

Designing Electronic Powertrain Controls Symposium

May 4-6, 2004

Motorola Parmer Conference Center
Austin, TX, USA

New!

Also from SAE

**Control Systems: Model Based
and Control Systems Development
Seminar**

May 3, 2004

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Designing Electronic Powertrain Controls Symposium

May 4-6, 2004 • Motorola Parmer Conference Center • Austin, Texas

The operation of modern powertrains relies increasingly on the design of the supporting electronics and software. The engineering content is a mixture of skills and knowledge that is increasing all the time. This symposium will provide attendees with a clear understanding and appreciation of not only what goes into the systems today but how and why the ingredients are designed the way they are.

Participants will engage in presentations and discussions on all aspects of the current and future technical scene. The content ranges from the fundamentals of the hardware and software through the latest thinking on engineering cost-effective and capable systems. From the rapid-prototyping of new developments through the design for reliable manufacturing and the methods to achieve successful results within aggressive time and cost budgets, there is information that is useful to everyone involved in automotive powertrain design, development and production.

In addition to the symposium speakers, participants will have the opportunity to discuss their questions in informal meetings and also view a valuable range of product table-top displays from the key vendors in the sector. The meeting also provides a rare opportunity to attend a seminar on Control Systems which will be held prior to the main meeting (see description on next page).

AGENDA

Save \$100 by registering
before April 23, 2004!

DAY 1 - Tuesday, May 4, 2004

7:30 am **Registration** – Motorola Parmer Auditorium
8:30 am **Announcements**
Colette Wright, Program Engineer, SAE International
Welcome and Introductions
Bernard J. Challen, CEO, Shoreham Services

FUNDAMENTALS AND SYSTEM ELEMENTS

Chairperson – *Bernard J. Challen*, CEO, Shoreham Services
8:45 am **Keynote – “Managing Powertrain Control”**
Dennis Bogden, Director of Powertrain Electronics Engineering, General Motors Corp.
9:15 am **Modern Control Methods**
Lino Guzzella, Professor, Federal Institute of Technology (ETH), Switzerland
10:00 am **Refreshment Break**
10:30 am **Introducing Engine Fundamentals**
Bernard J. Challen, CEO, Shoreham Services
11:00 am **Engine Modeling for Control Applications**
Tom Morel, President, Gamma Technologies Inc.
11:30 am **Embedded Estimator Design Process Example**
Pete Maloney, Principal Consultant, The MathWorks
12:00 noon **Discussion Panel with Morning Presenters**
12:15 pm **Lunch and Vendors’ Table-top Exhibition**

DESIGN APPROACHES

Chairperson – *Bernard J. Challen*, CEO, Shoreham Services
1:30 pm **Distributed Powertrain Controller - Fact or Fiction?**
Kenneth P. Waichunas, Director Automotive US, VaST Systems Technology
2:00 pm **Signal Delivery Analysis**
Dennis Bogden, Director of Powertrain Electronics Engineering, General Motors Corp.
2:30 pm **Common Engine Control Architectures**
Gunter Mueller, Software Supervisor, Robert Bosch Corp.
3:00 pm **Refreshment Break**
3:30 pm **On-Board Diagnostics Requirements**
John Van Gilder, Development Engineer, GM Powertrain
4:15 pm **In-cylinder Ion Sensing Opportunities**
Yiqun Huang, Sr. Research Engineer, Southwest Research Inst.
4:45 pm **Discussion Panel with Afternoon Presenters**
5:15 – **Reception and Vendors’ Presentations**
8:00 pm
Chairperson – *Scott Lehman*, Automotive Industry Marketing Mgr., The MathWorks
This reception will permit attendees to exchange views and also to listen to vendor presentations in the form of application examples and experiences.

DAY 2 - Wednesday, May 5

8:45 am **Announcements**
SILICON ENGINEERING
Chairpersons – *Dennis Bogden*, Director of Powertrain Electronics Engineering, General Motors Corp.
Patrick Leteinturier, Sr. Principal Automotive Systems, Infineon
9:00 am **Motorola’s Vision of Automotive Silicon**
Ron Stence, Strategy Marketing & Sr. Systems Engineer, Motorola SPS
9:45 am **Infineon’s Vision of Automotive Silicon**
Patrick Leteinturier, Sr. Principal Automotive Systems, Infineon
10:30 am **Refreshment Break**
11:15 am **Newest Developments for Sensing in Powertrain Controls**
Randy Frank, Randy Frank & Associates, Ltd.
11:45 am **Rapid System Development**
Andy Beaumont, Manager, Ricardo Inc.
12:15 pm **Discussion Panel with Morning Presenters**
12:30 pm **Lunch** – Board bus to Motorola Fabrication Facility. Box lunches will be provided.

PLANT TOUR

1:45 – **Plant Tour of Motorola Fabrication Facility, Oak Hill**
5:15 pm
- Welcome and Introductions by Motorola Sr. Executive
- Video: Basics of Silicon
- Tour MOS-11 Wafer Fabrication Facility
- Tour Product Analysis Lab
- Motorola demonstrations and tabletops

DINNER

5:30 pm Board bus for the world-famous Salt Lick BBQ Restaurant - hospitality evening sponsored by Motorola.

