DESIGN AND CONTROL OF HYBRID VEHICLES

PROMISING SOLUTIONS FOR FUEL EFFICIENT VEHICLES

Learn the working principles and dynamic models of hybrid vehicles and master the use of analytical tools to maximize their fuel economy potential

May 28–30, 2008
Ann Arbor, Michigan

PARTICIPANTS RECEIVE A MATLAB/SIMULINK HYBRID VEHICLE SIMULATION MODEL

KEY BENEFITS AND UNIQUE PROGRAM FEATURES

Participants will learn:

- Hybrid vehicle configuration basics–series, parallel and power-split
- Key hybrid sub-system modeling
- Hybrid vehicle power management strategies
- Concepts and modeling/control techniques successfully implemented in laboratories or on prototype vehicles

WHO SHOULD ATTEND

Professionals involved in the design, development or integration of hybrid vehicles:

- Engineers
- Technical Design
- Product Development
- Product Integration

LEARNING BY DOING THIS SHORT COURSE'S HANDS-ON APPROACH, CASE STUDY EXAMPLES AND SIMULATION EXERCISE HELP YOU GRASP AND APPLY CONCEPTS MORE QUICKLY AND EFFECTIVELY.

REGISTER TODAY, SPACE IS LIMITED

May 28–30, 2008, Ann Arbor, Michigan
Registration Fee: $1,895
This program begins at 8:00 a.m. on the first day and concludes at 4:00 p.m. on the final day.

Register Online Today: **InterPro.engin.umich.edu**

FOR MORE INFORMATION

Visit our website: **InterPro.engin.umich.edu**
Call: (734) 647-7200
Email: MEonline@umich.edu

presented by MichiganEngineering

PROGRAM INSTRUCTORS

Dr. Huei Peng is a full professor at the Mechanical Engineering Department and the Director, Interdisciplinary Professional Programs (InterPro) at the University of Michigan–Ann Arbor. His research interests include modeling and control of hybrid vehicles, fuel cell vehicles and advanced power-train techniques. He has published more than 130 technical papers in referred journals and conferences in related fields. He is the Secretary and Executive Committee member of the ASME Dynamic Systems and Control Division. Dr. Peng is a 15 year member of SAE.

Dr. Zoran Filipi is an Associate Research Professor at the U-M Mechanical Engineering Department and the Assistant Director of the Automotive Research Center, a multi-university consortium advancing state-of-the-art modeling, simulation and testing of ground vehicles led by the University of Michigan. His research interests include engine combustion, heat transfer and emissions, integration of advanced powertrain and vehicle systems and hybrid propulsion. He has published more than 80 technical papers in referred journals and conferences in related fields. He is a member of SAE, ASME, Combustion Institute and Michigan Renewable Fuels Commission.

AGENDA

PROGRAM AGENDA

- Energy and environment
- Vehicle fuel economy
- What is hybrid propulsion?
- Fuel converters, energy carriers and energy storage
- Configurations–parallel, series and power-split hybrids
- Current status–technology, market and environmental impact
- Hybrid vehicle fundamentals
  - Vehicle load
  - Vehicle performance: top speed, grade-ability and acceleration
  - Energy losses, energy consumption
  - Driving conditions, duty cycles
  - Fuel economy and emissions
- Modeling hybrid system components
  - Engine
  - Transmission: CVT, automatic transmission and EVT
  - Traction and braking model
  - Driver model
  - Battery and electric drive–working principles and simple models
  - Hydraulic drive and accumulator
- Integrated Vehicle model and hands on exercises
  - Component sizing
  - Vehicle performance and duty cycles
  - Vehicle control hierarchy; supervisory control power management
- Case study 1: Vehicle performance analysis
  - Drive cycles and drivability
  - Detailed energy analysis
- Case study 2: Control and design of a parallel HEV
  - Dynamic model
  - Power management control algorithm
  - Design and control examples
- Case study 3: Control and design of a split HEV (Toyota hybrid system)
  - Dynamic model
  - Power management control algorithm
  - Design and control examples
- Case study 4: Control and design of a series hybrid hydraulic vehicle
  - Dynamic model
  - Power management control algorithm
  - Design and control examples
- Hardware-in-the-loop technique for experimental evaluation of hybrid systems:
  - Methodology for coupling of real hardware to virtual components/systems
  - Demonstration of the engine-in-the-loop testing capability

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