Friday, December 11, 2009

Undergraduate Research and Senior Design Engineering Project Exposition
Design Expo noon – 3:00 p.m.

Featuring undergraduate research and senior design projects from the departments of:

Chemical & Environmental Engineering
Civil Engineering
Electrical Engineering & Computer Science
Engineering Technology
Mechanical, Industrial and Manufacturing Engineering

• Please contact the individual departments regarding formal presentation times.
• Bioengineering projects displayed at the Spring Semester Exposition (April 30, 2010)
to attend the Senior Design Exposition on Friday, December 11, 2009 from noon to 3 p.m. The event will take place in the College of Engineering’s Nitschke Hall, on the campus of The University of Toledo.

The College of Engineering sponsors the exposition to showcase design projects created by graduating seniors from the departments of Bioengineering, Chemical and Environmental Engineering, Civil Engineering, Electrical Engineering and Computer Science, Engineering Technology, and Mechanical, Industrial and Manufacturing Engineering.

As part of the required senior design project, students form business-consulting units to develop a solution for a client’s technical/business challenge. Businesses, industries and federal agencies sponsor these projects.

The exposition is free and open to the public. No reservations are necessary. You are welcome to attend all or part of the day’s events. High school and community college teachers are invited to bring their students to the exposition.

Bus drivers can drop off passengers in front of Nitschke Hall. Parking is available on all sides of the engineering complex and across the street. Parking passes are not required on this day.

For more information on the exposition call 419.530.8014 or email sstewart@eng.utoledo.edu.

For more information on the programs offered in the college or to schedule a tour of the college, please call 419-530-8040 or email jpawleck@eng.utoledo.edu.
Styrene monomer (SM) is currently produced in a two-step process from benzene and ethylene. First, benzene is alkylated with ethylene to form ethylbenzene (EB). After purification, the ethylbenzene is catalytically dehydrogenated to produce styrene. The dehydrogenation step is endothermic and requires a large quantity of steam mixed with the ethylbenzene to maintain the desired reaction temperature, to depress coking of the catalyst and to dilute the reaction concentration to enhance the reaction equilibrium. This design project involves the evaluation of a process that utilizes a catalyst that will produce styrene from toluene and methanol in one step. Some byproduct ethylbenzene is also produced which can be sold to conventional styrene producers. The catalyst discovery may enable us to develop a new lower cost route to styrene production. The assignment is to synthesize a flowsheet and prepare a preliminary design and economic analysis for a new process to produce styrene from toluene and methanol.
DESIGN OF A GREEN TEACHING CENTER AT THE UNIVERSITY OF TOLEDO
Faculty Advisors: Dr. Jiwan D. Gupta and Dr. Matthew Franchetti
Client Advisors/Sponsors: The University of Toledo
Students: Cole Marburger, Michael Titus, Michael McNeill, Kyle Kuhlman, Justin Niese and Travis McKibben

The project involves designing a teaching center for alternative energy at The University of Toledo's Scott Park Campus based on Leadership in Energy and Environmental Design (LEED) principles. The project will include the design of research labs, classrooms, faculty offices, computer labs and an auditorium. Several energy efficient technologies will be used including a geothermal heating and cooling system, solar panels, wind turbines and a water collection system. This project will provide a learning center for students and the community alike. By creating a unique teaching Green Teaching Center, the University strives to become a model for alternative energy.

SENIOR CITIZEN HOUSING FOR CONGREGATION MEMBERS AT THE HINDU TEMPLE AND HERITAGE HALL OF TOLEDO
Faculty Advisor: Dr. Jiwan D. Gupta
Client Advisor: Dr. Raj Bhatia, Chair person Long Range Planning committee
Students: Olivia Beebe, Patrick Bierl, Kevin Moore, Zach Mulder and Rachel Rudolph

The purpose of this project is to design senior citizen condominium type housing for the members of the congregation of the Hindu Temple and Heritage Hall of Toledo. Each condo will have two to three bedrooms with dining, living, kitchen and 2 car attached garages. Also a two story apartment building will be provided for six to eight families and will have a similar layout, but covered parking instead of attached garages. The entire project is designed as a Planned Unit Development (PUD). The complex will also have a building that will be designed as a club house, exercise room and kitchen with a dining facility for 30-40 people. The project includes geothermal energy for heating and cooling, rainwater harvesting and other LEED principles.

