Acknowledgements

A tremendous thank you to our industry and community sponsors and partners ...
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Tim Schulz, Dean, College of Engineering; Bob Warrington, Codirector, Institute for Leadership and Innovation; and Leonard Bohmann, Associate Dean, College of Engineering

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Scope
The Undergraduate Expo highlights hands-on, discovery-based learning at Michigan Tech. Nearly one thousand students in Enterprise and Senior Design teams showcase their work and compete for awards. A panel of judges, made up of corporate representatives and Michigan Tech staff and faculty members, critique the projects. Many of them are sponsored by industry, which allows students to gain valuable experience through competition at the Expo, as well as direct exposure to real industrial problems. The Expo is a combined effort of the College of Engineering and the Institute for Leadership and Innovation.

Student Awards
Senior Design Awards
Based on poster
First place—$150
Second place—$100
Third place—$75
Honorable Mention—$50 (three to be awarded)

Enterprise Awards
Based on poster and presentation
First place—$300
Second place—$150
Third place—$100

Undergraduate Expo Image Contest
Photo or non-photo graphics
First place—$100
Second place—$50

Enterprise and Senior Design Patent Disclosure Competition
Winners announced at the Expo
Best Overall—$250
Best Technical Specification—$150
Best Prior Art Review and Competitive Analysis—$100

On the cover, L to R a sampling of teams from last year’s Undergraduate Expo:

Reducing Maintenance Costs through Continuous Monitoring—Ethan Grindle and Jordan Bosque setting up an SEL relay in preparation for testing polling and analysis software. Team sponsored by ITC Holdings.

BoardSport Technologies Enterprise—Doing a quality check on a snowskate deck freshly pulled out of the press. Team sponsored by Altair Engineering and Letherer Truss and Wall Systems Inc.

Human-Powered Grain Processor—The team’s stone mill prototype will fill a need of African people by allowing them to grind their own corn into flour. Team sponsored by the Woychowski Family Foundation.

More Special Thanks
To the distinguished judges who give of their time and talents to help make the Expo a success; to the faculty advisors who generously and richly support Enterprise and Senior Design; and to all the behind-the-scenes superstars (you know who you are)—thank you for your dedication to our students.
Greetings all, and welcome to the eleventh annual Undergraduate Expo!

The Undergraduate Expo highlights the foundations of a Michigan Tech education: experiential learning; teamwork; application of theory, design and innovation; leadership and communication; and multidisciplinary solutions to problems. We strive to deliver an educational experience that prepares our students to create the future.

The students showcasing their projects today have embraced these foundations. They should take tremendous pride in their accomplishments and hard work.

Senior Design enables small teams of highly dedicated students to explore and solve real industry challenges throughout their senior year. Our program is more like a “first job” than a “last class,” connecting students and industry through open-ended projects, which enable teams to follow the complete design process—from ideation to realization.

Michigan Tech’s innovative Enterprise Program facilitates interdisciplinary learning, leadership development, and team-based work in a businesslike setting. Teams of first- through fourth-year students from diverse disciplines operate much like real companies to develop products, processes, and services within their market space. Faculty advisors serve as coaches and mentors, with industry leaders playing a supporting role as collaborators and clients.

We would like to take this opportunity to express our gratitude to the many corporate and community sponsors who so generously support our educational mission by providing invaluable project experiences, along with mentorship and guidance for our students. The benefits of industry and academia working together as partners in higher education are clearly evident, especially here at the Michigan Tech Undergraduate Expo.

Sincerely,

Timothy J. Schulz
Dave House Professor and Dean
College of Engineering

Robert O. Warrington
Codirector
Institute for Leadership and Innovation

Leonard J. Bohmann
Associate Dean for Academic Affairs
College of Engineering
Michigan Tech 2012
Senior Design and Enterprise Teams

Enterprise Projects—pages 6–22
Senior Design Projects—pages 24–31
**101**

MTS Hydraulic Power Unit
Efficiency Optimization

The team poses with an MTS HPU.

**Team Members**
Tyler Muckenhirn, Neil Rumschlag, Peter Henning, Yu Ge, and Haoefei Xie, Mechanical Engineering

**Advisor**
Michael LaCourt

**Sponsor**
MTS Systems

**Project Overview**
MTS Systems Corporation wants to reduce the water usage of their hydraulic oil coolers on the hydraulic power units they manufacture. By increasing the thermal efficiency and better controlling the cooling process, a lower water flow rate can be used to remove the same amount of heat from the oil.

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**102**

Cost-Optimized Prosthetic Knee Joint

Final design for prototype of prosthetic knee joint for amputees in India.

**Team Members**
Elizabeth Anne Dancy, Biomedical Engineering; Matthew Goldsworthy, Aram Kim, Laura Maciosek and Anna Miller, Mechanical Engineering; and Kelsy Ryskamp, Mechanical and Biomedical Engineering

**Advisor**
Dr. Gregory Odegard

**Sponsor**
Dr. Rajesh Malhotra, All India Institute of Medical Sciences

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**103**

Gentex Rear View Mirror Squeak Tester

Assembling the final mirror squeak tester.

**Team Members**
Troy Bouman, Christopher Hathaway, Craig Jeplawy, Alexandrea Reid, and Sheng Zhang, Mechanical Engineering

**Advisors**
Charles Van Karsen and Dr. William Endres

**Sponsor**
Gentex

**Project Overview**
We are designing and producing a prototype of a device that will repeatably and objectively evaluate a mirror's propensity for creak/squeak during repositioning. The device will simulate a typical grip and movement that a driver introduces during mirror repositioning and quantify any noise response resulting from it. We will evaluate various approaches to this end, ultimately designing and prototyping a device based on the approach found to be optimal. The device must be highly adaptable and able to accommodate many types of windshield mounts and mirror designs. Signal processing may be employed to selectively filter background or other input not associated with any mirror body response.
104 Development of an In Vivo Sensor System to Measure Environmental Conditions on Implantable Medical Devices

Shown is the test circuit, designed by graduate student Andrew DeRouin, for a wireless in vivo sensing system.

**Team Members**
Thomas Dienhart, Jaimee Lofquist, Zac Logan, and Andrew Currison, Biomedical Engineering; Keith Driscoll, Biomedical Engineering/Mechanical Engineering

**Advisors**
Dr. Keat Ghee Ong

**Sponsor**
Boston Scientific

**Project Overview**
Boston Scientific is a leader in the development of therapies and implantable devices used to treat cardiovascular disorders, cardiac arrhythmias (abnormal heart rhythms), sudden cardiac arrest, heart failure, and vascular system issues. The focus of this project is to develop a wireless device which provides feedback for assessing in vivo conditions for different implant situations.

