the electromagnetic waves have been proven that they may be harmful to human health by many studies; therefore, the electromagnetic shielding and electrostatic protection are necessary. The purpose of this study is in order to reduce the harm of electromagnetic waves on humans. First, stainless steel wires are used as the core and are wrapped in bamboo charcoal yarns. During the process, the wrapped materials are along the S- and Z-direction with different wrapping counts via an electrical covering machine. The purpose is to form stainless steel (SS)/bamboo charcoal (BC) wrapped yarns. The wrapped yarns are then examined for tensile strength and elongation for the optimal parameters. And next, SS/BC wrapped yarns (the wrap material) and spandex fibers (the core) are twisted with different twisting counts and twisting speeds into bi-layer elastic wrapped yarns via a rotor twister. Last, the bi-layer elastic wrapped yarns and BC yarns serve as the face yarns, while antibacterial yarns, cross-section wicking yarns, and spandex fibers are used as the ground yarns. A computer jacquard hose machine is used to form these materials into elastic, functional composite weft knits. The influences of wrap counts on the mechanical properties, EMI SE of the knits are tested in order to make the elastic composite knits with multiple functions. Finally, gain the complex elastic knitted fabric. Then the complex knitted fabrics have permanent anti-static properties and electromagnetic shielding effectiveness. The test results show that complex knitted fabrics have the maximum tensile strength (453.45N) and EMSE (38.3 dB).

Tomas Lovasi
Student, University of Chemistry and Technology, Prague, Czech Republic
Milan Kouril
University of Chemistry and Technology, Prague, Czech Republic
&
Sarka Msallamova
University of Chemistry and Technology, Prague, Czech Republic

Electrochemical Healing Techniques for Concrete Reinforcement Restoration

Electrochemical chloride extraction from a reinforced concrete structure may be accompanied with an electrochemical injection of healing agents if such agents are positively charged and are able migrate towards the activated reinforcement. Positive charge carrying nanoparticles or cationic corrosion inhibitors might be the proper choice. Organic substances with a positive charge and their salts are mostly such inhibitors. Critical concentration of chlorides was investigated for fresh and carbonated concrete pore solution. Corrosion inhibition efficiency was evaluated by means of polarization resistance as a measure of corrosion rate. Sodium nitrite was taken as a reference corrosion inhibitor. Migration tests were performed in order to test the migration ability of promising cation corrosion inhibitors, namely guanidine carbonate, methylamine, tetrabutylammonium bromide, tetrabutylphosphonium bromide or triethylenetetraammine. Concentration profile of the inhibitors and chlorides was investigated in the testing concrete blocks. The best results have been obtained for guanidine carbonate and triethylenetetraammine up to now. Both showed migration ability and reasonable corrosion inhibition efficiency.

Ylenia Maruccia
Data Scientist, Exprivia SpA, Italy

Talking Machines: How Big Data can help in Real-Time Anomalies Detection

The advent of new technologies such as IoT, Augmented Reality, Robotics, Artificial Intelligence has led a major impact on an industrial scale paving the way towards the so-called Industry 4.0.

In this scenario of significant change for industry, Big Data play a key role thanks to the information generated through their analysis. The introduction of technologies such as IoT in machine monitoring has surely generated a huge amount of machine operation data, useful to understand not only how a machine is working, but also to predict any breakdowns and to schedule predictive maintenance interventions. But predictive analysis is only a first step in the field of next-generation maintenance, prescriptive analysis can actually facilitate real-time monitoring and allow the creation of case study such as what will be described in this paper.

Imagine getting access to the machines by creating a maintenance system that can highlight and detect a problem, through Machine Learning techniques, and to receive in an automatic and immediate way, the solution for that issue on smart glasses of the workman, through the use of mixed-reality.

The following case study describes the design and development of a system of intelligent and real-time monitoring of machines utilizing the large amount of data produced by sensors inserted into the machines that can provide useful and continuous information on their life.

The implementation of machine learning algorithms that can analyze and process the large amount of generated data allows real-time extraction of important information to monitor machine operating conditions. When an anomaly is detected, the system seeks, through semantic analysis techniques, the solution to the detected anomaly and sends it, immediately, on the workman's smart glasses who is able to manage the issue and to handle it in the best way possible.