ALBERTUS BROWN SENIOR DEVELOPMENT
Faculty Advisor: Dr. Jiwan D. Gupta
Client Advisors: Mr. Matthew Sutter, Manager of Development, Lucas Metropolitan Housing Authority, Toledo, Ohio., Mr. Matt Lewandowski, Lewandowski Engineers, Toledo, Ohio
Students: Alecia Kuhn, Hannah West, Jenn Feasby, Marguerite Johnson, Michael Endredi and Timothy Smith

The Albertus Brown Homes (ABH) site, located in the vicinity of downtown Toledo, Ohio. Existing housing at the ABH does not meet all building code requirements or provide safe living conditions for the current residents. Therefore, the Lucas County Metropolitan Housing Authority (LMHA) applied for a $10 million housing grant for demolition of all current buildings and construction of a new 5-story senior housing complex on this site. The proposed building includes 82 units, common health club, kitchen, and dining facilities. The project includes geothermal energy for heating and cooling, rainwater harvesting and other LEED principles. Stipulations of the grant include adherence to the American Disabilities Act and Green Enterprise Communities standards.
DESIGN OF A PEDESTRIAN BRIDGE OR UNDERPASS TO CROSS DOUGLAS ROAD TO CONNECT THE ENGINEERING COMPLEX WITH MAIN CAMPUS

Faculty Advisor: Dr. Jiwan D. Gupta
Client Advisor: Victor Brigner, The University of Toledo, Director of Facilities Maintenance and Construction
Students: Ryan Askins, Chris Beckert, Josh Dobrzeniecki, Kyle Kreft and Nick Zenk

Due to increasing student pedestrian traffic from Main Campus to the Engineering Complex, it is becoming increasingly necessary to provide a safe means for safe crossing Douglas Road without causing traffic delay. A solution to protect the safety of the student while crossing Douglas Road is to design and build either a pedestrian bridge or underpass. Either option will eliminate traffic congestion and unnecessary traffic delays at the Douglas Road and Oakwood Avenue intersection. Also, it will eliminate conflict points between pedestrians and vehicle traffic. As part of the University’s sustainability initiative, many alternative energy ideas will be incorporated in the design such as a Geothermal Heating and Cooling system as well as Solar Panels.
Solar Car Boost Converter
Faculty Advisor: Dr. Roger King
Client Advisors/Sponsors: UT College of Engineering
Students: Nick Wantz, Domenic Bentz, Sean Currie and Andrew Trubiani

We will be building a boost converter that will be able to take the voltage from a solar array and convert it to the voltage of a battery array. In addition, we will be designing a method for calculation the MPPT of the solar array with a microcontroller. This information will then be used in the boost converter to maximize the amount of energy collected from the solar array.

Electric Golf Caddy
Faculty Advisor: Dr. Richard Molyet
Students: Brent Pohlman, Jack Steinke, Dan Sloan and Mike Westrick

We will be building an electric golf caddy. Our design will be a little larger than an ordinary push cart and it will include an electric motor that will power the back tires. The cart will be hand operated by someone walking with the cart, or we will also be looking into remote wireless control. Our goals are to make the cart as light weight as possible, with a rechargeable battery, and supply enough power to travel up steep hills. Also having a design that is compact enough to fit in a car will be a necessity. Having an adjustable speed will also be needed for faster and slower walkers, but even at the different speeds we want enough power to scale the larger hills.

Data Acquisition Device for Bird Monitoring System
Faculty Advisor: Dr. Mohsin Jamali
Student: James Valleroy

Our proposed project activity is to design a data acquisition device which can capture audio and video signals from sensors, such as microphones, marine radar, and thermal imaging cameras. The analog signals will be converted to digital data, which will be sent to a computer for signal processing, analysis, and display. The data acquisition device will be designed for integration into a bird migration traffic monitoring system for placement near wind turbines.