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105 Portage Health Noise Monitoring Device

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106 The Development of a Hydrophilic/Hydrophobic Interface

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**Team Members**
J. Ethan Lynch, Shaubhik Bhattacharjee, Trent Jansen, and J. Nathan Willemstein, Biomedical Engineering; and Lynn Giesler, Biomedical Engineering/Mechanical Engineering

**Advisors**
Dr. Michael Neuman and Dr. Keat Ghee Ong

**Sponsor**
Portage Health

**Project Overview**
The goal is to design and develop a sound-level alarm to be incorporated at Portage Health in Hancock. The objective is to alert the main focus group when sound levels reach a decibel level over a set threshold and remind the focus group to quiet down to benefit patient health. The design needs to accommodate for a multifunctional interface to give the user an opportunity to individually customize each unit by allowing for data logging, variable threshold settings, visible alarm, and an appropriate display for changing settings.

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**Team Members**
Traci Billings, Biomedical Engineering and Anthropology; Hilary Aho and Henry Durnwald, Biomedical Engineering/Materials Science and Engineering; and Thomas Hurley and Julia Osborne, Biomedical Engineering

**Advisor**
Dr. Megan Frost

**Sponsor**
Department of Biomedical Engineering

**Project Overview**
We are fabricating a polymer layer to interface with hydrophilic and hydrophobic materials simultaneously. This will be accomplished through the production of a coating that can be placed over a base layer, such as polypropylene, silicon rubber, or stainless steel, that will allow for good adhesion with a collagen layer, which will in turn promote cell attachment and growth. A potential benefit of this technology is to control biological response to artificial materials used to fabricate implanted devices.
Project Overview
The Portage Lake Golf Course requires a machine that will sift multiple grades of sand and soil. Currently the method that is used to sift soil is purely manual, and thirty to forty hours per week are put into sifting soil. There is no method to sift sand. The goal of the project is to develop a method to sift sand and soil to reduce working hours and improve course quality.

Team Members
Alex MacLeod, Yachan Zhang, Bob Williams, Colleen Switlik, and Steve Schmiedeknecht, Mechanical Engineering
Advisor
Dr. Michele Miller
Sponsor
Portage Lake Golf Course

Team Members
Ruiyu Kang, Aaron Moore, Nick Pomeroy, Stephen Whittaker, and Drew Maki, Mechanical Engineering
Advisors
Charles Van Karsen and Dr. Brian Endres
Sponsor
Whirlpool

Project Overview
Our team is performing root-cause analysis followed by corrective-action design and implementation to improve the reliability and repeatability of the in-process, pressure-decay, leak-test machine at Kohler Engines.

Team Members
John Kosmatka, Aaron Cedergren, Mindy Saxton, Myles Strong, and Jessica Nelson, Mechanical Engineering
Advisor
Dr. Charles Margraves
Sponsor
Kohler Engines

Project Overview
Our goal is to redesign the Laundry 123 Work Surface produced by Whirlpool Corporation. This involves changing from an injection-molding process to a thermoforming process.
**110 Jaipur Foot Improvements**

Marcel prepares for the shaping of internal components of the foot.

**Team Members**
Victoria Demers, Mechanical Engineering; Allison Lebovsky, Biomedical Engineering/Mechanical Engineering; Paul Sturmer, Robert Strobel and Marcel Kerkove, Mechanical Engineering; and Stefanie Bass, Biomedical Engineering

**Advisors**
Dr. Gregory Odegard and Dr. Anil Jain, Jaipur, India

**Sponsor**
Department of Mechanical Engineering-Engineering Mechanics

**Project Overview**
We are dedicated to the improvement of the Jaipur Foot, a prosthetic used for low-income patients. The foot is labor-intensive and made by hand. Targeted areas of improvement include weight reduction, flexibility, and quality control. The team traveled to India in March to meet with the sponsor and to have the prototype tested.

**111 Automated Carpet Cleaning Test Stand**

This automated carpet cleaning test fixture, sponsored by Bissell Homecare, will allow for rapid testing of new brush chamber designs.

**Team Members**
Andrew Bitely, Brent Guimont, Michael Hojnacki, Zacharey Hussong, and Jim Shortland, Mechanical Engineering

**Advisor**
Dr. Gordon Parker

**Sponsor**
BISSELL Homecare, Inc.

**Project Overview**
We were given the task to design and build an automated carpet-cleaning test fixture for BISSELL Homecare. This device will help BISSELL optimize the performance of its vacuums by allowing the company to evaluate prototype brush chambers on its vacuum cleaners before completely developing a new vacuum.

**112 Pet-Friendly Motorcycle Sidecar**

The sidecar is fabricated from a frame made from 1-inch OD steel tubing that supports a 16- and 10-Gage welded steel metal body shaped similar to a dog house.

**Team Members**
Brad Lynn, Joseph Supinsky, and Jan Zlebek, Mechanical Engineering Technology

**Advisor**
Dr. John Irwin

**Sponsor**
School of Technology

**Project Overview**
Our goal is to design, fabricate, and test a pet-friendly motorcycle sidecar, one of the first of its kind. The sidecar needs to effortlessly mount to a 1982 Honda CB900 without any modifications to the motorcycle. The sidecar should be reliable, fuel-efficient, and comfortable—all while providing a safe riding environment for most household pets.
113 Economic Recovery of Alloying Elements from Grinding Swarf

Team Members
Alicia Steele, Materials Science and Engineering/Mechanical Engineering; and Daniel Hein, Michael Wyzlic, and Nicholas Kraft, Materials Science and Engineering
Advisor
Dr. Jaroslaw Drelich
Sponsor
Casting Services Group

Project Overview
Casting Services Group (CSG) in Menominee, Michigan, currently supplies salt cores used to make precision cast components, such as aluminum pistons. As a new business opportunity, Casting Services Group would like to investigate economical recovery of high-value alloying elements from grinding swarf—fine metallic shavings removed from cutting and grinding tools. We will look at the process development and economics associated with reclamation of the valuable elements.

From scrap to cash: Valve seat inserts overlayed on SEM image of grinding swarf.

114 Jeep Wrangler Door Check

Team Members
Samantha Meader, Yi Sui, Nathan Wastell, and Cory Karosa, Mechanical Engineering
Advisor
Charles Van Karsen
Sponsor
Chrysler

Project Overview
The 2007 and current JK generation of the Jeep Wrangler—two- and four-door variants—are manufactured and sold without a door-check mechanism. A door check is a mechanical device used to hold the door open at various detents (angles). The current Wrangler only uses a nylon strap to stop the door from making contact with the front fenders of the vehicle. The largest consumer complaint is that the vehicle doors can close when parked on a slight incline. We have been presented with the task of designing a door check, which must contain at least two detents (mid-angle and full-open); provide a way of easy removal of the doors; meet all of Chrysler's Design Verification Plan and Report requirements (DVP&R); and not impede the door-closing velocity or effort.

This image shows the internal components of the door check when fully assembled inside the hinge.