This system can also provide remote support in order to increase the chances of success of the maintenance intervention. In this scenario, Big Data are at the basis for the development of such a structured system, but at the same time with a great innovative component as it combines important technologies together such as IoT, Big Data and Mixed-Reality. The definition of such a system increases customer service productivity and improves plant efficiency by offering a service that can anticipate failures and take corrective action in useful times.

Arash Mazaheri
PhD Candidate, University of Zanjan, Iran
&
Amir Masoud Rahimi
Associate Professor, University of Zanjan, Iran

Synchro Software: Can be used to Enhance and Optimize the Performance of Urban Signalized Intersections with Queue Blockage?

Recently, with population growth and increased travel demand, the number of automobiles has increased and, as a result, traffic problems and crowdedness of passageways (especially in urban intersections) have escalated. Precise engineering designs matching country-specific countries gain more importance for traffic reduction over time.

In the past years, development of simulation and optimization software as well as software for timing traffic lights in intersections has increased. An example of such software is Synchro. These applications are designed in accordance with the traffic conditions in Iran to enhance traffic. This study was an attempt to assess the most common situations occurring in urban signalized intersections using this software. It was also tried to assess the precision, influence, and accuracy of the performance of this software. Since the measurements were carried out using information on the Amirkabir intersection in Zanjan City, it was tried to gain a better understanding of the traffic behavior in intersections. Moreover, the most important factors leading to an increase in the similarity between the assessment model and the real-world situation of Zanjan City were identified and assessed.

In this study, the following parameters were compared using the Synchro software and the results were assessed subsequently: the width of the effective line for traverse of automobiles; variations of presence of heavy vehicles; change of parking lines; automobiles and buses parked in the vicinity of intersections; and presence of pedestrians. It was concluded that the Synchro software can be used to enhance and optimize the performance of intersections in terms of the aforementioned five parameters.

Andreea Mihailescu
Research Scientist / Development Engineer, Lasers Department /
National Institute for Lasers, Plasma and Radiation Physics, Romania

Architectural Challenges in Designing Big Data Solutions in Support of Laser-Plasma Interaction Experimental Investigations

A stirring number of cutting-edge advancements mark the nearly six decades of laser technology. Attainable laser powers and intensities have increased dramatically as compared to the '90s while the pulse durations have shrunk towards the femtoseconds range. The interaction of such lasers with different types of targets and plasmas gives rise to a multitude of applications, from medicine to industrial processing and energy production. However, the numerous benefits are not free from caveats as there are still technological issues to be addressed and there are still numerous phenomena occurring during the interaction that are not yet fully understood. Some of these may be potentially damaging hence their mitigation is vital. Regardless of such situations, an optimization of interaction conditions is always desirable and this has long been associated with running state of the art simulation software, specifically either hydrodynamic (fluid) or kinetic codes, in accordance with the laser-plasma or laser-target interaction regime. Often, choosing between the two approaches implies an inevitable dismissal of certain phenomena while trying to maintain reasonable accuracy limits. It is in this context that predictive modelling and recommender systems impose themselves as a comfortable and reliable alternative for designing optimized experiments or for estimating potential results.

This presentation is meant to offer an overview on what it means to design a self-managed big data solution in support of the laser-plasma/laser-target interaction research community. The author will discuss related issues, starting from the specificity of data employed, data discovery and data processing to building data lakes, choosing the appropriate SQL or NoSQL databases according to the needs (high availability and fast write performance or ACID transactions and analytics support) and continuing with the importance of having workflow engines and resource allocators running. Improvements brought by the implementation of adaptive load moving strategies for MapReduce, containerization and partial in-memory processing will be comparatively discussed and the difference in terms of execution times will be highlighted. The last part of the presentation is devoted to the design of the integrated deep learning solution with a focus not only on the most effective combinations of algorithms but also on some of the deployed strategies such as grid search, constructive learning dropout and ensemble learning. In spite of being highly resource-intensive, the migration journey from conventional machine learning to the more complex

deep learning was compelling due to the nature of the training data involved. Nevertheless, the combination between deep neural network (DNN) or convolutional neural network (CNN) and decision jungle resulted in improved generalization and diminished memory usage.

