THE UNIVERSITY OF BRITISH COLUMBIA
Department of Civil Engineering
SIERA: Sustainable Infrastructure Research Group

IC-IMPACTS

Smart & Sustainable Infrastructures

Abstract

In the context of a smart city, having smart and sustainable infrastructures is unavoidable. In order to achieve smartness in an infrastructure, a multidisciplinary effort is needed. A monitored infrastructure has the capability to behave smart, to communicate effectively by the intake of data and talking back. It should be able to 'see' the environmental conditions, to 'sense' the ground vibrations, to 'hear' the internal cracking noises, and to 'smell' the smokes of a fire. It should be intelligent enough to collect, process, and analyze data, like a *Neural Network*, in order to make smart decisions on how to warn its occupants, early enough, for a safe and efficient evacuation during a life-threatening event. A smart and sustainable infrastructure should also be able to learn, through *Artificial Intelligence*, and to effectively and efficiently communicate with its co-existing structures in a smart setting, using the *Internet of Infrastructures*. In a smart city, infrastructures are built using *Smart and Multi-Functional Materials*, and are fully instrumented using *Smart Sensing Technologies*, equipped with the highest levels of *Structural Health Monitoring* systems; this is a necessity for achieving a *Multi-Hazard Early Warning System* in a smart and sustainable city. This workshop aims to bring the top experts from all around the world together for a series of talks followed by an interactive workshop. The objective of this meeting, however, is to create a strong ground for future research collaborations and industrial innovations in the field, through a joint multidisciplinary international effort.

THE UNIVERSITY OF BRITISH COLUMBIA
Department of Civil Engineering
Earthquake Engineering Research Facility

Earthquake Engineering Research Institute
UNIVERSITY OF BRITISH COLUMBIA CHAPTER

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ISSSI 2019
1st Interdisciplinary Seminar on Smart & Sustainable Infrastructures
March 5th, 2019 – Vancouver, BC, Canada

Workshop Venue
Sage Bistro at the UBC Vancouver Campus
6331 Crescent Rd, Vancouver, BC V6T 1Z1

Workshop Organizing Committee

- **Salman Soleimani-Dashtaki**, *Civil Engineering Postdoctoral Fellow, SIERA Group (Chair)*
- **Nemy Banthia**, *UBC Professor of Civil Engineering, SIERA Group Lead (Co-Chair)*
- **Carlos E. Ventura**, *UBC Professor of Civil Engineering, EERF Director (Co-Chair)*

- **Anupam Choudhary**, *MASc Student, UBC Civil Engineering Department – SIERA Group*
- **Mohammed Farooq**, *PhD Student, UBC EERI Student Chapter Vice-President*
- **Preetish Kakoty**, *PhD Student, UBC EERI Student Chapter President*
- **Ferya Moayedi**, *Executive Assistant, UBC Civil Engineering – SIERA Group*
- **Robert Shilton**, *PhD Student, UBC Civil Engineering – SIERA Group*

Workshop Format & Themes

The workshop consists of seven distinct themes, run in two main sessions: (1) Theme Specific Technical Presentations and (2) Round Table Focus Group Discussions. In the first part, each theme would have a keynote speaker to deliver a 20 min long talk. Then, in the second part, the workshop attendees will be broken into seven theme specific groups, sitting at different round tables, which are lead by the speakers of the themes. The attendees are then encouraged to move between the round tables for cross-disciplinary discussions. At the end, each theme lead will present a brief summary of the discussions in point form. The seven main workshop themes are:

- Theme 1 – Early Warning Systems (EWS)
- Theme 2 – Structural Health Monitoring (SHM)
- Theme 3 – Water Quality Sensing & Monitoring
- Theme 4 – Smart & Multifunctional Materials
- Theme 5 – Intelligent Sensing Technologies
- Theme 6 – Tsunami, Flood, Fire, and Impact
- Theme 7 – Internet of Infrastructures (IOI)

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Workshop Agenda – March 5th, 2019

