OPAL-RT TECHNOLOGIES

AGENDA

OPAL-RT'S 1st Local Conferences
on Real-Time Simulation

SEPTEMBER 26-27, 2019
SAN FRANCISCO | USA

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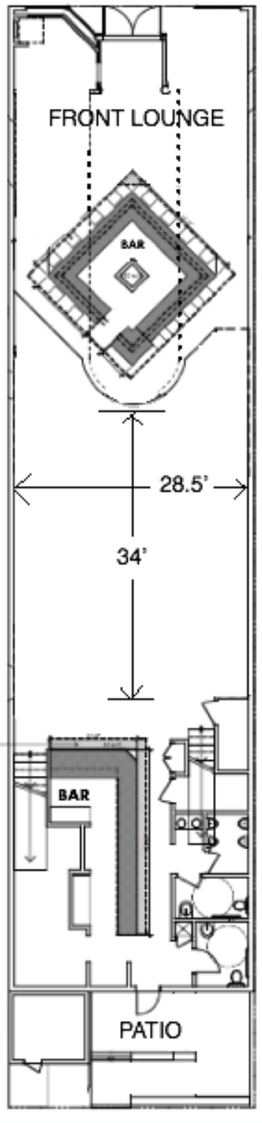
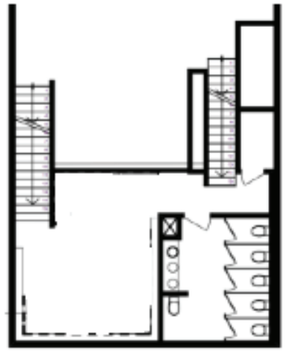
FLOOR PLANS

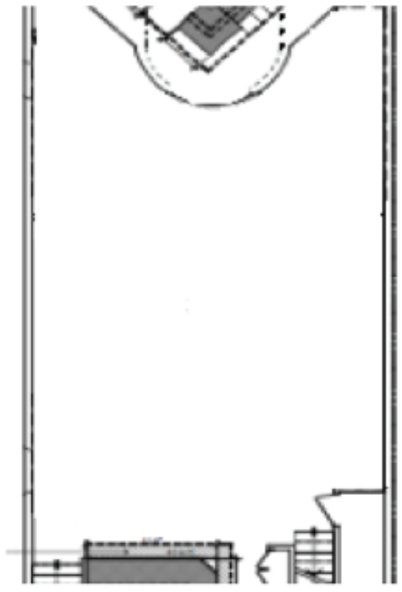
Main Floor



2nd Floor Mezzanine



ZOOM-IN OF
MAIN FLOOR
AREA: 969 SQ FT



AGENDA

THURSDAY, SEPTEMBER 26th, 2019

TIME	ACTIVITY	PRESENTER(S)
8:00 AM – 9:00 AM	Registration & Breakfast	
9:00 AM – 10:15 AM	Part 1 - Workshop on OPAL-RT's HIL tools usage for Electrical Power train simulation including RT-LAB, eHS and Electrical Motor library	Derek Boychuk, Customer, Solutions Architect, OPAL-RT TECHNOLOGIES
10:15 AM – 10:45 AM	**BREAK**	
10:45 AM – 12:00 PM	Part 2 - Workshop on OPAL-RT's HIL tools usage for Electrical Power train simulation including RT-LAB, eHS and Electrical Motor library	Derek Boychuk, Customer Solutions Architect, OPAL-RT TECHNOLOGIES
12:00 PM – 1:00 PM	**LUNCH - SPONSORED BY NATIONAL INSTRUMENTS**	
1:00 PM – 2:00 PM	Workshop on OPAL-RT's Scripting using Python RT-LAB	Vincent Lapointe, Product Manager, OPAL-RT TECHNOLOGIES
2:00 PM – 3:15 PM	Part 1 - Workshop on EV powertrain HIL on NI Veristand including eHS and Electrical Motor library	Myriam Desranleau, Field Applications Engineer, OPAL-RT TECHNOLOGIES
3:15 PM – 3:45 PM	**BREAK**	
3:45 PM – 5:00 PM	Part 2 - Workshop on EV powertrain HIL on NI Veristand including eHS and Electrical Motor library	Myriam Desranleau, OPAL-RT, Field Applications Engineer




