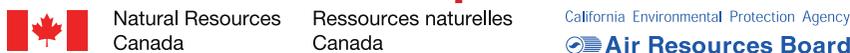


Headline Sponsors



Diamond Sponsors



Platinum Sponsors



Gold Sponsors



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Bronze Sponsors



Event Sponsors



Participating Schools

- Embry-Riddle Aeronautical University
- Georgia Tech
- Howard University
- Michigan Technological University
- Mississippi State University
- Missouri University of Science and Technology
- North Carolina State University
- The Ohio State University
- Pennsylvania State University
- Rose-Hulman Institute of Technology
- Texas Tech University
- University of Ontario Institute of Technology
- University of Victoria
- University of Waterloo
- University of Wisconsin
- Virginia Tech
- West Virginia University



Advanced Vehicle Technology Competitions

This competition year marks the 20 year anniversary the U.S. Department of Energy has sponsored Advanced Vehicle Technology Competitions (AVTC) through Argonne National Laboratory.

Over the past two decades, more than 45 competitions have been held with more than 85 participating universities for more than 15,000 students.

The AVTC program is seeding the automotive industry with thousands of engineering graduates with real-world experience, better preparing them for the transportation and energy-related challenges of the 21st century.

KRISTEN DE LA ROSA
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Managed by
Argonne
NATIONAL LABORATORY

www.ecocarchallenge.org

DESIGN **YEAR ONE** SIMULATION

EcoCAR The Ne**x**t Challenge

NORTH AMERICA'S PREMIER COLLEGIATE AUTOMOTIVE ENGINEERING COMPETITION

JUNE 7-12, 2009 • TORONTO, CANADA

WWW.ECOCARCHALLENGE.ORG



U.S. DEPARTMENT OF
ENERGY

GM

EcoCAR The NeXt Challenge

Dear Competitors and Friends of EcoCAR: The NeXt Challenge,

Welcome to the Year One Competition Finals for EcoCAR: The NeXt Challenge! We are excited about this week's activities and the opportunity to recognize competition students. We look forward to seeing how each team develops its advanced propulsion systems as the competition progresses. We applaud the teams' commitment and innovative spirit.

We would also like to recognize the competition sponsors for their commitment to the EcoCAR program. EcoCAR sponsors have shown that collaboration between government, industry, and academia can create successful partnerships to address critically important scientific issues. With the help of 28 EcoCAR sponsors, competition participants are gaining valuable experience with today's tools and technology that will prepare these future graduates to contribute to the automotive engineering community and beyond.

The EcoCAR competition has begun at a time when the need for creative automotive technology solutions to reduce petroleum dependence and vehicle emissions has never been more important. We're pleased that so many universities throughout North America are taking part in this program, and we look forward to what this week of competition will bring.

We wish good luck to each team. Let the competition begin!

Sincerely,



Steven G. Chalk
Deputy Assistant Secretary
Office of Energy Efficiency and
Renewable Energy
U.S. Department of Energy



Thomas G. Stephens
Vice Chairman, Global Product Development
General Motors Corporation



YEAR ONE

DESIGN & SIMULATION

On behalf of the Government of Canada, it's my pleasure to welcome the EcoCAR participants to Canada.

This competition is a true example of our strong partnership with the United States, and our Government is so grateful to our many sponsors from both sides of the border who have contributed to this project. I would like to extend special thanks to General Motors and the U.S. Department of Energy; their dedication to this competition is what makes it all possible.

EcoCAR is a prime example of what can happen when industry, academia and governments collaborate together. We should all be proud of the high level of skill and the tremendous leadership that the EcoCAR teams have demonstrated.

The Government of Canada has been supporting student vehicle competitions since their inception in 1989. EcoCAR underscores our Government's commitment to addressing alternative and advanced automotive technologies.

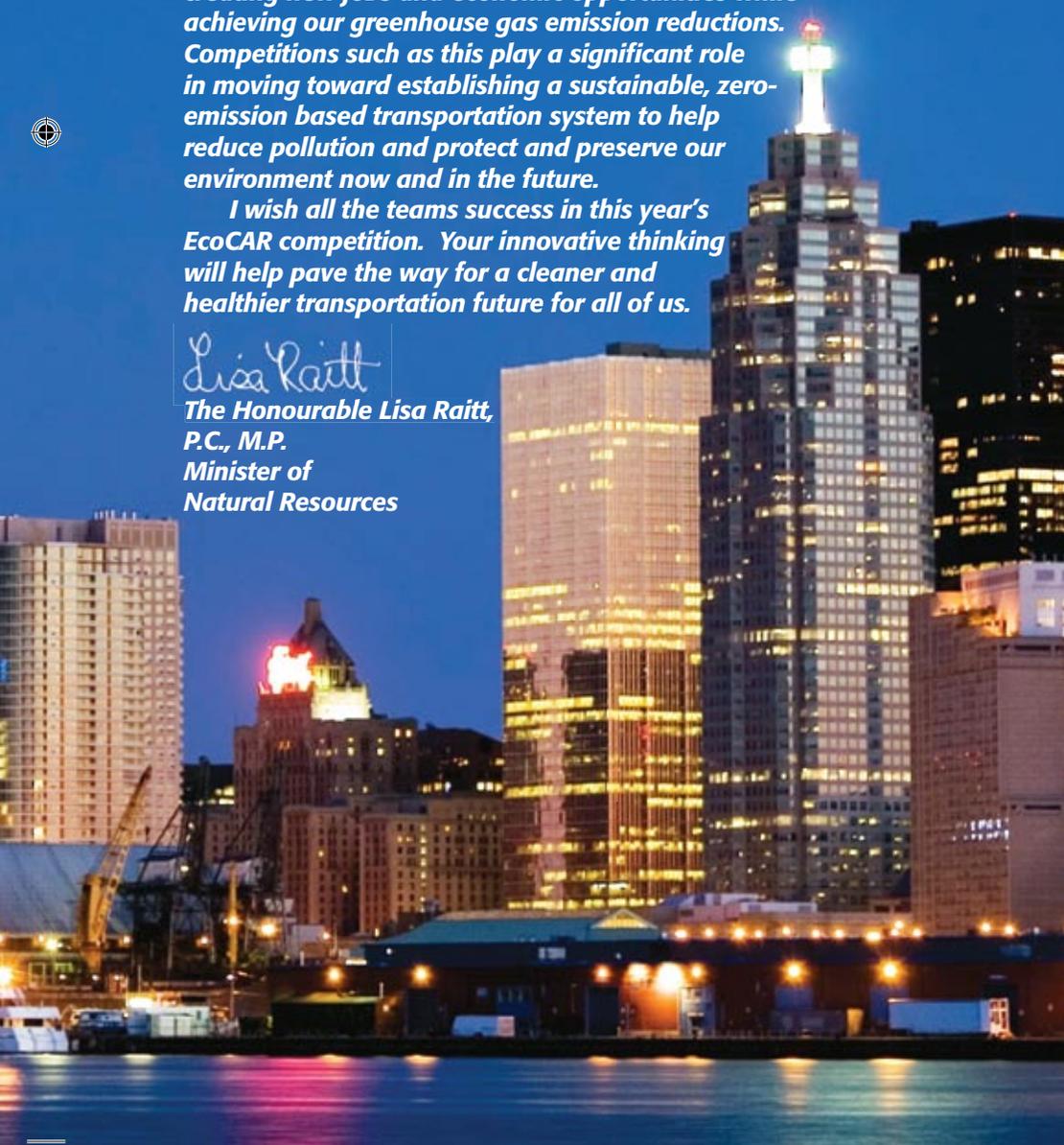
Developing alternative technologies is a key component to creating new jobs and economic opportunities while achieving our greenhouse gas emission reductions. Competitions such as this play a significant role in moving toward establishing a sustainable, zero-emission based transportation system to help reduce pollution and protect and preserve our environment now and in the future.

I wish all the teams success in this year's EcoCAR competition. Your innovative thinking will help pave the way for a cleaner and healthier transportation future for all of us.

**The Honourable Lisa Raitt,
P.C., M.P.
Minister of
Natural Resources**

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INTRODUCING

EcoCAR



The Next Challenge **YEAR ONE**

DESIGN &
SIMULATION

EcoCAR: The NeXt Challenge kicked off in May of 2008 when the 17 participating North American universities were announced in Washington, D.C. following the conclusion of Challenge X.

EcoCAR: Goals

The goal—reduce the environmental impact of SUVs by improving fuel efficiency and reducing emissions, while retaining vehicle performance and consumer appeal.

Students are designing and building advanced propulsion solutions that are based on categories from the California Air Resources Board (CARB) zero emissions vehicle (ZEV) regulations.

Technical Goals

- Incorporating technologies that reduce petroleum energy consumption on the basis of a total fuel cycle well-to-wheel (WTW) analysis
- Increasing vehicle energy efficiency
- Reducing WTW greenhouse gas (GHG) and criteria emissions
- Maintaining consumer acceptability in the areas of performance, utility and safety

Yearly Focus

- Year One** Teams use modeling and simulation to develop their vehicle architecture
- Year Two** Designs are turned into functioning prototype vehicles
- Year Three** Vehicles are refined to “Near Showroom Quality”

Year One Competition Finals

Now at the conclusion of Year One, EcoCAR teams have been learning real-world automotive engineering practices through the use of Model-Based Design and graphical system design technologies that include hardware-in-the-loop (HIL) and software in-the-loop (SIL), which help to bring the students’ vehicle designs from concept to the road.

The Competition Finals, held in Toronto, June 7-12, 2009, will bring together more than 350 students, faculty, team mentors, competition organizers and sponsors for a dozen technical and PR events.

The competition is sure to result in some fresh, new ideas, but it will also serve as a launching pad for bright, young minds to contribute future innovations in green vehicle technologies. Perhaps, the most significant benefit of EcoCAR is the invaluable real-world experience and training that it provides to a new generation of engineers. These students will leave the program well-equipped to make an impact after they graduate.

We encourage you to follow the teams on this three-year journey to see what innovative and unique technologies emerge at www.ecocarchallenge.org and www.green-garage.org.

ECO CAR 2009 ARCHITECTURES

Team	Architecture, Top Level	Fuel Converter	Electric Motor 1	Electric Motor 2	Electric Motor 3	Energy Storage (kWh)
Embry-Riddle Aeronautical University	Biodiesel EREV	GM 1.3 L CI	GM 2Mode		Magna 55 kW E-RDM	12.8
Georgia Tech	Ethanol HEV	GM 1.6 L SI	GM 2Mode			9.6
Howard University	Biodiesel PHEV	GM 1.3 L CI	GM 2Mode			12.8
Michigan Technological University	Ethanol PHEV	GM 2.4 L SI	UQM 100 kW			21.1
Mississippi State University	Biodiesel EREV	GM 1.3 L CI	125 kW UQM	UQM 75 kW	Magna 55 kW E-RDM	21.1
Missouri University of Science and Technology	Hydrogen FC-PHEV	GM Fuel Cell	Fuel Cell ETS			21.1
North Carolina State University	Biodiesel EREV	GM 1.3 L CI	Fuel Cell ETS	PERM 150 W		21.1
Pennsylvania State University	Biodiesel EREV	GM 1.3 L CI	Fuel Cell ETS	UQM 75 kW Generator		12.8
Rose-Hulman Institute of Technology	Biodiesel HEV	GM 1.3 L CI	TM4 53 kW	TM4 53 kW		12.8
Texas Tech University	Ethanol PHEV	GM 1.6 L SI	GM 2Mode			12.8
The Ohio State University	Ethanol EREV	1.8L SI	Ballard 67 kW	EV1 Drive		21.1
University of Ontario Institute of Technology	Full Function Electric		Delphi S-10 EV Drive			80
University of Victoria	Ethanol EREV	GM 2.4 L SI	GM 2Mode	UQM 75 kW		21.1
University of Waterloo	Hydrogen FC-PHEV	GM Fuel Cell	Fuel Cell ETS			12.8
University of Wisconsin	Ethanol EREV	750 MPE Turbo	DU 174 105 kW	Sapphire 150 kW		13.6
Virginia Tech	Ethanol EREV	GM 2.4 L SI	Danaher 16 kW	Danaher 90 kW		21.1
West Virginia University	Biodiesel PHEV	GM 1.3 L CI	GM 2Mode			12.8



EcoCAR teams unveiled their vehicle architecture designs at the Washington Auto Show in February 2009. The diverse range of propulsion technologies being pursued include Fuel Cell Plug-in Hybrid Electric Vehicles (FC-PHEV), Full Function Electric Vehicles (FFEV), Plug-In Hybrid Electric Vehicles (PHEV), Hybrid Electric Vehicles (HEV), and Extended Range Electric Vehicles (EREV).