115 Reduce Residual Stresses in Gray Iron Brake Rotors for Subsequent Ferritic Nitrocarburizing

Team Members
Carol Deming, Trevor Gibson, Nick Weinberg, Materials Science and Engineering; and Lance Taylor, Mechanical Engineering/Materials Science and Engineering
Advisor
Dr. Paul Sanders
Sponsor
ThyssenKrupp Waupaca

Project Overview
Internal stresses are developed during solidification of gray iron automotive brake rotors. Ferritic nitrocarburizing has been recently employed to reduce corrosion, but stress-relieving is required to mitigate distortion during this process. To eliminate the time and cost of stress-relieving, it is desirable to minimize casting stresses through design and process optimization. Solidification modeling software (MAGMASOFT) will be employed to minimize casting stresses through solidification so that residual stress treatments are no longer required. Using Six Sigma techniques, a complete casting and mold strategy will be developed to minimize residual stress development.

MAGMA Soft residual stress model of a modified Thyssen Krupp Waupaca brake rotor casting.
116 Pneumatically-Powered Assistive Exoskeleton

Team Members
Brandon Breda, Zach Carlson, and Carl Seidel, Electrical Engineering Technology

Advisor
Dr. Aleksandr Sergeyev

Sponsors
MAC Valves, Portage Health

Project Overview
Our goal is to develop an exoskeleton that reacts more naturally to the user’s movement by providing structural support—modeled after kinematic motion of the skeletal system and the use of soft pneumatic “muscle-like” actuators. The development of an affordable, adaptable, lightweight, and user-friendly powered exoskeleton for lower limb and back support has many applications in industry.

Testing setup for the Pneumatic Muscle, pulling a 20-lb weight.

117 Fatigue in Stainless Steel Components Produced by Powder Metallurgy and Hot Isostatic Pressing

Team Members
Tyler Bobbly, Samantha Leonard, Dave MacEwen, and Anthony Tuthill, Materials Science and Engineering

Advisor
Dr. Calvin White

Sponsor
Electric Power Research Institute (EPRI)

Project Overview
The Electric Power Research Institute (EPRI) is conducting research to examine the suitability of replacing traditional cast stainless steels used for pressure-boundary applications with components produced by powder metallurgy (PM) and hot isostatic pressing (HIP). Our team is conducting low-cycle fatigue and surface-roughness tests on material obtained from a PM-HIP stainless-steel prototype valve body, as well as an equivalent cast stainless steel. A literature search has led to the development of a plan to explore and analyze the difference in the process-property-microstructure relationship between the two components, using a Six Sigma approach.

Anthony Tuthill prepares to load a sample using the MTS machine.

118 Split Hopkinson Pressure Bar

Team Members
Eric Little and Thomas Roose, Mechanical Engineering Technology; and John Kolacz, Industrial Technology

Advisor
Scott Wagner

Sponsor
School of Technology

Project Overview
Split Hopkinson Pressure Bar (SHPB) is an apparatus designed to measure stress-pulse propagation in a metal bar. Our goal is to create the mechanical means of a scaled-down version of the SHPB with design improvements for testing metal samples. Currently the Department of Civil and Environmental Engineering at Michigan Tech has a forty-five-foot-long SHPB for testing three-inch diameter concrete samples.

Datum for the design of the Split Hopkinson Pressure Bar project. Datum belongs to the civil engineering department.
**119 Hybrid Hovercraft**

Team Members
Jarret Pesola, Ryan Schurig, and Zak Whiteley, Mechanical Engineering Technology

Advisor
Dr. John Irwin

Sponsor
School of Technology

**Project Overview**
Our goal is to convert a human-powered hovercraft to a hybrid hovercraft, with a lift component that is no longer powered by the operator, in order to increase overall practicality. The lift component must use a means of alternative energy to keep the carbon footprint to a minimum.

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**120 Locating Contamination in the Lake Linden Stamp Sands**

Team Members
Elliot Rouleau, Andrew Reed, Guogun Zhang, Laura Schaner, Will McSorley, Jacob Woolley, and Eric Shepeck, Geological Engineering

Advisor
Dr. John Gierke

Sponsor
Michigan Department of Environmental Quality

**Project Overview**
The Michigan Department of Environmental Quality requested that we perform preliminary data collection to aid in its investigation of subsurface contamination in the suspected contamination area within Lake Linden Park. Utilizing several geophysical methods, data were collected to observe any contrast in instrument readings between the contamination and surrounding soil. Magnetics, electromagnetics, and electrical resistivity were the geophysical properties examined.

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**121 Diesel Engine Cavitation Observation Apparatus**

Team Members
Nick Nemethy, Electrical Engineering; and Trent Alexander, Brian Judson, Evan Lucas, Todd McIntosh, and Tim Reinke, Mechanical Engineering

Advisor
Dr. Charles Margraves

Sponsor
John Deere

**Project Overview**
Diesel engine coolant cavitation is a very serious condition that over time can easily destroy an engine. Cavitation is the formation and implosion of very small vapor cavities/bubbles within a liquid. Sonoluminescence, light emission from cavitation, is the phenomenon by which cavitation will be observed. Imaging cavitation on a running engine has never been attempted before. We are developing an imaging system that will allow John Deere to observe cavitation on a running engine, as well as a system to calibrate the camera system and ensure that it is working properly. We are also developing a test procedure to run on the test engine.
122 Modeling and Simulation of Microwave Photonic Links

The team outside of Harris Corporation in Palm Bay, Florida.

Team Members
Joseph Haefner, Troy Copenhaver, Mike Mauer, and Jacob Kurka, Electrical Engineering-Photonics; and Jess West, Physics/Electrical Engineering-Photonics

Advisor
Dr. Christopher Middlebrook

Sponsor
Harris Corporation

Project Overview
At the intersection of RF and photonic-based communications, the field of microwave photonics has emerged to provide new and powerful tools for communication systems engineers. If properly designed, microwave photonic links can provide the inherent advantages of photonics to analog communication systems on a variety of platforms. Harris Corporation is an industry leader in high-reliability, high-performance, RF and photonic devices for both commercial and military applications. The company has been conducting state-of-the-art research in microwave photonics for several years.

123 Modeling and Design of a Clavicle Bone-Plate for Zimmer

Clavicle and plate in UGNX.

Team Members
Genny Gierke, Mark Savageau, Michael Marcon, Scott Dombroski, Kevin Adamek, and Andy VerSteeg, Biomedical Engineering

Advisor
Dr. Sean Kirkpatrick

Sponsor
Zimmer Inc.

Project Overview
Mid-clavicular fractures are one of the most common injuries to the human skeleton. The task for this project is to create a clavicle bone-plate for Zimmer’s Trauma Division. Designs were justified based on biomechanical modeling of stresses performed in both the MATLAB and Abaqus environments. The final plate design was shown to balance clavicular stresses due to the biomechanical loading of daily activities, as well as provide structural support for various fracture geometries in the clavicle.

124 Breaker Wear Monitoring

Simulating a single-phase fault using a Doble F6150 and a Basler relay.

Team Members
Kyle Desser, Keith Diels, John Gibbs, Craig Helminen, Logan Pirkola, and Nicole Talbot, Electrical Engineering

Advisor
John Lukowski

Sponsor
ITC Holdings

Project Overview
The objective of our project is to improve circuit breaker maintenance efficiency. The goal of our project is to identify a monitor with the capability to accurately measure accumulated breaker wear. Once a device has been identified, a method will be provided for the breaker-wear monitor to detect when a particular circuit breaker needs maintenance.
**125 Synchronous Belt Transmission Error Test Bench**

Three-dimensional solid body model of the transmission error test bench.