LED Replacement for 60-watt Incandescent Bulb
Faculty Advisor: Dr. Roger King
Students: William Hoen, Eric Haubert, Thomas Locher and Eric Taylor

The project consists of replacing a 60-Watt incandescent bulb with a LED or LEDs. The circuit will be designed with a digital switching power supply and a dimming application. Major Project Subtasks: Gather all parts for needed project; design a feasible circuit; build circuit; test circuit; and retest until it works. Possibly: have a dimmer switch; design a bulb for the LEDs.
Solar Cell Heated Swimming Pool in Toledo
Faculty Advisors: Dr. Rashmi Jha and Dr. Anthony Johnson
Students: Jorhan Ordosgoitti, Aaron Bollinger and Joseph Dawaliby

Major Project Subtasks: Research average private home outdoor swimming pool water temperature in summer; investigate the average amount of light that reach the ground in the city of Toledo; calculate the amount of energy needed to heat the water to the comfortable temperature; design of a heater system using commercially available solar cells, including a system to monitor the water temperature and correctly correct it to the desired temperature set by the user; calculate the cost of the system.

Vacuum Tube Pre-amplifier for Guitar/Bass
Faculty Advisors: Dr. Richard Molyet and Dr. Roger King
Students: James Musselman, John Greg and Jeff Phillips

The project for design and implementation of a vacuum tube preamplifier circuit will consist of the following: Research of design strategies; design of electronic circuit; testing and modification of circuit design; implementation of the final design.

Class Schedule Based RFID Backpack Inventory System
Faculty Advisor: Dr. Vijay Devabhaktuni
Students: Derrick Huelskamp, David Minton and Justin Spangler

Students tend to bring wrong books to class, forget calculators or other required accessories, thus the need for the Class Schedule Based RFID Backpack Inventory System or BIS for short. The BIS will read RFID tags located on the books, notebooks, calculator, etc. at the push of a button. The system will then alert the user on whether all required items, based on the inputted class schedule, are located in the backpack. The system will also consist of a Graphical User Interface to allow the user to easily input a class schedule.

Biometric Home Security System
Faculty Advisor: Dr. Ezzatollah Salari
Students: Rebekah Deason, Paul van der Sluijs, Joe Williams and Brad Chase

The purpose of this project is to design and implement a home security system that is capable of being armed and disarmed using a fingerprint scanner. This is a much more secure method of controlling home security systems due to the ability of access codes being stolen or simply forgotten. We will be designing the system so that an entire family (or whoever the administrator chooses to give the privilege to) may have each of their member's fingerprints able to arm and disarm the home security system.

“Side Step” - Bootable Anti Virus for Windows
Faculty Advisor: Dr. Hilda Standley
Student: Matthew Stewart

“Side Step” – Bootable Anti-Virus for Windows will be software that boots from CD, going around the Windows Operation System using a form of Bootable Linux. The program will load from the Linux boot and run a Java based program that will search for corrupted Windows files and replace them with a clean version of the file. The program will also contain a free anti-virus that will run and search the computer for any known threats. This project is suited for windows machines that have crashed and will not let the user access the computer due to a virus, malware, or spyware.

Tier Modal Abstraction Platform (TMAP)
Faculty Advisor: Professor Brent C. Nowlin
Students: David A. Shah, Matt C. Fousek, Anthony J. Greer and Roger J. Walker

One of the most common abstraction layers in computing is the implementation of the desktop metaphor. This project tries to construct a less convoluted solution to the main computing environment using multiple modes; speech and gesture recognition systems and an alternative metaphor using objects that can easily be manipulated and mutated to serve various functions required by the user. The speech and gesture recognition nodes interpret user input and relay the information to a server application that process the data and render interpreted results to the non-traditional graphical user interface.
GRAY WATER SYSTEMS (CET)
Faculty Advisor: Professor Linda Beall
Students: David Kauffman, Jacob Lamming, James Niece

The project proposes a gray water system for the University of Toledo Engineering North Engineering Building complex, and compares the design and potential cost savings of this system and comparable systems of this size with other gray water system proposals ranging in size from individual family residential to larger scale industrial installations. The project addresses design, implementation and cost both for new construction and for retrofitted construction on urban sites.

SHOPPING CART SCREEN (CSET, EET, MET)
Faculty Advisor: Dr. Weiqing Sun
Client Advisors/Sponsors: Sautter's Food Market
Students: Adel Al Akeel, Hassan Alabkary, Sultan Alali, Mohammed Alawad, Eisa Almohammad, Mohammed Alrajhi

The shopping cart screen allows the customer to scan his/her items, calculate the total amount, and check out as soon as the customer is done shopping.