ECO CAR 2009 EVENTS AND AWARDS

TOP PLACE AWARDS

Top competition finishers are determined by the best combined scores from all the scored events.

1st Place Overall	\$7,000
2nd Place Overall	\$6,000
3rd Place Overall	\$5,000
4th Place Overall	\$4,000
5th Place Overall	\$3,000
6th Place Overall	\$2,000

SCORED EVENTS

Controls Event Presentation

80 Points

Event Captain: Jim Kolhoff – Director, Powertrain Transmission Controls – General Motors

The Controls Event Presentation is focused on evaluating the selection and design of each team's controls system architecture, their control and diagnostic strategy, and their simulation results for meeting the team and competition goals. This presentation is designed to evaluate the effectiveness with which the team has executed the Year One controls deliverables and provide a summary of the team's control system design progress for the first year. Teams will give their controls presentations to a team of government and industry judges, articulating how they achieved the Year One controls deliverables and will demonstrate the analysis and simulation methods they used to select of the elements of their control system.

Best Controls Event Presentation – \$1,000

Electrical Systems Presentation

80 Points

Event Captain: Ron Weiss – Engineering Manager, Hybrid Powertrain Electronics – General Motors

The Electrical Systems Presentation is a technical presentation to a team of government and industry judges detailing the electric drive system. The electric drive system is the heart of electric vehicles (both hybrid electric vehicles and fuel cell vehicles), which consists of electric motors, power electronics, and electronic controls. This event evaluates how well a team's electrical system satisfies their performance requirements, what trade-offs were made, and if their integration plans are production-ready.

Best Electrical Systems Presentation – \$1,000

Hardware-in-The-Loop Evaluation

150 Points

Event Captain: Michael Wahlstrom – Controls and Simulation Engineer, Advanced Vehicle Technology Competitions – Argonne National Laboratory

The Hardware-in-the-Loop (HIL) Evaluation challenges teams to demonstrate the viability of the team's HIL test bench for future control system development. This event takes place in the team's exhibit booth where a team of judges evaluate the team's HIL system, model development, safety and fault mitigation test plans, and vehicle communication and control setup.

First Place – \$2,000

Second Place – \$1,500

Third Place – \$1,000

Mechanical Systems Presentation

80 Points

Event Captain: Ed Argalas – Engineering Specialist – General Motors

The Mechanical Systems Presentation for Year One of EcoCAR is focused on CAD design, structural integration, and performance modeling and analysis to create a vehicle subsystem that will meet the team and competition goals. The presentation is given to a team of government and industry judges who evaluate the effectiveness with which the team has executed the Year One mechanical deliverables of EcoCAR. Particular emphasis will be placed on evaluating the completeness of the proposed mechanical architecture and expected conformance to program requirements through simulation and analysis.

Best Mechanical Systems Presentation – \$1,000



Outreach Presentation

40 Points (Pre-competition and competition points)

Event Captain: Lynda Palombo – Senior Manager, Business Strategy – Hydrogen, Fuel Cells and Transportation Energy – Natural Resources Canada

The purpose of the EcoCAR Outreach Program is to use various outreach strategies to educate and raise awareness about the benefits of advanced vehicle technology and how it reduces the overall impact of transportation on the environment and our economy. Teams will give their Outreach Presentation to a team of government and industry judges outlining the details of their Year One Outreach activities, which focuses on youth outreach, media relations, and website development. Teams were also challenged to develop a comprehensive communications plan for their three-year program and develop a technical success story featuring the team's use of EcoCAR sponsor tools.

First Place – \$1,250

Second Place – \$1,000

Third Place – \$750

Best Communications Plan – \$1,000

Best Media Relations Program – \$750

Best Education Program – \$750

Best Team Website – \$750

Best Social Networking – \$250

Spirit of Outreach Award – \$250

Best Technical Success Story – \$250

Pre-Competition Safety Inspections

60 Points

Co-Captains: Michael Wahlstrom – Controls and Simulation Engineer and Frank Falcone – Vehicle Systems Engineer, Advanced Vehicle Technology Competitions – Argonne National Laboratory

Technical Inspectors from Argonne National Laboratory and the U.S. Department of Energy visited each of the 17 universities and inspected their laboratory facilities, safety equipment and procedures, and their HIL setup. Teams had to prepare comprehensive safety documentation and procedures for their laboratory in preparation for their vehicle development work in the second year of the competition.

Best Overall Safety Award – \$500

Project Initiation Approval Presentation

80 Points

Event Captain: Steve Ballentine – Global Cost Reduction Manager – Body, Exterior, Interior Engineering

The Project Initiation Approval Presentation is focused on vehicle architecture selection and the associated selection of the major vehicle subsystems. The intent of this event is to allow each team the opportunity to demonstrate an understanding of vehicle architecture, the advantages and limitations of the selected architecture, and how the particular architecture affects the overall vehicle balance to requirements. Teams will give the presentation to a group of government and industry judges and are expected to demonstrate a high level understanding of the vehicle integration areas (occupant packaging, subsystem packaging, mass, thermal performance, dynamic performance, noise & vibration performance, safety performance, and fuel economy). Particular emphasis will be placed on evaluating the relationship between the vehicle architecture chosen and the vehicle technical specifications.

Best Project Initiation Approval Presentation – \$1,000

Technical Reports

370 Points

Event Captain: Frank Falcone – Vehicle Systems Engineer, Advanced Vehicle Technology Competitions – Argonne National Laboratory

Teams were tasked to prepare five written technical reports throughout the year, including reports on Production Vehicle Modeling, Vehicle Architecture Selection, Subsystem Design, HIL System Development, ESS design, Vehicle Integration Refinement, and finally, an SAE-formatted technical paper summarizing their overall Year One concept, design elements, engineering analysis, and development of the vehicle.

Best Written Design Report – \$2,000 (final report only)

First Place, Best Cumulative Technical Reports – \$1,000

Second Place, Best Cumulative Technical Reports – \$750

Third Place, Best Cumulative Technical Reports – \$500



ECOCAR 2009 EVENTS AND AWARDS

Trade Show Display and Presentation

60 Points (Pre-competition and competition points)

Event Captain: Toby Dunmore – Hybrid Development, General Motors

Recognizing the critical need for up-front organization and local support of each team, the EcoCAR organizers introduced the new Business program for Year One of the competition. The teams were challenged to develop a Business Plan that included focus on Business Program deliverables, including developing a Business Strategy report and presentation and follow-up progress reports. At the competition, teams were challenged to put their business skills to work, setting up a trade show display highlighting their vehicle design and giving a technical presentation to a group of government and industry judges similar to what you would see on the exhibit floor of a technical conference such as SAE World Congress. Using any visual aids they prefer – video, trade show displays, hardware demonstrations, etc. – teams will set up a multimedia display in their assigned exhibit booth space and give judges a technical review of their overall vehicle design strategy and selected architecture.

Best Trade Show Presentation – \$500

SPECIAL AWARDS

Dr. Don Streit Sportsmanship Award – \$500

This award is presented to the team that offers the highest level of assistance and support to other teams and organizers despite their own circumstances. This award is presented in honor of Dr. Donald Streit, who served as a dedicated faculty advisor to the Penn State University FutureTruck team and embodied the true meaning of sportsmanship. Although Dr. Streit's life ended prematurely, his memory and his example are carried on by the students who have and will continue to participate in advanced vehicle technology competitions for decades to come.

Ron Stence Spirit of the Challenge Award – \$500

This award, presented by the competition organizers, is presented in memory of Ron Stence, a former sponsor and competition organizer from Freescale Semiconductor, whose dedication and passion for the advanced vehicle technology competition and his pursuit of high technical standards was inspiring. This award is presented to the team that embodies that same spirit, by demonstrating exceptional perseverance in the face of adversity, maintaining a positive attitude throughout the competition despite significant challenges and obstacles, and pursuing exceptionally high technical standards.

Team to Watch Award – \$500

This award, presented to a team that caught the attention of the competition organizers, demonstrating impressive performance in the competition although not necessarily scoring in the top six places.

SPONSORED AWARDS

BOSCH Diversity in Engineering Award

Event Captain: Erica Krolik – Human Resources, BOSCH

This award recognizes the team that best develops and implements a successful diversity recruitment strategy for their EcoCAR team.

First Place – \$750

Second Place – \$500

Third Place – \$250

dSPACE Embedded Success Award

Event Captain: Vivek Moudgal, Sales Director, dSPACE

The dSPACE Embedded Success Award is granted to the teams that demonstrate the most effective use of dSPACE HIL equipment to simulate vehicle architectures and develop their control strategies. The EcoCAR competition tasks students with creating new and complex vehicle configurations, with controls being one of the most challenging areas of development. dSPACE HIL simulators play a vital role by providing a real-time virtual test environment to simulate vehicle models and use this as a test platform for developing control algorithms. The intent of this award is to promote best practices in the application of HIL technology for vehicle development, and teams will be evaluated based on their overall first-year competition presentations and



demonstrations. Areas of focus for the award will be vehicle modeling, control strategy development, test plan development, testing results, and overall HIL simulation methodology followed.

First Place – \$750 and dSPACE Automotive Simulation Model software package

Second Place – \$500 and dSPACE Automotive Simulation Model software package

Third Place – \$250 and dSPACE Automotive Simulation Model software package

Freescale Silicon on the Move Award

Event Captain: John Cotner – Senior Applications Engineer, Freescale Semiconductor

This award recognizes the team that demonstrates the most innovative and comprehensive use of Freescale Semiconductor products.

First Place – \$750

Second Place – \$500

Third Place – \$250

National Instruments Most Innovative Use of Graphical Design Award

Event Captain: Paul Mandeltort – Applications Engineer, National Instruments

This award is presented to the team that demonstrates the most innovative use of Graphical System Design and National Instruments tools for any phase of the vehicle development cycle.

First Place – \$750

Second Place – \$500

Third Place – \$250

National Science Foundation Outstanding Faculty Advisor Awards

Event Captain: Don Senich, Section Head, Academic Programs, Directorate for Engineering – National Science Foundation

Presented to one incoming and one long term faculty advisor who best incorporates the EcoCAR goals, objectives, and activities into the undergraduate engineering curriculum and who has had the most significant impact on the engineering education of their students.

Outstanding Incoming Faculty Advisor – \$10,000

Outstanding Long Term Faculty Advisor – \$10,000

The MathWorks Modeling Awards

Event Captain: Tom Egel, Principle Consulting Engineer, The MathWorks

These awards are given to the team that best employs The MathWorks tools in support of their Year One deliverables.

First Place – \$750

Second Place – \$500

Third Place – \$250

Women in the Winner's Circle Foundation Women in Engineering Awards

Event Captain: Lyn St. James, Women in the Winner's Circle Foundation

Sponsored by the Women in the Winner's Circle Foundation, these awards honor women engineering students who are demonstrating outstanding technical excellence and accomplishments through EcoCAR.

Outstanding Women in Engineering Award – \$1,000

Rookie of the Year Award – \$500



ECOCAR 2009 JUDGES

CONTROLS EVENT PRESENTATION

John Cotner is a senior applications engineer for the Field Automotive Systems Team of Freescale Semiconductor. John has held a variety of positions within the automotive electronics industry for the past 20 years, including five years of work on hybrid vehicle control and powertrain electronics at Freescale. John received both bachelor's and master's degrees in electrical engineering from the University of Michigan. He is also a member of SAE and IEEE.

Eric Dillaber is a senior technical consultant for The MathWorks. He specializes in helping development organizations adopt Model-Based Design tools for production code generation, and verification and validation in the automotive and aerospace industries. Prior to joining The MathWorks, Eric was a lead developer for yaw stability control algorithms for TRW. His experience includes extensive work in control system design, embedded systems and code generation tools.