**Team Members**
Ryan Helminen, Forrest Tingo, and Brittany Breitmeyer, Electrical Engineering; Patrick Haas, Mechanical Engineering; and Blake Latchford, Computer Engineering

**Advisor**
John Lukowski

**Sponsor**
Nexteer Automotive

**Project Overview**
The goal of this project is to measure the transmission error between two pulleys attached to a synchronous belt. One pulley will be driven by an electrical motor, and the other will be permitted to spin freely. Transmission error is defined as the difference in angle between the two pulleys’ angle at an instance in time. A tension should be able to be applied to the belt by an idler or by a force separating the pulleys.

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**126 Power-Assisted Door Safety System for Armored Vehicles**

Brett programming the microcontroller to read our sensors.

**Team Members**
Keith Helminen, Mark Holmstrom, Erik Peterson, Brett Schiavo, and Sean Keyes, Electrical Engineering

**Advisor**
Donald Secor

**Sponsor**
BAE Systems

**Project Overview**
BAE Systems has identified the need to increase safety and situational awareness for vehicles utilizing power-assisted doors. Safety needs to be improved to ensure that accidental damage to equipment or, more importantly, injury to personnel, does not occur due to powered-door operation. Situational awareness of the vehicle’s operators should also be improved by doubling the function of the safety system for uses such as detecting blind spots.

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**127 Mobile Microgrid**

Mobile Microgrid turns the power system inside the Michigan Tech Mobile Laboratory into an educational tool for self-contained power systems.

**Team Members**
Antonio Donati, Adam Heskitt, Shawn Mayorga, Hillori Mitchell, Electrical Engineering; and Hanchen Liu and Zhuang Shao, Mechanical Engineering

**Advisors**
Dr. Wayne Weaver and Dr. Gordon Parker

**Sponsor**
Department of Energy

**Project Overview**
This project is focused on the configuration and improvement of a self-contained electrical microgrid inside the mobile laboratory for hybrid electric vehicle education. The microgrid system of the lab includes generators, plug-in vehicles, dynamometers, and renewable energy sources. To extend the education, research, and outreach capabilities of the mobile lab, we implemented a system-level monitoring and control system, power-flow simulation, wind turbine, and various demonstrations.
128
RFID-Based Safety System

Yan Guo, Mingzi Li, Matt Rathbun, and Bin Zhou connect a RFID reader to a microcontroller.

Team Members
Jonathon Nelson, Xingbo Song, Zhi Zheng, Matt Rathbun, Yan Guo, and Xin Hao, Electrical Engineering; and Michael Mermuys, Mechanical Engineering
Advisor
Donald Secor
Sponsor
ArcelorMittal

Project Overview
We are planning to design a system that automatically logs when employees come in or out of dangerous areas. As the sponsor has requested, this capability won’t use a card swipe or a two-way radio. Instead, we will use RFID scanners in doorways and RFID tags that will be worn or held by employees. This all depends on the working environment and the specific needs of the sponsor, such as what type of RFID device they prefer or what they need the scanning range to be.

129
Remote Water-Sensing Hydrant

To the left, determining a suitable method for allowing an antenna to pass through the housing while the remaining team members; to the right, attempting to get the transceivers to transmit and receive the appropriate signals.

Team Members
Adam Geml, Electrical and Computer Engineering; Michael Mermuys, Mechanical Engineering; Xin Hao, Jonathon Nelson, Xingbo Song, and Zhi Zeng, Electrical Engineering
Advisor
Donald Secor
Sponsor
ArcelorMittal

Project Overview
The scope of this project is focused on the dry barrel hydrant and creating and packaging a prototyped sensor to wirelessly transmit a signal if the hydrant contains water. The goal is to reduce or eliminate the number of hydrants damaged due to freezing weather.

130
Bioabsorbable Polymer-Coated Metal Stent Degradation Simulation Design

Fluorescent polymer-coated wires for degradation characterization.

Team Members
Kristina Price, Brendan Daun, Thomas Faulkner, Erin Larson, Derek Yesmunt, and David Strobel, Biomedical Engineering; and Kelsey Waugh and Matt Gardeski, Materials Science and Engineering
Advisors
Dr. Jeremy Goldman and Dr. Jaroslaw Drelich
Sponsor
Boston Scientific

Project Overview
The next generation of drug-eluting stents may contain drug-releasing biodegradable polymer coatings. However, the biodegradation rates and behavior of these polymer coatings will first need to be tailored to meet the needs of diseased arteries. As an improvement over existing methods, we have developed low-cost, simplified, and time-effective methods for characterizing the degradation behavior of different polymers. These parallel in vitro and in vivo methods exploit the properties of fluorescent molecules and utilize simple implant geometries to characterize degradation rates and behavior.
131 Minimally Invasive Thoracic Fixation System

From left to right: Mary Czysen, Ben Foelker, Hannah Mikulich, Justin Slis, Justin Springer, and Katie Ross

Team Members
Mary Czysen, Ben Foelker, Hannah Mikulich, Justin Slis, Justin Springer, and Katie Ross, Biomedical Engineering
Advisor
Dr. Rupak Rajachar
Sponsor
Medtronic

Project Overview
Implantable devices are the future of sensor technology, and finding a way to reliably and effectively fixate these devices inside the body is the focus of this project. Conventionally, these sensors are used for monitoring thoracic cavity activity and are placed subcutaneously; but with normal body movement the sensor can experience noise due to the instability of the implantation site. Secure fixation to a more mechanically stable site in the thoracic cavity may reduce device motion and thereby reduce noise. For this to be realistic, however, any procedure would have to be minimally invasive.

132 Electric Machine Dynamometer Safety Stop System

Completed Phase I of Safety Stop System for Dynamometer Test Bed.

Team Members
Matt DeBar, Raquiem Ali, and Ryan Paul, Electrical Engineering Technology
Advisors
Dr. Aurenice Oliveira and Dr. Wayne Weaver
Sponsor
ABB

Project Overview
We created a safety stop circuit and enclosure for a dynamometer test bed for many different electrical machines.

133 3M Solar-Powered Patio Umbrella

Solar-powered rechargeable lighting system capable of being retrofitted onto a patio umbrella.

Team Members
Joseph R. Dowdle, Xiaolei Zhang, Douglas Sims, and Erik Griffith, Electrical Engineering
Advisor
Dr. Duane Bucheger
Sponsor
3M

Project Overview
As solar technology gains popularity, there are emerging needs for ways to harness solar energy. One such area involves utilizing solar energy to provide light once sunlight becomes scarce or no longer available. With an interest in exploring this developing area, 3M seeks to assess the commercial viability of designing and building a solar-powered umbrella that is capable of using solar energy to power a lighting system. Additionally, the umbrella system should be capable of harnessing enough solar energy to provide four hours of reading light and have a manufacturing cost of $50 and a mean time before failure of at least five years.
134

Affordable Light Fixture Accessory
Business Team

Members of the ALFA team after class.