AGENDA

FRIDAY, SEPTEMBER 27th, 2019

TIME	ACTIVITY	PRESENTER(S)
8:00 AM – 9:00 AM	Registration & Breakfast	
9:00 AM – 9:30 AM	Welcome to RT Spotlight, San Francisco Opening ceremony, Electrical powertrain HIL, where does OPAL-RT stand and where is OPAL-RT going ?	Pierre-Francois Allaire & Maxim Beaudoin, OPAL-RT
9:30 AM – 10:00 AM	Development of Hardware-in-the-Loop unit and Fast Prototyping tool using OPAL-RT at Karma Automotive	Geng Niu, Senior Manager, Powertrain Hardware, Karma Automotive
10:00 AM – 10:30 AM	Challenges, opportunities, and technology for electrification of LDV through HDV	David Christensen, Executive Director, Utah State University
10:30 AM – 10:45 AM	**BREAK**	
10:45 AM – 11:15 AM	Tools, Methods and Quality Approaches to Deliver High Quality Control in Digital Power Electronics.	Dr. Hamish Laird, CTO, ELMG Digital Power, Inc
11:15 AM – 11:45 AM	eHs and Electrical motors: Features, Roadmap, return on experience and market trends	Vincent Lapointe, Product Manager, OPAL-RT TECHNOLOGIES
11:45 AM – 12:15 PM	Full Vehicle Simulation for Electrified Powertrain Selection	Brad Hieb, Principal Application Engineer, MathWorks
12:15 PM – 1:15 PM	**LUNCH - SPONSORED BY NATIONAL INSTRUMENTS**	
1:15 PM – 1:45 PM	Applying a Platform-Based Approach to Optimize EV Testing	Nate Holmes, Principal Solutions Manager, Automotive, National Instruments
1:45 PM – 2:15 PM	SIL and HIL for ADAS and Autonomous testing architecture	Hervé Pollart, General Director, OPAL-RT STI
2:15 PM – 2:45 PM	Ensuring Reliable V2X Communications by Simulation	Lloyd Wihl, Application Engineering, SCALABLE Network Technologies
2:45 PM – 3:00 PM	**BREAK**	
3:00 PM – 3:30 PM	Advanced Power Emulators enable P-HIL Testing of Integrated Power Systems	David Eddy, General Manager, D&V Electronics USA
3:30 PM – 4:00 PM	Battery Management System with OPAL-RT	Derek Boychuk, Customer Solutions Architect, OPAL-RT TECHNOLOGIES
4:00 PM – 4:30 PM	Assessing the Impacts of Electric Vehicles into the Distribution Grid	Gustavo Vianna Cezar, Staff Engineer, SLAC National Accelerator Laboratory
4:30 PM – 6:30 PM	Exhibition	Sponsors
6:30 PM – 9:30 PM	**WELCOME RECEPTION - SPONSORED BY NATIONAL INSTRUMENTS**	

PRESENTATIONS DAY 1 – SEPT. 26TH, 2019

9:00 AM – 10:15 AM

Part 1 - Workshop on OPAL-RT's HIL tools usage for Electrical Power train simulation including RT-LAB, eHS and Electrical Motor library

10:45 AM – 12:00 PM

Part 2 - Workshop on OPAL-RT's HIL tools usage for Electrical Power train simulation including RT-LAB, eHS and Electrical Motor library

DEREK BOYCHUK
Customer Solutions Architect
COMPANY: OPAL-RT TECHNOLOGIES

1:00 PM – 2:00 PM

Workshop on OPAL-RT's Scripting using Python RT-LAB

VINCENT LAPOINTE
Product Manager
COMPANY: OPAL-RT TECHNOLOGIES

BIO: Vincent received his Master's in Mechanical Engineering from the University of Laval. Having occupied several positions at OPAL-RT, he is now responsible for defining the product strategy, in particular for electric products, and participates in defining the roadmap. He helps ensure that OPAL-RT is continuously innovating and remains ahead of trends.

THANK YOU FOR VISITING US AT RT SPOTLIGHT!

PRESENTATIONS DAY 1 – SEPT. 26TH, 2019

2:00 PM – 3:15 PM

Part 1 - Workshop on EV powertrain HIL on NI Veristand including eHS and Electrical Motor library

3:45 PM – 5:00 PM

Part 2 - Workshop on EV powertrain HIL on NI Veristand including eHS and Electrical Motor library

MYRIAM DESRANLEAU
Field Applications Engineer
COMPANY: OPAL-RT TECHNOLOGIES

BIO: Myriam Desranleau has been a Field Applications Engineer at OPAL-RT for two years. She works closely with customers developing hardware-in-the-loop test systems, and primarily focuses on OPAL-RT's tools for the National Instruments platform. Previously, Myriam worked for NI as an Applications Engineering Specialist in the automated test industry. She received her bachelor's degree in Mechanical Engineering from McGill University in 2013.

