SAVI SMART CITY RESEARCH & DEMOS

Thursday, October 15, 2015 – 9:00 am to 4:30 pm

9:00-10:40 ***International Research Activities – Galbraith 202, Session Chair: Bill Hutchison***

GENI: Enabling the Cities of the Future--**Niky Riga**, GENI

FIWARE, Open environment for development of smart cities applications, **Jacques Magen** and **Silvio Cretti**, FIWARE

Decentralising the IoT and delivering new services using modular gateways, **Charalamos Doukas**, Create-Net

SAVI, Platform for Smart Infrastructures, **Alberto Leon-Garcia**

Smart Cities and the Distributed Cloud, **Rick McGeer**

11:00-12:30 ***Panel: Research Challenges in Smart City Platforms— Galbraith 202--Moderator: A. Leon-Garcia***

Eric Miller, "Smart transportation involves more than real-time sensing and operational control. It also involves the long-term design of transportation networks, services and urban built form that enable efficient, sustainable day-to-day operations."

Reza Iravani, "The modernization of the grid must include leveraging the investment in existing plant. I will discuss the role of advanced measurement and monitoring techniques in this regard."

Charles Despins, "ICTs are a key driver of sustainability. Smart City designs must leverage a holistic approach to information and energy infrastructures as well as to adoption challenges in order to take full advantage of this opportunity."

Niky Riga. Smart Cities means smart applications, which means smart infrastructure and thus smart networks. How can we build platforms that although robust can be adjusted to the individual needs of each application? Is there one network architecture that fits all, or do we need to ensure diversity in the network level to be able to truly support smart applications?

Silvio Cretti: "Developing software for Smart Cities is often a "do it from scratch" job. Selecting and operating ICT applications for Smart Cities often conducts to an inevitable "vendor lock in". Having a common set of API, a standard data model and an open data publication system can help in improving portability and interoperability and in creating an open, sizeable and sustainable market for Smart Cities services. FIWARE (http://fiware.org), together with initiatives like OASC (Open and Agile Smart Cities), envisages this common Smart Cities framework."

Pete Karagiannis, Perspectives on security challenges in IoT.

Rick McGeer, "Two points. One, the critical need for computational POPs near data sources and consumers, and two, the critical need for ongoing, real-time emulation of a smart city for both prediction and to detect malware and infestation."

13:00-14:30 ***Demonstrations of Smart City Applications-I-Bahen 7180***

Demos of Smart City Applications from SAVI Design Challenge Camp: Six student teams from SAVI universities.

The Smart Condo Project: Multi-Occupant Activity Recognition in and Ambient Assisted Living Environment, J. Vlasenko, M. Yazdchi, M. Azghandi, S. Rafatnia, I. Nikolaidis, E. Stroulia, Alberta

Symbiotic Evolution of CAV Applications and Networks: an Expedition in Wireless Networked 3D Vision for Public Safe
Yuehua Wang, Wayne State Univ.

The Pollution Visualizer Demo, Rick McGeer U. Victoria

TreSight: Context-Aware Tourism Recommendation System, Silvio Cretti,FIWARE

15:00-16:30 ***Demonstrations of Smart City Applications-II- Bahen 7180***

Smart Room Monitoring through Wireless Sensor Networks in Software Defined Infrastructures, P. Spachos Guelph U., and J. Lin, U. of Toronto

Demonstration of M2M Communications in the Industrial Internet of Things,
T. Szymanski and M. Rezaee, McMaster University

EODN-IDMS: A distributed storage service for open access to remote sensing data, E. Kissel, S. Batzli, U. Wisconsin-Madison

Federation of U.S. GENI and Canada SAVI Testbeds, Rick McGeer U. Victoria, and H. Bannazadeh U. Toronto

Virtual Helsinki, Silvio Cretti, FIWARE

Home Watch: Energy Management System for Affordable Housing,
V. Ganev, K. Hassanzadeh, I. Nikolaidis, E. Stroulia. U. of Alberta

Demonstration of Telco Cloud environmental assessment and optimization portal, M. Cheriet, T. Subedi, S. Khazri, ETS Montreal
Connected Vehicle & Smart Transporation Application Platform A. Tizghadam, A. Leon-Garcia, U. Toronto