Time	Topic	Speaker
08:30 am	**Opening remarks** Welcome message and a brief overview of IC-IMPACTS: Canada India Research Center of Excellence, the main sponsor and the funding institution for the event	**Prof. Nemy Banthia** UBC Professor of Civil Engineering, Distinguished University Scholar, and Senior Canada Research Chair in Infrastructure Rehabilitation & Sustainability, CEO & Scientific Director of IC-IMPACTS
08:45 am	**Welcome notes** Introduction to the Workshop Objectives and the Set of Activities	**Dr. Salman Soleimani-Dashtaki** Workshop facilitator, postdoctoral fellow & sessional lecturer at the Department of Civil Engineering, University of British Columbia, Vancouver, BC, Canada
09:00 am	**Theme 1 – EWS: Early Warning Systems** A Journey Towards a Multi-Hazard Early Warning System (MHEWS)	**Prof. Carlos E. Ventura** Professor of Structural Dynamics and Earthquake Engineering, Director of the Earthquake Engineering Research Facility (EERF), Civil Engineering Department, UBC, Vancouver, BC
09:20 am	**Theme 2 – SHM: Structural Health Monitoring** Instrumenting Civil Infrastructures for Structural Health Monitoring (SHM) Purposes	**Prof. Ruben Boroschek** Professor of Structural Dynamics at the Universidad de Chile, Engineering Expert in Experimental Dynamics of Structures, CEO and founder of Ruben Boroschek & Asociados (RBA), Santiago, Chile
09:40 am	**Theme 3 – Water Quality Sensing & Monitoring** Real-Time Water Quality Sensing and Monitoring as an Integrated Tool in a Multi-Hazard Warning System for Resource Allocation in Emergency Response Planning and Disaster Management	**Prof. Mina Hoorfar** Professor of engineering in electrical, mechanical, and leadership; head of the Advanced Thermo-Fluidic Laboratory (AFTL), and the director of the school of engineering at the UBC Okanagan, BC, Canada
10:00 am	**Coffee Break**	

10:30 am	**Theme 4 – Smart & Multifunctional Materials** Horizons of Innovation in Development of Smart, Multifunctional, and Sustainable Materials	**Prof. Nemy Banthia** Professor of Civil Engineering, Distinguished University Scholar, and Senior Canada Research Chair in Infrastructure Rehabilitation, UBC
10:50 am	**Theme 5 – Intelligent Sensing Technologies** Development of Tailor-Made Sensors for Detection of Structural Damage, Failure, or Collapse During a Natural Disaster or an Extreme Loading Event	**Prof. Clarence de Silva (TBC)** Professor of Mechanical Engineering and Senior Canada Research Chair in Mechatronics and Industrial Automation, UBC Vancouver
11:10 am	**Theme 6 – Tsunami, Flood, Fire, and Impact** Implications of a Multi-Hazard Early Warning System in Extreme Hydrodynamic Loading of Infrastructures, Dam Safety, Security, or Breaching **Presentation Topic:** *Tsunami and Coastal Flooding Effects and Impacts on Infrastructures*	**Prof. Ioan Nistor** Professor of Hydraulic & Coastal Engineering in Department of Civil Engineering, Assistant Vice-Provost, Graduate & Postdoctoral Studies, University of Ottawa, ON, Canada
11:30 am	**Theme 7 – IOI: Internet of Infrastructures** The Integration of Models, Data, and Virtual Computing for Operational Monitoring and Post-Disaster Emergency Response Management	**Dr. Hamed Ebrahimian** Senior Research Engineer and Data Scientist at SC Solutions Inc. from Sunnyvale, California, USA
11:50 am	Instructions and re-arrangements for starting the "Focused-Group Round-Table Discussion" activity	**Dr. Salman Soleimani-Dashtaki** Workshop Facilitator, UBC
12:00 pm	**Working Lunch & Break**	
01:00 pm	**Continue with the Activity: Focused-Group Round-Table Discussions** *Start filling out the flipcharts and preparing the summary presentation notes	
02:00 pm ***5 Minutes Stand-Up Presentation Each Theme**	**Summary Presentations by the Theme Lead** Theme 1 – Early Warning Systems (EWS) Theme 2 – Structural Health Monitoring (SHM) Theme 3 – Water Quality Sensing & Monitoring Theme 4 – Smart & Multifunctional Materials Theme 5 – Intelligent Sensing Technologies Theme 6 – Tsunami, Flood, Fire, and Impact Theme 7 – Internet of Infrastructures (IOI)	 Prof. Carlos E. Ventura Dr. Ruben Boroschek Prof. Madjid Mohseni Prof. Nemy Banthia Prof. Boris Stoeber (TBC) Prof. Ioan Nistor Dr. Hamed Ebrahimian
02:35 pm	**Workshop Highlights & Recap**	**Prof. Carlos E. Ventura**
02:45 pm	**Closing Remarks & Invitation for Future Collaboration Opportunities**	**Prof. Nemy Banthia**