Concluding remarks address the perspectives, challenges and further architectural and algorithmic improvements that could bring a positive impact towards an overall optimization of predictive analytics for designing optimized laser-plasma, respectively laser-target interaction experiments.

Edward Minchin
Professor and Interim Associate Director, M.E. Rinker School of Construction Management, University of Florida, USA
Giovanni Migliaccio
Associate Professor, University of Washington, USA
Lourdes Ptschelinzew
Graduate Research Assistant, University of Florida, USA
&
Yuanxin Zhang
Assistant Professor, Guangzhou University, China

Best Practices for the Design Process for the Construction-Manager-as-General Contractor Delivery System

In the early 1990s, the American driving public insisted that planned highway and bridge projects be completed quicker than was possible using the Design-Bid-Build (DBB) construction project delivery system, which had dominated the industry since the 1930s. This led state Departments of Transportation (DOTs) to explore fast-track methods of construction. In the late 1980s some DOTs had begun experimenting with using the Design-Build (D-B) delivery system. Forty-two state DOTs and numerous county and municipal transportation agencies now use the system. However, D-B has displayed disadvantages. This has caused DOTs and similar agencies to search for still another delivery system that might mitigate or eliminate those concerns while providing many of the advantages of D-B. A solution was offered by Construction-Manager-as-General-Contractor (CM/GC), a system that shows great potential, but designers have trouble with the speed of the construction process. This paper tells the story of the development of a guidebook by the research team that the FHWA has published and disseminated to all state DOTs to help them establish their design processes when using CM/GC to delivery their highway and bridge construction projects. Among the findings of the research are that the most important advantage of CM/GC is the innovations possible through the pre-construction services of the contractor as CM; the second biggest advantage of CM/GC is the flexibility it grants the participants, before and during the project, in assigning risk in the proportions that are best for project success. Other findings include that everything should be done to retain the CM as early as possible, and it is important that the design process enable the team to permit and design the project in small "mini" phases, and that this process be tailored to begin construction early.

Mohamed Moussa
Graduate Student, The American University in Cairo, Egypt
A. Samer Ezeldin
Professor and Chair, Department of Construction Engineering, The American University in Cairo, Egypt
&
Sayed Ismail
Assistant Professor, Ain Shams University, Egypt

A Risk-based Logistic Regression Decision Support Model for the Selection from The World Bank Lending Instruments

The International Bank for Reconstruction and Development (IBRD), a World Bank subsidiary, is one of the leading International Finance Institutions (IFIs) that fund infrastructure projects in developing countries. The Bank provides an array of funding services to its member states through its various subsidiaries. These services such as grants and soft loans are often least burdensome on general budgets of governments. However, there are significant differences in the nature of these funding instruments and their ability to address certain project risks. This paper utilizes the feedback of 21 international experts with adequate experience in World Bank funded infrastructure projects in order derive a logistic regression model that yields the recommended funding instrument. This paper focuses on two instruments provided by the Bank which are the Investment Project Finance (IPF) and the Program-for-Results (P-for-R).

Suleiman Hassan Otuoze
PhD Student, University of Birmingham, UK
Dexter Hunt
Senior Lecturer, University of Birmingham, UK
&
Ian Jefferson
Professor, University of Birmingham, UK

Review of Trends in System Resilience for Sustainable Future Transport in Megacities

The wellbeing of society is dependent on transport for movement of people and goods. As a vital critical infrastructure, transportation has become catalyst of socio-economic potentialities, productivity and security. The world population reaches a 7.5 billion mark in 2017, with projections to reach its numerical milestones of 9.7 billion in year 2050. Rising global population midst the existential threats of security, gust of weather as well as environmental pollution are as important to the future of transport in the fast evolving megacities. Hazards, threats and uncertainties to critical infrastructures are fast increasing resulting from trails of socio-economic, environmental and ecological footprints of human population, urbanization, risk and security problems. Resilience is closely related to resistance to taming vulnerability as the concept dominating core discourses and debates on sustainability of future transport assets. This work gauges the knowledge base of researchers through systematic review of published literature sources on the subject of transport resilience. The study involves content review, analysis and rating for a random sample of literature materials to access the awareness and seriousness accorded the problem. The findings are intended to serve as technical blueprint serving as sine qua non for sustainable transport to cope with uncertainties of both population and urbanization booms of the next decades.