PRESENTATIONS DAY 2 – SEPT. 27TH, 2019

9:00 AM – 9:30 AM

Welcome to RT Spotlight, San Francisco Opening ceremony, Electrical power train HIL, where does OPAL-RT stand and where is OPAL-RT going?

PIERRE-FRANCOIS ALLAIRE
Vice-President, Sales & Marketing
COMPANY: OPAL-RT TECHNOLOGIES

— AND —

MAXIM BEAUDOIN
Team Leader, Western North America Sales
COMPANY: OPAL-RT TECHNOLOGIES

9:30 AM – 10:00 AM

Development of Hardware -in-the-Loop unit and Fast Prototyping tool using OPAL-RT at Karma Automotive

DR. GENG NIU
Senior Manager, Powertrain Hardware
COMPANY: Karma Automotive LLC

BIO: Dr Geng Niu, Senior Manager, Powertrain Hardware, Karma Automotive, is leading the electrified powertrain development for various Karma vehicle programs, including EREV and BEV architecture. He received his B.S. in Electrical Engineering from Beihang University, Beijing, China, followed by his M.S. and Ph.D. degrees in Electrical Engineering from Illinois Institute of Technology, Chicago. In his 3-year career in Karma Automotive, he was leading the in-house product development team to design the second generation power inverters for Karma Revero GT and Revero GTS. Also he was overseeing the e-drive system software development and control algorithms for traction derive and range extender.

ABSTRACT: Inverter team at Karma Automotive provides in-house development of power inverters (HW and SW) for world-class Karma EVs. As a main step in inverter SW and HW development, we developed a Hardware-in-the-Loop unit and an inverter fast prototyping tool. The Hardware-in-the-Loop unit is a main tool for SW development task, and it is now being extended to include SW verification tests, too. On the other hand, the fast prototyping tool is an essential tool to facilitate the implementation of inverter HW for the future EV platforms. This unit also provides a powerful tool for development of SW application layer with the possibility of high frequency sampling and monitoring.

The presentation file will discuss the structure of Hardware-in-the-Loop unit (power stage and monitoring) using OP5700 platform and its interaction with control board via CAN bus. It also covers the CAN unit of OP5700 platform to be used for implementation of automatic verification tests. As another discussion, the development of the fast prototyping tool (including motor control algorithm, protection, diagnostics, and CAN communication) using OP4510 platform will be discussed. The testing of the fast prototyping unit with the hardware-in-the-loop unit will be also presented.

PRESENTATIONS DAY 2 – SEPT. 27TH, 2019

10:00 AM – 10:30 AM

Challenges, opportunities, and technology for electrification of LDV through HDV

DAVID CHRISTENSEN
Executive Director, Center for Sustainable Electrified Transportation (SELECT)
COMPANY: Utah State University

BIO: David Christensen is Executive Director of the Sustainable Electrified Transportation (SELECT) Research Center. The Center is led by Utah State University and, since its founding in early 2016, the Center has grown from five university partners and a dozen faculty members to 13 core and affiliated university partners with more than 40 researchers with globally recognized expertise across sectors in electric transportation research. SELECT's vision is to develop and strategically grow a network of diverse, inter-disciplinary faculty and students as well as key industry members and other stakeholders while fostering a culture of inclusion across ideas, diverse backgrounds, and research activities to spur pursuit of breakthrough research activities, enabling technologies, and engineered systems in electrified transportation. David coordinates SELECT's strategic direction, member relations, and commercialization activities in addition to directing membership activities among the Center's industry members and collaborators. David holds a PhD in Professional Communication/Rhetoric from Utah State University, and he also serves as the Board Chair for the DOE-funded Utah Clean Cities Consortium.