ABSTRACTS & BIOS

GENI: Enabling the Cities of the Future--**Niky Riga**, GENI

Abstract:
The Global Environment for Network Innovations is a distributed virtual laboratory that spans across the United States. GENI was built for at-scale network experiments to explore and create new possibilities of Internets and to support distributed systems research. Since then GENI has evolved to an infrastructure that can support services of the future. In this talk we are going to discuss about how researchers have been using GENI to provide advanced applications in their cities. How are they connecting homes, schools, ambulances to their services and how can lessons learned from GENI deployments can help build the base for making our cities smarter.

Dr. Niky Riga is a Network Scientist for the GENI Project Office (GPO). Niky is responsible for supporting GENI users in integrating and deploying their experiments within the GENI infrastructure, and ensuring that the deployment makes the best use of GENI resources.
Before joining the GPO in 2010, Niky worked on innovative projects within the Network Research department of BBN. Her focus was designing and prototyping pioneering transport services for Mobile Ad-hoc Networks.
Niky earned a Diploma in Electrical and Computer Engineering at the National Technical University of Athens, and an MS degree in Computer Science at Boston University.

FIWARE, The open environment for the development of smart cities applications, **Jacques Magen** InterInnov and **Silvio Cretti**, CREATE-NET/ representatives of FIWARE Mundus

Abstract:
The presentation will provide an overview of FIWARE, an open initiative aiming to create a sustainable ecosystem to grasp the opportunities that will emerge with the new wave of digitalization caused by the integration of recent Internet technologies. The initiative is based on the following pillars:
- The FIWARE platform provides a simple yet powerful set of APIs (Application Programming Interfaces) that ease the development of Smart Applications in multiple vertical sectors. The specifications of these APIs are public and royalty-free.

- FIWARE Lab is a non-commercial sandbox environment where innovation and experimentation based on FIWARE technologies take place. Entrepreneurs and individuals can test the technology as well as their applications on FIWARE Lab, exploiting Open Data published by cities and other organizations. FIWARE Lab is deployed over a geographically distributed network of federated nodes leveraging on a wide range of experimental infrastructures.
- FIWARE Ops is a collection of tools that eases the deployment, setup and operation of FIWARE instances by Platform Providers. It is designed to help expand the infrastructure associated to a given FIWARE instance by means of federating additional nodes (datacenters) over time and allowing cooperation of multiple Platform Providers. FIWARE Ops is the tool used to build, operate and expand FIWARE Lab.
- The FIWARE Acceleration Program aims at promoting the take up of FIWARE technologies among solution integrators and application developers, with special focus on SMEs and start-ups. Although it was born in Europe, FIWARE has been designed with a global ambition, so that benefits can spread to other regions. The FIWARE Mundus programme is designed to bring coverage to this effort engaging local ICT players and domain stakeholders, and liaising with local governments in different parts of the world.

SILVIO CRETTI

Silvio Cretti is Deputy Head of the Smart Infrastructures (SmartI) Area at CREATE-NET, Italy. He obtained his M.Sc in Physics at University of Trento. Before joining CREATE-NET in 2010, he worked as software engineer, architect and technical leader for Telecom Italia, gaining a wealth of knowledge in the software development and software architecture fields.

Silvio has been involved in several European projects as Architect, Work Package Leader and Task Leader, including a few FIWARE related projects. He is responsible for the interaction between FIWARE and the SAVI Canadian Platform.

JACQUES MAGEN

Jacques Magen is the founder and chairman of InterInnov, a company specialised in international innovation. He is responsible for leading the FIWARE Mundus initiative at international level.

Jacques has more than 25 years of experience in international R&D and innovation all over Europe and beyond, most specifically in the field of IT and telecommunications. He is currently involved in several R&D projects in Europe and is also involved in cooperation with Canada, USA and Korea. In the past couple of years he has also become involved with entrepreneurship and start-ups.

Jacques is a member of the Board of the 5G Infrastructure Association, a member of the Steering Board of the NetWorld2020 European Technology Platform, and a member of the Future Internet PPP Steering Board. He is also the Chairman of the Celtic-Plus EUREKA European R&D programme in telecommunications.

