



THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

Abstract Book:

2nd Annual International Conference on
Engineering Education & Teaching
5-8 June 2017, Athens, Greece

Edited by
Gregory T. Papanikos

2017

Abstracts
2nd Annual International
Conference on
**Engineering Education &
Teaching**

5-8 June 2017, Athens, Greece

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TABLE OF CONTENTS

(In Alphabetical Order by Author's Family name)

Preface		9
Conference Program		11
1.	Why Maritime Actors Have Tried to Standardize Contracts and Support Arbitration Jurisdictions <i>Gurvan Branellec & Anne Choquet</i>	15
2.	Experiential and Peer Mentoring Experiences and their Impact on Persistence <i>James Collofello</i>	16
3.	CNN-based Vehicle Logo Classification for Vehicle Manufacturer Recognition <i>David Fernandez-Llorca & Mario Jimenez-Garcia</i>	17
4.	CNN-based Vehicle Logo Classification for Vehicle Manufacturer Recognition <i>David Fernandez-Llorca & Mario Jimenez-Garcia</i>	18
5.	What is the Best Design Code in Structural Engineering Education? <i>Klaus Holschemacher</i>	19
6.	Changing Structure and Functions of Urban-Rural Fringes in a Process of Urban Stability in Turkey <i>Ozan Hovardaoglu & Seda Calisir-Hovardaoglu</i>	20
7.	Developing a Crash Risk Index and Detecting Driver's Engagement in Secondary Tasks from Driving Behavior Attributes and Socioeconomic Characteristics: A Naturalistic Driving Study <i>Sherif Ishak, Maggie Ye & Osama Osman</i>	21
8.	Teaching Sustainability in Mechanical Engineering Curriculum <i>Roy Issa</i>	22
9.	Interpreting Corrosion Activities in Reinforced Concrete Structures of Highway Bridges, Using Acoustic Emission Techniques <i>Vadivel Jagasivamani</i>	23
10.	Development of a Public Participatory GIS Platform for Urban Transformation Projects: A Case Study in Kadikoy Historical Center <i>Elif Kirpik & Buket Aysegul Ozbakir</i>	24

11.	Analysis of Tools for Revitalization and Rehabilitation of Brownfields <i>Jiri Kugl</i>	26
12.	Bridging the Gap between Academia and Industry: Lessons Learned from a Graduate IT Professional Development Program <i>Arianit Kurti & Fisnik Dalipi</i>	27
13.	Contemporary Urban Development in the Global Area: A Methodological Assessment <i>Emilia Malcata Rebelo</i>	28
14.	The Analysis of Nationwide Area-Based Management Survey in Japan <i>Jun Mitarai & Naphasinee Suebsuk</i>	29
15.	Education in Astronomy: An Experience of the Adaptation and Application for the Southern Hemisphere, of Educational Material Designed Originally for Northern Hemisphere <i>Roberto Nardi, Telma Cristina Dias Fernandes & Nicoletta Lanciano</i>	30
16.	Integrating Nanotechnology Concepts into Traditional Engineering Programs <i>Deb Newberry</i>	31
17.	Intuitive Education for Logic Circuit Design <i>Yuichi Okuyama</i>	32
18.	A View of Industrial Engineering Profession in Turkey: An Application of Web-Based Survey <i>Ayca Ozceylan & Eren Ozceylan</i>	33
19.	Policy and Law for Urban Green Space Management in South and North Korea <i>Mi Sun Park & Hyowon Lee</i>	34
20.	I Knew You Were Trouble: Designing a Cross-Course Assignment between Engineering and Strategic Communication <i>Ari Perez-Mejia</i>	35
21.	The UPMSat-2satellite: An Academic Project within the Aerospace Engineering Education <i>Santiago Pindado, Elena Roibás-Millán, Javier Cubas Cano, Andrés García, Angel Pedro Sanz Andres, Sebastián Franchini, María Isabel Pérez Grande, Gustavo Alonso, Javier Pérez-Álvarez, Felix Sorribes-Palmer, Antonio Fernández-López, Mikel Ogueta-Guitierrez, Ignacio Torralbo, Juan Zamorano, Juan Antonio de la Puente, Alejandro Alonso & Jorge Garrido</i>	36

22.	Conducting an Orchestra or How Faculty Management May Influence Engineering Education <i>Ulrike Quapp</i>	38
23.	Operational Performance of Partial Crossover Displaced Left Turn Intersections <i>Essam Radwan</i>	39
24.	The Inverted Classroom Model in a Master's Degree Program for Civil Engineers <i>Felicitas Raedel & Joerg Lange</i>	40
25.	Towards a Flipped Classroom in a Signal and Systems Engineering Course <i>Ana Maria Reyes Parra, Fredy Andres Olarte Dussan & Mario Julian Canon Ayala</i>	41
26.	Re-imagining Density in an Inner City Suburb of Melbourne: From 'Dangerously Overcrowded' to 'Urban Consolidation' <i>Belinda Robson</i>	43
27.	The 4th Order Statistics on Ultra Wideband Short-Range Radar (UWB-SRR) for Cyclist Detection <i>Rahmad Sadli, Yassin El Hillali, Laila Sakkila, Atika Rivenq & Charles Tatkeu</i>	45
28.	Business Topics in New Product Development for Engineering Senior Design <i>Sanjay Sisodiya, Steven Shook & Kathy O'Malley</i>	46
29.	Experiences in Learning Engineering Skills in co-Operation with Companies <i>Timo Vaskikari</i>	48
30.	Evaluating the Impacts of Compact Growth on Traffic Emissions and Exposure to Air Pollution in High-Density Areas with a Land Use-Transport-Emission Integrated Model: A Case Study of Xiamen, China <i>Man Yuan & Yaping Huang</i>	49
31.	A Hands-On Approach to Introduce Fuel Cells to Engineering Undergraduate Education <i>Farshid Zabihian</i>	50

Preface

This book includes the abstracts of all the papers presented at the *2nd Annual International Conference on Engineering Education & Teaching, 5-8 June 2017, Athens, Greece* organized by the Athens Institute for Education and Research (ATINER). In total 31 papers were submitted by 33 presenters, coming from 16 different countries (Australia, Brazil, China, Colombia, Czech Republic, Finland, France, Germany, Italy, Japan, Portugal, South Korea, Spain, Sweden, Turkey and USA). The conference was organized into 12 sessions that included a variety of topic areas such as practice, teaching experience, engineering programs, and more. A full conference program can be found beginning on the next page. 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 institute. 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 38 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.

Gregory T. Papanikos
President

FINAL CONFERENCE PROGRAM
2nd Annual International Conference on
Engineering Education & Teaching,
5-8 June 2017 Athens, Greece

PROGRAM

Conference Venue: Titania Hotel, 52 Panepistimiou Avenue, Athens, Greece

C O N F E R E N C E P R O G R A M

08:00-09:00 Registration and Refreshments

09:00-09:30 (Room D-10th Floor) Welcome and Opening Address

Gregory T. Papanikos, President, ATINER.

**09:30-11:00 Session I (Room E-10th Floor):
Policy**

Chair: Virginia Sisiopiku, Associate Professor, The University of Alabama at Birmingham, USA.

1. Gurvan Branellec, Associate Professor, Brest Business School, France. Why Maritime Actors have Tried to Standardize Contracts and Support Arbitration Jurisdictions. How such Practices Contribute to a soft Uniformity of the Law?
2. Mi Sun Park, Assistant Professor, Konkuk University, South Korea & Hyowon Lee, Professor, Seoul National University, South Korea. Policy and Law for Urban Green Space Management in South and North Korea.
3. Belinda Robson, Senior Policy Advisor, Yarra City Council, Australia. Re-imagining Density in an Inner City Suburb of Melbourne: From ‘Dangerously Overcrowded’ to ‘Urban Consolidation’.