ABSTRACT: The nation is at a crossroads in time: our aging grid and deteriorating roads receive low grades and need trillions of dollars in upgrades; transportation accounts for 50% of air pollution and 70% of petroleum use in the US; and, at the same time, interest in EVs and their charging needs is skyrocketing with electrification offering zero tailpipe emissions and dramatically reduced energy consumption. Thus, at the nexus of the crossroads is an opportunity to effect transportation electrification as a crucial part of a coming transformation. Considering, however, the challenges of Lithium-based energy storage, public charging infrastructure development, and electrifying larger vehicles, this presentation discusses research and a vision toward widespread electrification of light to heavy duty vehicles with the goal to eliminate cost, range, battery and charging barriers to adoption by providing low cost ubiquitous charging at the level where users are no longer concerned with where, when or how they charge.

10:45 AM – 11:15 AM

Tools, Methods and Quality Approaches to Deliver High Quality Control in Digital Power Electronics.

DR. HAMISH LAIRD
CTO
COMPANY: ELMG Digital Power, Inc

BIO: Hamish Laird is CTO at ELMG Digital Power, Inc. His work is helping people realize the benefit of digital power electronics control to speed time to market, minimize the converter cost, maximize efficiency and provide stable robust operation. His converter control experience includes HVDC transmission control, hybrid vehicles, electric vehicles and rail traction along with telecom power and battery energy storage. He has thirty years of experience in the design, research, development and commercialization of power converters with strong focus on manufacturability and production.

Hamish worked for Alstom Grid, Aucom and Eurotherm Drives before completing his Doctorate in Shunt Active Filtering and founding ELMG Digital Power. Current ELMG Digital Power customers include large electrical OEMs such as ABB, energy storage companies, traction companies and automotive companies.

Hamish recently worked with the PSMA (Power Supply Manufactures Association) to develop guidelines for software quality in the digital control of power electronics. He is a regular and well-respected presenter at APEC and other conferences.

ABSTRACT:
The key reasons for using digital control in power electronics are:

- Lower cost
- Complex control requirements
- Configurability
- Optimizing for operating point variation
- Control adaption
- Management of the non-linearity of the converter
- The ability to tune the switching times precisely to minimize the power loss and maximize the efficiency.

The advantages of digital control of power electronics bring with them challenges. Dealing with these challenges before they expose problems is the key to fast product delivery and reliable and robust operation.

The challenges include:

- Limited Number of Bits
- Sampling and limited bandwidth
- Processing Delay
- Producing and maintaining high quality software code

The presentation explores the detail of these challenges and presents tools, methods and quality approaches to address them.

PRESENTATIONS DAY 2 – SEPT. 27TH, 2019

11:15 AM – 11:45 AM

eHs and Electrical motors: Features, Roadmap, return on experience and market trends

VINCENT LAPOINTE
Product Manager
COMPANY: OPAL-RT TECHNOLOGIES

BIO: Vincent received his Master's in Mechanical Engineering from the University of Laval. Having occupied several positions at OPAL-RT, he is now responsible for defining the product strategy, in particular for electric products, and participates in defining the roadmap. He helps ensure that OPAL-RT is continuously innovating and remains ahead of trends.

ABSTRACT: eHS is OPAL-RT's nanosecond power electronics solver for real-time simulation on FPGA. This presentation focuses on features, applications and enhanced workflows in the new version, featuring new components (transformers, line models, switching functions, and switches) as well as improved accuracy and precision. The improved usability of eHS' workflows comes from the powerful and intuitive Schematic Editor, which enables construction, editing and integration of circuits, and is integrated within eHS. This new generation of solver has use cases within all types of power electronics systems, like industrial motor drive, battery management system and electrical transportation.

11:45 AM – 12:15 PM

Full Vehicle Simulation for Electrified Powertrain Selection

BRAD HIEB
Principal Application Engineer
COMPANY: Mathworks

BIO: Brad is an application engineer at MathWorks, focusing on control design. Prior to joining MathWorks, Brad worked for Ford Motor Company for 14 years. His Ford experience included advanced powertrain controls design, vehicle and powertrain controls for Ford's Formula 1 racing program, and vehicle dynamics simulation, tools and methods work. Prior to Ford, Brad worked for several years as a logic design engineer at Cray Research. Brad holds a M.S.E. from the University of Michigan, Ann Arbor and a B.S. from Iowa State University, both in electrical engineering.

ABSTRACT: Full vehicle simulation models are needed to assess attributes such as fuel economy and performance. In this session, you will learn how MathWorks automotive modeling tools can be used for powertrain selection studies. Specifically, we will examine the impact of adding an electric motor at different locations along the driveline (e.g., pre- or post-transmission). In order to make a fair comparison between alternatives, an optimal supervisory control strategy known as ECMS (Equivalent Consumption Minimization Strategy) is applied. With these closed-loop models, we can quantify the performance / fuel economy tradeoffs for the architectures under consideration and determine an optimal powertrain selection.