Decentralising the IoT and delivering new services using modular gateways: the AGILE approach, **Charalamos Doukas**, CREATE-NET

Abstract
AGILE is an H2020 EU funded project that aims to deliver open source hardware and software for managing IoT devices and data. The main concept is to provide a modular gateway that can be customised easily based on user and use case needs and allow the management of connected devices, the aggregation of sensory data and the creation/deployment of IoT apps on the gateway itself. Promoting the new notion of decentralised Internet, the AGILE gateway can be used within the context of Smart Cities for ambient monitoring and information crowdsourcing respecting data privacy and data provenance. To promote innovation based on the project we have partnered with organisations that foster entrepreneurship and community adoption using methods liked Open Calls for SMEs and startups and open source community engagement. The talk will present the concept, the innovative use cases that can be deployed within the SmartCity context, the Open Calls and also potential ideas for further exploitation of AGILE.

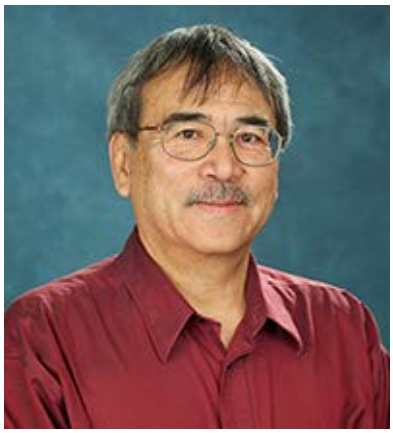
Charalampos Doukas has received a Diploma in Information & Communication Systems Engineering and a PhD in Biomedical Engineering from the University of the Aegean in Greece. His main research interests include wireless sensors and data transmission over heterogeneous networks, pervasive computing, multimedia transmission, data classification and applications for the Internet of Things. He has published more than 50 research papers in international scientific conferences, 17 journal papers and 7 book chapters. He is also the author of "Building the Internet of Things with the Arduino".

SAVI Platform for Smart Infrastructure. Alberto Leon-Garcia, Distinguished Professor, University of Toronto

We envision future application platforms that are built on flexible, versatile and evolvable infrastructure that can readily deploy, maintain, and retire the large-scale, possibly short-lived, distributed applications that will be typical in the future applications marketplace. In this talk we introduce the SAVI application platform built on software-defined infrastructure (SDI). We present SAVI's testbed for a multi-tier computing cloud in which resources in the "Smart Edge" of the network play a crucial role in the delivery of low-latency and data-intensive applications. We also

discuss the Third Tier of SAVI that consists of sensors and actuator devices at the extreme edge of the network. We discuss the crucial role of measurement and monitoring in managing the SAVI infrastructure. We then discuss the extension of these systems to the management of smart infrastructures such as transportation networks and power grids.

Bio: Professor Alberto Leon-Garcia is Distinguished Professor in Electrical and Computer Engineering at the University of Toronto. He is a Fellow of the Institute of Electronics an Electrical Engineering "For contributions to multiplexing and switching of integrated services traffic". He is also a Fellow of the Engineering Institute of Canada and the American Association for the Advancement of Science. He has received the 2006 Thomas Eadie Medal from the Royal Society of Canada and the 2010 IEEE Canada A. G. L. McNaughton Gold Medal for his contributions to the area of communications. He is currently Scientific Director of the NSERC Strategic Network for Smart Applications on Virtual Infrastructures. He was founder and CTO of AcceLight Networks in Ottawa, Canada.



Smart Cities and the Distributed Cloud, **Rick McGeer**

In this talk, we argue that the GENI and SAVI infrastructures are the prototypes for a critical infrastructure of the near future – the Distributed, interoperable, ubiquitous Cloud, which reacts to users and events instantly: the *InstaCloud*. This is not simply a bigger distributed infrastructure; it is an infrastructure with points-of-presence everywhere, which enables a unique class of applications and services. Only this pervasive infrastructure is as fast and facile enough to match the real world around us. We will discuss applications and services of the InstaCloud, review a set of existing prototypes of the InstaCloud, and from this draw some lessons for the architecture of the InstaCloud and its likely instantiations in the next few years