Bruce Emaus is president of Vector CANtech, Inc., a Michigan-based company specializing in tools and embedded software components for automotive distributed applications. With more than 30 years of experience in the field, he is a leading expert in the area of distributed embedded systems and small area network protocols. Bruce is also the chairman of the SAE Embedded Software Standards Committee and the Institute of Electrical and Electronics Engineers (IEEE) Southeastern Michigan Section Chair of the Vehicular Technology Chapter. His other accomplishments include the development of Ford Motor Company's first trip computer, Ford's first internally created integrated circuit, the creation of Ford's first peer-to-peer UART-based protocol and the development of a distributed electronic music system architecture before the advent of MIDI.

Tom Ender is the engineering group manager for General Motors of Canada's Chassis Control Team. His responsibilities have included electronic fuel pressure regulation and diagnostics, HVAC climate control, hybrid vehicle system diagnostics, pressurized fuel system control, electric vehicle drive control, diagnostics for stability control and electric trailer brake systems. Tom joined GM of Canada in 1997 as part of the Alternative Fuels Team. From 2003 to 2007, Tom served as the Challenge X team mentor for his alma mater, the University of Waterloo.

Tim Grewe is the chief engineer for General Motors' Rear Wheel Drive 2-Mode hybrid system. He is responsible for the design and release of all rear wheel drive hybrids ranging from a 60-foot articulated bus to the Chevrolet Tahoe. Tim is also a director of the global hybrid power electronics and controls. He started his career with General Electric developing distributed power systems for aircraft and locomotive transportation products. Tim is the holder of numerous patents and is active in the hybrid development industry.



Santhosh Jogi is the engineering director for dSPACE, and is presently in charge of engineering operations in the company's North American market. Over the past 11 years, Santhosh has worked in the area of product support and applications engineering, from both a technical and management perspective.

Jim Kolhoff is the global director of Transmission Controls for General Motors. His organization is responsible for electro-mechanical controls, control and diagnostic algorithm design and core transmission calibration. Jim was previously director of software engineering for GM Powertrain, and has 25 years of experience in automotive powertrain controls engineering.

Vivek Moudgal has managed the sales department for dSPACE since 2003. Prior to that, he managed dSPACE's engineering department. Throughout his tenure with the company, Vivek has had experience with hardware-in-the-loop (HIL) tools, dealing with issues such as control verification and validation.

Shannon Reeves joined General Motors in 2006 as a calibration engineer for Hybrid Powertrain. She calibrates the hybrid operating strategy and high voltage battery control for the RWD 2-Mode hybrid in the Tahoe, Silverado, and Escalade for performance and drivability. In 2008, she launched the 2-Mode Hybrid Tahoe and Yukon into production, and the 2-mode Hybrid Silverado, Sierra, and Escalade in 2009. She was on the Hybrid Electric Vehicle Team at Virginia Tech in 2005-2006, as well as a student participant in Year Two of Challenge X.

Phil Sharer is a systems Engineer at Argonne National Laboratory's Center for Transportation Research where he has worked for ten years on PSAT – Powertrain Systems Analysis Toolkit. He is now working on Autonomie.

Phil Shaw has been a project engineer for AVL since January 2008. He also currently serves as skill team leader in tools and methodologies development. Phil is responsible for developing and delivering advanced tool chain solutions to support calibration development. Previously, Phil worked for Ford Motor Company in a number of roles over 14 years, most recently as brand development and drivability supervisor.

David E. Smith is the manager for the Advanced Vehicle Systems Program in the Power Electronics and Electric Machinery Research Center at Oak Ridge National Laboratory. David is a vehicle systems engineer with industry experience in hybrid electric vehicle powertrain modeling, simulation, and supervisory control system design and development. He is familiar with embedded control system software and hardware, as well as associated hardware-in-the-loop (HIL) test methods. David also has a background in product design verification and production validation testing, Design Verification Planning and Report (DVP&R) development, and data acquisition and instrumentation techniques.

Kennebec Walp, a member of Woodward's MotoHawk embedded code generation group, holds degrees in Computer Science and Computer Engineering from Mississippi State University. Prior to joining Woodward, Kennebec was Control System leader of the MSU Challenge X team.

Andrew Watchorn is the senior academic product marketing engineer, Northeastern U.S., for National Instruments. During college, he worked for seven summers at General Motors in a variety of roles, including manufacturing engineer on assembly lines and project engineer related to the Cadillac Night Vision Head-Up-Display System.

ELECTRICAL SYSTEMS PRESENTATION

Ted Bohn is a principle investigator on plug-in hybrid electric vehicle (PHEV) prototype development in the Vehicle Systems Group at Argonne National Laboratory. His focus in this area includes in-vehicle traction battery subsystem benchmarking and validation, and power electronics and embedded systems control optimization of the electric powertrain in PHEVs. Over the past two decades, Ted has participated in advanced technology vehicle student competitions as both an entrant and a competition official. In that period, he has taken part in constructing more than 20 electric, solar, hybrid, and race car based vehicles.

Bob Davis is a general manager working in the Lincolnshire, Illinois office of Snap-on Diagnostics. He is responsible for platform development of hand-held products which are used by automotive technicians to diagnose and repair problems on today's increasingly complex vehicles. Bob has more than 30 years experience in the automotive service industry working for Snap-on, Motorola's Automotive Electronics Group and Sun Electric Corporation.

Mark Duvall is the director of electric transportation and energy storage at the Electric Power Research Institute (EPRI), an independent, non-profit center for public interest energy and environmental collaborative research. He is responsible for EPRI's research and development program for electric transportation, including electric, plug-in hybrid, and fuel cell vehicle programs and related advanced infrastructure, and non-road transportation electrification. Mark oversees a number of partnerships and collaborations between EPRI and electric utilities, automotive companies, local, state, and federal agencies, national laboratories, and academic research institutions.

Michael Hoff is the director of product safety and compliance at A123 Systems. In his three years with company, Michael has focused on designing and managing lithium-ion based energy systems. Prior to joining A123, he spent 18 years working with power, batteries and IC designs at American Power Conversion. He received a bachelor's degree in power engineering from Drexel University and a master's degree from Northeastern University.

Shaun Kalinowski is an application engineer for The MathWorks. Prior to joining the company, he spent more than two years working for Motorola developing prototype RF transmitters for Wideband Code Division Multiple Access (WCDMA) cell phones. He also spent seven years at Visteon developing RF embedded DSP systems for automotive radio receivers.

Peter Karlson is an electrical engineer at General Motors of Canada. His current focus is on advanced technology projects, working on waste energy harvesting and advanced HVAC system development for extended range electric vehicles. Peter joined GM in 1999 as part of the product engineering department. His work includes designing wiring and electrical systems for alternative fuel (compressed natural gas) pickup truck applications, wiring and electrical centre development on the Chevrolet Equinox and Pontiac Torrent programs, and electrical architecture on three Saturn VUE Hybrid programs.

Michael Melaragni is the senior manager of electronics engineering for the Powertrain Division at General Motors. He joined GM in 1992 as an associate engineer working at the Cadillac/Luxury Car Division. Prior to his current role, Michael served in various electrical engineering positions and was appointed as engineering group manager for Powertrain Vehicle/Infrastructure Software.

Alan Rooke is the North American automotive field applications engineering director with Freescale Semiconductor. Alan's responsibilities include supporting automotive Tier-1s and OEMs in their designs with microcontrollers, sensors and analog ASICs. He manages a team that provides pre- and post-sales support across the U.S., and also identifies and develops new automotive-targeted intellectual property.

Kris Sevel is a power electronics engineer in the Hybrid Power Inverter Group at General Motors. He joined GM in 2007 as an engineer in the Hybrid Power Electronics Group. Kris has primarily focused on the power electronics development for the Volt and next generation BAS hybrid powertrains. Kris earned a bachelor's degree in mechanical engineering from Ohio University and a master's degree from The Ohio State University, where he participated in the Challenge X vehicle competition as team leader.

Ross Bradsen is the director of business development for the OCE Centre for Materials and Manufacturing and has been working with the auto sector in Ontario for many years. Ross has extensive experience in the sector and has many connections to all of the OEMs as well as to the parts manufacturers.

Ron Weiss is the engineering group manager for Hybrid Power Electronics Validation at General Motors. He is a leading expert on generating world class technical requirements for hybrid power electronics validation and test procedures. Ron joined GM in 1994, and has a long history with electrified vehicles and component level validation.

HARDWARE IN THE LOOP EVALUATION

Santhosh Jogi—See Controls Event Presentation

Byungho Lee is a project engineer in General Motors' Advanced Controls and Emissions Group. He is currently working on a number of projects, centered on plug-and-play powertrain model architecture and hierarchy development, math-based control system design, and advanced diesel engine control development. Byungho has more than eight years of experience in advanced powertrain modeling and simulation for control system designs.

Vivek Moudgal—See Controls Event Presentation

Padma Sundaram is a senior system safety engineer for General Motors. She has 15 years of systems engineering experience, with a focus on safety system engineering. Prior to joining GM in 2006, she worked for Sage Software Company, Raytheon and Delphi Automotive. Padma's additional research interests include advanced safety analysis using modeling and simulation techniques, integrated safety functions for electric vehicles and vehicle dynamics.

Mike Wahlstrom is a controls and simulation engineer for the Advanced Vehicle Technology Competitions program at Argonne National Laboratory. In this role, he helps manage the technical scope of the EcoCAR Challenge. Mike is a former Challenge X team leader from the University of Waterloo.

John Wilson is the director of automotive sales for the Great Lakes region at National Instruments. With more than 11 years at NI, John has consulted with OEMs, suppliers, and teams from EcoCAR, Challenge X, and FutureTruck to integrate NI products in automotive applications.

Andrew Watchorn—See Controls Event Presentation



ECO-CAR 2009 JUDGES

MECHANICAL SYSTEMS PRESENTATION

Ed Argalas is an engineering specialist in vehicle dynamics for the Advanced Development Group at the General Motors North America Vehicle Dynamics Center, Milford Proving Ground in Michigan. Since joining the vehicle development staff in 2000, Ed has developed production ABS, TCS and ESC technologies for GM truck products. He also led the development of advanced active damping systems across architectures, and was responsible for the tuning of the chassis control system on the Chevrolet Equinox Fuel Cell EV. Currently, he is leading a project in advanced vehicle steering technologies.

Chris Fillyaw manages a team of applications engineers at The MathWorks. His team focuses on supporting automotive customers that are adopting model-based design. Chris has been involved in developing automotive systems for more than 10 years, and has been leveraging the capabilities of The MathWorks tools throughout his career.

Jon Heidorn is a vice president of marketing for Siemens PLM Software. He is responsible for marketing all products within the Americas business zone. Jon has held numerous positions with Siemens PLM Software (formerly UGS) including marketing business development director and business development consulting manager. He brings more than 20 years of enterprise product design, manufacturing, and data management experience with the Product Lifecycle Management (PLM) industry. Prior to joining UGS in 1995, Jon held positions with Schlumberger Technologies Applicon, Halliburton and P.C. Dynamics.

Don Hillebrand has over 20 years of experience in automotive engineering, research management, and government affairs and was a senior policy advisor to the Executive Office of the President, White House Office of Science and Technology. He is currently the deputy director of the Energy Systems Division at Argonne National Laboratory.

Gary Horvat is the global chief engineer and global program manager for Transmission and Hybrid Controls for GM's Powertrain Division. He joined GM in 1985 after previously working for Eaton Corporation. His previous roles at GM include design release engineer, engineering group manager for the Small Block Product Team, engineering group manager for the Exhaust Aftertreatment Group, and assistant chief engineer for V6 Engines.

Dick Kauling is an engineering group manager for General Motors' Global Powertrain Engineering Organization. His work currently focuses on global compressed natural gas and liquid petroleum gas applications. Prior to this role, Dick managed all the vehicle electrical and controls activity as part of GM's Canadian Regional Engineering Centre (CREC). He was also responsible for overseeing CREC's pre-production, computer aided engineering, tests and validation, laboratory and Kapuskasing Cold Weather Development Centre activities. Dick started his 27-year career at GM as a calibration engineer working on various powertrains.

Justin Kern is a senior calibration engineer at Bosch. He has worked at Bosch for five years, gaining expertise in Motronic engine control software for gasoline direct injection engines. Prior to joining Bosch, Justin worked for Argonne National Laboratory where he worked with hybrid electric vehicles, and served as a technical coordinator of the Advanced Vehicle Technology Competition programs.