PRESENTATIONS DAY 2 – SEPT. 27TH, 2019

1:15 PM – 1:45 PM

Applying a Platform-Based Approach to Optimize EV Testing

NATE HOLMES
Principal Solutions Manager, Automotive
COMPANY: National Instruments

BIO: Nate Holmes is a principal solutions manager for automotive test. He works on applying NI's platform and test approach to powertrain and vehicle dynamics test applications. Nate's previous roles at NI include R&D group manager for motion control and machine vision product lines and product management for various embedded systems products including EtherCAT and Expansion I/O in addition to Motion and Vision. He joined NI in 2007 as a member of the Application Engineering department where he was actively involved in supporting NI's efforts with FIRST robotics. Nate received his BS in mechanical engineering from the University of Florida.

ABSTRACT: EV validation presents a variety of test challenges ranging from high-speed/high-fidelity control and emulation of power electronics to managing massive parallel deployments of testers and the data they generate. Learn how NI's open and flexible platform combined with OPAL-RT real-time simulation models, tools, and expertise provide a foundation for standardizing test across the EV powertrain.

1:45 PM – 2:15 PM

SIL and HIL for ADAS and Autonomous testing architecture

HERVÉ POLLART
General Director at OPAL-RT Intelligent Transportation Systems
COMPANY: OPAL-RT Systèmes de Transports Intelligents (Lyon)

BIO: Hervé, with 15 years' experience in the automotive field, will lead our focus on autonomous vehicle technology. As General Manager of OPAL-RT Intelligent Transportation Systems, Hervé will be responsible for defining our strategy, roadmap and partnerships.

ABSTRACT: Learn how to integrate and validate each autonomous vehicle technology of new AD / ADAS sensors.

In this presentation, you will discover the best tools to migrating physical testbeds onto simulation platforms, in order to overcome obstacles, the automotive industry faces when testing autonomous vehicle.

2:15 PM – 2:45 PM

Ensuring Reliable V2X Communications by Simulation

LLYOD WIHL
Director, Application Engineering
COMPANY: SCALABLE Network Technologies

BIO: Lloyd Wihl is Director of Application Engineering at SCALABLE Network Technologies in Los Angeles. He graduated in Mechanical Engineering from McGill University, and is a recipient of the NASA achievement award. He has extensive experience in real-time simulation, and has led multi-million dollar projects in fields that include intelligent transportation, air traffic management, synthetic digitized battlefields, network-centric systems, cyber threat assessment, control systems for flexible robotic manipulators, and public safety. Mr. Wihl has published several papers on cyber warfare synthetic environments, and had the vision for, and guided development of SCALABLE's Network Defense Trainer, which integrates cyber and kinetic domains.

ABSTRACT: V2X promises to improve safety on the road by relaying information among vehicles to help reduce collisions and loss of life. The technology must operate with extreme reliability in a very dynamic environment, with high relative speeds, very low latency for dynamic connections and safety-critical message receipt, in crowded urban environments with interfering signals. V2X systems will use competing technologies including DSRC and C-V2X. However, there are many issues which will need to be resolved. Congestion on the roads will affect the ability to communicate, and mitigation strategies need to be developed. Security of the networks will be needed for trustworthiness. Significant testing will be needed to guarantee interoperability among devices.

The presentation will explain how lab-based simulation that includes urban environments, vehicle mobility, fading, path loss, interference, and cyber security is being used with real radios in-the-loop, under varying conditions with thousands of moving vehicles, to greatly reduce testing time, space, and cost.

PRESENTATIONS DAY 2 – SEPT. 27TH, 2019

3:00 PM – 3:30 PM

Advanced Power Emulators enable P-HIL Testing of Integrated Power Systems

DAVE EDDY
General Manager
COMPANY: D&V Electronics USA

BIO: General Manager of D&V Electronics USA, formerly E&M Power. Dave co-founded Mechanical Power Conversion in 1997 to target the nascent HEV/EV market. After merging with Electronic Power Conversion in 2000 to form E&M Power, Dave served as President until the acquisition by D&V Electronics in 2018. Dave has a BS in Electrical Engineering from Clarkson University, and a Masters in Business Administration from the University of Arizona.