09:30-11:00 Session II (Room F-10th Floor): Engineering Education: Practice and Experience

Chair: Vassilis Skianis, Research Fellow, ATINER.

1. James Collofello, Vice Dean, Fulton Engineering Schools, Arizona State University, USA. Experiential and Peer Mentoring Experiences and their Impact on Persistence.
2. Santiago Pindado, Professor, Universidad Politecnica de Madrid, Spain, Elena Roibás-Millán, Javier Cubas Cano, Andrés García, Angel Pedro Sanz Andres, Sebastián Franchini, María Isabel Pérez Grande, Gustavo Alonso, Javier Pérez-Álvarez, Felix Sorribes-Palmer, Antonio Fernández-López, Mikel Ogueta-Guitierrez, Ignacio Torralbo, Juan Zamorano, Juan Antonio de la Puente, Alejandro Alonso & Jorge Garrido, Universidad Politécnica de Madrid, Spain. The UPMSat-2satellite: An Academic Project within the Aerospace Engineering Education.
3. Arianit Kurti, Associate Professor, Linnaeus University, Sweden & Fisnik Dalipi, Linnaeus University, Sweden. Bridging the Gap between Academia and Industry: Lessons Learned from a Graduate IT Professional Development Program.
4. Timo Vaskikari, Responsible of Customership and Quality, Turku University of Applied Sciences (TUAS), Finland. Experiences in Learning Engineering Skills in co-Operation with Companies.

11:00-12:30 Session III (Room F-10th Floor): Engineering Teaching

Chair: Arianit Kurti, Associate Professor, Linnaeus University, Sweden

1. Deb Newberry, Director, Dakota County Technical College and Principal Investigator, Nano-Link, USA. Integrating Nanotechnology Concepts into Traditional Engineering Programs.
2. Roy Issa, Associate Professor, West Texas A&M University, USA. Teaching Sustainability in Mechanical Engineering Curriculum.
3. Farshid Zabihian, Assistant Professor, California State University, Sacramento, USA. Hands-on Approach to Introduce Fuel Cells to Engineering Undergraduate Education.
4. Ana Maria Reyes Parra, PhD Student, Universidad Nacional de Colombia, Colombia, Fredy Andres Olarte Dussan, Associate Professor, Universidad Nacional de Colombia, Colombia & Mario Julián Cañón Ayala, Teacher, Universidad Nacional de Colombia, Colombia. Towards a Flipped Classroom in a Signal and Systems Engineering Course.

12:30-14:00 Session IV (Room E-10th Floor): Transportation Operations

Chair: Deb Newberry, Director, Dakota County Technical College and Principal Investigator, Nano-Link, USA.

1. Essam Radwan, Professor and CATSS Director, University of Central Florida, USA. Pedestrian Safety at Mid-Block Crossings Based on Driving Simulation Experiment.
2. Man Yuan, PostDoc, Huazhong University of Science and Technology, China & Yaping Huang, Dean, Huazhong University of Science and Technology, China. Evaluating the Impacts of Compact Growth on Traffic Emissions and Exposure to Air Pollution in High-Dense Areas with a Land Use-Transport-Emission Integrated Model, a Case Study of Xiamen, China.

14:00-15:00 Lunch

15:00-16:30 Session V (Room E-10th Floor): Enabling Technologies

Chair: Jun Mitarai, Professor, Kyoto University, Japan.

1. Vadivel Jagasivamani, Research Assistant Professor, Hampton University, USA. Interpreting Corrosion Activities in Reinforced Concrete Structures of Highway Bridges, Using Acoustic Emission Techniques.
2. Rahmad Sadli, PhD Student, University of Valenciennes, France, Yassin El Hillali, Associate Professor, University of Valenciennes, France, Laila Sakkila, Researcher, University of Valenciennes, France, Atika Rivenq, Professor, University of Valenciennes, France & Charles Tatkeu, Professor, Institut Français des Sciences et Technologies des Transports, France. The 4th Order Statistics on Ultra Wideband Short-Range Radar (UWB-SRR) for Cyclist Detection.

16:30-18:00 Session VI (Room E-10th Floor): Methodology

Chair: Matthew Zenkteler, PhD Candidate, University of Queensland, Australia.

1. Jun Mitarai, Professor, Kyoto University, Japan & Naphasinee Suebsuk, Teaching Assistant, Kyoto University, Japan. Analysis of a Nationwide Area-Based Management Survey in Japan.
2. Emilia Malcata Rebelo, Assistant Professor, University of Porto, Portugal. Contemporary Urban Development in the Global Area: A Methodological Assessment.
3. Elif Kirpik, Research Assistant, Yildiz Technical University, Turkey & Buket Aysegul Ozbakir, Associate Professor, Yildiz Technical University, Turkey. Development of a Public Participatory GIS Platform for Urban Transformation Projects: A Case Study in Kadikoy Historical Center.

18:00-19:30 Session VII (Room E-10th Floor): A Roundtable Discussion on Teaching Urban Planning and Architecture in a Global World

Chair: Nicholas N. Patricios, Professor & Dean Emeritus, School of Architecture, University of Miami, USA.

1. **Lina Martínez**, Professor, Universidad Icesi Cali, Colombia. Happy City.
2. **Takashi Nakamura**, Associate Professor, Tokyo City University, Japan. Teaching Urban Planning in Japan.
3. **Alan Frishman**, Professor of Economics, Hobart and Wm. Smith Colleges, USA. Teaching an Urban Economics/Urban Studies Class in the U.S.
4. **Anissa Benaiche**, Researcher Associate, Nantes University, France. General Overview of Urban Planners Training In France.
5. **Giulia Pellegri**, Associate Professor, University of Genoa, Italy. Urban Planning Response-bilities: City, Landscape and Resilience.

For details on the discussion please [click here](#).

21:00-23:00 The Pragmatic Symposium of the Conference as Organized in Ancient Athens with Dialogues, Food, Wine, Music and Dancing but fine tuned to Synchronous Ethics

Tuesday 6 June 2017

07:30-10:30 Session VIII: An Educational Urban Walk in Modern and Ancient Athens

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

Group Discussion on Ancient and Modern Athens.

11:00-12:30 Session IX (Room F-10th Floor): Engineering Study Programs

Chair: Farshid Zabihian, Assistant Professor, California State University, Sacramento, USA.

1. Barry Hojjatie, Professor and Engineering Coordinator, Valdosta State University, USA. Enhancing Student Enrolment, Retention, and Satisfaction in Freshman Engineering.
2. Sanjay Sisodiya, Associate Professor, University of Idaho, USA, Kathy O'Malley, Professor, University of Idaho, USA & Steven Shook, Professor, University of Idaho, USA. Business Topics in New Product Development for Engineering Senior Design.
3. Ari Perez-Mejia, Assistant Professor, Quinnipiac University, USA. I knew you were Trouble: Designing a Cross-Course Assignment between Engineering and Strategic Communication.
4. Felicitas Raedel, Post-Doc, Technische Universität Darmstadt, Germany & Joerg Lange, Professor, Technische Universität Darmstadt, Germany. The Inverted Classroom Model in a Master's Degree Program for Civil Engineers.

12:30-14:00 Session X (Room E-10th Floor): Innovations in Transportation

Chair: Sherif Ishak, Lloyd J. Guillory Professor, Louisiana State University, USA.

