



March 17 - 18, 2022
Marriott Downtown at the Convention Center
Riverside, California

11th Annual International PEMS Conference

Moving towards Onboard Sensing,
Analysis, and Reporting (OSAR)

Hosted by: The University of California, Riverside
College of Engineering - Center for Environmental Research and
Technology (CE-CERT)



RIVERSIDE | College of Engineering –
Center for Environmental
Research and Technology

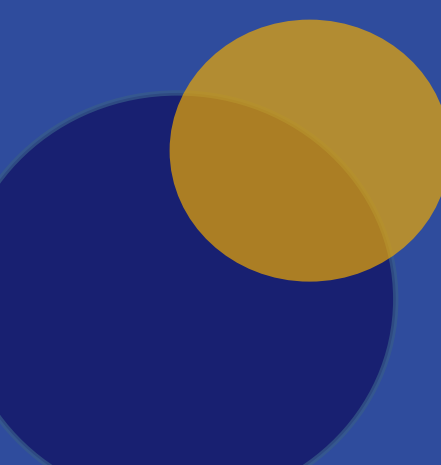
WELCOME



Welcome to the 11th Annual International Portable Emissions Measurement Systems (PEMS) Conference, presented by the University of California at Riverside (UCR) Bourns College of Engineering Center for Environmental Research and Technology (CE-CERT).

At this year's conference, we will explore the theme of Moving towards Onboard Sensing, Analysis, and Reporting (OSAR) by focusing on a wide range of measurement systems, from fully compliant regulatory PEMS to mini-PEMS or smaller systems, which includes everything from micro-PEMS, nano-PEMS, in-situ sensors, Portable Activity Measurement Systems (PAMS), to Real Emissions Assessment and Logging (REAL).

We would like to extend a special thank you to the sponsors of this year's conference. Their support and participation are instrumental in our ability to present a successful and world-renowned conference that will continue to host leaders from all areas of measurement systems for many years to come.



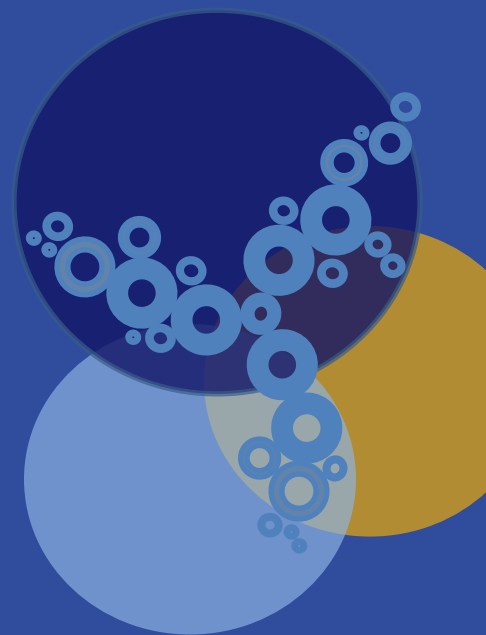
Thank you for your participation,
Kent Johnson, Ph.D.
Principal Investigator, Emissions and Fuels Research
UC Riverside | CE-CERT

Agenda Day 1

7:00 AM	Breakfast and Registration
8:00 AM	Opening Remarks and Keynote Speaker
9:00 AM	Government Policy
10:00 AM	Break
10:30 AM	New Approaches
11:30 AM	Lunch
12:40 PM	International Research Developments
2:20 PM	Break
2:40 PM	International Research Developments, cont.
3:40 PM	Break
4:00 PM	Panel Discussion
6:00 PM	Evening Reception

Agenda Day 2

7:30 AM	Breakfast
8:00 AM	Research Developments
10:20 AM	Break
10:50 AM	New Methods
11:50 AM	Lunch
Noon	2022 Featured Speaker Community Level Environmental Policy Developments
1:00 PM	Closing Remarks



DAY 1 – THURSDAY MARCH 17, 2022

7:00AM – 8:00AM

CHECK-IN AND BREAKFAST

8:00AM – 9:00AM

OPENING REMARKS AND KEYNOTE SPEAKER

Matthew Barth

Director and Professor,
UC Riverside | CE-CERT

Welcome and Opening Remarks

Christopher Frey

U.S. Environmental Protection Agency

Keynote Speaker

9:00AM – 10:00AM

GOVERNMENT POLICY

Roberto Gioria

European Commission - Joint
Research Center

Non-road Mobile Machinery in Service Monitoring Based
on PEMS - JRC Experiences in the Development of the
Regulatory Proposal

Scott Bacon

California Air Resources Board

Mini-PEMS: A Technical Review on What Is Needed for
Using it as a Screening and Compliance Tool

Kent Johnson

UC Riverside | CE-CERT

Onboard Sensing, Analysis, and Reporting (OSAR)

10:00AM – 10:30AM

BREAK

10:30AM – 11:30AM

NEW APPROACHES

Imad A. Khalek

Southwest Research Institute

Laboratory Investigation of Exhaust NO_x/NH₃ Sensors
Under Steady-State and Transient Operation Using ECTO-
LAB

Daisy Thomas

3DATX

Performance Evaluation of a Mini-PEMS: Results of
Intercomparison Studies and Implications for its Potential
Use for Road-Side Inspection, Fleet Screening, and Road
Worthiness