HVAC VENT CONTROL SYSTEM (CSET, EET, MET)
Faculty Advisor: Dr. Cyrus Hagigat
Students: Jamel Al-Amri, Abdullah Al-Shehri, Meshal Aldughatiher, Abdullah Alnujaidi, Ahmed Balharith, Fahad Husain

The HVAC vent control system is a set of several mechanical and electrical devices that can manipulate the air flow through the vents based on the temperature in the air around the vent. This extra control of the vent damper will ensure a better air distribution and lessen the energy needed to maintain the preset temperature.

NANOTUBE COMPOSITE TENSILE TESTER (MET)
Faculty Advisor: Dr. Ganapathy Narayanan, Professor Dale Simon
Students: Charles Alig, Brent Stockman, Jim Vandenboom

The purpose of this project is to design and build a nonomaterial tensile testing machine that will test the tensile strength and elongation of samples averaging 15 millimeters in length and 2 millimeters in diameter.
HYDRAULIC ANTI-PURSUIT DEVICE (MET)
Faculty Advisor: Professor Dale Simon
Client Advisors/Sponsors: Bil-Jax
Students: Kevin Cygan, James Hogg, Shaun Schnipke

The purpose of this device is to reduce civilian casualties and property damage during police pursuits. A hydraulically controlled jaw will mount on the front of a police vehicle to apprehend a fleeting suspect.

HEATED BRIDGE DECK USING RENEWABLE ENERGY (CET, MET)
Faculty Advisor: Professor Larry Loy
Client Advisors/Sponsors: Fluor Corporation, Tam O'Shanter Sports, Inc.
Students: Greg Hall, Eric Market, Dan Miller, Johnathon Morris, Chad Ritzler

This project is to heat a bridge deck with geothermal heat to eliminate the formation of ice and also to reduce contraction of the bridge deck during winter months.

BUSINESS CONTINUITY PLAN USING VOIP (CSET)
Faculty Advisor: Professor Allen Rioux
Students: Dustin Berlekamp, Adam Shea, Ben Watercutter, Ryan Weaver

This project creates and tests a communications-based business continuity plan that is deployable and manageable by end users utilizing an IP-PBX system, open source software and distributed IP telephony devices.

FLUID FLOW VISUALIZATION (MET)
Faculty Advisor: Dr. James Kamm
Students: Osama Al-Ansari, Abduaziz Almutairi, Abdulla Alhammadi

Fluid flow visualization entails the means of making fluid flow patterns visible. This project will develop a fluid flow visualization device to serve educational purposes.

ELECTRIC-POWERED BOTTLE JACK (MET)
Faculty Advisor: Professor Dale Simon
Client Advisors/Sponsors: Perkins Motor Service, Findlay Machine & Tool Inc.
Students: Keith Church, Brad Ehle, Kory Johnson, David Knoll, Bill Sparks

This project utilizes a convenient automatic electrical mechanism and connection to control a hydraulic jack used for raising and supporting trailers and vehicles.

NORTH ENGINEERING COURTYARD (CET)
Faculty Advisor: Dr. Nick Kissoff
Students: Curt Meuleman, Brad Ream, Tyler Schroeder, Tim Vargo, Shaun Whetstone

This project will improve the area between Nitschke Hall and North Engineering. The courtyard will provide a recreational space for professors and students to be utilized for their own needs.

KEYLESS DOMESTIC ENTRY (MET)
Faculty Advisor: Professor Richard Springman
Client Advisors/Sponsors: Spence Technologies
Students: Brian Bombik, Joe Cruz, Lyndsey Roby

This system uses an RFID key fob that, when in the range of a door, will unlock and pop it open while the screen door opens up completely.
REVERSE COOLED OTTO CYCLE (MET)
Faculty Advisor:  Professor Ron Ott
Client Advisors/Sponsors:  Crow Tool and Machine, Jeg's Performance Auto Parts, Jim's Automotive, Lockwood Performance, Summit Racing Equipment and SuperFlow Technologies Group
Students:  Andrew Fell, Amy Spencer, Bradley Wallace

This concept reverses the flow of coolant through an engine resulting in cooler combustion chamber temperatures. The cooler temperature allows for an increase in compression ratio, advanced timing, hotter spark plugs, and a leaner air-fuel mixture.