Ian MacIntyre is a research officer with the Hydrogen, Fuel Cells and Transportation Energy Group at Natural Resources Canada. He has been working in alternative transportation fuels for 17 years. Ian previously acted as secretary of the Canadian Transportation Fuel Cell Alliance Codes and Standards working group. He is currently working with industry to develop an electric vehicle technology roadmap for Canada.

Gerry Pietschmann is the director of the City of Toronto's Fleet Services division. In this role, he steers the course of action for Toronto's second Green Fleet Plan to reduce CO2 emissions by 15,000 tons (from 2008 to 2011). Gerry's current projects include working with the Toronto Atmospheric Fund to develop software to test and find the best technology for a greener fleet. With 35 years experience in fleet management, Gerry has maintained a pulse on new, innovative and eco-friendly vehicle technologies.

Muneeb Shaik is a CAE engineer at General Motors' Canadian Regional Engineering Centre. In this role, he supports CAE, validation and alternative fuel efforts. Muneeb has more than 16 years experience in modeling and simulation for durability, crashworthiness, and vehicle dynamics. He has also worked on materials procurement, vehicle builds, setup and conducting full vehicle barrier testing to meet Federal Motor Vehicle Safety Standards.

Bob Storc is an assistant chief engineer for Magna International Inc. His professional experience includes more than 36 years with General Motors and seven years with automotive suppliers (more than two years with Magna). Bob's expertise covers a wide range of areas including Wankel engines, all-wheel drive, vehicle development, interior trim, body, fasteners, chassis and vehicle packaging and vehicle integration, especially new product creation and strategy.

Tabitha Takeda is a research coordination officer with the Transportation Development Centre at Transport Canada. Tabitha is responsible for electric mobility and urban transit research. She has worked in the transportation field for a decade in the area of alternative transportation and fuels.

OUTREACH PRESENTATION

Alicia Alvin is the marketing manager for dSPACE. She has more than 20 years of experience in marketing, public relations, business communications and journalism. Alicia has worked extensively in the automotive, quality and environmental management industry sectors.

Andrea Arnold is public relations manager for AVL Americas, Inc., which offers combined solutions of powertrain engineering, simulation software and testing, and instrumentation systems. Andrea was previously a senior account executive at Eisbrenner Public Relations. She has a bachelor's degree in communication from Michigan State University.

Connie Bezanson manages the Advanced Vehicle Technology Competition activities within the U.S. Department of Energy's Vehicle Technologies Program Office. She received a B.S. in mechanical engineering from The Catholic University of America.



Liz Callanan manages corporate relations at The MathWorks with responsibility for investments in education, staff-driven initiatives, community support, green initiatives and related communications. She has introduced product partnerships in engineering education and business development, including the student version of MATLAB & Simulink software and the third-party partner program. Prior to joining The MathWorks in 1991, Liz led marketing at ADDAX, an M.I.T. lab-based software provider to the airline industry, and worked at Saga Ltd. in the U.S. and U.K.

Betsy Reid Creedon is director of business operations for General Motors Global Public Policy and Government Relations. She joined GM in 1997 as manager of process integration and reporting in the newly formed Public Policy Center, which combined four staff areas: Government Relations, Environment and Energy, Trade and Economics, and Corporate Relations and Diversity. Prior to joining GM, she was a consultant in total quality management with the UAW-GM Quality Network for 12 years.

Andy Mastronardi is global director of the Freescale University Program. Prior to joining Freescale, Andy spent 26 years in the education industry, both as a teacher and in educational publishing.

Lynda Palombo is the senior manager of business strategy for the Hydrogen, Fuel Cells and Transportation Energy Group at Natural Resources Canada. Lynda is responsible for strategic planning, reporting and business development for alternative transportation energy technologies. She has worked on the U.S. Department of Energy's Advanced Vehicle Competitions for more than 10 years, and is a member of the EcoCAR Steering Committee.

Dan Ramirez is the corporate innovation manager for Snap-on, Inc. He is responsible for several original innovation projects as well as the day-to-day operations of Snap-on's new 15,000-square-foot Innovation Center. Dan has served in a variety of marketing and product development roles throughout his 20-year career in the automotive and other industries.

Sarah Walby is a human resources representative at Bosch. She is responsible for the recruitment and coordination of Bosch's Professional Development Programs for bachelor's and master's level students as well as campus relations activities.

PROJECT INITIATION APPROVAL PRESENTATION

Steven J. Ballentine is General Motors' Global Cost Reduction Manager – Body, Exterior, Interior Engineering. He has more than 35 years experience with GM, including roles in vehicle development, powertrain engineering, engineering program management, Buick product planning, door systems engineering, vehicle portfolio planning and vehicle architecture design. For the past five years, Steven served as the chief engineer for the Saturn VUE, developing the all new 2008 model, including BAS and 2-Mode hybrid vehicles.

Alexandra Cattelan is an assistant chief engineer for General Motors' Chevy Volt. She has experience in automotive applications, primarily focused on hybrid and alternative fuel systems, powertrain systems and electronic controls. Alex has a bachelor's degree in industrial engineering and a master's degree in mechanical engineering from the University of Toronto.

Patrick Davis is the program manager of Energy Efficiency and Renewable Energy's Vehicle Technologies Program Office at the U. S. Department of Energy. He is responsible for two major government industry partnerships, the FreedomCAR and Fuel Partnership and the 21st Century Truck Partnership. He also serves on the Board of Directors of the American National Standards Institute. Patrick's previous roles include senior advisor for transportation technologies in the office of Energy Efficiency and Renewable Energy, DOE coordinator of the President's 20-in-10 Initiative, and acting program manager of the Office of Hydrogen, Fuel Cells and Infrastructure Technologies.

Richard Fry is senior manager for the Hydrogen, Fuel Cells and Electric Vehicle Program with CanmetENERGY, Natural Resources Canada. Richard has extensive experience in the areas of environmental protection, industrial energy efficiency, alternative transportation, and energy research and development. He has a bachelor's degree in chemical engineering and a master's degree in business administration from the University of Toronto.

Brad Hieb is a principal applications engineer for The MathWorks. Prior to joining The MathWorks, Brad worked for Ford Motor Company for 14 years. His experience at Ford included powertrain controls design, Formula 1 vehicle controls, and vehicle dynamics simulation.

Larry Johnson has more than 30 years of transportation research experience and is the author or co-author of more than 70 publications and conference presentations on transportation topics. He serves as the director of the Transportation Technology R&D Center at Argonne National Laboratory.

Dave Kalen joined Sensors four years ago, and has been instrumental in introducing the SEMTECH PEMS systems into academia, research and development facilities as well as OEMs. Dave's work includes projects that involve developing real world testing for Special Equipment Market Association (SEMA) members, EcoCAR, SAE Clean Snowmobile Challenge, and green racing.

Noel Mack is the director of hybrid development for Magna Powertrain. He has been with Magna International Inc. for more than 10 years. Before joining the automotive industry, he spent a decade working in aerospace engineering. Noel is also an adjunct professor at the University of Detroit Mercy, where he teaches a post-graduate course in hybrid electric vehicle performance and design.

Ray Corbin is president of AVL Powertrain Engineering, Inc. He is responsible for the company's powertrain engineering consultancy activities and growth of the company's North American simulation software sales. Corbin has more than 40 years of powertrain experience and is an active member of the Society of Automotive Engineers (SAE) and the North American Defense Industry Association (NADIA).

Joe Moore is the chassis lead engineer for global technology engineering at General Motors' Canadian Regional Engineering Centre (CREC). Since joining GM in 1988, Joe has held various technical and management roles including product engineer, chassis design-release engineer, quality engineering manager and chassis manager. In 2002, Joe started the Vehicle Integration Group, which is responsible for physical integration and studio interface at CREC. Last year, he also took on the role of focus area lead for fuel economy and advanced engineering solutions.



Rob Mosher is the director of product management for A123 Systems. He manages strategic external relations and the product management team for A123 Systems Energy Solutions Group. Prior to joining A123 Systems, Rob held a variety of business development and product management positions with Teradyne, Incorporated. Rob also spent several years as a management consultant for the Boston Consulting Group where he worked on issues of corporate strategy in a variety of industries.

Robert J. Reuter was appointed General Motors' global vehicle chief engineer of Compact Crossover Vehicles in September 2005. In this capacity, he is responsible for the compact SUV's execution globally, as well as architecture development for this segment. Under his leadership products such as the Saturn VUE, Chevrolet Equinox, Pontiac Torrent, Opel Antara and Chevrolet Windstorm have been executed within the global engineering framework. Robert has been with GM since 1977.

Don Senich is the section head of Academic Programs in the Directorate for Engineering at the National Science Foundation. He is responsible for implementing \$22 million in academic and industrial collaborative research in the Engineering Directorate and is the procurement interface with the Small Business Administration's Office of Government Contracting.

Rymal Smith is the manager of Hydrogen Village, an internationally recognized program that is developing a permanent and sustainable hydrogen and fuel cell infrastructure and economy in the Greater Toronto Area. His previous positions include manager of the Natural Gas Vehicle (NGV) Division at Union Gas, and director of transportation business development for Stuart Energy. Rymal is the recipient of the Canadian Ministry of Natural Resources' Michael Grant Technology Award and the CNGVA Award of Merit.

John Wilson—See Hardware In The Loop Evaluation

WRITTEN DESIGN REPORT

Roger Clark is senior manager of General Motors' Energy Center. He also leads the GMNA Energy Expert Team and the Fuel Economy Learning Vehicle Program. Roger's responsibilities include working on the development and integration of vehicle energy and drive quality requirements, fuel economy and CAFE/CO2 strategy, and other new technologies for vehicle fuel economy leadership.

Frank Falcone is a vehicle systems engineer for Argonne National Laboratory's Advanced Vehicle Technology Competition program. He serves as a technical lead for the EcoCAR Challenge. Frank is a former Challenge X Team Leader from San Diego State University, where he earned his bachelor's and master's degrees in mechanical engineering.

Dr. Aaron Hoskin is a research officer in the Hydrogen, Fuel Cell and Transportation Energy (HyFATE) Group at Natural Resources Canada. Prior to joining NRCAN in 2006, Aaron completed two post doctoral fellowships in Germany. His background is in metal hydride materials for hydrogen storage.

Bob Larsen is a senior technical advisor in the Center for Transportation Research at Argonne National Laboratory. Bob initiated the Advanced Vehicle Technology Competition program in 1989 and was instrumental in the development of the EcoCAR competition and all of its predecessors.

TRADE SHOW DISPLAY AND PRESENTATION

Steven Boyd has worked at the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, since 2006. In his current position as technology development manager for the Vehicle Technologies Program, Steven oversees research efforts in hybrid and advanced vehicle systems, including capacitor and magnet development for automotive power electronics and electric motors. Steven is a former Challenge X team leader for the Virginia Tech Hybrid Electric Vehicle Team.

Toby Dunmore joined General Motors in 1994 as a chassis development engineer on midsize vehicles. He has since worked in a variety of areas including brake and stability control systems, product design, chassis controls calibration and engine mount development. For the last six months, Toby has been on a special assignment in Hybrid Controls and Integration, helping to define the global development methodology.

Mel Fox started at General Motors in March 2008 as an energy storage system integration engineer for the Chevy Volt. Prior to joining GM, Mel interned at Toyota Motor Manufacturing in Georgetown, Kentucky and at GM R&D in Warren, Michigan. Her undergraduate research studies at Wayne State University included diesel exhaust aftertreatment. At Penn State University, her graduate studies involved computational fluid dynamics of coal combustion and experimental studies of the effects of intake-induced turbulence on the characteristics of hydrogen-assisted natural gas combustion in a spark-ignited engine.

Chris Haliburton is a validation engineer for General Motors' Hybrid Electrical Integration and Validation Team. He is responsible for vehicle integration issue resolution, validation planning, and plant build support for the Chevy Volt. Before joining GM, Chris was a controls test engineer for Azure Dynamics Inc., and a PSAT simulation engineer at Argonne National Laboratory. As a student at the University of Waterloo, he was heavily involved in Challenge X, graduating as one of the team's co-leaders.