1. David Fernandez-Llorca, Associate Professor, University of Alcalá, Spain & Mario Jimenez-Garcia, Research Assistant, University of Alcalá, Spain. CNN-based Vehicle Logo Classification for Vehicle Manufacturer Recognition.

12:30-14:00 Session XI (Room F-10th Floor): International Engineering Education

Chair: Barry Hojjatie, Professor and Engineering Coordinator, Valdosta State University, USA.

1. Klaus Holschemacher, Professor, Leipzig University of Applied Sciences, Germany. What is the Best Design Code in Structural Engineering Education.
2. Roberto Nardi, Professor, Universidade Estadual Paulista "Júlio de Mesquita Filho", Brazil, Telma Cristina Dias Fernandes, Graduate Student,

	<p>Universidade Estadual Paulista “Júlio de Mesquita Filho”, Brazil & Nicoletta Lanciano, Professor, Università di Roma "La Sapienza", Italy. Education in Astronomy: An Experience of the Adaptation and Application for the Southern Hemisphere, of Educational Material Designed Originally for Northern Hemisphere.</p> <p>3. Yuichi Okuyama, Associate Professor, The University of Aizu, Japan. Intuitive Education for Logic Circuit Design.</p> <p>4. Ulrike Quapp, Faculty Manager, HTWK Leipzig University of Applied Sciences, Germany. Conducting an Orchestra or how Faculty Management may Influence Engineering Education.</p>
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14:00-15:00 Lunch

15:00-16:30 Session XII (Room E-10th Floor): Special Issues

Chair: Roman Klementsitz, Senior Scientist, University of Natural Resources and Life Sciences (BOKU), Austria.

1. Sherif Ishak, Lloyd J. Guillory Professor, Louisiana State University, USA, Maggie Ye, Graduate Student, Louisiana State University, USA & Osama Osman, Research Associate, Louisiana State University, USA. Developing a Crash Risk Index and Detecting Driver's Engagement in Secondary Tasks from Driving Behavior Attributes and Socioeconomic Characteristics: A Naturalistic Driving Study.
2. Ozan Hovardaoglu, Associate Professor and Vice Dean, Faculty of Architecture, Erciyes University, Turkey & Seda Calisir-Hovardaoglu, Associate Professor, Erciyes University, Turkey. Changing Structure and Functions of Urban-Rural Fringes in a Process of Urban Stability in Turkey.
3. Jiri Kugl, PhD Student, Czech Technical University in Prague, Czech Republic. Analysis of Tools for Revitalization and Rehabilitation of Brownfields.
4. Ayca Ozceylan, Lecturer, Gaziantep University, Turkey & Eren Ozceylan, Assistant Professor, Gaziantep University, Turkey. A View of Industrial Engineering Profession in Turkey: An Application of Web-Based Survey.

21:00- 22:30 Dinner

Wednesday 7 June 2017
Educational Island Tour: (Details during registration)
or
Mycenae and Epidaurus Visit: (Details during registration)

Thursday 8 June 2017
Delphi Visit: (Details during registration)

Gurvan Branellec

Associate Professor, Brest Business School, France

&

Anne Choquet

Associate Professor, Brest Business School, France

Why Maritime Actors Have Tried to Standardize Contracts and Support Arbitration Jurisdictions

The international transport of goods by sea involves different kind of international trade operators. Therefore, uniformity of law seems to be the best solution to satisfy the demand of security from these various operators.

Nevertheless, states cannot create new rules for this activity only by unifying regulation in the conventional way.

There is a discord between the desire for uniformity and the reality in the implementation of the rules because of convention's conflicts.

This is the reason why maritime actors have tried to standardize contracts and support arbitration jurisdictions. But how do such practices contribute to a "soft" uniformity of the law?

James Collofello

Vice Dean of Academic and Student Affairs, Ira A. Fulton School of
Engineering, Arizona State University, USA

**Experiential and Peer Mentoring Experiences and their
Impact on Persistence**

Over the last 8 years, the Fulton Schools of Engineering at Arizona State University have seen their undergraduate engineering population triple to over 12,000 students while during the same period both freshmen and sophomore persistence within engineering has improved significantly. Current data will be presented at the workshop. The persistence improvements are attributed to a combination of experiential and peer mentoring opportunities designed to ensure student success and to establish an engineering identity from the first day they begin their engineering education.

The freshmen year experience has been continuously evolving with a focus on building a strong engineering community as well as providing numerous diverse opportunities for experiential learning. E2 camp provides a unique, off-campus experience that engages freshmen in activities that introduce them to engineering, faculty, staff and current students. The freshmen career exploration event brings a career fair environment to campus in which freshmen engage with hundreds of potential employers. Redesigned freshmen engineering courses engage students in project-based learning taught by a dedicated freshmen engineering faculty. Peer mentoring is integrated into all activities with engineering peer mentors in the residential community, camp counselors at E2, Undergraduate TAs in all freshmen classes and peer career coaches. Freshmen are also welcomed into over 60 engineering student organizations. The impact of the combination of these activities has led to record freshmen retention in engineering and provides the underlying foundation for sophomore persistence.

David Fernandez-Llorca

Associate Professor, University of Alcala, Spain

&

Mario Jimenez-Garcia

Research Assistant, University of Alcala, Spain

CNN-based Vehicle Logo Classification for Vehicle Manufacturer Recognition

Vehicle Manufacturer Recognition (VMR) has recently become a key feature to be used when license plate numbers cannot be detected or fake plate numbers are used in traffic control and management applications. One of the clearest indicators of a vehicle manufacturer is its vehicle logo. In this way, most of the vision-based VMR approaches are based on vehicle logo classification. In this work, we contribute to this topic by presenting an experimental comparison of different Convolutional Neural Networks (CNN) applied to vehicle logo recognition. A data set containing 26.289 logo images corresponding to 31 car manufacturers is used to validate the proposed approach. The ability of the CNN to learn features robust to rotations is analyzed by artificially increasing the data set up to 446.913 adding rotated samples. The proposed methodology is also compared with a baseline classifier based on Histograms of Oriented Gradients (HOG) and Support Vector Machines (SVM). Experiments show an average accuracy of 99.33%.

Barry Hojjatie

Professor and Engineering Coordinator, Valdosta State University, USA

Enhancing Student Enrolment, Retention, and Satisfaction in Freshman Engineering

Traditional methods of teaching engineering courses give limited opportunities for student-student and student-faculty interactions and are not generally suitable for the current generations of students that are constantly being distracted with social media and other personal electronic devices. The objective of this study is to describe various methods of teaching and collaborative learning that we have used in mechanical engineering courses to motivate students in engineering. These engaging approaches include: application-based teaching and learning and implementing hands-on projects and experiential learning methods that allow students to develop skills and knowledge required for industry; collaborative learning and solving the same groups engineering problem by various methods and comparing numerical the results to understand interconnecting among various physical principles; and incorporating computational methods using ANSYS and MATLAB and for analysis and graphical representation of problems. We will also report on the project activities that we have performed in development of our experimental and computational mechanics laboratory capabilities to support engineering students in undergraduate research projects that are beneficial for their education and have potential benefit to Georgia industry. These methods seem to improve students learning and motivation in engineering. Our enrollment in engineering statics has significantly increased and many students have shown interest in taking our directed study courses.

Klaus Holschemacher

Professor, Leipzig University of Applied Sciences, Germany

What is the Best Design Code in Structural Engineering Education

Design codes (e.g. Eurocodes, US-codes like ACI code, Japanese codes or Chinese codes) play a huge role in building industry. Thus, in international civil and structural engineering programs as well as in courses for local students more and more the question arises which kind of design code, the local one or/and foreign codes, should be the best to teach.