RFID COMPONENT TRACKING SYSTEM (CSET, EET)
Faculty Advisor:  Dr. Ahmad Farhoud
Client Advisors/Sponsors:  BASF Corporation, Krause Engineering, Shaltz Automation, Inc. and SSOE, Inc.
Students:  Abdulaziz Alamoudi, Walled Banibakhsh, Don Chidester, Austin Rampersad, Matt Shumaker, Joe Tagarisa

Radio Frequency Identification (RFID) component tracking system prevents equipment failure and recalls by preventing incorrect component selection. RFID can be used for inventory control in warehouses.

ELECTRIC/WIND VEHICLE (CSET, EET, MET)
Faculty Advisor:  Dr. Ahmad Farhoud
Students:  Jeremy Burnat, Daniel Rafko, Adam Reau

This project extends the range of an electric vehicle using the power of wind. The project uses a golf cart adding a wind generator complete with support electronics in controlling the power generated.

AUTOMATED HOUSE COOLING SYSTEM (EET, MET)
Automated House Cooling System (EET, MET)
Faculty Advisor:  Dr. Ted Evans
Students:  Abdulaziz Alawad, Abdulaziz Almansour, Matt Bollinger, Danny Duncan

This project is a cooling system that will reduce electricity usage by controlling which cooling method will be used to cool the house. The optional methods are a system of fans or the air conditioner.

SOLAR POWER CHARGING STATION (CET)
Faculty Advisor:  Dr. Nick Kissoff
Client Advisors/Sponsors:  Crown Battery Manufacturing Co.
Students:  Dustin Jacobs, Mike Merritt, Dylan Sabin

This charging station will use solar panels to charge a set of batteries. This will provide a temporary power hookup for residential construction companies and reduce the cost of a project.

SUPERNODAL APPROACH TO IT ASSET MANAGEMENT IN SECURE ENVIRONMENTS (CSET)
Faculty Advisor:  Dr. Weiqing Sun
Sponsors:  The University of Toledo Information Technology Network Security and Desktop Development Departments
Students:  Nick Fraker, Katrina Schudel

This project is a security-focused automated asset management system for IT departments, uniquely designed to distribute the workload across a company's systems, potentially reducing inventory scans of large networks from weeks to hours.
Dorr Street Development
Faculty Advisor: Dr. Nick Kissoff and Professor Linda Beall
Students: Ryan Bockrath, Preston Kelson, Ryan McCarthy, Adam Thomas

This is in response to the University's goal to purchase and develop property on the south side of Dorr Street. In order to facilitate student friendly development the project is investigating methods of access between campus and this area.

UT Laptop Tracking System (IT)
Faculty Advisor: Professor Allen Rioux and Professor Jeff Osthimer
Client Advisors/Sponsors: The University of Toledo Information Technology Department, The University of Toledo Police Department, The University of Toledo Carlson Library
Students: Stephen Marlow, Jennifer Sullivan

This project is a system designed to track lost and stolen laptops on UT's main campus. By using the University's network infrastructure, the system can resolve a physical location from the network information.
GARDEN TOOL ADAPTATIONS FOR A CLIENT WITH JUVENILE RHEUMATOID ARTHRITIS
Faculty Advisors: Dr. Mohamed Samir Hefzy and Dr. Mehdi Pourazady
Students: Mark Bensi, Ryan Jones, Andrew Posta and Jon Strausbaugh
Sponsors: Ability Center of Greater Toledo, National Science Foundation

The client has severe Juvenile Rheumatoid Arthritis, which is a childhood disease that causes inflamed and swollen joints. As a result, the client is unable to bend her arms or legs and uses adaptations for regular daily activities. The designed garden tool adaptations allow the client to plant and maintain a garden of her own with minimal outside assistance.

LIGHTWEIGHT STORABLE WHEELCHAIR
Faculty Advisors: Dr. Mohamed Samir Hefzy and Dr. Mehdi Pourazady
Students: Kevin Brasher, Derek Hetrick and Marc Nungester
Sponsors: Ability Center of Greater Toledo, National Science Foundation

The client, a frequent traveler, uses a wheelchair for mobility purposes, and airlines generally store her chair as cargo. Often her chair is damaged during a flight. Additionally, the client needs a wheelchair that can easily fit into smaller vehicles. She needs a re-engineered wheelchair that easily folds small enough to fit in a suitcase as carry-on baggage.