Cheri-Ann Olsen is a project officer with the Hydrogen, Fuel Cells and Transportation Energy Group at Natural Resources Canada. Cheri is a graduate of the FutureTruck student vehicle competition, where she was team lead for the University of Alberta. Since joining NRCAN, Cheri has been involved in a variety of hydrogen and fuel cell research and demonstration projects. She also is a member of EcoCAR Steering Committee.

NATIONAL INSTRUMENTS MOST INNOVATIVE USE OF GRAPHICAL DESIGN AWARD

Dominic Lalli is the regional field engineer for Toronto and Southern Ontario at National Instruments. In this role, Dominic consults with customers in the automotive and other industries for implementing NI products in their applications.

Paul Mandeltort is the product manager for automotive networking products and the EcoCAR corporate sponsor at National Instruments. As a team leader from the FutureTruck competitions, Paul has been involved with the competition series for more than nine years and has supported EcoCAR and Challenge X teams.

THE MATHWORKS MODELING AWARD

Tom Egel is a Principal Application Engineer at The MathWorks. Previously, Tom was an electrical design engineer at Texas Instruments, applications engineer with Analog, Inc. (Saber), and most recently, technical marketing engineer at Mentor Graphics. Before joining The MathWorks in July 2005, Tom spent over 12 years developing/supporting/selling physical modeling tools in the automotive/transportation industry.

Scott Furry started working at The MathWorks in November 2005 as a senior technical consultant. His area of specialty is control design automation, including code generation. He came to The MathWorks with extensive experience in the conception, design, development, application, and calibration of automotive embedded control systems.

Kerry Grand is a senior technical consultant for the MathWorks with a focus on large scale collaborative modeling and automatic code generation for real-time embedded controls. Kerry previously worked for Ballard Power Systems where he worked on power conversion/motor controls and Ford Motor Company where he worked on hybrid vehicle controls.

Pete Maloney is a principal consulting engineer for The MathWorks, whose main areas of focus are powertrain calibration tool development and application, large-scale control modeling, and physical system modeling for automotive customers. Before joining The MathWorks in 2000, he designed and developed electronic engine control algorithms for Ford Motor Company and Delphi Automotive Systems over a 10-year period, resulting in 15 related patents.

WOMEN IN THE WINNER'S CIRCLE FOUNDATION—WOMEN IN ENGINEERING AWARD

Lyn St. James is the founder of the Women in the Winner's Circle Foundation, a non-profit organization that focuses on worldwide activities and programs for driver development, advocacy, diversity and education, particularly for women who aspire to become race car drivers. As a former professional IndyCar driver, Lyn is one of the few women to successfully qualify for the Indianapolis 500, and the first woman to win the Indianapolis 500 Rookie of the Year award. During her celebrated driving career, she held 31 international and national closed circuit speed records and won races such as the 24 Hours of Daytona. Lyn also currently serves as a motivational speaker.

LaVern Sula is the general director at General Motors' Canadian Regional Engineering Centre (CREC). She got her start with GM as a co-op student while attending the New York Institute of Technology. In 1988, LaVern was hired full time as a quality control engineer and supervisor. She has served in a variety of roles including variation simulation modeler, business information manager, director of electrical development and validation and director of electrical systems.

Cindy Svestka is the executive technical assistant and business process manager for General Motors' Powertrain Vehicle Integration Group. Since Cindy joined GM in 2000, she has worked on design and development of ethanol fuel systems for full size trucks, overseeing the energy and drive quality performance of the Chevrolet HHR, and meeting the fuel economy and vehicle performance targets for the 2009 Saturn VUE 2-Mode Hybrid program. Throughout her time at GM, Cindy has been engaged as a Technical Lead for EcoCAR, Challenge X, FutureTruck and the Ethanol Vehicle Challenge. Prior to joining GM, Cindy worked for Argonne National Laboratory on the Advanced Vehicle Technology Competition program and was a student team leader in the Propane Vehicle Challenge.

OUTSTANDING FACULTY ADVISOR AWARD

Kristen De La Rosa is director of the Advanced Vehicle Technology Competition program at Argonne National Laboratory where she has organized 18 competitions since 1996. Today, she manages all day-to-day activities of the EcoCAR competition and is responsible for establishing more than \$80M of financial and in-kind support to successfully execute the three-year EcoCAR program.

Frank Falcone—See Written Technical Report

Lynda Palombo—See Outreach Presentation

Don Senich—See Project Initiation Approval

Aaron Sullivan is a design engineer in General Motors' Chassis Organization. He is currently working on GM's new global midsize car program. Since joining GM in 1997, he has worked on a variety of assignments involving vehicle fuel economy and drive quality ranging from model development to integration of GM's first CVT transmission. Aaron later moved to the area of vehicle dynamics where he was responsible for the performance validation of anti-lock braking systems, including the 2004 GMT 800 Parallel Hybrid Truck program. He was also responsible for suspension and steering system development and validation on several small SUVs including most recently the 2008 Saturn VUE. In addition to his current assignment, Aaron is also one of the GM technical leads for the EcoCAR program.



ECOCAR 2009 SCHEDULE

Date	Time	EcoCAR Event	Toronto Location
Sunday, June 7	8:00 AM - 5:00 PM	EcoCAR Registration	Sheraton Hall – Lower Concourse, Sheraton Centre
	10:00 AM - 5:00 PM	Trade Show Move In	Sheraton Hall
	2:30 PM - 3:30 PM	Satellite Media Tour Briefing	Innovation Theatre – Sheraton Hall
	4:00 PM - 5:00 PM	Organizer Meeting	Conference Room H – Mezzanine Level, Sheraton Centre
	5:30 PM - 5:45 PM	Buses depart for CN Tower	Circle Drive, Sheraton Entrance
	6:00 PM - 9:00 PM	Team Welcome Night	Horizons – CN Tower
	9:45 PM - 10:00 PM	Buses Return to Sheraton Centre	Front Entrance – CN Tower
	Monday, June 8	6:00 AM - 10:30 AM	Satellite Media Tour
10:30 AM - 11:30 AM		Judges' Briefing	Conference Room D – Mezzanine Level, Sheraton Centre
10:30 AM - 11:30 AM		Trade Show Presentation Judges' Briefing	Conference Room E – Mezzanine Level, Sheraton Centre
11:00 AM - 1:00 PM		Lunch	Osgoode Ballroom – Sheraton Hall
12:00 PM - 12:40 PM		Opening Ceremony	EcoCAR stage – Nathan Phillips Square
1:00 PM - 6:00 PM		Trade Show Open	Sheraton Hall
1:00 PM - 6:00 PM		HIL/Trade Show Presentation Judging	Sheraton Hall
3:00 PM - 3:20 PM		Judging Break	Sheraton Hall
6:00 PM		All Judging Concludes	
Tuesday, June 9		7:00 AM - 8:00 PM	Team Practice Sessions
		Controls Presentation	Conference Room B
		Electrical Presentation	Conference Room C
		Mechanical Presentation	Conference Room F
		Outreach Presentation	Windsor East
		Project Initiation Approval Presentation	Conference Room G
	7:30 AM - 8:20 AM	Judges' Breakfast	Osgoode Ballroom – Sheraton Hall
	7:30 AM - 8:00 AM	Team Leaders' Meeting	Innovation Theatre – Sheraton Hall
	8:00 AM - 5:00 PM	Trade Show Open	Sheraton Hall
	8:20 AM - 4:40 PM	HIL/Trade Show Presentation Judging	Sheraton Hall
	10:40 AM - 11:00 AM	Judging Break	Sheraton Hall
	12:00 PM - 1:00 PM	Lunch	Osgoode Ballroom – Sheraton Hall
	12:15 PM - 12:45 PM	Organizer Meeting	Conference Room H
	3:00 PM - 3:20 PM	Judging Break	Sheraton Hall
	4:40 PM - 5:20 PM	HIL Judges' Wrap Up	Conference Room D
	4:40 PM - 5:20 PM	Trade Show Presentation Judges' Wrap Up	Conference Room E
	5:30 PM - 5:45 PM	Buses depart for Faculty Dinner	Circle Drive, Sheraton Centre
6:30 PM - 9:30 PM	Faculty Advisor Dinner	Prego Della Piazza, Yorkville	
9:30 PM - 10 PM	Buses return to Sheraton	Prego Della Piazza, Yorkville	

ECO CAR 2009 SCHEDULE

Date	Time	EcoCAR Event	Toronto Location
Wednesday, June 10	7:00 AM - 8:00 AM	Judges' Breakfast	Osgoode Ballroom – Sheraton Hall
	7:30 AM - 8:00 AM	Team Leaders' Meeting	Innovation Theatre – Sheraton Hall
	8:00 AM - 9:00 PM	Trade Show Open	Sheraton Hall
	8:00 AM - 4:40 PM	Static Event Judging	Mezzanine Level – Sheraton Centre
		Controls Presentation	Conference Room B
		Electrical Presentation	Conference Room C
		Mechanical Presentation	Conference Room F
		National Instruments Presentation	Conference Room E
		Outreach Presentation	Windsor East
		Project Initiation Approval Presentation	Conference Room G
		The MathWorks Award Presentation	Conference Room D
		Women in Engineering Presentation	Windsor West
	10:00 AM - 10:20 AM	Break	Osgoode Ballroom – Sheraton Hall
	11:40 AM - 12:20 PM	Lunch	Osgoode Ballroom – Sheraton Hall
	11:50 AM - 12:10 PM	Organizer Meeting	Conference Room H
	2:40 PM - 3:00 PM	Break	Osgoode Ballroom – Sheraton Hall
	5:40 PM - 7:00 PM	Sponsor Social Reception & Remarks	Innovation Theatre – Sheraton Hall
	7:00 PM - 9:00 PM	Sponsor Social Dinner	Osgoode Ballroom – Sheraton Hall
Thursday, June 11	7:00 AM - 7:40 AM	Judges' Breakfast	Osgoode Ballroom – Sheraton Hall
	7:30 AM - 2:00 PM	Trade Show Open	Sheraton Hall
	7:30 AM - 8:00 AM	Team Leaders' Meeting	Innovation Theatre – Sheraton Hall
	7:40 AM - 12:00 PM	Static Event Judging Cont'd	Mezzanine Level, Sheraton Centre
		Controls Presentation	Conference Room B
		Electrical Presentation	Conference Room C
		Mechanical Presentation	Conference Room F
		Outreach Presentation	Windsor East
		Project Initiation Approval Presentation	Conference Room G
	9:40 AM - 10:00 AM	Opening Remarks/Break	Innovation Theatre – Sheraton Hall
	10:00 AM - 12:30 PM	Education Day Displays & Demos	Sheraton Hall
	12:30 PM - 1:30 PM	Lunch/Closing Remarks	Osgoode Ballroom – Sheraton Hall
	2:00 PM - 5:00 PM	Trade Show Move Out	Sheraton Hall
	5:00 PM - 6:00 PM	Organizer Meeting	Conference Room H
Friday, June 12	7:30 AM - 7:45 AM	Buses depart for Palais Royal	Circle Drive, Sheraton Entrance
	8:00 AM - 11:00 AM	Awards Ceremony & Breakfast	Palais Royale – Harbourfront
	11:00 AM - 11:15 AM	Buses depart for Sheraton	Circle Drive – Palais Royale
	11:45 AM - 12:30 PM	Press Conference Finale	Innovation Theatre – Sheraton Hall

ECOCAR 2009 TEAMS

EMBRY-RIDDLE AERONAUTICAL UNIVERSITY

FACULTY ADVISORS: Jack McKisson, Richard Stansbury and Darris White

TEAM LEADER: Vincent Sabatini

TEAM DESCRIPTION

The Embry-Riddle EcoEagles, led by Vincent Sabatini, are split into three primary task groups: Mechanical, led by Ryle Maxson, Electrical, led by Nicole Lambiase, and Controls, led by William Haupfear. Each of the design groups has several major vehicle tasks assigned to them, which the group leaders then assign to their members. On the administrative side, Business tasks are handled by Scott Forte, while Outreach is coordinated by Jen Haydt.

VEHICLE DESIGN

The EcoEagles vehicle is an Extended Range Electric Vehicle (EREV), consisting of a GM 1.3 liter diesel engine running on B20 biodiesel, a GM 2-mode transmission, a 55 kW Magna electric rear drive motor, and an A123 330 V, 12.8 kW-hr lithium-ion battery pack. The vehicle will be able to drive approximately 25 miles on electric-only power, before having to switch to hybrid mode, in which the engine switches on to sustain the battery and power the vehicle. The addition of the rear motor allows for higher all-electric speeds and overall power and acceleration.



