



Lab Tour Opportunities

Lunchtime

Tony England Engineering Lab Building

12:10 p.m.	Tour A:	Digital Engineering Laboratory
	Tour B:	Power Engineering Simulator Lab
12:25 p.m.	Tour A:	Power Engineering Simulator Lab
	Tour B:	Digital Engineering Laboratory

End of the Day

Institute for Advanced Vehicle Systems Building

5:15 p.m.	Driving Simulator and ImpLi-Fi Demo
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Lab Descriptions

Digital Engineering Laboratory

The laboratory develops data-driven frameworks and technologies that connect information about product lifecycle, from design to disposal, to provide insights into system behavior and performance.

Power Engineering Simulator/Research Lab

Experimental validation is crucial for emerging research and technologies. The Power Engineering Simulator/Research Lab supports researchers/students by providing a combination of emulation, simulation, and real hardware to realize a large-scale, virtual environment that is measurable, repeatable, flexible, and adaptable to emerging technology while maintaining integration with legacy equipment. Its capabilities span transmission, distribution & metering, distributed generation, and home automation and control – providing true end-to-end capabilities for the smart grid. The Power Engineering Simulator/Research Lab enables researchers and students to conduct, validate, and evolve cyber-physical research from fundamentals to prototype, and finally, transition to practice.

Research activities are aimed at achieving the optimization of electric and hybrid system design, component design and operation control. The focus is on areas crucial for the development and commercialization of electric and hybrid vehicles. It encourages the integration of research and graduate education in terms of curriculum renovation, graduate research directions and industrial sponsorship for graduate research projects.



Driving Simulator Lab

The Driving Simulator Lab houses a motion-based driving simulator to support faculty and students for advanced research and education in automotive systems, human factor and ergonomics, human-machine interaction, and driver behavioral studies. The DSL is in the Institute for Advanced Vehicle Systems, 1080 IAVS, in the College of Engineering and Computer Science at the University of Michigan-Dearborn.

The simulator consists of the following main components: (1) a driver occupant platform with professional driving interface units (seat, pedals, steering wheel with stalks), a glass cockpit and center console touch screen, a high-end digital audio system with sub-woofer and 4 satellite speakers, and a vibration actuator; (2) a 6-DOF motion base and control loading system for force feedback on the steering wheel and a transport frame; (3) a visual system based on 3 displays mounted on the simulator top frame; and (4) Panthera simulation software fully integrated with the following application software:

- CARSIM: various vehicle dynamics models, including sedans and SUVs
- 3D Unity for operating 3D objects in the simulation
- SimSound for simulating noise and vibration
- iMotion: physiological sensors (heart signal (ECG) and skin conductance (GSR))
- Tobii eye tracker used to analyze the profile of driver's attention
- Siemens PreScan/Aimsun for sensor modeling and generating various traffic scenarios and environments

ImpLi-Fi Demo

ImpLi-Fi technology, developed from the ground-up at UM-Dearborn, is a light-based ad hoc physical layer communication protocol, developed with a focus on ease of setup and secure data transfer, with characteristically low susceptibility to interference and interception. Utilizing an LED or laser diode for data transmission natively provides a high level of directionality compared to even the most advanced RF beam-shaping techniques, allowing users to see how their data is being transmitted, and granting greater security for sensitive data. Our demo will be outdoors (through the west end of IAVS) and will showcase semi-truck marker lights and headlights wirelessly communicating data with a ground station over long distances.