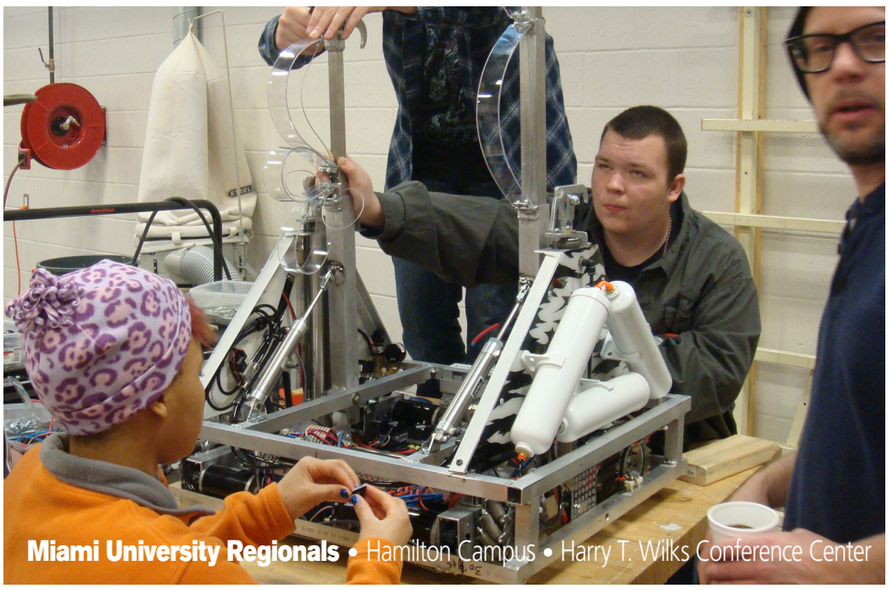
SCHOOL OF ENGINEERING & APPLIED SCIENCE
Department of Engineering Technology

SENIOR DESIGN projects 2013

April 26 • 9am-4pm



IN ROOM 1

9am

Advanced Drainage Systems (ADS) Corrugated Polyethylene Pipe Perforator

Marc Carneo, Marita Hergert, Erickson Taveras
Advisor and Mentor: **Gary Drigel**

Student engineers designed a robotic drilling system or perforator for corrugated pipe used in storm water drainage. The main goal of this project was to combine two different machines into one enabling a leaner process for pipe manufacturing. The successfully designed perforator is able to accommodate pipe sizes ranging from 12" to 30." This perforator enables employees to do changeovers more efficiently to decrease manufacturing cost for ADS.

9:30am

Exercise Equipment Smart Spotter

Steven Daviaux, Jacob Ruggles
Advisor and Mentor: **David Hergert**

Students designed a standard Smith machine by adding a pulley system connected by cables to a motor, contactor, and microcontroller. As an exercise is in progress, proximity switches will detect each pass made by the weight.The number of repetitions will be displayed on an LCD screen. If the user cannot finish the set, the motor and pulley will lift the weight off of the user and the LCD panel will display the attempted weight lift.

10am

Eastman Kodak – Leak Test Stand- Catcher Duct Assembly (CDA)

Melissa Stewart-Mackie, Bill Jones
Advisor and Mentor: **Gary Drigel**

Student engineers designed and built a Leak Test Stand that consisted of an automated servo system to control air pressure and flow rate of cleaner fluid. During this period of time readings were taken and recorded automatically. These included but were not limited to: pressure, flow rate, and error readings. The error readings consisted of any indication of fluid leaks that were detected. If there were any signs of a leak whether, it was a visual indication or error readings that indicated a leak; then the catcher duct assembly failed to meet specification and sent for rework.

10:30am

Remote Robot Arm Station for Distance Education Laboratories

Eric Bauer, George Dewalt, Matthew Culbertson
Advisor and Mentor: **Mert Bal**

In this project, the students designed and built hardware and software interfaces for web-based remote control and monitoring of an articulated robot arm for engineering distance education laboratory classes. The by-product of this project is aimed to be utilized in several distance courses at the Miami University, Department of Engineering Technology.

11am

Hot Die Stamping – AIDA America and AK Steel

Andrew Faulkner, Jeremy Hansman
Advisor and Mentor: **Gary Drigel**

Student engineers designed, built and tested a water-cooled hot forming die. Hot stamping and other warm forming processes have become an area of interest among automotive manufacturers and tier one support manufacturers. The need for this type of manufacturing process has been dictated by government safety and fuel efficiency standards. These mandates have forced manufacturers to design and produce stronger and lighter automobiles to meet standards. As a result, manufacturers have begun producing high strength low alloy steels, and lighter stronger aluminum alloys. These metals have forced producers into specialized stamping procedures, including warm forming.

11:30am

Scale Natural Gas Compressor Station Simulator — Basic Systems, Inc.

Cole Fehrman, Eric Ravak, Matt Mallett
Advisor and Mentor: **Mert Bal**

Students designed and built a scale simulator of a natural gas compressor station, which will be utilized in the Basic Systems Inc. The system involves a recycle circuit for a compressor, and a proportional valve in this recycle circuit that will be controlled by a PLC and allow tuning the PID control parameters within the PLC unit. The designed system directly benefits Basic Systems Inc., who provided funding of the entire project.

12-1pm

LUNCH BREAK & AWARDS CEREMONIES

(Parallel Sessions will start in Room 2 after the Lunch Break)

IN ROOM 2

1pm

FIRST Robotics-Columbus

Dwight Anderson, Steven Cox
Fort Hayes High School, Columbus Ohio
Advisor and Mentor: **David Hergert**

FIRST Robotics Competition (FRC) combines the excitement of sport with the rigors of science and technology. Under strict rules, limited resources, and time limits, teams of 25 students or more are challenged to raise funds, design a team "brand," hone teamwork skills, and build and program a robot to perform prescribed tasks against a field of competitors. In this case, students will work with Fort Hayes High School in Columbus.