GEORGIA TECH

FACULTY ADVISORS: Tom Fuller and David Taylor

TEAM LEADER: Ryan Melsert

TEAM DESCRIPTION

The Georgia Tech EcoCAR team is divided into five working groups; Mechanical, Controls and Low Voltage Electrical, Batteries and High Voltage Electrical, CAD/CAE and Packaging, and Outreach/Business/Fundraising. Each of these groups has a faculty advisor, and together with the team faculty advisors and student team leader they work to create a successful vehicle.

VEHICLE DESIGN

The Georgia Tech EcoCAR team has decided to implement a split hybrid powertrain, where the vehicle dynamically changes between parallel and series operational modes. The powertrain consists of a GM 1.6L SI dedicated E85 engine paired to GM's 2-Mode hybrid transmission, which includes two electric motors, two eCVTs, and four fixed gear ratios. On-board electrical energy is stored with a lithium-ion battery pack developed by A123 Systems, Inc.



HOWARD UNIVERSITY

FACULTY ADVISORS: Jason Ganley, James Hammonds and Grant M. Warner

TEAM LEADER: Francis Kirong

TEAM DESCRIPTION

The Howard University EcoCAR team is organized into four working groups: Mechanical Design, Electrical Design, Controls, and Business/Outreach. Each group is directed by a group leader who is responsible for developing tasks and coordinating activities among other group members. The team features a mix of participants, both graduate and undergraduate, and several majors from across the University.

VEHICLE DESIGN

The Howard University EcoCAR team is developing a Plug-in Hybrid Electric Vehicle (PHEV). The vehicle powertrain will feature a GM 1.3 liter diesel engine, and the two-mode power-split transmission. The engine will run on B20 biodiesel developed in a campus-wide cooking oil reclamation project. The electrical storage system will be comprised of a lithium-ion battery pack from A123 systems.



MICHIGAN TECHNOLOGICAL UNIVERSITY

FACULTY ADVISOR: John Beard

TEAM LEADER: Adam Kantor

TEAM DESCRIPTION

The Michigan Technological University's EcoCAR team consists of four major sub teams: Mechanical led by Christopher Lucier, Electrical led by Andrew Best, Controls led by Adam Bono, and Marketing led by Dennis Karttunen. All four of these teams are overseen by a team leader, Adam Kantor, and a faculty advisor, John Beard.

VEHICLE DESIGN

Michigan Technological University's proposed design consists of a General Motors E85 compatible 2.4L EcoTEC engine longitudinally mounted in the engine bay with an automatic transaxle mounted in the rear of the vehicle. This allows the team to evenly distribute the weight of the vehicle as well as provides room for the 21.1 kW UQM electric motor mounted between the transaxle and the engine. Clutches are mounted on either side of the electric motor allowing the vehicle to run in various hybrid modes.



ECO CAR 2009 TEAMS

MISSISSIPPI STATE UNIVERSITY

FACULTY ADVISOR: Marshall Molen

TEAM LEADER: Matt Doude

OUTREACH COORDINATOR: Lauren Cobb

TEAM DESCRIPTION

The Mississippi State University team is headed by a team leader and is divided into six sub groups that focus on specific areas of the vehicle design and implementation. The team is divided into the following groups: Powertrain, Mechanical, Controls, Electrical, Emissions, and Outreach.

VEHICLE DESIGN

The Mississippi State University EcoCAR team has chosen a Plug-In Series Range-Extended Hybrid for its architecture choice. An electric range of 40 miles will be provided by a 21.1 kWh A123 Systems battery pack. Additional range will be provided by a 1.3L GM turbodiesel engine coupled to a 75kW UQM generator. A 51kW Magna electric motor in the front and a 125kW UQM electric motor in the rear will provide the tractive power.



MISSOURI UNIVERSITY OF SCIENCE & TECHNOLOGY

FACULTY ADVISORS: Mehdi Ferdowsi, Scott Grasman, Umit Koylu and Robert Landers

TEAM LEADER: Kevin Martin

TEAM DESCRIPTION

The Missouri University of Science and Technology EcoCAR Team consists of five sub teams (mechanical, electrical, control, business, marketing) each with a team leader. The team leverages the interdisciplinary nature of the team by incorporating various majors into each sub team. Regular membership is supplemented by incorporating special identified projects into numerous courses. Coordination among the team leadership and the various undergraduate and graduate students participating occurs at weekly meetings.

VEHICLE DESIGN

The Missouri S&T team is designing a cutting edge hydrogen fuel cell plug-in hybrid electric vehicle (FC PHEV). This technology represents a dramatic transformation of the vehicle's powertrain system. The powertrain consists of a 95 kW polymer electrolyte membrane (PEM) hydrogen fuel cell which is coupled with a 80kW continuous power electric motor that includes regenerative braking. Additional power and range is provided by a 21.1 kWh lithium-ion battery pack.



NORTH CAROLINA STATE UNIVERSITY

FACULTY ADVISOR: Terry Gilbert

TEAM LEADER: Ali Seyam

OUTREACH COORDINATOR: Dr. Pam Carpenter

TEAM DESCRIPTION

The NC State University team is headed by two student leaders, Abram Harder and Ali Seyam, and is comprised of four sub teams (Mechanical, Electrical, Controls and Outreach/Business) with each sub team being headed by a student leader. High levels of multi team cooperation are implemented through the use of a Google Site.

VEHICLE DESIGN

The NC State University team has proposed an EREV (Extended Range Electric Vehicle) architecture. Major donated components include; the GM 101X ETS electric drive motor, a 1.3L SDE 4 cylinder diesel engine from GM, and a cutting edge prismatic lithium-ion battery from A123 systems. The team has proposed to use B-20 biodiesel as the fuel to extend the range of their EREV.



THE OHIO STATE UNIVERSITY

FACULTY ADVISORS: Shawn Midlam-Mohler and Giorgio Rizzoni

TEAM LEADER: Eric Schacht

OUTREACH COORDINATOR: Justin Ford

TEAM DESCRIPTION

The Ohio State University Team is comprised of undergraduate and graduate students divided into Engineering and Business segments. The Engineering segment has Mechanical, Electrical, and Controls subteams and is responsible for vehicle design, construction, and testing. The Business segment is an interdisciplinary group responsible for educational and marketing activities.

VEHICLE DESIGN

The Ohio State University Team's vehicle architecture is a range-extended electric vehicle (E-REV). The design features a 21.1 kWh lithium-ion battery pack with a 103kW electric machine to provide primary drive power and regenerative braking. In addition, the design utilizes a 1.8L engine recalibrated for E85 fuel, coupled with a 67kW electric machine via an innovative twin-clutch transmission. This transmission design allows the vehicle to operate in a series or parallel hybrid mode and allows front axle regenerative braking.



ECO CAR 2009 TEAMS

PENNSYLVANIA STATE UNIVERSITY

FACULTY ADVISORS: Daniel C. Haworth and Gary Neal

CO-TEAM LEADERS: Derek Bailey and Thomas Sutherland

OUTREACH COORDINATOR: Mark Hull

TEAM DESCRIPTION

The Penn State Advanced Vehicle Team is headed by co-team leaders and consists of six sub teams (Auxiliary Power Unit, Drivetrain, Energy Storage, Electronics, Controls, Public Relations/Business). Each sub team is headed by a sub team leader. The sub teams work together to develop the vehicle and are directed through weekly project management meetings.

VEHICLE DESIGN

Penn State's vehicle is a plug-in series architecture with an estimated electric vehicle range of 25 miles due to an energy dense, liquid-cooled lithium-ironphosphate battery pack. The vehicle will use a 1.3L GM diesel engine to drive a 75 kW electric generator that produces electricity to power the vehicle. Finally, a 120 kW electronic traction system will be used to propel the vehicle.



ROSE-HULMAN INSTITUTE OF TECHNOLOGY

FACULTY ADVISORS: Zachariah Chambers and Marc Herniter

CO-TEAM LEADERS: Cameron Hazel, Jonathon Kellerman, Robert Warden and Rebecca Winer

TEAM DESCRIPTION

The Rose-Hulman team consists of three key groups: the Mechanical team lead by Rebecca Winer and Robert Warden, the Electrical team lead by Jonathon Kellerman, and the Controls team lead by Jonathon Kellerman and Eric Stokes. Ashley Erffmeyer coordinates the Business and Outreach components of the competition with Dr. Zac Chambers and Dr. Marc Herniter serving as the faculty advisors.

VEHICLE DESIGN

The Rose-Hulman architecture is a parallel pre/post transmission hybrid electric powertrain. A 1.3L GM diesel engine using B20 biodiesel is assisted by a TM4 electric motor, both of which are connected to a GM four speed automatic transmission. A second TM4 motor is attached to the rear axle for regenerative braking and enhanced acceleration. A custom A123 high voltage lithium-ion battery completes the system.



TEXAS TECH UNIVERSITY

FACULTY ADVISORS: Dean Fontenot, Richard Gale and Tim Maxwell

CO-TEAM LEADERS: Alan Falls and Matt Harrison

TEAM DESCRIPTION

The Texas Tech University EcoCAR team is made up of 17 students who have come together to achieve more for our mother Earth, for our fellow humans, for our university and for ourselves. Our team comes from diverse backgrounds but with a common vision. We are comprised of graduate and undergraduate students, international and domestic students, and also students from different streams such as Mechanical Engineering, Electrical Engineering, Industrial Engineering, Business and Marketing. Dr. Maxwell, Dr. Gale and Dr. Fontenot from Texas Tech University along with Mr. Jon Stec from General Motors are our guiding lights in this journey.



VEHICLE DESIGN

Texas Tech University's EcoCAR vehicle is designed as front wheel drive 2-Mode Hybrid. The vehicle will consist of a 1.6L GM Europe engine intended to run on E-85, a GM 2-Mode transmission which has two planetary gear sets as well as two 55kW electric motors, and a battery pack containing four A123's 25S2P modules. The engine suggested will be lighter than stock and help to balance the added weight of the 2-Mode transmission. Ideally the vehicle will operate solely on electric power at low speeds and blend power for higher speeds.

UNIVERSITY OF ONTARIO INSTITUTE OF TECHNOLOGY

FACULTY ADVISORS: Mike Eklund, Marnie Ham, Ruth Milman and Greg Rohrauer

TEAM LEADER: Mike Maduro

TEAM DESCRIPTION

The UOIT EcoCAR team is headed by two co-team leaders and comprises six sub groups: Business, Mechanical, Energy Storage, Control, Electrical, and Outreach. Each sub-team is headed by a student leader, and meets on a weekly basis to assure system design compatibility and to complete tasks such as promotion of the project and our vehicle architecture to the public.

VEHICLE DESIGN

Our proposed architecture is full function electric vehicle given its superior energy efficiency. It has a stored energy capacity of approximately 80 kWh, contains 90 high energy density lithium polymer batteries, and is driven by a 120 kW electric motor. With this setup we expect to obtain a range of approximately 200 miles.



ECO CAR 2009 TEAMS

UNIVERSITY OF VICTORIA

FACULTY ADVISORS: Curran Crawford and Zuomin Dong

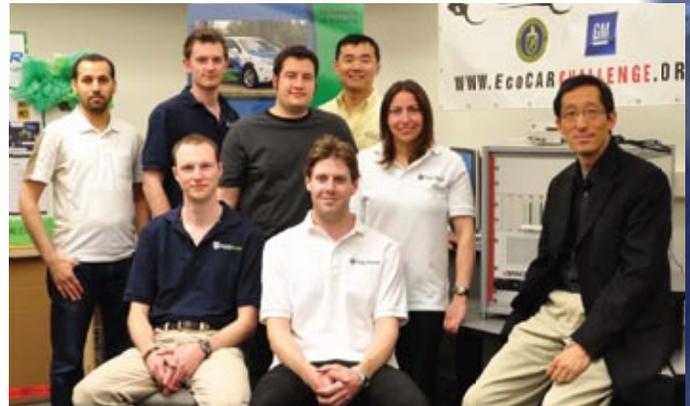
TEAM LEADER: Jeremy Wise

TEAM DESCRIPTION

The University of Victoria's team is comprised of one team leader and several technical experts in electrical, mechanical and controls engineering. Together, they manage project teams that are assembled to develop specific competition deliverables or team requirements. Outreach and media activities are organized by a dedicated team that also reports to team leadership.