DAY 3 - Thursday, May 6

8:30 am **Announcements**

IMPLEMENTATIONS AND CHALLENGES

Chairperson – *Scott Lehman*, Automotive Industry Marketing Mgr., The MathWorks
8:45 am **Keynote – “Future Vehicle Requirements”**
Robert E. Larson, Associate Director, EPA
9:15 am **The Emissions Control Challenge for Heavy-Duty Diesel Engines**
Magdi Khair, Staff Engineer, Southwest Research Inst.
10:00 am **GM ATC Motor Controller Experience**
Mark Selogie, Program Manager, *Dan Kowalewski*, S/W Engineer, General Motors Corp.

10:30 am	Refreshment Break
11:00 am	Development of a Virtual Vehicle Transmission Test Cell for Powertrain Control System Development and Testing <i>Joe Steiber, Sr. Research Engineer, Southwest Research Inst.</i>
11:30 am	Traction Control Systems for the Next Generation All Wheel Drive Vehicles <i>Sankar K. Mohan, Executive Engineer, Eric Bansbach, Mgr. Control Systems, New Venture Gear, Inc.</i>
12:00 noon	Discussion Panel with Morning Presenters
12:15 pm	Lunch

IMPLEMENTATIONS – CASE STUDIES

	Chairperson – <i>Ron Stence, Strategy Marketing & Sr. Systems, Motorola SPS</i>
1:30 pm	Far East Industry Developments <i>Myoungcho Sunwoo, Professor, Hanyang Univ.</i>
2:00 pm	Signal Delivery Analysis (Case Study) <i>Dennis Bogden, Director of Powertrain Electronics Engineering, General Motors Corp.</i>
2:30 pm	New Software Tools <i>Dave Gorshkov, Development Engineer, AXEON</i>
3:00 pm	Symposium Achievements – a review and context <i>Bernard J. Challen, CEO, Shoreham Services</i>
3:10 pm	Symposium Concludes

Registration includes complete set of all handouts!

**Attend this seminar —
one location
two learning opportunities**

Control Systems: Model Based and Control Systems Development

May 3, 2004 • I.D.# C0251

This workshop focuses on the fundamental background and design parameters involved in developing model-based and robust controller systems for automotive applications. Through a series of modules that include discussion, illustration, and hands-on problem-solving, participants acquire a basic understanding of how to apply modern control design methods to automotive technical systems.

Each one-hour module is divided into introduction and theory (20 minutes), exercises (30 minutes), and discussion of solutions (10 minutes). In the exercises, one problem is treated in detail (cruise control for vehicles with SI engines). Matlab/Simulink™ software is used as the primary problem-solving tool.

***Note:** Participants are asked to bring their own laptop to run a free limited-time license of Matlab/Simulink that is furnished with the workshop.

Benefits of Attending

Upon completion of this workshop, participants will be able to:

- List basic modeling techniques
- Explain the advantages and drawbacks of feedback control
- Recognize models and parametrization of model uncertainty
- List important controller design rules
- Describe the limits of controller design
- Generate options on how to cope with uncertainty (robust controller design)

Who Should Attend

Mechanical and electrical engineers interested in applying modern control design methods to technical systems, especially in the automotive area.

Prerequisites

Participants should have taken an undergraduate course on linear control and understand the basic concepts of dynamic systems analysis, such as differential equations and Laplace transform. It is also helpful if participants have some experience with Matlab/Simulink and controller hardware and software.

Seminar Content

Modeling of Dynamic Systems

- Methodology
- Normalization
- Linearization

System Properties

- Frequency domain representation
- Continuous and discrete time Stability
- Qualitative behavior
- Bode and Nyquist diagrams

Describing Model Uncertainty

- Structures
- Parametric approach
- Non-parametric approach
- Experimental approach

Control Design, Part I: Design for Nominal Plants

- Design rules
- Main controller structures
- Achievable limits

Control Design, Part II: Design for Uncertain Plants

- Robust stability
- Robustness optimization

Controller Realization

- Coping with main non-linearities
- Digital realizations

Summary and Conclusions

Instructor(s): Lino Guzzella

Lino Guzzella is Professor for Thermotronics at the Measurement and Control Laboratory, Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland. Dr. Guzzella's research interests include modeling, model-based control, and optimization of engine systems. Dr. Guzzella received his Mechanical Engineering diploma in 1981 and his doctoral degree with a thesis on nonlinear and robust controls in 1986 both from ETH Zurich.

Registration: \$655 ; SAE Members: \$605
Course Credits: .65 CEU

Tabletop Displays

During the symposium, companies from related industries will host tabletop displays. Don't miss this chance to see new technologies and network with representatives from these important organizations.

Companies wishing to exhibit and demonstrate their related technology products should contact the SAE Exhibits team at exhibitions@sae.org or 1-724-772-7116.