Team Members
Kurt Weirich, Dennis Brown Yuxiao Wang, and Mengjiao Xia, School of Business and Economics

Advisor
Roger Woods

Sponsor
Greg Storm, GLS Innovations

Project Overview
The device we are working with is the Accessible Light Fixture Accessory (ALFA), which is being designed to simplify and make safer the process of changing light bulbs and light fixtures. The primary target for this device is real estate developers and builders active in single- and multi-family residential areas. The secondary market is people with physical limitations that currently make it difficult or impossible to change a light bulb or fixture on their own.

135

Leak Test Calibration Cart

The team lays out the pneumatic circuit for the Leak Testing Calibration Cart for the first time.

Team Members
Aaron Friedsberg, Electrical Engineering; Adam Smith and Cody Finch, Computer Engineering; and Kyle King, Electrical and Computer Engineering

Advisor
Dr. Duane Bucheger

Sponsor
Fives Cinetic Automation Corp.

Project Overview
Our goal is to create a portable cart that moves easily from one station to another in a factory setting and performs three types of leak tests: pressure decay, mass flow, and mass spectrometer. The cart will perform the leak tests and compare the results to other stationary testers, so they can be calibrated if necessary.

136

Electric Vehicle Charging Infrastructure Plan

This generic street sign is currently being used to show dedicated electric vehicle charging station parking spots.

Team Members
Patrick Hampston, Sam Perram, and Nicholas Steffey, Civil Engineering; and Simon Mused, Environmental Engineering

Advisor
Dr. George Dewey

Sponsor
General Motors

Project Overview
We are developing a long-range plan for electric vehicle public charging infrastructure in Houghton and Michigan’s Upper Peninsula.
137  
**Humidity and Temperature Data Logger with GPS Position Recording**

Creating a device to evaluate rust potential on steel coils by monitoring atmospheric conditions and GPS location.

**Team Members**
Seth Adams and Tim Behmke, Electrical Engineering Technology

**Advisors**
Joel Kimball and Dr. Aleksandr Sergeyev

**Sponsor**
ArcelorMittal

**Project Overview**
We are assembling a unit for ArcelorMittal that will sample and record the humidity, temperature, and position as their steel is shipped by rail. The unit will sample and record the data every thirty minutes. The data will be retrieved by plugging the unit into a computer via USB. The data will then be compiled and displayed for easy analysis.

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138  
**Nexteer REPS: Synchronous Belt Tension Measurement**

Taking measurements on a load cell for Nexteer steering unit.

**Team Members**
Jacob Augsburger, Matthew Sundquist and Shijun Liu, Electrical Engineering; Matt Stilwell and Emily Paquette, Mechanical Engineering; and Matt Johns, Computer Engineering

**Advisor**
Dr. Duane Bucheger

**Sponsor**
Nexteer

**Project Overview**
Our goal is to determine the most efficient and effective way of finding the belt tension in Nexteer’s rack-assist, electric-power steering gears. We are accomplishing this through the design and fabrication of a specialized testing stand and multiple measurement devices that utilize a variety of methods to accurately determine the tension in the belt. This tension is an important component in the operation of these gears, and the team has worked hard in acquiring the best results possible through research and testing of methods that use displacement and force, instead of harmonics, to find tension.

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139  
**Rapid Shock Test Fixture**

Rapid shock test fixture.

**Team Member**
Brad Lynn, Mechanical Engineering Technology

**Advisor**
Dr. Dave Wanless

**Sponsor**
Alliance Laundry Systems

**Project Overview**
My goal is to design and build a rapid life-test fixture for a frontload washing machine.
Caterpillar pipelayer boom fore-and-aft adjustment feature, used to axially align large pipes to be welded together.

Team Members
Louis Braun, Jesse Vandenberg, Bryan Finn, Spike Gralewski, and Ross Vandenbosch, Mechanical Engineering

Advisor
Dr. Gordon Parker

Sponsor
Caterpillar

Project Overview
We are introducing a boom design update with additional degrees of freedom for the Caterpillar Pipelaying Boom. Thoughts at the onset of this project indicate the need for introduction of small fore-aft movement, up to a foot and a half in either direction. This must be done without decreasing the payload of the boom. We will also take care not to decrease or compromise the structural integrity of the boom while introducing this motion capability.

Team Members
Steven Johns, Minglei Guan, Benjamin Madsen, Kyle Nordling, and Brian Oestreich, Mechanical Engineering

Advisor
Dr. Michele Miller

Sponsor
Greg Laarman, Jost International

Project Overview
The objective of this project is to design a new landing gear product for semitrailers. The design will feature a dual-speed gearing system to automatically shift between high and low gear ranges, based on the state of loading, in order to improve ease of use and safety.
Our picture is the first 3-D draft CAD model of our senior design project, the Accessible Light Fixture Accessory.

**Team Members**
James Maercklein, Abdulrahman Blaisi, Jeffery Squires, and Su Ting Lau, Mechanical Engineering

**Advisor**
Dr. William Endres

**Sponsor**
Greg Storm, GLS Innovations

**Project Overview**
We are developing a device to simplify and make safer the servicing (changing light bulbs, cleaning, replacing fixture) of common ceiling and wall light fixtures that are beyond reach of the common individual, whether standing or sitting at floor level.

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**Team Members**
Jay Anderson, Eric Link, Doug Yossida, Jan Schneewind, and Mike Bork, Mechanical Engineering

**Advisor**
Dr. Charles Margraves

**Sponsor**
Cummins

**Project Overview**
We are in the process of designing and fabricating an apparatus that will allow engine manufacturers to identify performance requirements for emergency shutoff valves using empirical testing methods. Emergency shutoff valves are required safety equipment for diesel engines in various markets, and our apparatus will facilitate appropriate cost reductions and design improvements to these components through the use of innovative testing equipment and procedures.

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**Team Members**
Dale Goodloe, Materials Science and Engineering, and Jesse Dillon, Materials Science and Engineering/Mechanical Engineering

**Advisor**
Dr. Paul Sanders

**Sponsor**
EJ

**Project Overview**
Copper is a key element used in ductile iron to promote the stabilization of pearlite. However, as copper prices continue to rise, our sponsor, EJ, is interested in understanding whether other elements, such as manganese and tin, can be used in place of copper. Specifically, we were tasked with developing and executing a design of experiments (DOE) to quantify the effects of varying Sn and Mn content on the mechanical properties of 80-55-06 ductile iron.

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Diesel Engine Emergency Shutdown Apparatus. Replacing grips to begin tensile testing of ductile iron specimens.
146
EZAC Creep Testing Team

Three creep samples of EZAC, a zinc-based die-casting alloy developed by Eastern Alloys.