This paper deals with the question how important teaching of design codes in structural engineering education actually is and which will be the best code for different student groups.

In the first part the author discusses the necessity of teaching design codes at universities.

Further, the paper presents an overview about different design codes and provides information about their structure and content.

In the third part the author gives recommendations to lecturers how to choose the ideal code for various structural engineering programs (local programs, international programs) and discusses the difficulties with heterogeneous students groups in international programs. Advantages and disadvantages of teaching different international codes are discussed, also under the use of examples from the structural concrete course at HTWK Leipzig University of Applied Sciences.

The paper comes to the result that for designing buildings and infrastructure basis knowledge and experiences in national building codes are important. Without any knowledge about design codes graduates are not able to work in practice. Furthermore, the author concludes that most of the German graduates are working in Germany and will come in contact with foreign codes only rarely. But, resulting from increasing worldwide globalization and supported by the European Bologna Process, engineering education at German universities will become more and more international. Universities are forced to attract more foreign students and motivate their students to go abroad. Thus, in international structural engineering programs lecturer should teach one of the most important codes (e.g. Eurocode, US-code), ideally in English language.

Ozan Hovardaoglu

Associate Professr/Vice Dean of the Faculty of Architecture, Erciyes
University, Turkey

&

Seda Calisir-Hovardaoglu

Associate Professor/Program Director of Urbanization, Erciyes
University, Turkey

**Changing Structure and Functions of Urban-Rural Fringes
in a Process of Urban Stability in Turkey**

Urbanization experience that Turkey has gone through for more than 5 decades is characterized by rapid urban growth and urban population booming. With a national demographic tendency of population booming, national level urban population increase rates sometimes tripled and even quadrupled the total population increase rates. Since the national economic development policies have mostly supported industrialization as the main component of both national and regional development efforts, population has indispensably intensified on urban areas. Urban growth and growth related urban problems, therefore, have always been on the focal point of national urbanization agenda of Turkey. The last two decades, however, began to show changing demographic trajectories. The growth rates of urban population nationwide have been declining. In many Anatolian cities, moreover, urban population began to be stabilized. During a period of rapid urban growth urban-rural fringes in many of the cities have either been planned to be reserve areas for further growth, or identified to be locations of certain land-uses which should not or could not be located in urban areas, or in many cases, become slum house areas. However, in a period of stability, urban-rural fringes seem to be left without proper planning decisions. This study aims at reimagining a theoretical framework for urban-rural fringes as new opportunities for urban economic development by re-constructing the relations between urban areas and fringes and new opportunities for rural development as well by suggesting new functions to urban-rural fringes as the places for spillover effects from “near-rural” areas to rural settlements.

Sherif Ishak

Lloyd J. Guillory Professor, Louisiana State University, USA

Maggie Ye

Graduate Student, Louisiana State University, USA

&

Osama Osman

Research Associate, Louisiana State University, USA

**Developing a Crash Risk Index and Detecting Driver's
Engagement in Secondary Tasks from Driving Behavior
Attributes and Socioeconomic Characteristics:
A Naturalistic Driving Study**

Distracted driving has long been acknowledged as one of the leading causes of death or injury in roadway crashes. The focus of past research has been mainly on the impact of different causes of distraction on driving behavior. However, only a few studies attempted to detect distracted driving from driving behavior attributes. This study takes advantage of the rich SHRP 2 Naturalistic Driving Study (NDS) database to develop a model for detecting the likelihood of a driver's involvement in secondary tasks from distinctive attributes of driving behavior. Five performance attributes, namely speed, longitudinal acceleration, lateral acceleration, yaw rate, and throttle position were used to describe the driving behavior. A model was developed for each of three selected secondary tasks: calling, texting, and passenger interaction. The models were developed using a supervised feed-forward Artificial Neural Network (ANN) architecture to account for the effect of inherent nonlinearity in the relationships between driving behavior and secondary tasks. The study also proposed a Crash Risk Index (CRI) to estimate the crash risk associated with the socioeconomic characteristics of drivers and their tendency to experience distracted driving. The proposed CRI was developed based on the crash risk associated with performing secondary tasks during driving and the effect of socioeconomic attributes on the likelihood of engagement in secondary tasks. Logistic Regression analysis was conducted to identify the significant secondary tasks with high crash risk and the socioeconomic characteristics with significant effect on drivers' engagement in secondary tasks. The developed CRI indicates the relative crash risk associated with the socioeconomic characteristics of drivers, given the likelihood of engagement in secondary tasks.

Roy Issa

Associate Professor, West Texas A&M University, USA

Teaching Sustainability in Mechanical Engineering Curriculum

Sustainability development teaching modules at the senior level were recently introduced into the undergraduate Mechanical Engineering curriculum at West Texas A&M University through the offering of two courses. One of those courses is an elective course that introduces sustainability in engineering design, and examines the eco-aspects of material production, use and disposal at end of life. The course also introduces input-output environmental life cycle assessment (EIO-LCA) as a tool for evaluating the relative impact products have on energy resources and the environment, along with the interaction between the different sectors in the economy. A variety of Eco-Audit and EIO-LCA case studies from the thermal and solid mechanics areas are examined. In the second course offered, an originally core course on thermal-fluid design, the contents of the course are revised to integrate half a semester worth of teaching material on exergy-based sustainability assessment of thermodynamic cycles. Improvements to the performance of the cycles from the thermal, economic and environmental points of view are examined through exergo-economics and exergo-environmental studies. Surveys administered to the students before and after taking the courses reveal the impact these courses have on students' interest and understanding of sustainability in engineering design and analysis.

Vadivel Jagasivamani

Researcher/ Assistant Professor, Hampton University, USA

Interpreting Corrosion Activities in Reinforced Concrete Structures of Highway Bridges, Using Acoustic Emission Techniques

Highway Bridges are vital part of transportation system. Steel reinforced concrete structures, used in Highway bridges are prone to attack by corrosion. Periodic nondestructive tests are carried out to look for corrosion damages. Visual inspection is commonly used along with electrochemical and resistivity measurements to determine the vulnerability of concrete structures to corrosion.

In-service monitoring for corrosion-damage evaluation of steel-reinforced concrete structures are very useful to ensure the safety and the reliability of the structures and to reduce the maintenance costs, especially when the onset of corrosion is detected at early stages. Acoustic Emission (AE) monitoring is a promising method to detect the early stages of corrosion. AE monitoring is very useful in collecting data from the concrete structures, without the need for the presence of an operator at the bridge site. There are some difficulties in implementing AE technology. Ambient noises arising from traffic situations, along with mechanical disturbances will greatly interfere with the AE data. Reliable methods of interpreting the measured AE signals, need to be evolved.

Large volumes of data are collected during the course of monitoring the structure. Identifying the useful part of the measured data and interpreting the test results are time consuming and also, interpretation is ambiguous in many circumstances. Commercially manufactured AE systems provide several useful parameters of the AE bursts, for analyses of data. It is up to the end users to identify the most relevant parameters.

The characteristics of the AE waveform can be an indicative of the corrosion activities taking place in concrete. Also, some parameters deduced from AE bursts are useful in identifying the emissions due to corrosion. This research effort focuses on developing a useful technique to identify the underlying mechanisms of corrosion and interpreting acoustic emission data in assessing the activities of corrosion in concrete structures.

Elif Kirpik

Research Assistant, Yildiz Technical University, Turkey

&

Buket Aysegul Ozbakir

Associate Professor, Yildiz Technical University, Turkey

Development of a Public Participatory GIS Platform for Urban Transformation Projects: A Case Study in Kadikoy Historical Center

Due to the weaknesses in economic vitality and social challenges, new approaches are required to meet the changing needs of life, economy, social profile, technology and democracy in urban transformation process.