ABSTRACT: System-level analysis capability, centered on modeling and simulation, has been identified as a key enabling technology for solving integrated power system challenges and high-performance power emulation pushes the boundaries of what can be tested prior to full system integration. For example, DC power systems are being applied in an increasing number of applications ranging from EV / HEV automobiles to More Electric Aircraft (MEA) to data centers and micro grids. The stability of these DC power systems is of critical importance to their operation. The presence of constant power loads and bidirectional power flow of many of the loads along with the parasitic inductance and distributed capacitance makes accurate calculation and simulation of stability margins challenging at best.

A bi-directional power source with a controllable bandwidth that can exceed the bandwidth of the fastest load can provide a means of determining system margin. The design and capabilities of the Direct Current Emulator (DCE) from D&V Electronics will be presented as well as using this capability to design and test DC power systems. The DCE can be controlled by a high-speed fiber optic interface with sub-microsecond latency for real time simulation Power Hardware In the Loop (P-HIL) to verify small signal stability analysis. Full DC power systems and power system components can be tested using the DCE as either a bi-directional load to load the power system or as a source to test components intended to connect to the DC power system. When the DCE is emulating the DC power system to test components it can be configured as a controllable source impedance and can generate transients and controlled noise and ripple. In combination with D&V's electric motor emulator, also capable of real time simulation P-HIL, full vehicle system integration and component compatibility testing can be achieved.

3:30 PM – 4:00 PM

Battery Management System with OPAL-RT

DEREK BOYCHUK
Customer Solutions Architect
COMPANY: OPAL-RT TECHNOLOGIES

4:00 PM – 4:30 PM

Assessing the Impacts of Electric Vehicles into the Distribution Grid

GUSTAVO VIANNA CEZAR
Staff Engineer
COMPANY: SLAC National Accelerator Laboratory

BIO: Gustavo Cezar is a staff engineer at the Grid Integration Systems and Mobility (GISMo) at SLAC National Accelerator Laboratory and also a PhD candidate at Stanford University. He is currently working in projects looking into minimize the impacts of electric vehicles into the grid, integration of grid edge resources, and assessing grid stability using cloud computing. He focus in bridging the gap between hardware and software and taking academic research into real world experiments. He is in charge of the GISMo lab and lead the team that developed the state-of-the-art Bits and Watts Lab at Stanford University.

ABSTRACT: Electrification of transportation has been growing in a fast pace in the last few years worldwide. Many countries are creating policies and regulations to incentivize wide adoption of electric vehicles (EV). In the US, California is in the leading edge with high goals. However, without an understanding of the real impacts of EV loads into planning and operations of the electrical grid, this wide adoption can create catastrophic consequences. In this talk we will discuss two current projects SLAC is leading in order to address operations and planning challenges in workplace charging stations and fleet operations.

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COMPANY DECSRIPTION:
Critical technology trends in advanced driver assistance systems (ADAS) and electric vehicles (EVs) present new test challenges beyond the here and now. This quickly evolving technology landscape increases the pressure on any test schedule and requirements.

Using NI's flexible platform-based approach means you can own the test system IP and make changes quickly rather than solely relying on a third-party vendor. Work with NI to overcome the pressure of these rapidly changing test requirements using an open and easily upgradable platform that offers the test system flexibility you need to test the vehicles of tomorrow today.

http://www.ni.com/en-us.html

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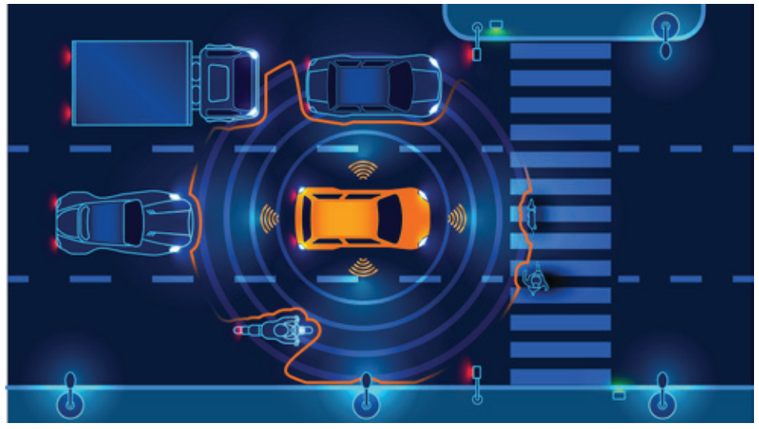
COMPANY DECSRIPTION:
SCALABLE Network Technologies has developed a family of software products for engineers, analysts and operators of mission-critical, business-critical environments to help ensure the networks, the networked systems, and the distributed applications work effectively under all normal and emergency operating scenarios. Our solutions integrate software virtual networks with physical hardware and applications, allowing users to rapidly test a wide range of highly realistic scenarios for better operational planning, more effective training and enhanced communications effectiveness without the expense of building out physical infrastructure. SCALABLE has created a "lab-based risk reduction" approach that provides a repeatable, verifiable, and highly cost-effective solution. SCALABLE's simulation software is used by commercial, government, military, and educational organizations around the world.