Team Members
Kyle Deane and Mike Knudsen, Materials Science and Engineering
Advisor
Dr. Paul Sanders
Sponsor
Eastern Alloys

Project Overview
This project studies the creep behavior of EZAC, a new zinc-based, die-casting alloy developed by Eastern Alloys. To accomplish this goal, work had to be done to fix the die-casting machine, die-cast samples, and creep test—in both EZAC and Zamak samples—for comparison. Six Sigma principles were employed to ensure the information gathered was statistically significant.

148
Knee Brace Locking Mechanism

Friction and mechanical advantage to make leg brace mechanism easier to use.

Team Members
Craig Pietila, Mikel Marshall, Bryan Rocheleau, Zhi Zhang, and Chris Pollock, Mechanical Engineering
Advisor
Dr. Gregory Odegard
Sponsor
Department of Mechanical Engineering-Engineering Mechanics

Project Overview
We are working to improve the locking mechanism on a knee brace used by children in India. The current lock is too difficult for the children to operate, so our task is to redesign the locking mechanism to make it easier to use.

149
Electric DEF Tank Header Heater

3-D model of the prototype.

Team Members
Lukas Lund, Alex Kaidan, and Chris Hughes, Mechanical Engineering; and Ron Kaunisto, Civil Engineering/Mechanical Engineering
Advisor
Dr. Gordon Parker
Sponsor
John Deere

Project Overview
John Deere is required to meet US EPA-mandated (tier 4) emission standards, aimed at reducing environmental impact of diesel engines, all by 2014. These standards specify the reduction of nitrous oxides (NOx) and particulate matter. John Deere is investigating the use of Selective Catalytic Reduction (SCR) systems to reduce NOx from the exhaust of diesel engines. This process uses a urea solution, called diesel exhaust fluid (DEF), which is injected into the exhaust and then converted into ammonia to chemically transform the NOx into nitrogen and water molecules. DEF freezes at -11C; therefore, vehicles operating below this temperature will require the DEF to be thawed. EPA regulations require injection to start within seventy minutes of startup at -18C. By this time, there must be adequate DEF available to maintain injection. The components needed for operation include a fluid heater, a temperature sensor, a level sensor, a suction line, and a return line within a five-gallon tank.
150
Assault Climbing Device

Jeff Kangas (left) and Collin Veele (right) troubleshoot their compressed air-launching device.

Team Members
Nick Charters, Alex Cotton, Jeff Kangas, Adam Reich, and Collin Veele, Mechanical Engineering
Advisor
Dr. Adam Loukos
Sponsor
Air Force Office of Scientific Research

Project Overview
In rescue and assault operations, soldiers are required to access locations that require the climbing of vertical obstacles in high-risk, non-permissive environments. Using current methods, the physical demands of such climbs are very high. Also, grapples are not effective in many instances due to the lack of a grappling hold, and the long distances needed to throw the grapple/rope are beyond the capability of the troops. The Air Force Office of Scientific Research is sponsoring a national design contest among fifteen universities to create a functional prototype that provides a solution to the problem of assault and rescue-climbing missions.

151
EVSE Business Team

The EVSE team meeting after class.

Team Members
Jiayi Long, Kathryn Poulisse, Ye Zhou, and Paul Petroskey, Business Administration
Advisors
Dr. George Dewey and Dr. Roger Woods
Sponsor
General Motors

Project Overview
We have developed a comprehensive business plan that is catered to rural municipalities looking to implement electric-vehicle charging stations.

152
Waupaca FNC Case Depth

After filling their molds, students pour a spectroscopy button for future testing of the alloy chemistry.

Team Members
Ashwin Vekaria and Sara Heck, Materials Science and Engineering
Advisor
Dr. Paul Sanders
Sponsor
ThyssenKrupp Waupaca

Project Overview
To improve the corrosion resistance of gray cast-iron rotors, it is desirable to improve the ferritic nitrocarburizing case depth by varying the composition and processing of the gray iron. Specifically, this project will evaluate the impact of silicon content, anadium content, and FNC process temperature on the case depth of ferritic nitrocarburizing on a surrogate 20-mm thick gray cast-iron plate. Currently the average nitrocarburized layer thickness is 0.004 inches and the sponsor ideally expects a mean layer thickness of 0.008 inches.
CASTING CAPABILITIES FOR THE WORLD OF TOMORROW

ThyssenKrupp Waupaca is a TS-16949 and ISO 14001 certified producer of gray, ductile, and compacted graphite iron castings, melting over 9,500 tons per day.

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waupacacareers@thyssenkrupp.com

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www.highschoolenterprise.org

High School Enterprise aims to attract more students into STEM post-secondary education and careers, with an emphasis on underrepresented groups. You can help by supporting a team at a school near you, supporting the outreach efforts at Michigan Tech, or both.

Contact Paige Hackney
phackney@mtu.edu
906-487-4371

www.highschoolenterprise.org
Team Leaders
Alisha Clark, Mechanical Engineering; Clay Kliem and Jonathan May, Mechanical Engineering
Technology
Advisor
Dr. James DeClerck, Mechanical Engineering-Engineering Mechanics
Sponsors
Project Overview
We build a formula-style race car to compete in both static and dynamic events at competition. The concept is to build an affordable race car geared towards the weekend auto-croosser, where the static engineering innovations and dynamic racing capabilities are judged and ranked. Michigan Tech has a long history of top-performing cars. Each year we push the racing envelope to develop cutting-edge innovations that will create the future of racing.

Team Leaders
John Bush, Computer Science, and Rachel Swaney, Electrical Engineering
Advisor
Glen Archer, Electrical and Computer Engineering
Sponsors
Chrysler, Pall Corporation, Oshkosh Truck, Plexus, US Department of Energy
Project Overview
Blue Marble is made up of several sub-teams, each working on various projects that are in some way related to security. The goal of Blue Marble is to create sustainable, secure systems for our sponsors, either corporate or within the University. Though located in the ECE department, members in Blue Marble come from a host of other engineering disciplines, including mechanical engineering, computer science, and business.

Team Leaders
Sarah Cavanagh and James Parisot, Mechanical Engineering
Advisor
Robert Page, Mechanical Engineering, and John Lukowski, Electrical Engineering
Sponsor
General Motors
Project Overview
The goal of the Enterprise is to promote and learn about advanced hybrid vehicles in order to reduce fuel consumption and be more environmentally friendly. The Enterprise is a three-year project that takes a normal car and transforms it into a hybrid electric vehicle.


**204 Clean Snowmobile Enterprise**

Team members assembling competition snowmobile for testing.

**Team Leaders**
Dylan Truskolaski and Lauren Nasca, Mechanical Engineering

**Advisor**
Dr. Jason Blough, Mechanical Engineering–Engineering Mechanics

**Sponsor**

**Project Overview**
We compete annually in the Clean Snowmobile Challenge against teams from other universities all around the world. We must engineer and construct a clean, quiet, and efficient internal combustion engine that can run on “flex-fuel”. This sled will be tested on its acceleration, handling, emissions, noise, fuel economy, and endurance. The team will be competing for the second time in the electric snowmobile category. This snowmobile is capable of running for extended ranges, while pulling loads, without having to be recharged.


**205 Aqua Terra Tech Enterprise**

Team Terra Tech attended a well pump test.