Being one of them, Planning Support Systems (PSS) became very popular in recent years in order to strengthen the participation of the community and all stakeholders in the decision-making process, enhance effective communication and monitor the effects of applied policy and management plans more effectively.

Furthermore, a great awareness has also been increased on related concepts such as resilience, participation, mobility, cooperation, environment, human capital, quality of life and governance towards a more sustainable and smart urban lifestyle. Among these concepts, "governance" has been on the focus of urban agenda which allows participatory democracy through the inclusion of citizens as well as decision makers at all steps. Both national and international literature surveys remark that Public Participation should be used effectively in urban transformation projects for smarter cities and smarter communities.

Moreover, urban transformation projects in Turkey indicates that traditional participation methods are inadequate in some dimensions such as accessing to disadvantageous groups, timing and spatial problems and ease of expression. With the development of the Internet and technology, participation methods have been diversified with tools such as urban information systems, discussion forums, and geo-questionnaires. One of these tools is Public Participatory Geographic Information Systems (PPGIS).

Within the context of this study, the pilot project has been tested in Kadıköy Historical Center through a PPGIS platform as an e-participation method. The platform has been developed to analyse the physical, social and economic dimensions of the Center and to employ a location based online survey to understand the level of participation in

areas where traditional participation methods are not sufficient in urban transformation projects.

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Analysis of Tools for Revitalization and Rehabilitation of Brownfields

This work focuses on answering the difficult question of how we can work with brownfields and it deals with tools that enable the revitalization and rehabilitation projects in the area. The aim of this work is to identify, classify and analyze these instruments. It studies instruments from several countries with long-term experience with this issue (eg. France, Great Britain, USA, Germany, Denmark, Czech Republic) and analyze their contribution and the feasibility of their implementation in other countries. The conclusion is that the tools can be divided into several categories from different perspectives: strategic tools, legislative tools, spatial planning and urban design tools, economic tools, construction tools, organizational tools, information tools, education tools, contractual tools, cultural heritage tools and rating tools. This leads to situation where the issue of brownfields is often handled by numerous institutions and instruments which could complicate the process. Some of the tools (especially the economic and legislative ones) are country-specific and cannot be that easily implemented, however some effective tools (for example organizational, information and education tools) don't require any legislative background and can be therefore easily used by any country to help their brownfield revitalization and rehabilitation process.

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&

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Bridging the Gap between Academia and Industry: Lessons Learned from a Graduate IT Professional Development Program

The rapid advances of technologies, constantly brings new demands for new skills and expertise of the professionals in IT industry. There is a constant need for people that have in-depth understanding and know how to develop the new innovative services using these new technologies. In these settings, the real challenge is how to find the right persons with the right education in an industry where the in-thing yesterday may be out-of-date tomorrow? To add to this challenge, universities are still *“increasingly stove-piped in highly specialized disciplinary fields”* (Hurlburt et al., 2010) as well as there is a lack of flexibility for the professionals to have their competences developed. All this points out the great challenges that universities are facing for alignment between academic development within degree curricula and the requirements that industry demands for their specific needs (Falcone et al. 2014).

In this research effort we report our experiences from an ongoing Graduate Professional Development Program where we address these challenges through a co-creation process with IT industry based on open innovation. Through this model we bring together research expertise, academic experience and experts from industry in a collaborative process for developing courses to suit the current needs of IT professionals. As an outcome of this process, the course content is tailor-made, as well as everything else in connection, such as: bite-size modules, adjustable pace, open and online educational resources, as well as a flipped classroom approach to teaching.

As a result, we have developed and provided so far five courses that have been very well accepted by the IT professional. Thus, in this paper we aim to provide some insights on approaches for facilitating continuous competence development plans for IT professionals within regular university educational offer.

Emilia Malcata Rebelo

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Contemporary Urban Development in the Global Area: A Methodological Assessment

Throughout the last years, governments and states that struggle with increasing financial difficulties have been increasingly forced to resort to private stakeholders and different financial mechanisms to fund urban activities, considering the prevailing financial and fiscal crisis. States have successively restructured their agendas through design and implementation of instruments that intercross state and market stakeholders. Thus they have developed instruments to include private partners in decision processes that traditionally belong to the public sphere, namely in the provision of services, urban equipment and infrastructure, and public spaces. In these relations between the state and private stakeholders, the former resorts to a rationale that traditionally belongs to privates that, by their turn, pursue their own interests to create value-added profitable products and services, minimizing risk, which inevitably shapes the urban landscape.

The main goal of the current article consists in presenting an innovative analysis framework of the new step in urban production we are currently going through, featured by the increasing influence of neoliberalization; the social, economic, financial, political and communicational globalization; the relevance of marketization at urban and metropolitan levels; and by the growing tendencies to find alternatives to fund property. This analysis is aimed at the identification and systematization of the influences they have exerted on urban production in general and on public infrastructure and equipment in particular, thus conveying the new urban landscape (corresponding to a new urban development phase) that characterizes current real estate markets. It is, thus, outstanding to deeply comprehend the relations between real estate and markets, so to figure out how urban development projects are designed by and guided to many different investors.

This reference framework systematizes relative spatial and temporal information, being a useful instrument to support decision-making processes, either on public, private, or mixed product-private sectors on urban development issues. Beyond its importance for strategy design, this instrument also fits governments' increasing needs to fund urban development through means alternative to the traditional taxes.

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&

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The Analysis of Nationwide Area-Based Management Survey in Japan

Japan is now facing population decrease, low growth rate, financial stringency, and difficulty to maintain plenty of infrastructure. So, the way to revitalize economy and improve way of life is not the development, but the management of the resource each city. Therefore, Area Based Management (ABM) , defined as an independent actions to solve problems and to enhance value of a specific area by group of the residents, business owners and landowners, is now widespread in Japan. However, there are no any survey about the situation of the ABM in Japan. So, we conducted the nationwide ABM survey by questionnaire to local city governments in 2015 and 2016. Objective of this paper is to summarize cognate field of ABM in Japan, which are purpose, organization structure, activities, and some other fields.

From the survey, there are found at least 574 ABM organizations over Japan. Main purposes of ABM are: firstly, creating visitors, secondary, creating beautiful townscape and thirdly, creating community awareness and networking. ABM organizations initiated by public sectors are 35% and approximately 70% of ABM organization don't have juridical authority. The revenues of ABM organizations are sorted in descending following order: government supporting, membership supporting and earning from ABM activities. Events are highest percentage from six categories of ABM activities, though their percentage is less than half. In addition, the main problems of ABM are financial and human resources.

In conclusion ABM in Japan are based on various organization structures and various activities under three main purposes.

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**Education in Astronomy: An Experience of the Adaptation
and Application for the Southern Hemisphere, of
Educational Material Designed Originally for Northern
Hemisphere**

This study describes the stages of translation and adaptation of didactic material, configured in the form of a diary, originally titled “Il Diario del Cielo” (Sky’s Diary; Lanciano, 2012). Such steps are provided in a wider ongoing research, which seeks, among other questions, to answer the following ones: What are the peculiarities of the process of translation, adaptation and interpretation of astronomy didactic material, from the Northern to the Southern Hemisphere reality? What lessons this adaptation raise from the point of view of local and global perception and reference systems? Issues such as: the visible horizon, the times of sunrise, culmination and sunset and moon, day duration according to time of year and latitude of the observing site, equinoxes, solstices, seasons, phases of the moon, among other, are discussed from activities under the foundations of Observational Astronomy. The need to record data observed on a daily basis, besides to reveal an interdisciplinary character, involving different areas of knowledge, also points to the need to diagnose, discuss and reflect on teachers’ difficulties when working with students enrolled in activities involving the use of teaching materials. These activities can contribute to building a coherent and broader view of its position in space and time, in terms of physics and astronomy, as well as cultural and social aspects. Our conclusion, therefore, is that the implementation of educational activities proposed in this study and in this communication, which proposes new practices and moments of reflection and discussion with teachers on conceptual and didactic aspects, can be understood as a contribution viable and relevant for the Astronomy teaching.

