

ENT SENIOR DESIGN DAY



ROOM 1 PRESENTATIONS

For concurrent presentations, see other side.

9:30am

Trail-Gate Mobile Lifting System*

Jacob Mullins and Nick Pyane
Advisor & Mentor: **Gary Drigel**

Student Engineers designed and constructed a mobile lifting system (Trail-Gate) that attaches to the receiver hitch of a Toyota Tundra pickup truck. This system allows for assisted loading and unloading of heavy and/or awkward items into the truck bed.

10:00am

CSX Transportation - CSX Lidar Tracking System for Rail Cars*

Marcus Gray and Gerald Mukiawa
Advisor & Mentor: **Gary Drigel**

Student engineers designed and built a Lidar tracking system using CSX Transportation in Cincinnati, Ohio, as a case study. The project was a proof of concept to eliminate the blind spots within CSX's Auto-classification computer system. When implemented, this device would increase safety and productivity while reducing costs to the company.

10:30am

Smart Air Pressure Regulator System

Nate Fields and Greg Kramer
Advisor & Mentor: **Gary Drigel**

Student engineers have designed, programmed, fabricated and assembled a cost-effective automatic pressure delivery system prototype that quick-connects to an OTS (Off-The-Shelf) air compressor. When an OTS air tool fitted with a custom Smart Plug is quick-connected to the custom air hose assembly, the Plug's target pressure is identified and the pressure is automatically adjusted then delivered by the Smart Regulator.

11:00am

Intelligrated Conveyor Systems - A Multi-Sensor Device for Data Collection in Material Handling

Paul Mass, Matt Taylor and Kayla Vertner
Advisor and Mentor: **Gary Drigel**

Student engineers designed and built a measuring tool that will enable Research & Development Specialists to create more efficient conveyor systems used in the material handling industry. The IntelliBox provides real-time feedback of impact forces and acceleration values experienced by the box as it travels along the conveyor. This data is vital in determining how fast an item can be conveyed without damaging the shipping container and/or the product inside it.

11:30-1:30pm

LUNCHEON PROGRAM

(Keynote address by Miami University President Gregory Crawford, Alumni Welcome & Awards Ceremonies)

1:30pm

Ganymede Corp. - Tower Survey using an Unmanned Aerial Vehicle (UAV)

Dominick Fantino and Craig Yeager
Advisor & Mentor: **Gary Drigel**

Student engineers developed and built an accurate structural profile device for aerial inspection and surveying of communications towers using an unmanned aerial vehicle (UAV). This would provide a safe alternative to the current industry standard inspectors climbing towers to do structural inspection.

2:00pm

CNC Router

Jacob Fritz and Robert Siegrist
Advisor & Mentor: **Gary Drigel**

Student engineers have designed, analyzed and built a CNC Router capable of rapid manufacturing of parts for the prototyping industry. This is a computer programmable machine that is capable of processing soft and hard wood, HDPE, PVC, acrylic, medium density fiberboard, and aluminum.

2:30pm

Mitsubishi Electric Automotive America - Mitsubishi Lathe Conversion

Zach Henderson, Brett Huelsman and Travis Wesley

Advisor & Mentor: **Gary Drigel**

Student engineers redesigned, analyzed, and installed a fully automated starter armature machining process. Design require-

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.

ments included: mechanical operation, addition of electrical controls, quality of product produced and easier operation.

3:00pm

OPW - Fixturing for a Coordinate Measuring Machine (CMM) to Inspect Fuel Filler Nozzles

Chris Chesnut and Hugues Seumo
Advisor & Mentor: **Gary Drigel**

Student engineers designed and built a universal rotating fixture to accommodate inspection of multiple size fuel nozzles for a Coordinate Measuring Machine (CMM). This will improve the current process of measuring a nozzle by reducing setup time and increasing efficiency of process by allowing the operator to measure multiple nozzles simultaneously. is the best to use in their operations.

3:30pm

Automated Log Splitter

Clayton Bapst, Nigel Collett and Levi Miller (Shawnee State)

Advisor & Mentor: **Rob Speckert**

Student engineers designed and manufactured an Automated Log Splitter that will sense the size of the log, and adjust accordingly to ensure the log is split on center. This system is powered by 120 Volts AC and utilizes a hydraulic system, stepper motors, and programmable logic controllers.

4:00pm

Large Surface Area Power Washer

Jacob Huber and Daniel Lipps

Advisor: **Gary Drigel**

Student engineers designed, constructed and tested a prototype large area power washer that can be used to power wash large concrete surfaces such as driveways and sidewalks with ease.

4:30pm

Whirlpool Corporation FANUC Robot Training Cell

Chad Adkins, Jason Bowers, and Dylan McDorman (Rhodes State and Terra State)

Advisors: **Rob Speckert**

Student engineers designed, installed, and programmed a working robot cell at Whirlpool Corporation's facility in Ottawa, Ohio. The cell will be utilized for training personnel for a Fanuc robot. The team developed a training program that will be used to teach technicians and engineers how to use the teach pendant, how to manually control the robot, and the basic programming of the robot.

5:00pm

Parking Assist

Andrew Melrose and Shyanna Penley (Zane State)

Advisor: **Rob Speckert**

Student engineers designed, programmed, and installed a park assist system that uses a mobile application to notify the driver how close the car is to an object.