PRODUCT DESCRIPTION:
The EXata communications simulation platform (EXata) is a network emulator that lets you evaluate on-the-move communication networks. It uses a software virtual network (SVN) to digitally represent the entire network, the various protocol layers, antennas, and devices. The system can interoperate, at one or more protocol layers, with real radios and devices to provide hardware-in-the-loop capabilities. EXata can also be connected to systems with real applications, which run on the SVN just as they would run on real networks. It provides a cost-effective and efficient way to ensure the reliability of V2X communications to reduce collisions and loss of life in the future. EXata is being used to support the research being done to develop V2X technology. In V2X, interoperability is crucial. The technology must also operate with extreme reliability in a very dynamic environment, with high relative speeds, very low latency for dynamic connections and safety-critical message receipt, in crowded urban environments with interfering signals. SCALABLE's wireless simulation that includes urban environments, vehicle mobility, fading, shadowing, path loss and interference, and our models of 802.11p, LTE, Thread, Bluetooth and 5G provide the answer. Our tools reveal details about network performance at every layer of the stack, to locate problems in various environments and scenarios and improve safety on the road. EXata is already in use in the USA, Europe, and Asia to support this research.

www.scalable-networks.com

SILVER SPONSORS

COMPANY DECSRIPTION:
Doble Engineering Company strives to ensure all people have reliable, safe and secure power. We do this by providing advanced diagnostics and engineering expertise to the energy industry worldwide. Our companies and product lines include Manta Test Systems, Morgan Schaffer, Vanguard Instruments and Xtensible Solutions. Whether the goal is condition monitoring or asset management, Doble has solutions for any need. Doble is part of the Utility Solutions Group of ESCO Technologies Inc. (NYSE: ESE).

PRODUCT DESCRIPTION:
F6350e / F6300e External Amplifiers

These amplifiers are useful in high power protection testing applications when you need additional current and/or voltage sources, for critical high burden relay testing, as well as system modeling.

When used in combination with Doble's Protection Suite software, you will have the ultimate flexibility to test complex schemes. These amplifiers also offer the industry's most current sources in one piece of equipment.

www.doble.com

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COMPANY DECSRIPTION:
D&V Electronics designs and manufactures leading edge test solutions for all components of an electrified powertrain and for all stages of the product life cycle, from R&D through to end of line production and aftermarket. Its worldwide customer base includes OEMs, Tier 1 & 2 manufacturers, universities, government institutions, and test centers. D&V Electronics has supplied high quality testing expertise, technology, and support to customers in over 90 countries for over 20 years.

PRODUCT DESCRIPTION:
D&V Electronics combines leading edge technology and innovative design to produce superior vehicle electrification test solutions. We provide two advanced power emulators, e-Motor Emulator and DC Emulator that are P-HIL compatible with fiber optic interfaces. The DC Emulator product line is a 30kW to 1.2MW DC source/sink that emulates dynamic, complex bidirectional loads with best in class frequency response, deterministic streaming with <1us latency, bidirectional full-power slew rate of <100us, and repeatable noise/ripple generation. Ideal for testing vehicle energy systems and components, including batteries, and for HIL with real-time simulation to emulate large switching and regenerative loads to study their effect on the whole power system. The e-Motor Emulator mimics the 4-quadrant electrical output of multi-phase synchronous or induction motor/generators under user-controlled speed, torque, and temperature conditions thereby simulating an electric drive train or electric propulsion motor. This electronic dynamometer, with facility requirements suitable for laboratory installations, offers significant advantages in test capabilities and flexibility as well as low acquisition and operating costs.

www.dvelectronics.com

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