Deb Newberry

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Integrating Nanotechnology Concepts into Traditional Engineering Programs

Nanotechnology, dealing with materials at the molecular and atomic level is inherently multi-disciplinary with applications in multiple market segments. It has been known for decades that properties of nanoscale materials do not always follow the laws of the macro or micro scale. Nanotechnology concepts can be counterintuitive. Because of the multiple applications of nanoscale materials, understanding the concepts of nanotechnology needs to be integrated into mechanical, civil, electronics, material science and biotechnology courses. However, in many cases nanotechnology concepts are only given a cursory review.

This presentation will discuss the approach, methodology, content and lessons learned from the integration of nanotechnology concepts into more traditional engineering curriculum in a Nanoscience Technician Program over the last 14 years. Courses to be discussed include Fundamentals of Nanotechnology, Nanoelectronics, Nanomaterials and Nanobiotechnology.

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Intuitive Education for Logic Circuit Design

We report an educational effort of “real logic gates” that are devices we developed to introduce logic circuit design. Current problems of educations in logic circuit design class are (1) complexity of CAD tools, (2) learning in the virtual environment. The complex nature of CAD tools prevents students from understanding logic circuit design. Students must follow many steps to enter Logic gates, and spends much time to learn CAD tools. In our case, we give 6 hours’ class time to enter and simulate full adder circuit for third-year students in our university. Besides, students learn logic circuit design virtually on a CAD tool. Particularly for young people, learning in a virtual way prevent them from understanding behavior of circuits. For these issues, we developed "real logic gates" for students which contain LEDs to show input/output signals status, and terminals to connect to other gates by electric wires. These "real gates" ease to understand logic circuit since they can touch and wire logic gates by hand. Students intuitively understand the behavior of gates, setting a logic value to gates, and output of logic gates. We hold lectures to use the real gates for people between the age of 10 to 15 years old. Participants tested functions of three basic logic gates (and, or, and inverter gates), and build a half adder circuit. It took only 1 hour for the exercise, and 2 hours lecture for a theory of logic circuit design.

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A View of Industrial Engineering Profession in Turkey: An Application of Web-Based Survey

Industrial engineers determine the most effective ways to use the basic factors of production - people, machines, materials, information, and energy - to make a product or to provide a service. They are the bridge between management goals and operational performance. The profession of industrial engineering gets attention both in the world wide and in Turkey. In this study, it is aimed to present the existing situations of graduated industrial engineers at industry and to reflect their thinking about profession in the future. To do so, a web-based survey from literature is applied to the 865 industrial engineers registered to the Chamber of Mechanical Engineers in Turkey between October and December 2016. 368 responses are considered for the analysis. Different results related with sectors, demographic and economic are obtained and illustrated. We believe that results help to head of industrial engineering departments in academic area, to engineers and managers in production/service sector, and to candidate industrial engineers. In addition, this study lights the way for future of the industrial engineering profession in Turkey.

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Policy and Law for Urban Green Space Management in South and North Korea

Urban green spaces provide ecosystem services as the benefits people obtain from ecosystems. Green space promotes physical activity, psychological wellbeing, and the general public health of urban residents. Demands on urban green spaces emerged and is increasing. Establishing and managing green spaces is a crucial issue in the urban policies. Since the 1990s, policies on managing urban green spaces have been mentioned in South Korea and North Korea. Two Koreas have established and implemented urban green space management policies. This study attempts to investigate changes of the policies on managing urban green spaces over two decades in South Korea and North Korea. For the analysis, documents such as plans, regulations and policy reports on urban greening and urban planning from 1990s to 2015 were collected and analyzed. In particular, Acts regarding to urban green space management in South Korea and North Korea were deeply analyzed. South and North Korean policy approaches to urban green spaces were described and compared, using the concept of sustainability and ecosystem services. The research findings do contribute to a better understanding of institutional and legal systems for urban green spaces in South and North Korea. This paper also recommends basic policy principles and a legal framework for urban green space management within a unified Korea in the future. We expect our efforts to contribute to preparations for Korean unification. Also the research findings can provide other countries with significant information on policy and laws to establish and manage green spaces towards urban sustainability.

Ari Perez-Mejia

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I Knew You Were Trouble: Designing a Cross-Course Assignment between Engineering and Strategic Communication

In the current workplace, engineers must work in multidisciplinary teams with a wide variety of professionals to ensure the success of a project (Wojahn et al. 2001). Such a workplace requires excellent written and oral skills, so that requirements and results may be communicated to other people in the organization without relying on technical jargon. An important part of this process is communicating with the organization's communications department so that information important to the public may be disseminated in an accessible manner. As civil engineers are responsible for the building and maintenance of public and private structures, they must often report on the state or the reasons of failure of structures. It is critical that engineers are able to explain technical processes in the case of a crisis, as the organization needs to repair its image and strengthen its relationship with the public. In order to foster these skills, students taking an introductory Geotechnical Engineering course worked together with students taking a Crisis Communication course to jointly prepare a plan of action due to an engineering failure.

The engineering students benefitted from this project by developing written and oral communication skills, as well as creative thinking. As analyzing the causes of failure through the use of case studies is an essential part of the engineering learning process, and a skill that is commonly used in practice, the experiences of the students translating technical knowledge are manifold. Project-based learning connecting engineering students with clients has been shown to produce excellent pedagogical results (Boehm et al. 1999; Hirsch et al. 2001) as it provides students with "a richer set of design issues" (Buckley et al. 2004) and increases student engagement and knowledge retention (Railsback 2002). This paper presents the process used to create the collaborative assignments, the results, as well as the lessons learned from the process.

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The UPMSat-2satellite: An Academic Project within the Aerospace Engineering Education

Today, project-based learning is a well-known methodology in engineering education. In the IDR/UPM Institute of the Technic University of Madrid (UPM), different lines of research have been

developed to involve students into projects related to aerodynamics (both theoretical and experimental), fluid dynamics on low gravity, and space science (heat transfer).

Although these lines of research were initially related to the PhD programs integrated within the academic plan of the university, the increasing interest among the bachelor and master students on research and projects linked to the most advanced engineering techniques, prompted the IDR/UPM academic staff to offer some specific projects to these students as their final degree thesis.

In the present work, the UPMSat-2 satellite project is analyzed as an academic tool to involve different groups of students into a big project, encouraging them not only to develop specific skills in relation to a single subsystem of the satellite, but also to harmonize their work with the results from other groups of students working on other different subsystems.

The different groups of students were directed by the professors of the IDR/UPM Institute. These students being from two different degrees at UPM: Bachelor's Degree in Aerospace Engineering and Master's Degree in Space Systems (MUSE). The main difference between these two groups being the amount of work carried out to fulfill the degree requirements. For the Bachelor's Degree in Aerospace Engineering, a 300-hour average project is required, whereas for the Master's Degree in Space Systems this limit increases to 450 hours.