Tabletop Display Details

TABLETOP DISPLAY\$1,800

FEE INCLUDES:

- One tabletop display space (Includes one 6 foot x 30 inch table with two chairs)
- One complimentary Symposium Registration* (Includes lunch and refreshment breaks, evening reception, and handout materials)
- Recognition in the event program (Includes logo and brief description of company)

***There is no limit on staff attending the exhibit. However, if additional staff would like to attend the Symposium technical program, a separate registration is required.**

NETWORKING SPONSORSHIP OPPORTUNITIES...

An easy, cost-effective way to distinguish your company from the competition at this event!

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PACKAGED SPONSORSHIP OPPORTUNITIES...

Gold Level\$ 10,000
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Bronze Level\$ 3,000

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Upcoming SAE Events

Fundamentals of Modern Vehicle Transmissions Seminar

June 7-9, 2004 - Troy, Michigan
September 20-22, 2004 - Troy, Michigan
I.D.# 99018

A Familiarization of Drivetrain Components Seminar

June 24, 2004 - Troy, Michigan
September 15, 2004 - Troy, Michigan
I.D.# 98024

Diesel Engine Technology Academy

June 7-11, 2004 - Troy, Michigan
I.D.# ACAD03

Automotive Fuel Cell System Seminar

June 21-23, 2004 - Troy, Michigan
August 16-18, 2004 - Troy, Michigan
I.D.# C0112

Powertrain Selection for Fuel Economy and Acceleration Performance Seminar

July 21-22, 2004 - Troy, Michigan
I.D.# C0243

SAE Conferences

Powertrain & Fluid Systems Conference & Exhibition

October 25-28, 2004
Tampa Marriott Waterside
Tampa, Florida, USA

SAE Commercial Vehicle Engineering Congress and Exhibition

October 26-28, 2004
Donald E. Stephens Convention Center
Metro Chicago Area, Illinois, USA

Motorsports Engineering Conference & Exhibition

November 30-December 2, 2004
Hyatt Regency
Dearborn, MI, USA

2005 SAE World Congress

April 11-15, 2005
Cobo Center
Detroit, MI, USA

Other Resources from SAE

For details about these and other SAE products, visit us at store.sae.org

- Electronic Engine Control Technologies, 2nd Edition (PT-110)
- Advanced Hybrid Vehicle Powertrain Technology (SP-1697)
- Understanding Automotive Electronics (R224)
- Vehicle and Engine Technology (R-233)
- Fuel Cell Power for Transportation 2003 (SP-1741) Available on CD-ROM!

Sign up for Designing Electronic Powertrain Controls Symposium

Before April 23, 2004:

Members: \$695
Non-members: \$795

After April 23, 2004:

Members: \$795
Non-members: \$895

**Save \$100 by registering
before April 23, 2004!**

Registration and Fees (in U.S. Dollars)

Registration is limited. Those wishing to enroll after April 30, 2004 or planning to attend without registering in advance should verify that space is available by calling SAE Customer Service at 1-877-606-7323 (1-724-776-4970 outside the U.S. and Canada).

Due to the program format and the nature of the information presented, handout materials will only be available to registered attendees. This policy ensures that all information in the handouts will be taken in the context in which it is presented. Requests for handout materials by nonregistrants will not be considered.

SYMPOSIUM REGISTRATION FORM

040168

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Register me for:

- Designing Electronic Powertrain Controls Symposium (ID# 2004S07)
 Control Systems: Model Based and Control Systems Development Seminar (I.D.# C0251)

Preferred mailing address is:

- Business Home (Check one)

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 If you have a disability that may impact your participation in this seminar, please call 2 weeks prior to the start date so that we can address your needs.

Cancellations — If you cannot attend, you may send a substitute or transfer to a future offering. A full refund is issued if you notify SAE at least 14 days prior to seminar start date. If canceled less than 14 days prior, the full fee is charged. For \$50, you may process a one-time transfer to a future offering within one year of canceled seminar. Canceling may reduce group discounts. To cancel, transfer or send a substitute, call SAE Customer Service (numbers listed above).

Note: SAE reserves the right to change instructors or cancel seminars and cannot be held responsible for costs incurred other than the registration fee. Prices subject to change.

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Be sure to indicate on checks as well as purchase orders the names of participants, TOPTec name, and dates. Please print clearly.

Note: The SAE reserves the right to change speakers or cancel programs due to circumstances beyond its control and cannot be held responsible for costs incurred other than the registration fee.

Conditions of Sale: Payment must accompany registration. No refunds or cancellations after **April 22, 2004.**

To register and for additional details, contact SAE:

Online: www.sae.org/depc

E-mail: CustomerService@sae.org

Phone: Toll free 1-877-606-7323

Outside U.S./Canada 1-724-776-4970

Fax: 1-724-776-0790

Mail: Customer Service, SAE, International
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Register today!*

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*Look inside for agenda, speakers
and registration form.*

SAEInternational™

"The premier society dedicated to advancing mobility engineering worldwide"

***Are you involved in automotive powertrain design, development and production?
Then you can't afford to miss the***

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Through presentations and discussions, this symposium will cover:

- What goes into the systems today
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*Space is limited
Register today!*