Jeh-Nan Pan
Professor and CSQ Fellow, National Cheng Kung University and Chinese Society for Quality, Taiwan
&
Chung-I Li
National Cheng Kung University, Taiwan

A New Demerit Control Chart for Monitoring the Quality of Multivariate Poisson Process

This study aims to develop a new demerit control chart suitable for monitoring the quality of a manufacturing process with multiple characteristics subject to multivariate weighted Poisson distribution. Considering the correlation among different quality characteristics and their degrees of influence on the final product, we propose a new statistic for demerit scheme which gives different weights to different quality characteristics. Then, a new demerit control chart for multivariate weighted Poisson distribution (WMP chart) is developed accordingly. Moreover, a simulation study is conducted to evaluate the detecting performances of our proposed WMP chart and multivariate Poisson control chart (MP chart) using the out-of-control average run length (ARL_1). Finally, a numerical example with a two dimensional telecommunication data set is given to demonstrate the usefulness of our proposed WMP chart. Both the simulation results and numerical example show that the detecting ability of our proposed WMP chart outperforms that of the MP chart when a process shift occurs. Hopefully, the results of this research can provide a better alternative for detecting the mean shifts occurred in a multivariate Poisson process.

Stefan-Gheorghe Pentiuc
Professor, University Stefan cel Mare Suceava, Romania
&
Crenguta Bobric
Associate Professor, University Stefan cel Mare Suceava, Romania

Clustering Techniques for Comparative Analysis of Load Factor Profiles

The paper addresses the improving of the comparative analysis techniques of the load profiles in the electrical substations. Among the advantages of using the load profiles, it is worth noting that the simultaneity coefficients should not be estimated or calculated because the load profiles include this information and the calculation of the power losses is possible for any period of time. The analysis of load profiles can lead to credible predictions.

Analysis methods based on the grouping of the load curves and their visual comparison are subjective and difficult to apply. It is proposed a method of comparative analysis of the load profiles of a distribution station, in which grouping is made based on hierarchical clustering techniques Groups analysis should also be correlated with the temperature values that can greatly influence the demand for energy.

The paper presents a case study based on data collected at a distribution substation for three months, February-April. The method of spatial grouping techniques has led to a progressive grouping in coherent and representative groups, the effect of overloading or increasing the burden being modeled more precisely than in the traditional approach. Also, the transformer plots can be optimized for both peak and off-peak periods;

The obtained results validate the ability of grouping techniques in the classification of the load curves and the comparative analysis of the power consumption.

Gloria Polimeno
Data Scientist, Exprivia SpA, Italy

Designing Solution for Healthcare: A Case Study Combining Big Data and Blockchain Technologies

Nowadays the advent of the digital evolution has brought with it a growing availability of data. However, interesting data is not just those produced through social networks or the widespread use of mobile devices such as smartphones and tablets, but there is great importance and information in patient health data. Today, the expansion of this digital evolution allows to use the potential of digital communication technologies also in the field of Health, that can be defined as Health 4.0. The healthcare environment carries with it a wealth of data, structured and not, precious not only for optimal management of patient prevention and care but also for the management of medical processes, if appropriately protected and anonymous.

A Big Data approach is certainly crucial in order to manage, process and extract useful information from this huge amount of data. It is also essential in helping, on one hand the clinical research into a better understanding of health phenomena, and on the other hand it allows at optimizing typical processes of research by accelerating the development of new solutions, through machine learning activities.

While the use of Big Data models and tools provides an answer to the management and processing of these data, it is crucial to introduce different technologies that can guarantee the privacy and security of such sensitive data. The answer to this latter aspect is given by the application of the Blockchain paradigm.