Chris Sharp

Southwest Research Institute

Low NO_x Real-World Cycle PEMS and NO_x Sensors

11:30AM – 12:40PM

LUNCH

12:40PM – 2:20PM

INTERNATIONAL RESEARCH DEVELOPMENTS

Some Attendees Are Registered to Tour the CARB Facility at This Time

Nick Molden
Emissions Analytics

Easier, Cheaper, Deeper: A Novel Approach to Tailpipe Emissions Measurement

Ron Patrick
Engine Control and Monitoring (ECM) Company

ECM's Mini-PEMS and Micro-PEMS Systems and Components

Ricardo Suarez-Bertoa
European Commission - Joint Research Centre

Measuring Emissions from Heavy-Duty Vehicles Under Real World Conditions Using On-board Sensors and Advanced Portable Instruments

Phil Roberts
Horiba Mira Ltd.

RDE Plus – Rapid Characterization of Vehicle and Powertrain Performance and Emissions Using Digital Twin, Powertrain-in-the-Loop and Chassis Dynamometer Methodologies

Susumu (Mu) Sato
Tokyo Institute of Technology
VIRTUAL PRESENTATION

Real World Emissions Analysis Using Sensor-Based Emissions Measurement System for Light-Duty Direct-Injection Gasoline Vehicles

2:20PM – 2:40PM

BREAK

Some Attendees Are Registered to Tour the CARB Facility at This Time

2:40PM – 3:40PM

INTERNATIONAL RESEARCH DEVELOPMENTS, CONTINUED

David Mendez-Jimenez, Grace Johnson, Heejung Jung
UC Riverside | CE-CERT

The Influence of Portable and Built-in Ionizers on Ozone Concentration in Vehicle Cabins

Scott Miers, Brian Eggart
Michigan Technological University
VIRTUAL PRESENTATION

Development of a Mini-PEMS with High HC Capacity

Andre Luiz Silva Forcetto
Universidade de Sao Paulo
VIRTUAL PRESENTATION

Developing a Low-Cost PEMS for Flex Fuel Cars

3:40PM – 4:00PM

BREAK

4:00PM – 5:00PM

PANEL DISCUSSION

Kent Johnson

UC Riverside | CE-CERT

Imad A. Khalek

Southwest Research Institute

John Bowman

Cummins

Tao Huai

California Air Resources Board

Christopher Frey

U.S. Environment Protection Agency

5:00PM

END OF DAY 1

6:00PM – 9:00PM

EVENING RECEPTION: JOIN US AT THE COLLEGE OF ENGINEERING – CENTER FOR ENVIRONMENTAL RESEARCH AND TECHNOLOGY (CE-CERT) LOBBY FOR AN EVENING NETWORKING RECEPTION.



Please visit with our
sponsors throughout both
days of the conference
during breakfast, lunch,
and breaks to learn more
about their organizations
and available products.

DAY 2 – FRIDAY MARCH 18, 2022

7:30AM – 8:00AM

BREAKFAST

8:00AM – 10:20AM

RESEARCH DEVELOPMENTS

Brenda Lopez, Kent Johnson, Heejung Jung
UC Riverside | CE-CERT

Brake Activity of a Heavy-Duty Vehicle

Daisy Thomas
3DATX

Mini-PEMS Use for Advanced Inspection and Maintenance Methods to Identify High Emitters

Karl Ropkins
University of Leeds

Collecting Real-World Evidence on Factors Affecting Bus Fleet Non-Exhaust Emissions

Patrick Thompson
EmiSense Technologies, LLC

Low-Cost On-Board Electrostatic PM Sensing for Continuous Compliance Monitoring and Geofencing

Michael Sabisch
Eastern Research Group

Opening the “CAN” – Exploiting the Wealth of Data Within a Vehicle’s ECM

Hervé Borrel
Airlib Inc.

Improved Vehicle Cabin Air Quality by Control of Air Recirculation Using Spatiotemporally-Resolved Interactive Map

Ricardo Suarez-Bertoa
European Commission – Joint Research Centre

NO_x Real World Emissions Measurements from a Euro 6d-ISC Light-Duty Vehicle Using On-Board Sensors

10:20AM – 10:50AM

BREAK

10:50AM – 11:50AM

NEW METHODS

Andrew Burnette
MeasureMission

Communication with Unfamiliar Off-Road Vehicle Controller Area Network (CAN) Systems in the Field

Kent Johnson
UC Riverside | CE-CERT

Measuring Ship Emissions with Drones

Shun Fukami
Horiba

Advanced Portable Emissions Measurement System for
New Measurement Components (NH₃, N₂O, and SPN10)

11:50AM – 12:00PM

LUNCH

(SIT DOWN TO CONTINUE INTO FEATURED LECTURE)

12:00PM – 1:00PM

2022 FEATURED SPEAKER

Kathryn Higgins
South Coast Air Quality Management
District

Community Level Environmental Policy Developments

VIRTUAL PRESENTATION

1:00PM – 1:15PM

CLOSING REMARKS

1:15PM

END OF DAY 2

Some Attendees Are Registered to Tour the CARB Facility at This Time