**Team Leaders**
Zach Guerrero, Environmental Engineering, and Neil Bates, Geological Engineering

**Advisor**
Dr. John Gierke, Geological and Mining Engineering

**Sponsors**
Keweenaw Bay Indian Community, Gosling Czubak Engineering Sciences

**Project Overview**
Ours is a small but specialized enterprise, made up of only civil, environmental, and geological engineers. The team is conducting an extensive field study of the Pequaming Aquifer near L’Anse, Michigan, sponsored by the Keweenaw Bay Indian Community. We are characterizing the hydrology of the aquifer to determine the sustainability of the water resource for the surrounding residential area. We are also conducting a study, sponsored by Gosling Czubak Engineering in Traverse City, Michigan, on the use of air sparging to treat a water table contaminated with high levels of dissolved iron and chemical oxygen demand (COD). We have conducted a large series of lab tests using contaminated site soil to determine which conditions provide the greatest treatment. Once completed, we will extrapolate this data to the field to determine the most effective use of air sparging to treat the contaminated site.


**206 SAE Supermileage Systems Enterprise**

Supermileage Systems Enterprise Fall 2011.

**Team Leaders**
John Hefferon and Jared Schlueter, Mechanical Engineering

**Advisor**
Rick Berkey, Institute for Leadership and Innovation

**Sponsors**
Pi Innovo, Ford Motor Company Fund, MAHLE Powertrain, 3M, DENSO North America Foundation, General Motors, Chrysler, Cummins, E3 Spark Plugs, Oshkosh Corporation, Deere Foundation, ArconicMittal USA, Mitsubishi Electric

**Project Overview**
The goal of our team is to build the most fuel-efficient vehicle possible for the annual SAE Supermileage competition. Our team consists of students from various disciplines, including electrical, chemical, computer, mechanical, computer science, and business. We use a systems approach to maximize fuel efficiency, setting goals in each of the following areas: vehicle mass, aerodynamic drag, engine run time, engine efficiency, frictional losses, driver ergonomics, and vehicle reliability.
207
BoardSport Technologies

Three-point bend test being performed on a BST skateboard.

Three-point bend test being performed on a BST skateboard.

Team Leaders
Clay Kliem and Jonathan May, Mechanical Engineering Technology
Advisor
Dr. Ibrahim Miskioglu, Mechanical Engineering-Engineering Mechanics

Project Overview
The BoardSport Technologies Enterprise (BST) is a student-created and student-run organization. The enterprise operates much like a small business and is working to create innovative, lightweight, and strong boardsport-related products. BST consists of two teams: Snow Team and Skate Team. Each team operates as a separate entity and is responsible for its own management, operation, and productivity. The Snow Team focuses on snow sports (snowboarding, skiing, etc.), and the Skate Team designs and manufactures innovative skate decks and components.

208
ITOxygen Enterprise

ITOxygen is a student-run Enterprise specializing in IT help for student organization and businesses. Looking for custom IT solutions? Look no further!

Team Leader
Garrett Lord, Computer Engineering/Computer Network and System Administration
Advisor
Bob Maatta, School of Technology
Sponsors
CCI Systems

Project Overview
ITOxygen is a student-run Enterprise that focuses on developing information system and information technology solutions. Our areas of expertise include systems and information analysis, software development, database design, and web-based application development. We are a cross-disciplinary group, drawing from multiple fields of study. Current members are from computer science, computer engineering, the School of Business and Economics, and the School of Technology. Our goal is to provide real-world projects that allow our members to build leading-edge software development and information technology skills that will make them more marketable after graduation.

209
Efficiency Through Engineering and Construction (ETEC)

ETEC presenting to students at Detroit Community High School as part of the Energy Works program.

Team Leader
Ryon Barker, School of Technology
Advisor
Lynn Artman, School of Technology

Project Overview
The Efficiency through Engineering and Construction Enterprise strives to engage students in engineering and construction through real-world projects. It is a multidisciplinary team of highly skilled engineering and construction students who are focused on developing, solving, and redefining today’s engineering problems. We are dedicated to the principles of efficient design, social impact, environmental stewardship, and value to our customers.
**Alternative Fuels Group**

*Team Leaders*
Jacob Boes and Olivia Zajac, Chemical Engineering

*Advisor*
Dr. Wenzhen Li, Chemical Engineering

*Sponsor*
Ford Motor Company Fund

**Project Overview**
Our enterprise is devoted to researching new and innovative alternatives to fossil fuels.

**Solar Car Team creating scale model of solar car chaise.**

**IBV—Biomedical Solutions for Global Markets**

*Team Leaders*
Mary Hickey, Biomedical Engineering, and Evan Beckner, School of Business and Economics

*Advisor*
Dr. Robert Warrington, Institute for Leadership and Innovation, Dr. Michael Neuman, Department of Biomedical Engineering, and Anne Warrington, School of Business and Economics

*Sponsors*
J. Edgar McAllister Foundation, HEYER America

**Project Overview**
IBV is comprised of a diverse group of students working toward a common goal: create biomedical solutions for global markets. Currently the students are working on an Infant Heart Annunciator, to be used in the Third World, and a Low-Cost Pandemic Ventilator. The Annunciator is designed to detect the faint heartbeat of a newborn infant, which might otherwise go undetected by the birth attendants and/or their instruments (such as a stethoscope). The Ventilator performs only the necessary functions to sustain life in situations where a large number of ventilators are needed, such as a flu pandemic or natural disaster.

**IBV students Arjun, Katy, and Doug in the lab, creating biomedical solutions for global problems.**

**Velovations**

*Team Leader*
David Kravis, Mechanical Engineering

*Advisor*
Dr. John Gershenson, Mechanical Engineering-Engineering Mechanics

*Sponsors*
SRAM, Cane Creek, Park Tool, Saris, World Bicycle Relief, Pearl Izumi, Rolf Prima, Rocky Mounts, KORE, Niner

**Project Overview**
The Velovations Enterprise is dedicated to collaborating with the bicycle industry to develop new products and processes. The goal of Velovations is to educate students in the fundamentals of a product development enterprise from customer need, through product and process design and testing, manufacturing, supply chain management, marketing, and distribution.

**Setting up a test to measure wheel deflection under a load**
Team Leaders
Mivil Abraham, Electrical Engineering, and Emily Raffa, Computer Engineering
Advisor
Christopher Cischke, Electrical and Computer Engineering
Sponsors
Fulton Innovation, Esys Automation, Dr. Robert Carnahan, Boston Scientific, Chrysler

Project Overview
The goal of Wireless Communication Enterprise (WCE) is to: 1) Develop a student-owned culture that fosters high professional standards, mutual respect, creativity, productivity, effective personal communication, and a burning desire to learn; 2) Create projects that advance the communication industry and that generate an intense learning environment for Michigan Tech students. We intend for our graduates to be ready for the most challenging careers as they complete this Enterprise.