Dr. Rick McGeer is a Principal Investigator at the Communications and Design Group of SAP America Labs, working on next-generation Internet and programming environments technologies. He is also the Chief Scientist of US Ignite and an Adjunct Professor of Computer Science at the University of Victoria. He is currently the Principal Investigator on the GENI Experiment Engine project, which is an embedded containers-as-a-service infrastructure on top of one or more underlying wide-area infrastructures. Its principal feature is one-click allocation of customizable environments across the wide area. He has led multiple projects, mostly in the fields of testbeds, networks, and distributed clouds, including:

- The InstaGENI project, which created a network of 35 small Clouds networked across the United States under the GENI project (while a Distinguished Technologist at HP Labs/HP Enterprise Systems)
- The GENICloud and TransCloud projects, whose goal was to design and implement and interoperable, distributed, GENI-compliant Cloud architecure (while a Distinguished Technologist at HP Labs/HP ES)
- HP lead on the National Cyber Range (sub to Sparta), whose goal was to create a next-generation scalable automated testbed for national cyber systems.

• Social Network Analysis using Geometric Inference Techniques under the DARPA GRAPHS program, to design geometry-based systems for the analysis of very large graphs (109 nodes and beyond)
• The OpenNet project, which led to the first commercial switch implementation of OpenFlow.
• The CHART Project under the DARPA Control Plane program, which increased TCP/IP performance by a mean of 4000% under military conditions.

Eric Miller

Eric Miller has been a faculty member in the Department of Civil Engineering, University of Toronto since 1983, where he is currently Professor and Director of the University of Toronto Transportation Research Institute. He also served as Acting Chair of the Department of Civil Engineering during 1998-99, 2003 and 2007 and was the inaugural Director of the University of Toronto Cities Centre (2008-2012). He is also Research Director of the both the Data Management Group (which is responsible for the largest travel survey data collection and management program in Canada) and the Travel Modelling Group (which works closely with regional agencies to improve travel demand modelling in the Toronto region). He was Chair of the U.S. Transportation Research Board (TRB) Committee on Travel Behavior and Values (2009-2015), the International Association for Travel Behaviour Research (2008-09) and the TRB Sub-Committee on Integrated Transportation – Land Use Modeling, and is Member Emeritus of the TRB Transportation Demand Forecasting Committee (2000-09). He served on the TRB Task Force on Moving Activity-Based Approaches to Practice and the US National Academy of Sciences Committee for Determination of the State of the Practice in Metropolitan Area Travel Forecasting. He has chaired or been a member of numerous intercity travel demand modelling peer review panels throughout North America, including current membership on the California High-Speed Rail Authority's Ridership Technical Advisory Panel. Professor Miller is the recipient of the 2009 Wilbur S. Smith Distinguished Educator Award from the Institute of Transportation Engineers and the inaugural winner of the University of British Columbia Margolese National Design for Living Award (2012). Professor Miller is the developer of *GTAModel*, an advanced regional travel demand modeling system used by the City of Toronto to forecast travel demand in the Greater Toronto-Hamilton Area (GTHA) which incorporates TASHA, a state-of-the-art agent-based microsimulation activity/travel model; and ILUTE, an integrated land use – travel demand model system for the GTHA. He also was Principal Investigator for a major recent study by the Transportation Association of Canada "Changing Practices in Data Collection on the Movement of People". His international experience includes transit planning in Cairo and travel demand model development in Mumbai and Hyderabad. He is co-author of the textbook *Urban Transportation Planning: A Decision-Oriented Approach*, the third edition of which was recently released in e-book format.

Reza Iravani

Reza Iravani received the B.Sc. degree from Tehran Polytechnique, Iran in 1976, and the M.Sc. and Ph.D. degrees in 1981 and 1985 from University of Manitoba, all in electrical engineering. In July 1987 he joined the Department of Electrical & Computer Engineering at University of Toronto, where now he holds the rank of professor with tenure. He has been the holder of the L Lau Chair since November 2004. He founded the Centre for Applied Power Electronics (CAPE) in the Department of Electrical & Computer Engineering in 1989 and remains its director. His research interests include control and operation of High Voltage DC (HVDC) grids, integration of renewable/alternative energy resources and smart grid technologies/concepts in distribution systems and HVDC-AC transmission systems, and microgrids. His memberships and awards include: Fellow of the IEEE; Collective member of the Conseil Intenational des Grands Reseaux Electriques (CIGRE); Editor-in-Chief of the IEEE Transactions on Power Delivery; Associate Editor of the International Journal of Distributed Energy Resources and Smart Grid.

