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Technovations in Transportation

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Electronic Fuel Injection 101

This past summer, with help from the National Institute for Advanced Transportation Technology (NIATT), eight of the University of Idaho Formula Hybrid SAE team members attended the Electronic Fuel Injection (EFI) 101 course held at PINA Motorsports in Kent, Washington. EFI University offers the course in order to teach students the basics of factory and aftermarket engine management systems and how they are integrated with internal combustion engines.

Left to right: Bobby Jackson, Pietro Boyd, Samuel Wos, Josh Ulrich, Zack Porter, Stephen Hieb, Cody Brumett, & Justin Ruegsegger outside of the engine bay of the chassis dynamometer (dyno).

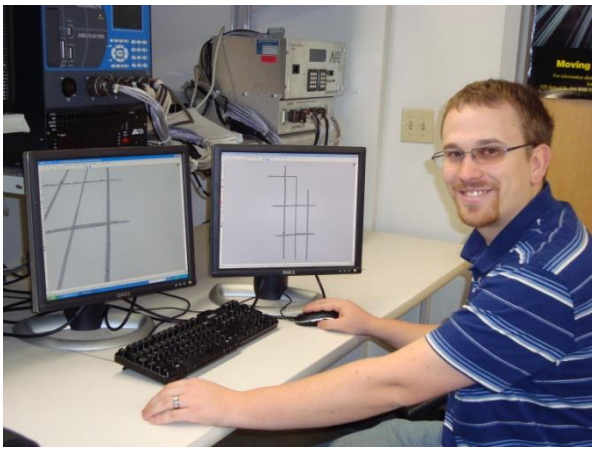
In the two-day course, students spend a majority of their time in the classroom learning the various functions and types of sensors, how engine management systems calculate the needed amount of air and fuel for a required operating condition, and how users can manipulate these data. The second day of the course is an introduction to the aftermarket engine management systems available, as well as a chassis dyno tuning session to demonstrate the material covered in the course. During the dyno session, the instructor adjusts fuel and timing tables in the engine's computer to demonstrate how this affects performance and air/fuel ratios. Everyone who attended had a great time and the students appreciated having the principles they learned in their engineering courses reinforced and demonstrated.

For additional information on the current team status see
http://seniordesign.engr.uidaho.edu/2010-2011/hybridformula/

Integrating Vehicle Emissions and Fuel Consumption Data With Microscopic Simulation

Researchers in NIATT are conducting the second phase of an exploratory research effort that focuses on understanding and quantifying the relationship between vehicle fuel use and emissions, and its trajectory throughout signalized intersection approaches. This is an important step toward accurately quantifying the environmental impacts of different signal improvement and sustainable mobility projects. Most of the vehicle emissions data used in emission and fuel consumption modeling are collected in a controlled laboratory environment. With the rapid technological changes to vehicles design that lead to reduction in vehicle emissions and fuel use, it is necessary to develop cost-effective real-time emission and fuel consumption data collection methods in the field to support microscopic traffic modeling applications.

The aim of this phase of the UTC project is to develop a microscopic emission and fuel consumption model that can describe various traffic conditions based on the detailed simulation of vehicle activity on a traffic network. This project seeks to address one of the major shortcomings associated with the use of existing microscopic and macroscopic models by integrating currently available and updated U.S.-based vehicle emissions and fuel consumption data into the VISSIM microscopic simulation model.



Matt Ricks working on VISSIM.

NIATT researchers working on the project will also examine the validity of using onboard vehicle diagnostics to collect real-time emissions and fuel consumption data from vehicles operating in the field and the possibility of integrating this real-time data with microscopic simulation models. An objective of this project is to provide transportation operators with a model that is capable of reliably estimating the environmental impact of various traffic management policies and fill a gap that currently exists in traffic modeling capabilities.

NIATT Researchers Awarded a Major Equipment Grant

Researchers in the Center for Clean Vehicle Technology recently received a $292,000 award for equipment from the M.J. Murdock Charitable Trust. Equipment purchased with the award will significantly expand the group's research capability by allowing acquisition of a high-resolution infrared camera and engine exhaust analyzers. These acquisitions will assist in completing the Small Engine Research Laboratory at the Moscow campus and the Combustion Laboratory in the Bio-Energy and Efficiency Research Group at the University of Idaho facility in Boise. For several years, NIATT faculty have been developing innovations using alternative fuels and ignition technology in internal combustion engines. This equipment will help researchers and students to better quantify improvements in fuel economy and pollution emissions while studying the fundamental mechanisms of combustion and pollution production.

NIATT Projects Headline Snapshot Day

Left to right (back): Cody Brumett, Dylan Rinker, Justin Ruegsegger, Sam Wos, Corey Adrian, Travis Shiell, Bobby Jackson, Stephen Hieb, (front): Jordan Anderson , Chris Eacker, Zack Porter are members of the Hybrid Formula Team.

Capstone design students, other undergraduates, and representatives of regional industry gathered on December 2nd for the 2011 December Snapshot Day. More than 20 teams from across the College of Engineering showed off progress to date on their two-semester service learning projects with clients from across the northwest. The format was an interactive poster session in the Gauss Johnson Laboratory. Five teams completed their work with the close of the Fall 2011 semester. These teams also gave 20 minute technical presentations about their work to members of the Mechanical Engineering and Electrical & Computer Engineering advisory boards. The remaining teams will report their end-of-project status at the annual University of Idaho Design Expo on April 27, 2012.

Prominent among the projects presented were NIATT's Hybrid Formula Car and next generation Clean Snowmobile Drive System. The Snapshot Day marked the official unveiling of a hybrid vehicle prototype that has been under development for the last two years. All systems are fully integrated on a vehicle platform that is ready for technical inspection like the one it will encounter at the Formula Hybrid Competition in May 2012 at the New Hampshire Motor Speedway. The vehicle includes a repackaged Yamaha YZ250 engine and Lynch electric motor that both supply power upstream of the transmission, allowing for significant weight reduction and traction torque improvement over typical entries in this engineering competition. Half of the team graduated in Fall 2011, and their technical presentation won first place, applauded for their integration of design analysis, innovative manufacturing, and thoughtful component testing. Tom LaPointe, NIATT Advisory Board Member, said "This is just the kind of real-world experience that gives UI students the kind of hands-on experience necessary to hone their competitive edge and help them excel in today's job market."

A prototype drive system for the Clean Snowmobile was also on display at the Snapshot Day. Nearly all snowmobiles use a track that is driven at the front-most part of the loop. This is convenient for packaging, but inefficient at transmitting power from the engine to the snow. A group of capstone students, Team RearMotion, have developed a prototype skid that will be mounted and tested in one of the NIATT Clean Snowmobile Challenge sleds to measure the drivetrain efficiency improvements compared to a traditional track system from the same sled. Improved drivetrain efficiency should benefit the Clean Snowmobile Challenge entry with increased fuel economy and better acceleration. An improvement in handling is also expected.

Jeremy Nichols (left) and Chris Hill with their rear drive prototype snowmobile track system at the Fall 2011 Snapshot Day.

Fall Fiesta!

NIATT hosted the second annual Fall Fiesta in September, to welcome back students, faculty, and staff for the 2011–2012 academic year. NIATT served the "Moscow Mile," a six foot party burrito from Patty's Kitchen. This is a popular lunch with our students.

NIATT also celebrated the end of the fall semester with a holiday party, honoring the students who graduated in December.

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