Team Leaders
Joseph DeHaan, Andrew Glaeser, Brett Schulte and Matt Rebandt, Mechanical Engineering
Advisor
Dr. Brett Hamlin, Engineering Fundamentals
Sponsors
Alcoa, ArcelorMittal USA, Chrysler, Cummins, General Motors Foundation, 3M, Ford Motor Company Fund, Oshkosh Corporation, Deere Foundation, DENSO North America Foundation, Mitsubishi Electric

Project Overview
This year the Blizzard Baja Enterprise is working on three projects. The modular front suspension project features a removable module that will reduce repair time and give material flexibility, while maintaining the ease of manufacturability and the low cost of the traditional suspension. The variable center-to-center drivetrain project focuses on enabling the distance between the primary and secondary clutches in the Continuously Variable Transmission (CVT) to change. This allows for a greater shift range which can raise or lower the overall gear ratio. The final project focuses on data acquisition: collecting data on suspension travel and rotational speeds of the clutches.
**216 Consumer Products Manufacturing Enterprise (CPM)**

The design team dissects a commercial shipping container to test material properties.

**Team Leaders**
Robert Parker and Pat Sommers, Chemical Engineering

**Advisors**
Dr. Tony Rogers and Dr. Sean Clancey, Chemical Engineering

**Sponsors**
Dow Corning, Bob Carnahan, nanoMAG, Village of Lake Linden

**Project Overview**
Consumer Products Manufacturing (CPM) Enterprise is a student-led organization run like a small business. In CPM, multidisciplinary teams of students work to create innovative product and process solutions that address the needs of commercial and governmental sponsors. Projects are aimed at increasing an existing product’s profitability or market potential, solving process bottlenecks, and creating new or improved products. Working with a variety of clients allows students to develop outstanding teamwork and communication skills. CPM students are currently designing a hydroponics system for fresh produce in the UP, creating sports protective equipment with new materials, developing alternate bulk shipping methods for Dow Corning, and optimizing large-scale manufacturing processes. With many leadership opportunities, fantastic advisors, and the help of top companies, CPM gives students experiences that will help them succeed in industry after graduation.

**217 CinOptic Communication**

The Cin/Optic Communication and Media Enterprise offers professional film, photography, and audio services to clients across the county.

**Team Leader**
Nathan Hunter and Jess Banda, Humanities

**Advisor**
Dr. Erin Smith, Humanities

**Sponsor**
BHK Child Development Board

**Project Overview**
We supply communication services in the form of video, audio, and web to clients.

**218 Green Campus Enterprise**

Students collecting data from an anemometer to determine if wind power is a viable option for Tech.

**Team Leaders**
Sarah McCauley, Environmental Engineering, and Andy McKenzie, Construction Management

**Advisor**
Dr. Christopher Wojick, Civil and Environmental Engineering

**Sponsor**
Michigan Technological University

**Project Overview**
The Green Campus Enterprise works to make the campus more sustainable through both low- and high-profile projects. We are collaborating with University personnel on many of our projects and gaining professional experience and leadership skills.
219
Husky Game Development

One of Husky Game Development’s many projects, Wave Warrior, allows players to customize gameplay by using their own music.

Team Leaders
Gabrielle Myers, School of Business and Economics, and Gary Phillips, Computer Science
Advisor
Dr. Scott Kuhl, Computer Science
Sponsor
Autodesk

Project Overview
The mission of Husky Game Development is to design and develop games for business, education, and fun. Some of our accomplishments include releasing a game on XBox Live, working with instructors to create virtual learning environments, and hosting Michigan Tech’s annual programming competition, BonzAI Brawl. One game currently in the works, Wave Warrior, allows users to turn their favorite music into an interactive experience. We have many other exciting games in the pipeline for 2012, so come check out our booth and see what we’ve been up to this year.

220
Aerospace Enterprise

The Oculus-ASR—a microsatellite for the advancement of space situational awareness, designed and built by the Aerospace Enterprise.

Team Leaders
Jake LaSarge and David Kiekintveld, Mechanical Engineering
Advisor
Dr. L. Brad King, Mechanical Engineering-Engineering Mechanics
Sponsors

Project Overview
The mission of the Oculus-ASR project is to increase US Air Force space situational awareness by assisting with the calibration of ground-based telescopes. There are many different sub-teams of the Oculus-ASR project, including electrical, software, mechanical, integration, and more.

221
Robotic Systems Enterprise

An RSE team project seen mimicking the high school robots at a FIRST Robotics competition.

Team Leaders
Colin Putters, School of Business and Economics, and Megan Crowley, School of Forest Resources and Environmental Science
Advisor
Dr. Aleksandr Sergeyev, School of Technology
Sponsors
General Motors, BAE Systems

Project Overview
The Robotic Systems Enterprise works hand in hand with area high schools through the worldwide FIRST Robotics program to spread interest in the fields of science and technology. Outside of the FIRST Robotics program, the Robotic Systems Enterprise has designed a fully autonomous sailboat and plans to expand that program to a full-sized research vessel for the Great Lakes.
222
Transportation Enterprise

The City of Houghton bus picks up students on the Michigan Tech campus.

Team Leaders
Adam Wenneman and Jessica Cichowski, Civil Engineering
Advisor
Dr. George Dewey, Civil and Environmental Engineering
Sponsors
Ford Motor Company Fund, General Motors, LS&I Railroad

Project Overview
The Transportation Enterprise (TE) is a discovery-based undergraduate educational program that uses industry-sponsored projects to serve as the framework and motivation for student learning. TE projects cover many facets of the civil engineering field. The TE Transit Team is currently working on a multiyear project to increase the use, efficiency, and sustainability of the Houghton and Hancock bus transit systems. The team is analyzing the current systems and designing alternatives, which include route alignments, stop locations, service hours, and other system improvements. Other ongoing projects address problems in the fields of rail, materials testing, and structural engineering.

223
Nanotech Innovations

Students from Nanotech Innovations working on building an affordable scanning tunneling microscope from the ground up.

Team Leaders
Oskar Strojny and Kyle Smith, Mechanical Engineering
Advisor
Dr. John Jaszczak, Physics
Sponsor
National Science Foundation

Project Overview
We are a student-run business, preparing students to face real-world challenges while working in the rapidly expanding field of nanotechnology. We also facilitate and promote the instruction of students and teachers alike on how to best adapt the science of nanotechnology to their lives. Clients include University College London (United Kingdom), Brookhaven National Laboratory, MAX Lab (Sweden), and Saha Institute of Nuclear Physics (India).

225
Humane–Interface Design Enterprise

This is the simulator that HIDE designed to be used for testing participants during the experiment.

Team Leaders
Brock Dean and Corbin Uselton, Computer Science
Advisor
Dr. Robert Pastel, Computer Science
Sponsor
Chrysler

Project Overview
The goal of HiDE is to provide students the opportunity to analyze and develop human–machine interfaces through real–world experience. Currently, our main projects are testing driver distraction on the Chrysler U–Connect and mobile applications for Chrysler vehicles to interface. We not only design and implement many of these interfaces, but we also have a team dedicated to creating experiments that will test their functionality.
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