DEVICE TO LIFT A PERSON FROM THE GROUND TO WHEELCHAIR HEIGHT
Faculty Advisors: Dr. Mohamed Samir Hefzy and Dr. Mehdi Pourazady
Students: Andrew Doughty, David Perkins, Jason Thomas and Eric Wells
Sponsors: Ability Center of Greater Toledo, National Science Foundation

This device was designed to assist in lifting a person from the ground up to wheelchair height with the assistance of only one other person. The device was constructed to be collapsible and lightweight enough to fit into the trunk or back seat of a car. This device will be useful in a number of situations, including being lifted after falling from the wheelchair and during recreational activities, such as picnics and playing on the floor with children.
Device to Assist Bariatric Persons with Exercising and Walking

Faculty Advisors: Dr. Mohamed Samir Hefzy and Dr. Mehdi Pourazady
Students: Gary Reynolds, Kurt Breyfogle, Matt Hammond and Ghassan Younes
Sponsors: Ability Center of Greater Toledo, National Science Foundation

Currently there is not a sufficient walker on the market to assist bariatric patients. The current walkers have a number of problems: the biggest two being the location of the center of gravity and the ability to use the walker through doorways. To address these problems, this team designed a new walker that would shift the center of gravity to a more central location on the walker. The team also developed a thinner design so that travel through doorways is not affected by the size of the walker. Finally, a few other modifications were made that would benefit the client, as well as other bariatric patients. The most beneficial of these modifications was a tray for the abdomen, which would allow a person to walk for longer distances by alleviating weight from the legs/feet. A prototype model was developed and tested to ensure that all goals were achieved.

A Self-contained Means to Allow Wheelchair Access to a Camping Trailer

Faculty Advisors: Dr. Mohamed Samir Hefzy and Dr. Mehdi Pourazady
Students: Jason Sebest, Mark McDermott and Nick Baden
Sponsors: Ability Center of Greater Toledo, National Science Foundation

This project required adapting a camper to allow electric wheelchair access. The camper has a large door on the front right side that folds down into a six-foot ramp. The group added another six-foot ramp to the trailer door to make a safer 12-foot ramp. The door was modified to be raised and lowered with an electric winch and a pulley system. The additional ramp is hinged to the outside of the door and uses gravity and an assist bar to extend out, while the tip of the ramp rides on the ground with a set of wheels. The system operates automatically when a button is pressed.

Treat Dispenser for Assistance Dogs

Faculty Advisor: Dr. Phil White
Students: Charmaine Cassabon, Cory Chapman, Kyle Everman and Sierra Pena
Sponsor: Assistance Dogs of America, Inc.

Service dogs provide assistance to clients who have had either a spinal cord injury or a disease that has made mobility difficult. Giving treats to assistance dogs is an integral part in the training of these animals; however, dispensing treats is a difficult task for persons with mobility problems. A treat dispensing device is a necessity for these clients. The clients’ varying degrees of mobility and the differences in their electric wheelchairs led to a device that dispenses treats similarly to a gumball machine, with a delivery tube and catch basin from which the dogs can retrieve the treats. The device can be activated by either a push-button or a spring and lever system mounted on the wheelchair. This device has been designed with the aid of client input; and with engineering software and the knowledge of the design team, the mechanism has been fully analyzed and tested for the clients’ use. The dispenser makes day-to-day training much easier for the clients who use it.

Development of an Express Electronic Transaction Machine

Faculty Advisors: Dr. Phil White and Dr. Anthony Johnson*
Students: Brett Madow, Brian Neuman, Andrew Holland* and Matthew Blaine* (*members from EECS Dept.)
Sponsor: The University of Toledo, College of Business

Long haul truck drivers spend a lot of time on the road with minimal opportunities to conduct necessary personal and business transactions, including paying bills and wiring money. Currently, there is no compact, convenient, all-in-one unit that does this. The ExpressETM is trademarked by Bajram Shekaj under the name and authority of ExpressETM.com. This project provides a basis for the technology and delivery of a more cost effective way to provide services to the trucking transportation industry.
ENERGY LAB HEAT EXCHANGER TEST BENCH
Faculty Advisor: Dr. Cy Masiulaniec
Students: Stephen Mellott, Joe Eccleston, Jim Herold and Jason Reier
Sponsor: The University of Toledo, College of Engineering

This group had the opportunity to complete a previous Senior Design project to update several experiments in the Energy Lab. There were three heat exchanger experiments in the Energy Lab that needed to be completed and integrated to a PC using LabView software. In addition, the existing test bench was expanded and partially rebuilt to include a dedicated PC and more storage space for equipment. The counterflow heat exchanger experiment was completely rebuilt, and a new shell and tube heat exchanger was be purchased and cut away so students can measure internal dimensions. Lastly, each experiment was properly calibrated so they would be ready to function by the end of this semester. The existing lab handouts were updated for future students, as well.