This paper will describe a case study in the medical field that aims at creating a tool that allows management and access to large amount of health date in a shared and safe way. In particular, this platform will be able not only to make available different types of data (eg daily life data, diagnostic tests, data collected by wearable devices) properly anonymized at various levels, but also to guarantee people to have full control of their data leaving them to decide who can access their data, for which use and at what cost. This can be considered as a first attempt to combine two major approaches, such as Big Data and Blockchain, in order to define a health care solution that allows an unique access to personal data, the marked sharing of medical information in a secure and fast way.

Benhur Satir
Assistant Professor, Çankaya University, Turkey

Turkish Red Crescent's Blood Collection and Blood Products Distribution Logistics Network Design

In the blood collection and blood products distribution logistics network of Turkish Red Crescent, there are many nodes such as Regional Blood Centers (RBC), Blood Collection Units (BCU), Blood Donation Centers (BDC), Transfusion Centers (TC), Test Laboratories (TL), etc. On some arcs between nodes, there may be multiple transportation options with different time requirements and costs. There may be opening/closing decisions of those nodes, assignment of BCUs to BDCs and BDCs to RBCs, transportation method selection on arcs, production amount decisions of blood products, etc. All those decisions affect the overall efficiency of the system. In this problem, we assume two basic objective functions to consider: time and cost. Design to minimize transportation time is effective especially for utilizing short shelf-life products: Thrombocyte Suspension (TS) and Erythrocyte suspension (ES). In order to increase their shelf life, transportation time should be minimized. The solution method requires multi-objective decision making approach.

Maren Schmuck
Research Assistant, Hochschule Hannover, Germany
Erdenetuya Lepenies
Research Assistant, Hochschule Hannover, Germany
&
Ulrich Luedersen
Professor, Hochschule Hannover, Germany

Mass Preservation of Original Written Cultural Artefacts from the 20th Century though Functionalized Nanofibres

Written cultural artefacts, especially documents of the 20th century are highly relevant for the social and political development as well as for the examination of history. Many of them are now at risk of destruction and becoming more fragile over time due to degradation processes. High costs for the preservation of written cultural artefacts–beside the enormous need – is particularly caused by manually shaped treatment processes(e.g. restoration with Japanese paper, single sheet deacidification) as well as cost-intensive materials for the restoration and conservation according to the current state-of-the-art.

The University of Applied Science and Arts Hannover is currently developing an efficient and sustainable paper restoration process using nanofibres which will allow us to make written cultural artefacts permanently available nearly independently of the degree of their damage. The focus in on a fast and cost-efficient combined workflow including the stabilization of papers, tissues and similar materials and the reduction of acid decay, tears and fillers.

The functionalized fibres are produced via a coaxial electro spinning process. The process involves an injector with a polymer reservoir, a high voltage source and a grounded voltage collector. The connection between the high voltage source and the polymer reservoir leads to a charge accumulation in the polymer solution. The polymer as well as the solvent can be the charge carrier. Inside the leaking drop, the charge carriers move to the surface and overcome the cohesive forces if the voltage is high enough, usually dominated by the surface tension of the solution. An electrically charged jet of polymer and solvent is ejected from the drop. The polymer jet is stretched by neighboring charge within the electrostatic field. Due to the stretching process, the surface gets larger, leading to evaporation of the solvent evaporates and solidification of the polymer fibre. Selected alkaline components are then applied to the surface and examined for their utility and efficacy for deacidifying paper. The successful deacidification is analyzed by determination of the alkaline reserve. Furthermore, the influence of the thickness of the nanofibre on the readability of the written material is

evaluated and the coated paper is subjected to tensile tests and tear resistance tests.

The innovation potential of this approach is the use of a modern technology which enables a machine-assisted fast restoration. This technology is particularly relevant for archive documents that accumulate in large numbers and provides sustainable and durable results at a higher speed.

Chien-An Shih
Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan
Ming-Long Yeh
Associate Professor, National Cheng Kung University Hospital, Taiwan
Fei-Yi Hung
Professor, National Cheng Kung University Hospital, Taiwan
Chih-Kai Hung
Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan
Cheng-Li Lin
Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan
Chia-Lung Li
Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan
I-Ming Jou
Orthopedic Surgeon, National Cheng Kung University Hospital, Taiwan
&
Wei-Ren Su
Chairman of Orthopedic Department, National Cheng Kung University Hospital, Taiwan

Biomechanical Comparison of Parallel, Posterior, and Y Configuration for Treating Comminuted Distal Humerus Fractures

Aim: The purpose of this study is to compare posterior versus parallel distal humerus fracture fixation system in treating comminuted distal humerus fractures (DHFs).