VEHICLE DESIGN

The University of Victoria's vehicle design is an E-REV with 40 miles of all-electric plug-in range provided by a high-capacity A123 lithium-ion battery. The use of a GM two-mode powersplit transmission and separate rear traction motor also enable AWD functionality. The 2.4L Ecotec engine is flex fuel capable and can run on E85 for reduced emissions and petroleum use. The flexibility of this design is expected to yield low fuel consumption and emissions, but still provide large amounts of power for exciting performance.



UNIVERSITY OF WATERLOO

FACULTY ADVISORS: Michael Fowler and Roydon Fraser

TEAM LEADER: Alex Koche

TEAM DESCRIPTION

The University of Waterloo Alternative Fuels Team (UWAFT) is based on a cooperation of business and engineering development. Both areas have a managing director and the team captain maintains the interaction between the two groups. Student involvement on the business team stretches across all faculties and activities include outreach, education, sponsorship, finance, marketing and web development. Engineering is divided into mechanical, electrical, controls, and fuel system design streams.

VEHICLE DESIGN

UWAFT's entry into EcoCAR is a Fuel Cell Plug-In Hybrid Electric Vehicle (FC-PHEV). The vehicle will have an all electric mode using battery modules from A123 systems with grid charging capabilities. This all electric operation will be blended with a GM hydrogen fuel cell engine that, together with the battery, will power an electric traction system to propel the vehicle.



UNIVERSITY OF WISCONSIN

FACULTY ADVISOR: Glenn Bower

CO-TEAM LEADERS: Mike Deau and Ben Fjellanger

TEAM DESCRIPTION

The University of Wisconsin Hybrid Vehicle Team's advisor is Dr. Glenn Bower and the team's co-leaders are Mike Deau and Ben Fjellanger. The UWHVT is primarily composed of undergraduate engineering students. The team is divided into the Mechanical, Electrical, Controls and Outreach subgroups which are responsible for their respective areas of the vehicle.

VEHICLE DESIGN

The UWHVT vehicle design is considered an Extended Range Electric Vehicle (EREV). The primary power source will be a 150kW electric motor used to drive the front wheels. The vehicle will also have the capability to generate power to recharge its battery packs or drive the rear wheels using a series configuration of a Flex Fuel capable I.C. engine and a 60kW electric drive. The lithium-Ion battery pack has been donated by Johnson Controls-Saft and is capable propelling the Vue approximately 20 miles on full electric.



VIRGINIA TECH

FACULTY ADVISOR: Doug Nelson

TEAM LEADER: Adam Robinson

OUTREACH COORDINATOR: Stefanie Goodwin

TEAM DESCRIPTION

The Hybrid Electric Vehicle Team (HEVT) of Virginia Tech is composed of senior mechanical engineering students and several underclass volunteers from different engineering backgrounds. The team is divided into three subteams; controls, mechanical, and electrical. The subteams work together to create and eventually implement the team's vehicle architecture. In addition, team members are responsible for the outreach, business and finance aspects of team operations.

VEHICLE DESIGN

Virginia Tech's Hybrid Electric Vehicle Team is designing an E-REV (Extended Range Electric Vehicle) plug-in hybrid. The vehicle will have the ability to charge the high energy capacity battery from any standard wall outlet, and run in electric-only mode for more than 65 km (40 miles). The Team's design calls for two electric motors to be integrated into the vehicle along with the battery pack in a split parallel architecture. In addition, the 2.4 L engine will be a flex fuel engine allowing the range extending fuel of the vehicle to be E85 ethanol.



WEST VIRGINIA UNIVERSITY

FACULTY ADVISOR: Scott Wayne

TEAM LEADER: Patrick Mancini

TEAM DESCRIPTION

The team at West Virginia University consists of 14 enrolled students pursuing degrees in Mechanical Engineering or Aerospace Engineering, and five Electrical Engineering majors. The team also has the assistance of six volunteers including a graduate and undergraduate student in Journalism to serving as Outreach Coordinators for the team. The structure of the WVU EcoEvolution team is arranged with Patrick Mancini as Team Captain, Andrew Yablonski as the Mechanical Team Leader, Matthew Grahek as the Controls Team Leader, David Kirby as the Electrical Team Leader, and Cara Slider and Matthew Haight as the Outreach and Business Team Leaders respectively. The Course is overseen by Dr. Scott Wayne of the Mechanical and Aerospace Engineering Department with the assistance of Howard Mearns and Zhenhua Zhu as Graduate Research Assistants.

VEHICLE DESIGN

The heart West Virginia University's EcoEvolution Vue is the GM 2-Mode Electrically Variable Transmission (EVT) which provides two continuously variable EVT modes and 4 fixed gear ratios enabling flexibility to optimize performance efficiency and emissions for a wide range of driving conditions. A fuel efficient 1.3L, 4-cylinder SDE turbo-diesel engine rated at 67 kW and 200 N-m peak torque fueled with B20 biodiesel fuel will provide primary propulsion power and electrical energy storage will be accomplished with a Lithium-Ion battery pack comprised of four 83V-22S3P battery modules from A123 Systems Inc. Simulations results indicate that the EcoEvolution should achieve 36mpg city and 38 mpg highway, with WTW GHE Emissions approximately 90 g/km and WTW PEU of .30 kWh/km.



ECO CAR 2009 SPONSORS

Headline Sponsors



The U.S. Department of Energy (DOE), through Argonne National Laboratory, provides overall competition management, team evaluation, and technical and logistical support for EcoCAR, the premier DOE sponsored student vehicle competition. DOE launched its student vehicle competition program in 1989 to demonstrate and test technologies developed in laboratories. By combining the next generation of technical innovators with emerging advanced transportation technologies, the EcoCAR competition helps ensure a sustainable, environmentally responsible transportation future. DOE and its network of national laboratories maintain an aggressive research and development program in advanced vehicle technologies, including fuel cells, energy storage, hybrid systems, advanced materials, alternative fuels, and heat engines. DOE continues to develop new technology to improve vehicle efficiency and lessen our dependence on foreign oil. Through the student vehicle competition program, over 15,000 students have received hands-on engineering experience and many of them have moved on to take jobs in the automotive industry, bringing with them an understanding of and enthusiasm for advanced vehicle technologies.

For more information, visit www.eere.energy.gov/vehiclesandfuels.



General Motors Corporation

Over the past 15 years, General Motors (GM) has joined the U.S. Department of Energy (DOE) to sponsor several successful student engineering competition programs. Most recently, GM and DOE have teamed up as headline sponsors of *EcoCAR: The Next Challenge*, the latest advanced vehicle technology competition program.

The three-year competition, modeled after the General Motors global vehicle development process, brings students into the real world of vehicle development and better prepares them to make a faster contribution to the engineering profession and the automotive industry.

Each participating university team will re-engineer a 2009 Saturn Vue, with three basic goals: reduce energy consumption, decrease emissions and maintain the performance and utility features of the stock vehicle. For this competition, the teams are also required to emulate the vehicle categories from the California Air Resources Board (CARB) zero emissions vehicle (ZEV) requirements. They are encouraged to explore a variety of technology solutions including electric, hybrid, plug-in hybrid and fuel cells.

GM will donate 2009 Saturn Vue vehicles to each of the university teams at the end of the first year of the competition. GM will also provide each university team with seed money and donate the use of its engineering, testing and proving ground facilities for student workshops and competitions. Finally, GM will provide highly controlled access to its intellectual property as well as engineering staff support and mentoring—including a program management, team mentors and event judges—and communications support for the competition series.

General Motors Corp. (NYSE: GM), one of the world's largest automakers, was founded in 1908, and today manufactures cars and trucks in 34 countries. With its global headquarters in Detroit, GM employs 252,000 people in every major region of the world, and sells and services vehicles in some 140 countries. In 2008, GM sold 8.35 million cars and trucks globally under the following brands: Buick, Cadillac, Chevrolet, GMC, GM Daewoo, Holden, Hummer, Opel, Pontiac, Saab, Saturn, Vauxhall and Wuling. GM's largest national market is the United States, followed by China, Brazil, the United Kingdom, Canada, Russia and Germany. GM's OnStar subsidiary is the industry leader in vehicle safety, security and information services.

More information on GM can be found at www.gm.com.

Diamond Sponsors



Natural Resources Canada Ressources naturelles Canada

The Government of Canada through Transport Canada, and Natural Resources Canada have been long time supporters of the U.S. Department of Energy's advanced vehicle technology competition program, providing technical and program support for more than 21 competitions over 17 years. EcoCAR underscores the Government of Canada's commitment to addressing greenhouse gas reductions and supporting sustainable energy policies and advanced automotive technologies.

Natural Resources Canada provides knowledge, expertise, and program activities for the sustainable development and use of Canada's natural resources and to support the global competitiveness of its resource and related sectors. This includes energy activities that encompasses policy development, market development programs, and international activities in energy efficiency, renewables, transportation technologies, alternative fuels, and conventional fuels. Transport Canada is responsible for transportation policies and programs. It ensures that air, marine, road and rail transportation are safe, secure, efficient and environmentally responsible.

www.canada.gc.ca/, www.tc.gc.ca/programs/environment/etv/menu-eng.htm and www.nrcan.gc.ca

California Environmental Protection Agency



Air Resources Board

California Air Resources Board California's state legislature established the Air Resources Board in 1967 to protect public health, the economy, and the state's ecological resources through the reduction of air pollution. With the passage of AB 32, the agency must now also develop and implement strategies to reduce greenhouse gas emissions. Since its formation, the ARB has successfully worked with the public, environmental groups, businesses and local and federal agencies to cooperatively reach our clean air goals. While many problems persist, California now enjoys the cleanest air in more than 50 years.

Platinum Sponsors



A123 Systems is one of the world's leading suppliers of high-power lithium ion batteries. The company's patent pending Nanophosphate™ technology enables its batteries to deliver a previously unavailable combination of power, safety and life. Applicable to a wide range of industries, A123 Systems' products remove many traditional technology constraints to provide OEMs expanded flexibility in system design. With world-class expertise and management, global manufacturing operations and one of the largest automotive lithium ion R&D teams, A123 Systems' and its Automotive Class Lithium Ion™ products are helping to accelerate platform electrification. Founded in 2001 and headquartered in Massachusetts, A123 Systems' proprietary nanoscale electrode technology is built on initial developments from the Massachusetts Institute of Technology. A123 Systems' Advanced Research & Government Solutions Division in Ann Arbor, Michigan is nationally recognized for new materials development and cutting-edge research. For additional information please visit www.a123systems.com.



dSPACE, Inc. is a market innovator and leading producer of engineering tools for embedded controller development. We provide integrated systems for prototyping control algorithms, automatic production code generation, controller testing, controller calibration and engineering support services. We look forward to participating in the EcoCAR competition as an opportunity to empower student engineers to quickly develop innovative solutions to the challenges of reduced emissions, increased performance, and driver satisfaction. Our robust and comprehensive ECU development environment can dramatically reduce development time and costs while providing increased flexibility for continuous modifications throughout the process. Today, more than 12,000 dSPACE systems are in use worldwide, serving customers in the automotive, aerospace, agricultural, educational, engineering, robotics and noise & vibration industries.



ECO CAR 2009 SPONSORS



National Instruments

For 30 years, National Instruments has been a technology pioneer and leader in virtual instrumentation — a revolutionary concept that has changed the way engineers and scientists in industry, government and academia approach measurement and automation. Leveraging PCs and commercial technologies, virtual instrumentation increases productivity and lowers costs for test, control and design applications through easy-to-integrate software, such as NI LabVIEW, and modular measurement and control hardware for PXI, PCI, PCI Express, USB and Ethernet. Headquartered in Austin, Texas, NI has more than 3,800 employees and direct operations in nearly 40 countries. For the past seven years, FORTUNE magazine has named NI one of the 100 best companies to work for in America. In addition to providing an NI Application Engineer advisor to each team for product support and expertise through all phases of the competition, NI will also donate more than \$750,000 in software, hardware, and training products to participating teams. Through its support of the EcoCAR competition, NI continues its commitment to education by providing tomorrow's engineering leaders with tools to be successful today and in the future.