DEVELOPMENT OF A VARIABLE LENGTH INTAKE TRACT FOR THE 2010 FORMULA SAE CAR
Faculty Advisor: Dr. Ray Hixon
Students: Daniel Waldock, Peter Hathaway, Mark Warmeling and Dwight Inkrott
Sponsor: Toledo Chapter of Society of Automotive Engineers

The objective of this project was to design, analyze, build, and test an intake system to extend the working RPM range of the FSAE team's car and have a general 10% increase in the torque curve. This will allow for less shifting and increased drivability while in competitive racing events, compared to a torque curve that increases and peaks quickly, and then drops to an almost un-usable range. The proposed design made use of the Helmholtz' resonance phenomenon, in which longer intake runners at lower RPMs, coupled with shorter intake runners at higher RPMs, make optimum torque within that range.

HYBRID ENERGY HARVESTING SYSTEM
Faculty Advisor: Dr. Yong Gan
Students: Michael Poetzinger, Adam Mohr, James Myers and Robert Burgess
Sponsor: The University of Toledo, College of Engineering

The purpose of this project was to design, build, and analyze a hybrid energy harvesting demonstration device, with the client preferring a Hydrogen Fuel Cell Energy System. The demo highlights the technology's advantages and future potential. Many improvements could be made on the various system components, but our project focused mainly on improvements to the solar cell. Our proposed design involves a compound parabolic concentrator to direct and concentrate a light source onto our solar cell. This simple device has no moving parts, improves reliability, lowers costs, and can improve efficiency.

DESIGN OF AN ADHESIVE APPLICATION MACHINE
Faculty Advisor: Dr. Phil White
Students: Johnny Rose, Kevin Danford, Patrick McCall and Edgar Palacios
Sponsor: Lott Industries

This team created a fixture to assist in the application of a foam gasket to a fuel tank cover. The fixture consisted of a groove to keep the foam in the correct profile; furthermore, a vacuum pulling through holes in the groove held the foam secure. Each bank of vacuum holes is activated by a photocell so that once the foam is placed over the holes the vacuum is drawn. The main objective was to ensure no gap was present at the joint where the ends of the foam come together.
DEVELOPMENT OF A SOLAR POWERED CAR
Faculty Advisor: Dr. Terry Bigioni
Students: Gordon Shaw, Jerry Hall, Rob Preslan and Nate Aring
Sponsor: The University of Toledo

The University of Toledo Solar Car Team is a student organization with the goal of competing in the North American Solar Challenge in June 2010. This team is newly formed team and in the process of building its first car. The goal of this project was to design the frame of the car. The first step was to choose the number of wheels the car would have and its basic layout. The team decided on a three-wheel design with a single wheel in the back. To ensure the driver's safety, the team used computer simulations to make sure the frame would hold up in different conditions (i.e. accelerating, turning, braking, and a crash). The team finalized the project by building the frame and performing verification checks before submitting the project to the Solar Car Team.

LEED RESEARCH BUILDING
Faculty Advisors: Dr. Matthew Franchetti, Dr. Jiwan Gupta, and Dr. Lesley Berhan
Students: Jeremy Bowman, Jerome Stiger, Lindsey Gorbe, Myron Bowers, Jordan Wise and Marcus Amendola

The University of Toledo is recognized as a front runner in renewable, alternative, and sustainable energies. Buildings are starting to become more energy efficient and environmentally friendly due to the worldwide push to “go green.” This project includes a cross-functional team of mechanical, industrial, civil and electrical engineers that designed and created a facility to include hands-on labs for the electrical, mechanical, and civil engineering departments, computer labs, and five classrooms for learning about renewable energy resources. The team's design was based on environmentally friendly technology, and the entire building will be an example of green technologies at work.
Thank You

AFFILIATED COMPANIES AND SPONSORS

The Ability Center of Greater Toledo, Sylvania, Ohio; Ms. Jill Caruso, Information and Referral Outreach Coordinator

Assistance Dogs of America, Inc.