Charles Despins

Charles Despins **Ph.D., Eng.**, is President and CEO of Prompt inc., a university-industry research and development consortium in the information and communications technologies (ICT) sector. In addition to his academic postings (that he continues to hold) in the Université du Québec network, he has held various posts in the private sector, namely at CAE Electronics, Microcell (Canadian cellular operator) and at Bell Nordiq Group (a network operator in rural and northern areas of Canada) as vice-president and chief technology officer. He has also worked as a consultant for wireless network deployments in India and China. Dr. Despins is a Fellow (2005) of the Engineering Institute of Canada and a recipient (2006) of the Outstanding Engineer award from IEEE Canada. Following thirty years in the ICT sector, he is today a frequent advocate on Sustainable ICT issues.

DEMO ABSTRACTS

SAVI Design Challenge for Smart City Applications
Six demos from SAVI Network Universities.
The SAVI NSERC Strategic Network has designed and deployed a national research testbed for experimentation in new network architectures, protocols, and applications. The testbed provides tools and facilities to develop novel applications spanning cloud, smart edge, and IOT infrastructure. This set of demos will present applications

developed by six teams of SAVI Graduate Students in the Design Challenge Camp held the week prior to the SmartCity Summit.

Home Watch: Energy Management System for Affordable Housing

Veselin Ganev, Kimia Hassanzadeh, Ioanis Nikolaidis and Eleni Stroulia
Computing Science Department, University of Alberta

Homes are being increasingly automated; appliances come equipped with smart meters; temperature and air-condition controls come with a variety of options and programs; security systems monitor house activity and generate a variety of notifications and alarms. In this new home, residents find themselves with too much power to make decisions that will impact energy consumption and comfort, and not enough understanding for how to make these decisions. The overall objective of this project is to design, develop and empirically evaluate natural user interfaces through which users can better understand the various smart elements of their home, how they work and consume energy, how they depend on each other, and how their operation can be better managed to improve comfort and respect energy-efficiency guidelines. This work was conducted in a project sponsored by the Wood Buffalo Housing Development Corporation.

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The Smart Condo Project: Multi-Occupant Activity Recognition in and Ambient Assisted Living Environment

Julia Vlasenko, Meisam Vosoughpour Yazdchi, Masoud Vatanpour Azghandi, Shahrzad Rafatnia, Ioanis Nikolaidis and Eleni Stroulia
Computing Science Department, University of Alberta

As the variety of sensors and embedded devices on our persons and in our homes increases and their cost plummets, we find ourselves creating a continuous record of multiple aspects of our daily life and activity. Yet, these devices are disconnected from each other and, typically, each one feeds data to a different platform. As a result, their configuration is difficult as is the integrated analysis of their data streams. In this project, taking advantage of the opportunity that sensors represent today, we have developed a hardware-software system for analyzing this record to draw inferences about people's activities. This interdisciplinary project, partially funded by the AGE-WELL NCE, brings together computing scientists, engineers, occupational therapists, industrial designers, and phramacists to study the following broad research question: “How can we monitor a person's daily-life activities through an easily available and inexpensive hardware-software system, in order to recognize trends and events that can inform their care plans?"