ROOM 2 PRESENTATIONS (Parallel Sessions)

9:30am

Toilet Defender

Jacob Deitrick and Clayton Mayberry (Zane State)

Advisor: **Rob Speckert**

Student engineers designed and fabricated The Toilet Defender which will stop the flow of water to a toilet for common leak problems associated with toilets. This device will potentially save money on water bills and repair costs due to common damage caused by a bad/leaking toilet

10:00am

Smart Home-based Pet Boarding

Ryan Hall and Tony Harding (Columbus State)

Advisor: **Reza Abrisham Baf**

Mentor: **Mert Bal**

Student engineers designed and developed a fully automated, home-based pet boarding system which would allow pet owners leave their pets unattended for long periods of time in their homes. The system incorporates the Internet of Things technology to interact with the cloud for allowing the pet owners to monitor and control the system over the world-wide-web.

10:30am

Smart Shopping Cart*

Brandon Thomas and Jaz-Maria Turner (Columbus State)

Advisor: **Reza Abrisham Baf**

Mentor: **Mert Bal**

Student engineers designed and built a prototype smart shopping cart for automatic identification of products when they are placed in a shopping cart. The device, utilizes the Radio Frequency Identification technology (RFID) track items' price and other relevant information, and display them to the shoppers while shopping.

11:00am

Automated Indoor Garden

Ben Frail and Zach Proctor (Rhodes State)

Advisor: **Mert Bal**

Mentor: **Reza Abrisham Baf**

Student engineers designed a self-contained automated indoor garden that will grow plants and serve as an indoor fruit and/or vegetable source to the household. The system uses UV light for proper growth of the plants. It also monitors soil moisture and temperature for automatic watering and regulation of plant temperatures. An on-board Human Machine Interface (HMI) allows users to carry out system adjustments as well as plant monitoring via the world-wide-web.

11:30-1:30pm

LUNCHEON PROGRAM

(Keynote address by Miami University President Gregory Crawford, Alumni Welcome & Awards Ceremonies)

1:30pm

Wetisserie: The Automated Wet Food Pet Feeder*

Trevor Rowe and Audra Smith (Shawnee State)

Advisor: **Rob Speckert**

Student engineers developed a programmable Wet Food Pet Feeder. This pet feeder will incorporate a rotating spindle for multiple timed feedings and a cooling system to keep wet food edible (safe) while the pet owner is away. The system will give the consumer the ability to portion out meals which can be set to be dispensed at the user's choice of time intervals.

2:00pm

**Firefighter Monitoring System*
Jamaledine Bouaziz and Graham Wardell (Columbus State)**

Advisor: **Mert Bal**

Mentor: **Reza Abrisham Baf**

Student engineers designed a system to monitor firefighter biometrics for preventing injuries during a fireside action. The system uses a set of wearable wireless sensors to monitor vitals and detect firefighters' motion, especially a rapid change of attitude due to a fall.

2:30pm

Industrial Monitoring and Process Control Systems*

Michael Karl and Brent Myers (North Central State and Edison)

Advisor: **Mert Bal**

Mentor: **Reza Abrisham Baf**

Student engineers will present examples of computerized monitoring and control systems which they designed and implemented in two different industrial processes: i) efficiency measurement of single phase electric motors at Emerson Climate Technologies, ii) monitoring thermo-laminated parts to detect vinyl adhesion failure at the Wurm's Woodworking Co.

3:00pm

Internet-Of-Things Based Forklift Truck Management and Crash Detector System

Roger Abdalla and Alex Mader (Columbus State)

Advisor: **Mert Bal**

Mentor: **Reza Abrisham Baf**

Student engineers designed an Internet-of-Things based control and monitoring system which utilizes wireless sensors and a cloud computing architecture to improve utilization and safety of fork lift trucks in large warehouses. The system incorporates a set of sensors and a smart-phone app that facilitates communication between the trucks and the forklift truck supervisor.

3:30pm

Autonomous Guided Vehicle

Philip Fulton and John Selhorst (Rhodes State)

Advisor: **Reza Abrisham Baf**

Mentor: **Mert Bal**

This project entails the design and construction of an AGV (autonomously guided vehicle) for use in computer integrated manufacturing facilities. The AGV uses ultrasonic and infrared sensor arrays to navigate autonomously and detect the presence of loads that will be picked up.

4:00pm

PLC Development Station for HVAC Applications at Bard Manufacturing Co.

Sean Skiver and Aaron Snyder (Northwest State)

Advisor: **Mert Bal**

Mentor: **Reza Abrisham Baf**

Student engineers designed a portable Programmable Logic Controller (PLC) simulation platform, which will be used for developing PLC programs at the Bard Manufacturing Co.

4:30pm

General Purpose Internet-of-Things Platform for Home Automation*

Nathan Evers, Ryan Spence and Emily Tucker

Advisor: **Reza Abrisham Baf**

Mentor: **Mert Bal**

Student engineers designed a general-purpose platform for easy development of Internet-of-Things based home automation applications. The designed system includes three controllers that the user can select from as needed to control security, energy-efficiency, and entertainment functions within the home.