Taking into account the aforementioned figures, the importance of having motivated students is crucial. In this sense, a project like the UPMSat-2 has revealed itself as a formidable way to gather students and professors around a common engineering task. It should be pointed out that this kind of satellite, a 50-kg spacecraft, allows a more complex engineering management when compared to the cubesats (that is, engineering operations such as testing, integration or harnessing are closer to the ones related to commercial or military aircraft). Besides, as the UPMSat-2 is used as a platform to qualify space technologies for engineering enterprises (Iberespacio, Bartington, SSVB, TecnoBit, Arquimea...), students are in contact with commercial enterprises from the space sector, this fact being also important in order to increase their motivation.

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Conducting an Orchestra or How Faculty Management May Influence Engineering Education

Faculty management is responsible for organizing teaching and research, for finances and human resources and many things more. Nevertheless, its influence on faculty's educational programs often is underestimated.

Faculty managements is always in a conflict, which means finding a balance between governing and supporting faculty members while working on all necessary tasks related to teaching and research as well as solving all occurring problems. Additionally, faculty management is in an uncomfortable sandwich position between the central university administration and the faculty members.

The big ambition of administration should be to be "invisible" for the scientific staff of faculty or university. And, faculty management must be very efficient and should avoid to use many faculty resources. Additionally, it is expected that management should take serious all concerns of the faculty members and try to assist them as good as possible. But, administration mostly has also a strong position in the faculty and university. Resulting from the management's decision about finances and human resources, teaching and research can be supported or impeded.

The paper explains typical tasks of faculty management and analyzes in which way it influences teaching as well as research.

In detail will be discussed how relieving scientific staff from administrative tasks saves time which will be needed to deliver high quality outcomes, to improve teaching and to increase research activities.

At the end the paper the author gives advices how to improve faculty management. The conclusion is that efficient faculty management can contribute to teaching and research immensely. Of course, quality and motivation of administrative staff is of high importance. Encouraging scientific staff by the administration is an excellent way to bring lecturers and scientist to maximum performance.

Essam Radwan

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Operational Performance of Partial Crossover Displaced Left Turn Intersections

This paper focused on the Crossover Displaced Left-turn intersections (XDL), also known as Continuous Flow Intersections (CFI). The XDL concept is best suited for intersections with heavy or unbalanced traffic volumes. There is little guidance on determining whether partial

XDL intersections are adequate to mitigate the overall intersection condition or full XDL is always required. The primary objective of this paper was to evaluate the overall intersection performance in the case of different partial XDL designs compared to a full XDL. The study intersection in Orlando, Florida, is experiencing two heavy conflicting movements operating near capacity. The XDL alternative was investigated for 4 different designs. Also, the impact of increasing volume on the intersection performance was considered by modeling the unbalanced volumes with 10% increment resulting in 5 different traffic scenarios. The results showed that a partial XDL alternative proved to be effective and compared favorably to a full XDL. Significant throughput improvements were observed in the XDL scenarios at the higher volume level with increase in capacity of 25%, 30-45% reduction in delay for the critical movements, and 25-40% reduction in queue lengths. The analysis revealed how partial XDL design can improve the overall intersection performance at various demands, reduce the costs associated with full XDL and proved to outperform the conventional intersection. However, partial XDL serving low volumes or only one of the critical movements while other critical movements are operating near or above capacity do not provide significant benefits when compared to the conventional intersection.

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&

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The Inverted Classroom Model in a Master's Degree Program for Civil Engineers

The education of civil engineers in Germany is marked by a series of lectures, exercises and exams. Several studies show, that a more learner-centered approach has a lot of advantages regarding learner's satisfaction and learning performance. In summer term 2015 elements of the so-called Inverted Classroom Model (ICM) were used in a course of the Master's Degree Program for civil engineers at the TU Darmstadt for the first time and with a great success. For summer term 2016 some additional improvements have been included and the complete course has been instructed with the ICM. In the paper the reasons for the change to the Inverted-Classroom-Model and the exact sequence of the course will be presented. In addition a discussion of the results of the evaluation takes place and a perspective on the further application of the ICM in the context of this course is given.

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Towards a Flipped Classroom in a Signal and Systems Engineering Course

In the last years, educational processes have been transformed due to the integration of new technologies. In this way, e-learning and b-learning have emerged as new learning approaches characterized by the mediation of electronic devices. Nowadays, the flipped classroom model can be considered as a b-learning modality in which the traditional teaching method is inverted, delivering instruction outside of class and developing “concept engagement” activities during the face-to-face lessons. This methodology has been integrated into different educational levels, including university courses, as a strategy to make lessons more dynamic.

At the Universidad Nacional de Colombia, the *Signals and Systems* course (oriented to electric, electronic and mechanic engineers) has traditionally being developed through magisterial (theory and concepts) and workshop (exercises) sessions. So far, this methodology has worked out to board most of the course contents, but still some topics seem to be complex for the students on the magisterial sessions. This is the particular case of the *convolution* concept, which is introduced in the course as a mathematical operation between two signals that allows finding the response of a linear system. Frequently, students find this concept hard to understand from the theoretical approach and don't seem to be interested in this topic, given the difficulty to associate it with practical and real situations.

In order to enhance students learning process about the convolution concept, a new learning and teaching methodology based on a *flipped classroom* model was proposed to be implemented in the Signal and Systems course during the convolution session on the first semester of 2017. For the strategy implementation, a set of digital educational resources (including a video of the *convolution* theoretical approach) and a practical activity were prepared. Digital educational resources (DER) are proposed to be reviewed by the students before the face-to-face session (traditionally the magisterial session). In this way,

the time for this session could be used to have a practical approach to the convolution concept. The proposed practical activity consists on finding out how sounds an audio signal on some specific places that were previously characterized (by the students and teachers).

With this methodology is expected that students could link the convolution concept with a real life application and enhance the comprehension of this topic in the Signal and Systems course. Once the convolution sessions conclude (March 2017), the instruments designed to identify students perceptions towards the new methodology proposed - the DER used and the convolution learning process - will be applied.

Belinda Robson

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Re-imagining Density in an Inner City Suburb of Melbourne: From 'Dangerously Overcrowded' to 'Urban Consolidation'

The City of Yarra is one of 79 locally elected local governments in Victoria – providing land use planning and population amenity in a way which complements the Federal and State government tiers of government. Yarra is located just to the north east of Melbourne's CBD. The City has a population of approximately 90,000 people spread over 20 square kilometres at a density of 45.6 people per square hectare. It has been estimated that the number of dwellings will increase by 50% over the next twenty years, mostly through additional medium to high-density apartments. As Melbourne's population is experiencing rates of population growth not seen since the 1960s, inner city Councils such as Yarra must balance development pressure with the expectations from the community about protection of neighbourhood amenity, particularly heritage character, housing affordability and maintaining social diversity.

This paper will firstly provide an historical analysis of the changing attitudes to inner city density in Melbourne. It will describe how housing density was seen as producing ill-health in the early twentieth century, being associated with working class poverty, the close proximity of manufacturing factories and lack of space for children to play. Following a process of 'slum clearance' from the 1950s, a period of gentrification revitalised the areas from the 1980s. With land value rapidly increasing, the new population growth in Yarra is primarily from young professionals, encouraged by state government policy positions to consolidate population growth in inner and middle-city areas. Council must now respond to new residents' demands for access to public space in private apartments.

To demonstrate the social dynamics which shape Council's current challenge, this paper will present the findings of a population survey of 833 residents from Yarra conducted in 2015 as part of its Planning Scheme re-write. These findings suggest that there are three distinct groups of residents living in Yarra, roughly connected to their years of residence in the area: the newcomers, who are prepared to embrace densification; long-standing residents (20 years plus) who are not prepared to accept any further densification; and a third group who feel uncertain about the impacts on their quality of life. For the newcomers,

densification needs to occur so that more people can enjoy proximity to inner city amenity, while for the more long-standing residents there is a fear that community infrastructure is not keeping pace with the increased population.