Demonstration of M2M Communications in the Industrial Internet of Things

T.H. Szymanski and M. Rezaee, McMaster University, Canada

Abstract—A convergence is occurring in the networking world, between the industrial networks which provide deterministic Machine-to-Machine (M2M) communications in factories, and today’s Best-Effort Internet. The resulting Industrial Internet of Things (IIoT) will support both Best-Effort communications for consumers, and deterministic M2M communications for machines. A demonstration of deterministic M2M communications in an IIoT testbed developed on an Altera FPGA is presented. An SDN control-plane can add Deterministic Transport

Connections to any forwarding-plane of simple packet switches, and configure several deterministic forwarding schedules in each switch. The FPGA testbed implements several topologies each supporting hundreds of deterministic M2M traffic flows: (i) a USA backbone network with 26 routers operating at 93% load, and (ii) a linear array of 8 routers operating at 99% load. The testbed indicates that: (i) M2M router buffer sizes are reduced by a factor of 1000 times, (ii) M2M end-to-end latencies can be reduced to the fiber latency, and (iii) jitters as low as 10 microseconds can be achieved over the continental USA network. The Deterministic IIoT will enable an M2M control system for the Smart Power Grid, which requires jitters _ 250 microseconds. The technology can add low-jitter deterministic M2M services to any packet-switched network, including IPv4, IPv6, MPLS, Ethernet, Infiniband, Fiber-Channel networks. The technology also applies to Data- Center, SuperComputer and Optical Packet Switching networks. The addition of deterministic services to the Best-Effort Internet can also pay for itself quickly, by increasing link utilizations to 90...100%, thereby reducing energy costs and capital costs.

EODN-IDMS: A distributed storage service for open access to remote sensing data.

Ezra Kissel, Indiana University, Sam Batzli, University of Wisconsin-Madison

Researchers at Indiana University in collaboration with the AmericaView consortium are developing the Earth Observation Depot Network (EODN), a distributed storage service that capitalizes on resources from the NSF-funded GENI and Data Logistics Toolkit (DLT) projects. The Intelligent Data Movement Service (IDMS), a deployment of the DLT on the NSF-funded GENI cloud infrastructure, realizes EODN to enable open access, reduced latency, and fast downloads of valuable Earth science information collected from satellites and other sensors. Accelerating access enables better synchronization of disparate imagery sets and facilitates new meteorological and atmospheric research applications.

GENI/SAVI Federation

Rick McGeer and Hadi Bannazadeh

Over the past seven years, under the auspices of the National Science Foundation, the US has been building a Distributed Cloud with deeply programmable networking, the Global Environment for Network Innovations (GENI). Over the past five years, Canada has been building a similar Distributed Cloud infrastructure, Smart Applications on Virtual Infrastructure (SAVI). Interoperation of the GENI and SAVI infrastructures permits researchers in both countries to create virtual networks of virtual machines spanning the continent, permitting the deployment of location- and context-sensitive Cloud services within the reach of any user in North America. In this talk and demonstration, we will show the architecture of federating these two testbeds, the demonstration of such a continent-girdling application, and discuss the GENI/SAVI federated network as the prototype for an eventual integration with similar infrastructures in the EU, Japan, and elsewhere.

Connected Vehicles & Smart Transportation (CVST) Application Platform

Ali Tizghadam, Allberto Leon-Garcia

This demo shows a work-in-progress on constructing an analytics platform for transportation data processing in large cities (in this demo Greater Toronto Area).

We demonstrate a platform to collect, analyze, and report on various aspects of transportation/communication data. We build a data dissemination layer based on content-centric networking (CCN) with a publish/subscribe overlay layer. Independent publishers of transportation data (including but not limited to mobile data, public transit data, weather information, camera feed, loop-detector data, twitter) can publish their data in the CVST platform and the platform allows for customized subscription through an analytics engine which is built on top of SAVI platform (Smart Applications on Virtual Infrastructure) as a Hadoop instance with vertical/horizontal scaling capability.

The Pollution Visualizer Demo

Rick McGeer

We describe the Ignite Distributed Collaborative Scientific Visualization System (IDCVS), a system which permits real-time interaction and visual collaboration around large data sets, with an initial emphasis on scientific data. The IDCVS offers such a collaborative environment, with real-time interaction on any device between users separated across the wide area. It provides seamless interaction and immediate updates even under heavy load and when users are

widely separated: the design goal was to fetch a data set consisting of 30,000 points from a server and render it within 150ms, for a user anywhere in the world, and reflect changes made by a user in one location to all other users within a bound provided by network latency. The system was demonstrated successfully on a significant worldwide air pollution data set, with values on 10, 25, 50, and 100km worldwide grids, monthly over an 18-year period. It was demonstrated on a wide variety of clients, including laptop, tablet, and smartphone.