Material and Methods: We performed a cadaveric biomechanical testing with posterior system plating (posterior two plating and single posterior Y plating), and parallel plating system to treat AO/OTA type C2.3 DHFs. In the three groups, we compared stiffness, intercondylar displacement before and after cyclic loading, and load to failure in both axial compression and posterior bending directions.

Results: In axial compression, there were no significant difference of stiffness and failure load between three groups. In posterior bending, both double plating system had higher stiffness and failure load than single posterior Y plating. Posterior two plating exhibited higher failure load than the parallel. Three fixation system showed no significant difference regarding intercondylar displacement changes after cyclic loading in both directions.

Conclusions: In this study, we found posterior two plating provides comparative biomechanical strength as parallel plating, and even higher posterior bending failure load than the parallel. Although single Y plating was weaker in posterior bending direction, it provided stable intercondylar fixation as compared to other two double plating systems.

Cise Unluer
Lecturer, Nanyang Technological University, Singapore

Influence of Carbonation on the Performance of Reactive MgO Cement-based Concrete Mixes

Reactive MgO cement-based formulations gain strength via carbonation, which increases sample density and stiffness and enables the evolution of the microstructure as the morphology and binding strength of the carbonate crystals contribute to the network structure. This process initiates with the hydration of MgO to form brucite ($Mg(OH)_2$, magnesium hydroxide), which can then react with CO_2 and additional water to form a range of strength providing hydrated magnesium carbonates (HMCs) within cement-based formulations. The presented work focuses on the use of reactive MgO in a range of concrete mixes, where it carbonates by absorbing CO_2 and gains strength accordingly. The main goal involves maximizing the amount of CO_2 absorbed within construction products, thereby reducing the overall environmental impact of the designed formulations and increasing strength. Microstructural analyses including scanning electron microscopy (SEM), X-ray diffraction (XRD) and thermogravimetry/differential thermal analysis (TG/DTA) are used in addition to porosity, permeability and compressive strength testing to understand the performance mechanisms. The amount of CO_2 sequestered is quantified to explain the mechanical performance of each sample, with the goal of achieving 100% carbonation through the careful design of mix composition and curing conditions. As a result, samples with comparable strengths to those containing Portland cement (PC) were produced, revealing the link between the mechanical performance and microstructural development of the developed formulations with the amount of CO_2 sequestered.

Timothy Young
Professor, University of Tennessee, USA

Quantifying Interactions in Manufacturing using Regression Tree Models – A Useful Inductive Step for Planning a Designed Experiment

Process variables that interact during manufacturing are key sources of variation that influence final product quality. Inductive statistical modeling methods such as regression trees can help manufacturers identify key correlations and quantify the level and strength of interactions. One of the challenges of using deductive statistical methods such as designed experimentation or DOE is selecting the key process variables for the experiment. If many variables are going to be studied, selecting which variables to select that may interact, and will therefore be aliased with one another is dependent on the experience of the industrial researcher. The assumptions associated with aliasing often reduce inference, especially for two-level interactions. It is proposed that regression tree models may be helpful in identifying important alias structures within the variables that may help the industrial scientist reduce the number of experimental runs and maximize scientific inference. Regression tree (RT) models ate very useful when the data space is non-homogeneous. This study utilized RT models to quantify the interactions of process variables influencing final product attributes of modulus and tensile strength from a medium density fiberboard manufacturing process. Results indicated that thickness control, press pressure, and press temperature interacted with each other and had critical operating regions that effected final product quality. These interactions were used to develop a central composite designed industrial experiment which included the interaction effects from the RT results which minimized the number of experimental runs and identified the alias structure of the variables. This two phase technique of combining RT models with central composite designed industrial experimentation may improve final manufactured product and lower costs of experimentation.