The paper will finally consider the findings of a photo-voice project conducted in partnership with Deakin University that looks how parents in newly built high-density apartments perceive their local area. This project provides deeper insights into how residents experience high-density living, especially the neighbourhood attributes they are most likely to value as well as those they see as barriers.

The paper will conclude with some observations about how inner city local councils are adapting to these conflicting views of housing density as well as what the Yarra experience means for current social planning research.

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The 4th Order Statistics on Ultra Wideband Short-Range Radar (UWB-SRR) for Cyclist Detection

The lack of surface of radar cross section (RCS) on the cyclist limits the amount of radar energy (low SNR) back to the radar receiver. With a very low SNR of the received echo, it is very difficult to determine the cyclist position by using the original correlator or 2nd order statistics. So, in this paper we proposed of the implementation of the 4th order statistics or the so-called *higher order statistics* (HOS) on the Ultra Wideband Short-Range Radar (UWB-SRR) for cyclist detection. The main purpose of this work is to investigate the performance of UWB-SRR for cyclist detection by using HOS. The advantage of using HOS is can suppress the noise over the useful radar signal in estimation time delay between the received echo and the UWB reference pulse. The uses of Ultra Wideband technology in cyclist detection is because it offers good precision of detection. The comparison results of using HOS and original 2nd order statistics are presented in this paper. Preliminary results show that the implementation of HOS in UWB-SRR gives better performance for the cyclist detection compared to the original 2nd order statistics.

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Business Topics in New Product Development for Engineering Senior Design

Engineering curriculum continues to evolve as new topics and concepts important to the domain are incorporated, and to also aid students in being successful once they join the workforce. While curricula at many institutions adapt to these directives, a large number of engineers in the workplace continue to face pressure to have a variety of skills and perform a range of tasks. Amongst the range of skills needed, is an understanding of marketing, finance, accounting, finance, team organization, and project management (e.g., Parnaby, 1998). Combined with mounting interest to integrate entrepreneurship topics within engineering education (Crawley, Malmqvist, Ostlund, Brodeur, and Edstrom, 2007), there is a need to seek novel ways to weave business principles into engineering education.

Since many programs struggle to add new courses to existing programs, we propose using a sequence of activities that can augment an existing course or sequence of courses. Many programs already have an existing project-oriented senior design course (e.g., Dutson, Todd, Magleby, and Sorensen, 1997), thus we propose augmenting existing senior design or capstone classes with a three-part set of activities/phases. Additionally, most engineering students have taken a principles course in economics or business and have already been exposed to many topics, but not been given an opportunity to apply them.

Considering that students are typically working on teams on a design project, we propose applying a product development framework to the existing course or sequence of courses. In particular, we ask students to address product development from the perspectives of technical, market, and financial feasibility. Due to the nature of design courses already including the technical portion, we direct our efforts to the remaining marketing and financial feasibility analyses.

The sequence of activities is rooted in pursuing the product development process from ideation to commercialization (e.g., Rainey,

2008). Using a perspective that each student team is a startup, the students go through activities as if they are creating a new business. In the first activity, students go through the ideation process and then select on idea they would like to pursue for development. This is an important step as it exposes students to the concept of brainstorming and then to evaluate ideas for product development consideration.

In the second activity, student teams identify a customer base for the product by performing a market feasibility analysis. Here, teams segment markets and perform a demand analysis for the proposed product. For the third activity, student teams consider financial feasibility by performing a revenue and cost analysis based on developing, producing, and making their product available to customers. In this last stage, teams also perform profitability assessments, breakeven analysis, and sensitivity analysis.

This sequence of activities not only exposes students to the process of product development, but aids in making the design project more meaningful to students through the application of business principles.

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Experiences in Learning Engineering Skills in co-Operation with Companies

Nowadays in Finland it is a quite normal way to teach students with projects from a real work life. It is very important for the whole society to get engineering students to work together with companies as soon as possible, already in the very beginning on the studies. Usually both sides win, students will get experience how to cope with real projects, and vice versa, companies will get quite cheap work labor with the newest knowledge and enthusiasm. Engineering students in every area in Turku University of Applied Sciences have practiced many years this kind of co-operation. However, there exists some practical things which should take in to consideration with this kind on co-operation. In many cases it can be difficult to get suitable projects from the industry at the right time. The projects should be in the right level in difficulty to be suitable for the students. And another way, when companies have suitable projects there may not be time enough for students to take apart into these projects, because they are in a hurry with their theoretical students at school. When the project is going on and everything is agreed on the paper between a company and the school, there are still many practical matters, which have to take into account to accomplish excellence results. In this paper many typical problems between companies and University of Applied Sciences are discussed and some conclusions are drawn and practical innovations are suggested to improve the co-operation.

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**Evaluating the Impacts of Compact Growth on Traffic
Emissions and Exposure to Air Pollution in High-Density
Areas with a Land Use-Transport-Emission Integrated
Model: A Case Study of Xiamen, China**

With a rapid urbanization and motorization, increasing traffic emissions has become the major source of air pollution in Chinese cities. Besides fuel quality and vehicle technology, the effects of urban form on traffic emissions should be paid attention to, but studies on high-dense cities are quite limited. In this paper, we developed a land use-transport-emission integrated model, selected Xiamen City as the study area, and evaluated the effects of compact growth on traffic emissions and exposure to air pollution in a high-dense city. The results show that a compact, high density urban development combined with improvement of subway system may significantly reduce regional traffic emissions. However, compact growth scenario may produce higher overall population-weighted and employment-weighted exposures to air pollution, which suggests that compact growth may be associated with more people exposed to higher concentrations. This implies that the key to minimizing adverse breath effects for citizens is a compact urban form with an improvement of the public transport system linked to an appropriate urban structure.

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A Hands-On Approach to Introduce Fuel Cells to Engineering Undergraduate Education

Fuel cells are one of the most promising technologies for electricity generation in the future; however, majority of engineering undergraduate students from different engineering disciplines are graduating with no knowledge of fuel cells.

A team of researchers at West Virginia University Institute of Technology (WVU Tech) collaborated to establish the Fuel Cell Laboratory and to conduct research on polymer electrolyte membrane fuel cells (PEMFCs) and solid oxide fuel cells (SOFCs). The aim of this laboratory is to introduce fuel cells to the engineering curriculum at various fields and to engage undergraduate students in research related to fuel cells and renewable energy. Currently the Fuel Cell Lab at WVU Tech is equipped with the following equipment related to fuel cell research: PEMFC research test station, PEMFC educational test station, equipment for PEMFC fabrication, equipment for PEMFC diagnosis, PEMFC demonstrational apparatus, and SOFC research test station.

In this paper, it will be explained how these experimental setups are being used to gradually introduce the concept of fuel cell to undergraduate students. In order to achieve this objective, first students conducted simple experiments with basic equipment. In these experiments, students measured all operational parameters and calculated the required parameters manually. During these experiments the internal operation of fuel cells were explained. Then, they conducted experiments with more sophisticated equipment where the operational data were recorded through a data acquisition system and calculations were done using the specifically designed software. In this step, the governing mathematical equations of the fuel cell operation are presented. Finally, when students had all essential knowledge and skills required, they were introduced to a full scale state-of-the-art fuel cell research facility to conduct research.

In this paper the above procedure will be explained in details and some outcomes and student achievements will be presented.