EcoloTIC Green Sustainable Telco Cloud:
Demonstration of Telco Cloud environmental assessment and optimization portal
M. Cheriet, T. Subedi, S. Khazri, ETS Montreal

Assessing and reducing greenhouse gas (GHG) emissions caused by the widespread use of computing and telecommunications services in many sectors of the economy is one of the most challenging research topics in Information and Communications Technologies (ICT). The Green Sustainable Telco Cloud (GSTC) project, led by the Ecole de Technologie Superieure, University of Quebec, in collaboration of University of Toronto and Ecole Polytechnique de Montreal addresses challenges in building virtual Telco services that are green and sustainable, by designing open and scalable clouds with environmental control features that optimize workload, energy consumption and GHG emissions, and by investigating the cloud's life-cycle and its environmental impacts.
This demonstration shows the portal and key functions of the GSTC platform which optimizes resource allocations when hosting Telco applications thanks to NFV and SDN techniques. IMS (Internet Multimedia Subsystem) virtualization, multipath forwarding in Telco data center, energy generation evaluation, carbon assessment, and virtual resource optimization are implemented in this prototype to minimize environmental impacts of Telco services. The Telco Cloud is also optimized to support smart city application provisioning, like M2M Smart Home, and cloud-based smart community.

FIWARE SME Demos
Sylvio Cretti and team

TreSight
Company/SME Hop Ubiquitous (Spain)
Abstract
TreSight shows how the combination of personal sensors and open data can enhance the delivered services in a tourism area, by leveraging on a context-aware recommendation system based on FIWARE technology.

Virtual Helsinki
Company/SME Playsign (Finland)
Abstract
Virtual Helsinki utilizes open data that is available in Helsinki area, such as public traffic, restaurant information and real estate market. This demo uses FIWARE Context Borker, POI and Web UI GEs.

Smart Room Monitoring through Wireless Sensor Networks in Software Defined Infrastructures
Petros Spachos, Univ. of Guelph and Eric Lin, Univ. of Toronto
Software-Defined Infrastructure (SDI) provides a unified framework for managing heterogeneous virtualized resources in cloud infrastructures. In this paper, we demonstrate the design of our monitoring system called MonArch that tackles the above challenge in a smart room infrastructure. A realtime wireless ad-hoc sensor network system for carbon dioxide monitoring at a complex indoor environment is supported. The system aims to detect and monitor the level of carbon dioxide on a real-time basis and provide overall air quality alerts timely.

Symbiotic Evolution of CAV Applications and Networks: an Expedition in Wireless Networked 3D Vision for Public Safety
Yehua Wang, Wayne State University

Abstract: Connected and automated vehicles (CAVs) represent a paradigm shift in road-transportation and vehicle-centered experience. As a foundation for CAVs, vehicular wireless networking significantly impacts the feasibility, adoption, and performance of CAV applications. This inherent coupling between CAV networking and applications,

the wide spectrum of CAV applications envisioned, and the continuous evolution of CAV networking and applications as well as the associated society impact require us to rethink our approaches to the research, development, and deployment of CAV networks and applications. Leveraging software-defined platforms and infrastructures for CAV networking and application deployment, one promising approach is to allow symbiotic exploration and evolution of CAV applications and networks in shared real-world systems and environments. In the context of real-time, wireless-networked 3D vision for public safety, this demo will illustrate this approach using GENI vehicular sensing, networking, and cloud computing resources.

In particular, vehicles with software-defined CAV innovation platforms will be deployed for supporting real-time 3D vision for campus safety surveillance, vehicular sensing, and vehicular control networking emulation at the same time. Integrating real-time vision with augmented-reality 3D campus environment, 3D vision enables naturalistic surveillance for campus safety; internal and external vehicle sensing enables modeling and development of CAV control algorithms for driving safety, which is also a major concern in public safety emergency response; integrating real-world vehicles with cloud-based simulation, vehicular control networking emulation enables exploration of next-generation vehicular wireless network solutions, which in turn enables future-generation CAV applications such as collaborative 3D vision for public safety emergency response and safe, green CAVs.