What is Senior Design?

Student teams conduct major open-ended research and design projects. Elements of the design process including establishment of objectives, synthesis, analysis, and evaluation are integral parts of the capstone. Real-world constraints such as economical and societal factors, marketability, ergonomics, safety, aesthetics, and ethics are also integral parts of the capstone. ENT 497: feasibility studies performed; ENT 498: implementation, testing, and production of design.

IN THE ROOM 1, continued

1pm

Wood Gasifier to Produce Syngas Fuel

Dustin Jordon, Joseph Kurzner, Gregory Napier
Advisor and Mentor: **Gary Drigel**

Students designed and build a wood gasifier to produce wood gas also known as syngas. They converted a gasoline powered go-kart to run on the syngas that the gasifier produced. For testing purposes they compared the efficiency of the engine running on syngas to its efficiency running on gasoline. They also tested the heat output of the engine while running on syngas compared to gasoline.

1:30pm

Conversion and Evaluation of a Volkswagen Jetta to Run on Vegetable Oil

Amanda Fite, Christopher Horwarth, Raymond Palmerton
Advisor and Mentor: **Gary Drigel**

Student engineers developed a system to operate a 2002 diesel Jetta on vegetable oil. Considerations for optimal performance included the stock configuration of the vehicle and the chemical and physical properties of vegetable oil. Using the most conservative operating restrictions, they monitored various parameters to track the progression of any mechanical degradation resulting from the use of the vegetable oil. They evaluated the viability of vegetable oil as a safe alternative fuel in modern direct injection diesel engines.

2pm

Functioning Prosthetic Thumb

Rachael Beckman, Matthew Otto, Brandon Ross
Advisor and Mentor: **Gary Drigel**

Student engineers designed a functioning prototype of a prosthetic thumb mechanism that can be put on or taken off much like a glove. The design included material selection, mechanism analysis, stress analysis, range of movement and physical size. Ideally, the thumb could function via input from the prosthetic hand should sell in a $500 to $1000 price range. The design range and fitment are wide since amputations are different for every case and may require more or less engineering time depending on the severity.

2:30pm

Toyota Camry – Natural Gas and Petroleum Hybrid Powered Vehicle

Nicholas Engle, Eric May, Thomas Scholl
Advisor and Mentor: **Gary Drigel**

Student engineers converted a 2007 Toyota Camry to a hybrid car using compressed natural gas as the secondary fuel source. Using a dynamometer, the team analyzed the vehicle's performance before and after conversion. Students predicted engine performance and compared their calculations to actual results. This low cost conversion provides vehicle owners an opportunity to use a fuel that is inexpensive, clean burning, and not harmful to the environment.

3pm

Electrically Assisted Rehabilitation Tricycle

Josh Foster, Don Whitmore
Advisor and Mentor: **David Hergert**

Student engineers designed a functional piece of exercise equipment for individuals with minor handicaps. It can be used as a rehabilitation device or as a recreational form of aerobic exercise. The unit is a tricycle with an electric motor assist, allowing the user to operate it for longer periods of exercise. The amount of assistance available from the motor can be controlled by the user.

3:30pm

Mobile Control of a 3-Phase Motor

John Sykes, Ira Coriell
Advisor and Mentor: **David Hergert**

Students designed a system that allows the speed of a 3-Phase Motor to be controlled with a mobile device. PHP code was used for the mobile device, with Labview running on the server. Security is maintained by having username and password protection both on the mobile device and the server controlling the variable frequency drive connected to the motor. The project is intended for use in the Electromechanical Engineering Technology program at Shawnee State University.

IN ROOM 2, continued

1:30pm

FIRST Robotics-Toledo

Jeff Marvin, Mack Warner, Seth Wiechers
Advisor and Mentor: **David Hergert**

FIRST Robotics Competition (FRC) combines the excitement of sport with the rigors of science and technology. Under strict rules, limited resources, and time limits, teams of 25 students or more are challenged to raise funds, design a team "brand," hone teamwork skills, and build and program a robot to perform prescribed tasks against a field of competitors. In this case, students will work with Toledo Technology Academy.

2pm

FIRST Robotics – Lakota Schools

Ansah Ntow, Matthew Waits, Robert Setlock
Advisor and Mentor: **Mert Bal**

In this project, the student engineers worked together with a team of high school students from the Lakota East Schools to design and develop a robot that would compete in the national FIRST Robotics Competition. The Miami students also designed and built a Machine Vision system for the competition robot in order to help FIRST Robotics team in accurate control of the robot for achieving competition goals.

2:30pm

Solar Rainfall Collection System

Daniel Dotson, Jeremy Anders, Steven Welch
Advisor and Mentor: **Mert Bal**

Students designed and developed a solar-powered rain water collector system, which collects rain water through the gutter system of a normal household or building and reuse for irrigation. The collector is intended to water sections of plants with the reused rainwater at any time of day whenever needed. The design of the system includes a web-based remote control interface via a mobile application. The owners can access and control the system even if they are not on the premises.

3pm

Solar Power Assisted Electric Scooter

Jeremy Bryant, Isidro Cabrera
Advisor and Mentor: **Gary Drigel**

Student engineers designed and built a solar power assisted system for an Auranthetic Charger electric scooter. In addition, they improved the aerodynamics of the electric scooter to maximize efficiency. This solar powered scooter would be a very efficient means to travel around town. The solar powered scooter should be an affordable alternative to those that either cannot afford a car or those who wish to save energy and money.

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