BASF Corporation, Wyandotte, Michigan

Bil-Jax, Archbold, Ohio

Century Equipment Inc., Toledo, Ohio

Crow Tool & Machine, Toledo, Ohio

Crown Battery Manufacturing Co., Toledo, Ohio

Findlay Machine & Tool Inc., Findlay, Ohio

Fluor Corporation, Irving, Texas

Hindu Temple and Heritage Hall of Toledo, Dr. Raj Bhatia, Chair person Long Range Planning Committee

Jeg's Performance Auto Parts, Columbus, Ohio

Jim's Automotive, Sylvania, Ohio

Krause Engineering, Fenton, Michigan

Lewandowski Engineers, Toledo, Ohio; Mr. Matt Lewandowski

Lockwood Performance, Toledo, Ohio

Lott Industries, Toledo, Ohio

Lucas Metropolitan Housing Authority, Toledo, Ohio; Mr. Matthew Stutter, Manager of Development
AFFILIATED COMPANIES AND SPONSORS CONT.

The National Science Foundation
Perkins Motor Service, Elyria, Ohio
Sautter's Food Market, Sylvania, Ohio
Shaltz Automation, Inc., Flint Michigan
Spence Technologies, Willoughby, Ohio
SSOE Group, Toledo, Ohio
Summit Racing Equipment, Akron, Ohio
SuperFlow Technologies Group, Des Moines, Iowa
Tam O'Shanter Sports, Inc., Sylvania, Ohio
Toledo Chapter of Society of Automotive Engineers
The University of Toledo, Information Technology Department, Toledo, Ohio
The University of Toledo, Police Department, Toledo, Ohio
The University of Toledo, Carlson Library, Toledo, Ohio
The University of Toledo, Toledo, Ohio; Mr. Victor Brigner, Director of Facilities Maintenance and Construction
The University of Toledo, Toledo, Ohio; College of Business
Vintage Electric Ltd., Inc., Toledo, Ohio
**AFFILIATED GUEST SPEAKERS**

**Dr. Christian Beins**  
Client Representative, Ability Center of Greater Toledo  
Sylvania, Ohio

**Ms. Jill Caruso**  
Information and Referral Outreach Coordinator,  
Ability Center of Greater Toledo  
Sylvania, Ohio

**Mr. Mark Fox**  
Technology Associate, The University of Toledo  
Toledo, Ohio

**Mr. Daniel Sexton**  
MIME Webmaster, The University of Toledo  
Toledo, Ohio

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**AFFILIATED FACULTY AND STAFF**

**Dr. Mansoor Alam**  
Professor & Interim Chair,  
Department of Electrical Engineering & Computer Science

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Mr. John Jaegly  
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Dr. Anthony Johnson  
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Dr. James Kamm  
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Dr. Weng Kang  
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Dr. Roger King, Professor  
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Dr. Nicholas Kissoff  
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Professor Norman Koenigseker  
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Mr. Alan Kossow  
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UT COLLEGE OF ENGINEERING CO-OPERATIVE EDUCATION PROGRAM

At the University of Toledo, our goal is to provide students with the necessary skills to be successful in the workforce upon graduation. All students in the Engineering Bachelor of Science programs are required to complete a cooperative (co-op) education component in order to earn their degree. Co-op is the integration of classroom and practical experience in an organized program. The University of Toledo is only one of six universities to have a mandatory co-op program. The hands-on opportunity with high-tech equipment in industry not only integrates classroom theory with practical experience, it also provides the engineering student with financial assistance to help offset the cost of their education. Engineering students are enjoying their co-op placements with more than 600 different companies in 38 states, Washington, D.C. and 29 foreign countries.

To learn more about this program please contact our Engineering Career Management Center at 419.530.8050.
The shaded U.S. map and States and countries listed above are indicative of co-op and/or full-time placements.

The College of Engineering is one of eight mandatory engineering cooperative education (Co-op) programs in the United States. Since 1997, there have been over 7,900 engineering co-op placements. The college has received national recognition thru inclusion in “The Best of Co-op”, three the National Commission for Cooperative Education, since 2005.