The MathWorks

The MathWorks is the leading developer and supplier of technical computing software. Employing more than 2,000 people, The MathWorks was founded in 1984 and is headquartered in Natick, Massachusetts, with offices and representatives throughout the world. The MathWorks customers are over 1,000,000 of the world's leading technical people, in over 175 countries, on all seven continents. They work at innovative companies, government research labs, financial institutions, and at more than 3,500 universities. They rely on us because MATLAB and Simulink have become the fundamental tools for their engineering and scientific work. By sponsoring EcoCAR, The MathWorks realizes its mission of support for math and science educational endeavors, fostering growth opportunities for those who will make contributions and discoveries in the future.



Freescale Semiconductor

is a global leader in the design and manufacture of embedded semiconductors for the automotive, consumer, industrial, networking and wireless markets. The privately held company is based in Austin, Texas, and has design, research and development, manufacturing and sales operations around the world.



AVL is the world's largest privately owned and independent company for the development of gasoline, diesel, and alternative fuel powertrain systems, as well as fuel cell and hybrid technologies. For more than 60 years AVL has

been active in the development of engines and powertrains providing low fuel consumption. Powertrain Engineering activities embrace all functions from concept definition through to production development. Supported by comprehensive in-house research, AVL's engineering specialists design and develop engines for both stationary and mobile applications, transmissions and complete powertrain systems.

The company offers combined solutions of powertrain engineering, simulation software and testing and instrumentation systems. AVL guarantees close cooperation with customers by affiliates and local offices worldwide. AVL's North American Headquarters is located in the Detroit suburb of Plymouth, Michigan.

By supporting EcoCAR, AVL is proving its commitment to the future of our industry with the on-going, hands-on education of tomorrow's engineers and leaders.

For more information, AVL can be found at www.avl.com



U.S. Environmental Protection Agency

Transportation and Air Quality's (OTAQ) mission is to reconcile the transportation sector with the environment by advancing clean fuels and technology, and working to promote more liveable communities. OTAQ is responsible for carrying out laws to control air pollution from motor vehicles, engines, and their fuels. Activities include: characterizing emissions from mobile sources and related fuels; developing programs for their control, including assessment of the status of control technology and in-use vehicle emissions; carrying out a regulatory compliance program, in coordination with the Office of Enforcement and Compliance Assurance, to ensure adherence of mobile sources to standards; fostering the development of State Motor Vehicle Emissions Inspection and Maintenance Programs; and implementing programs for the integration of clean-fueled vehicles into the market.

EPA's National Vehicle and Fuel Emissions Laboratory (NVFEL) is part of the Office of Transportation and Air Quality (OTAQ). Located in Ann Arbor, Michigan, NVFEL has about 400 employees and provides emission testing services for motor vehicle, heavy-duty engine, and non-road engine programs in support of U.S. EPA -OTAQ rulemakings, enforcement actions, and procedures development. Testing activities include certifying that vehicle and engines meet federal emissions and fuel economy standards, testing vehicles and engines for in-use compliance, and analyzing fuels, fuel additives, and exhaust compounds.

Gold Sponsors



The National Science Foundation

(NSF) has been a long-time supporter of the U.S. Department of Energy's advanced vehicle technology competitions. In addition to providing financial support to EcoCAR, each year the NSF provides two \$10,000 awards to faculty members who have made significant contributions to the goals of the EcoCAR program and to engineering education. This year will be the eighth year for the outstanding faculty advisor(s) award sponsored by NSF. NSF is an independent federal agency that supports fundamental research and education across all fields of science and engineering, with an annual budget of approximately \$6.1 Billion in Fiscal Year 2006. NSF funds reach all 50 states through grants and cooperative agreements to nearly 2,000 universities and institutions. Each year, NSF receives about 44,500 competitive requests for funding, and makes about 11,400 new funding awards. The NSF also awards over \$425 million in professional and service contracts yearly.

WOODWARD Woodward Mototron

Control Solutions is an electronic system integrator and a leader in the application of code generation onto the production controller. Woodward MotoTron is the supplier of MotoHawk® model-based software development tools used by many EcoCAR teams. Woodward MotoTron Control Solutions supplies electronic systems, tools, and controller hardware to the automotive, marine, industrial, recreational, power generation, and aviation industries. Woodward MotoTron enables its customers to be electronic system integrators using our tools including MotoHawk® for the following applications: Gasoline Engine and Transmission Control, Diesel Engine / Emissions Control, Hydraulic Hybrid, Electric Hybrids / Plug-In Electric, Integration – Multiplexing / CAN Based Control, Chassis – Hydraulics control, Autonomous Vehicles and Small Engine EFI.



Vector CANtech, Inc., located in Novi, Michigan, was established in 1997 as a wholly owned North American subsidiary of Vector Informatik GmbH. Vector is the leading provider of software tools, embedded software components and services to OEMs, their suppliers and various other industries. Vector tools equip engineers with the finest capabilities for design, diagnostics, calibration and testing of distributed networking systems. Parent company, Vector Informatik GmbH was founded in 1988 and currently employs 840 people together with Vector Consulting GmbH. In addition to its headquarters in Stuttgart, Germany, Vector also has

an international presence with subsidiaries in the USA, Japan, France, United Kingdom, Sweden and the Republic of Korea.

Vector is a proud sponsor of the EcoCAR: The NeXt Challenge that will challenge 17 North American Universities to reduce the environmental impact of vehicles. Our commitment to excellence along with our development of distributed systems tool, CANoe and our measurement and calibration tool, CANape can be utilized by each team to layout their in-vehicle network and fine tune their engine performance for optimal results.

More information on Vector CANtech, Inc. can be found at www.vector-cantech.com.



Sensors, Inc. is the leading manufacturer of portable emissions test systems for real-world applications. Our products reflect an engineering focus on innovation, timeliness, and quality as well as the latest manufacturing techniques. Sensors, Inc. also provides solutions for engine test cells, end-of-line testing, and comparison studies of after-treatment devices and fuel additives. Technologies include NDIR, NDUV, and FID for gaseous measurements, a pressure differential technique for measurement of total exhaust flow, particulate mass measurement using a quartz crystal microbalance technique, and partial dilution sampling systems. The SEMTECH product line is capable of testing diesel and gasoline engines (SEMTECH-DS, SEMTECH PPMD and SEMTECH EFM2). Sensors' headquarters in Saline, Michigan houses administrative, engineering and manufacturing facilities.



BOSCH The Bosch Group is a leading global supplier of technology and services. In North America, the Bosch Group manufactures and markets automotive original equipment and aftermarket products, industrial automation and mobile products, power tools and accessories, security technology, thermo-technology, packaging equipment and household appliances. Bosch employs approximately 25,000 associates in more than 70 locations throughout the U.S., Canada and Mexico, with reported sales of \$9.5 billion in fiscal 2007.

Bosch's involvement in EcoCAR mirrors our future and results focus by fostering the development of future engineering talent. Additionally, Bosch associates come from an extremely wide range of countries. This diversity is an ideal chance for the company and its associates alike to learn from other cultures and benefit from the wealth of perspectives and ideas. Bosch is sponsoring an EcoCAR Diversity Award to encourage EcoCAR teams to similarly embrace and learn from the diversity within teams and the community.

For more information on the company, visit www.boschusa.com.

ECO CAR 2009 SPONSORS

Silver Sponsors

Snap-on **Snap-on Inc.** To know Snap-on® tools is to love **Snap-on** tools. The wide range of products that the Snap-on family of brands has available become the treasured objects for most every type of professional tool user. That's because employees in our company are obsessed with innovation. Never satisfied, designers, engineers, and machine operators are continuously looking for ways to improve the company's products.

Snap-on Incorporated is a leading producer and distributor of tools, diagnostics, shop equipment and software solutions to the marketplace. All the brands in the Snap-on family are known for quality and innovation. Customers are turning to Snap-on as their single-source provider for all needs within the transportation service, industrial, government, education, agricultural and other commercial applications.



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Renewable Fuels Association

Renewable Fuels Association

As the national trade association for the U.S. ethanol industry, the Renewable Fuels Association (RFA) promotes policies, regulations and research and development initiatives that will lead to the increased production and use of fuel ethanol. RFA membership includes a broad cross-section of businesses, individuals and organizations dedicated to the expansion of the U.S. fuel ethanol industry.

Organized in 1981, RFA serves as the voice of the ethanol industry, providing advocacy, authoritative analysis, and important industry data to its members, Congress, federal and state government agencies, strategic partners, the media and other opinion-leader audiences.

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EcoMotors "Clean, Efficient and Lightweight Propulsion Systems for

a Better World" is the essence of our mission, as well as of our passion. EcoMotors' journey comprises the quest for ever-greater Power Density, and the enabling of globally relevant applications of our technologies.



Electric Power Research Institute (EPRI) conducts

research and development relating to the generation, delivery and use of electricity for the benefit of the public. An independent, nonprofit organization, EPRI brings together its scientists and engineers as well as experts from academia and industry to help address challenges in electricity, including reliability, efficiency, health, safety and the environment. EPRI also provides technology, policy and economic analyses to drive long-range research and development planning, and supports research in emerging technologies. EPRI's members represent more than 90 percent of the electricity generated and delivered in the United States, and international participation extends to 40 countries. EPRI's principal offices and laboratories are located in Palo Alto, Calif.; Charlotte, N.C.; Knoxville, Tenn.; and Lenox, Mass.



Women in the Winner's Circle

Foundation Founded in 1994 by Lyn St. James, the Women in the Winner's Circle Foundation is a 501(c)(3) organization

that focuses on worldwide activities and programs for driver development, advocacy, diversity and education, particularly for women who aspire to become race car drivers. The Foundation is dedicated to making a difference and reaching the point in time when "opportunity" and "diversity" are no longer concerns—they are taken for granted.

The Foundation's mission is to provide leadership, vision, resources and financial support to help create an environment of opportunity for women's growth in the automotive and competitive motorsports fields.



igus develops and manufactures industry-leading, plastic-based cable carriers, continuous-flex cables and plain and linear bearings. With more than 28,000 products, the company markets its Energy Chain Systems® to guide and protect moving cables and hoses, Chainflex® cables designed specifically for use in Energy Chain Systems, iglide® self-lubricating, oil-free, plastic bearings, DryLin® linear guide systems and igubal® spherical bearings worldwide. Iigus fosters the mechanical design ideas of students by offering free product donations in conjunction with its Y.E.S. (Young Engineers Support) Program. The program aims to not only support students and engineers, but also educate them on the merits and benefits of plastic components. For more information about the Y.E.S. Program, please visit www.igus.com/yesprogram.

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2009 Event Sponsors



Ontario

Government of Ontario The

Ontario Government is making innovation a key driver of the provincial economy. Through the eight-year, \$3-billion Ontario Innovation Agenda, the province is capitalizing on its creative environment, diverse culture, highly skilled workforce and internationally recognized education system. By investing in research and innovation, Ontario is helping to pioneer the discoveries of tomorrow that will create high-value jobs and a strong and competitive economy.



Ontario Centres of Excellence
Where Next Happens

Ontario Centres of Excellence (OCE) Inc. drives

the commercialization of cutting-edge research across key market sectors to build the economy of tomorrow and secure Ontario's global competitiveness. In doing this, OCE fosters the training and development of the next generation of innovators and entrepreneurs and is a key partner with Ontario's industry, universities, colleges, research hospitals, investors and governments. OCE's Centres work in communications and information technology, earth and environmental technologies, energy, materials and manufacturing and photonics. OCE is funded by the government of Ontario and is a key partner in delivering Ontario's Innovation Agenda.



City of Toronto

Toronto is Canada's largest city and sixth largest government, and home to a diverse population of about 2.6 million people. It is the economic engine of Canada and one of the greenest and most creative cities in North America. Toronto has won numerous awards for quality, innovation and efficiency in delivering public services. 2009 marks the 175th anniversary of Toronto's incorporation as a city. Toronto's government is dedicated to prosperity, opportunity and liveability for all its residents.



Ontario Power Authority is responsible

for ensuring a reliable, sustainable supply of electricity for Ontario. Its four key areas of focus are: planning the power system for the long term, leading and coordinating conservation initiatives across the province, ensuring development of needed generation resources and supporting the continued commercial evolution of the electricity sector.