

SENIOR DESIGN 2016 Projects



M
MIAMI
UNIVERSITY
COLLEGE OF
PROFESSIONAL STUDIES
& APPLIED SCIENCES

Department of Engineering Technology

Concurrent Sessions
FREE & OPEN TO THE PUBLIC

Friday, April 29
9:30am-4:30pm

Harry T. Wilks Conference Center
Miami University Hamilton

ROOM 1 PRESENTATIONS

For concurrent presentations, see other side.

9:30am

Kappler HazMat Suit Glove Assembly*

Dan Enderle, Kevin Faust, Jason Hale
Advisor & Mentor: **Gary Drigel**

Student engineers have designed, manufactured, and tested a machine to aid in the process of inserting gloves in Level-A HazMat suits. This device increased the repeatability and reliability of the glove installation process as well as improved the efficiency.

10am

RESCU-Flo Water Filtration System*

Jo Matota, Austin McFall, Sam Schmitt
Advisor & Mentor: **Gary Drigel**

Student engineers have designed, manufactured and tested a simple but robust prototype water purification system that can be used in crises and in third world countries. The goal was to fill a niche market between expensive high flow systems and inexpensive low flow systems.

10:30am

Bosch Automotive Steering I-Shaft Assembly Fixture and Turntable

Brett King, Nathan Strotman, Anthony Webb

Advisor & Mentor: **Gary Drigel**

Student engineers have designed, built, and implemented replacement fixturing and tooling to improve quality, reduce scrap and reduce down time of I-shaft assembly. Data collection and analysis indicate significant improvements.

11am

General Electric Aviation — Ultra High Temperature Laboratory Fatigue Testing Furnace

Austin Baker, David Taggart, Marcus Wallace

Advisor & Mentor: **Gary Drigel**

Student engineers have designed, constructed and tested an ultra-high temperature small footprint furnace capable of 2700°F and maintaining a specimen profile of $\pm 15^\circ\text{F}$. This furnace is used to fatigue test composite materials for the aerospace and power generation industry.

11:30am

Planetary Gear Assemblies for Machine Design Manufacture Using Two Models of 3D Printers

Graeme Guinup

Advisor: **Gary Drigel**

Mentor: **Mazyar Amin**

This student have designed and built several planetary gear assemblies including helical and herringbone gears. These gears were manufactured using Fused Deposition Modeling (FDM) 3D printer with ABS polymer feed stock. "Printing was done on both a CubePro® Trio printer owned by Miami and a LulzBot® Taz 5 owned by the student. Several printing and tolerancing parameters were developed during this process.

12-1:30pm

LUNCH BREAK & AWARDS CEREMONIES

1:30pm

BILSTEIN — Ride-Height Adjustable Shocks and Struts

Andrew Hackney, Roger Mills, Bryan Williams

Advisor & Mentor: **Gary Drigel**

Student engineers have designed, manufactured, and tested prototype tunable shock and struts for a Ford Flex. This is a new ap-

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.

plication and market for Bilstein. Prototypes were built and tested in the lab and then tested on a vehicle.

2pm

A-T Controls – Butterfly Valve Assembly Apparatus

Brian Coffey, Matt Day, Kyle Tillery
Advisor & Mentor: **Gary Drigel**

Student engineers have designed, analyzed, manufactured and tested an automated prototype device used to assemble and install the disc into butterfly valve bodies. This is an assembly process that was done manually. The initial design was for 6" valves but it will be expanded to other sizes pending results.

2:30pm

O-Ring Test System – DNV/GL

Robert Nicely, Jason Edgar
Advisor & Mentor: **Rob Speckert**

The purpose of this project is to evaluate multiple types of elastomers (O-rings) in various types of service conditions so that the client may choose which type of material is the best to use in their operations.

* ARMIN J. FLECK SCHOLARSHIP RECIPIENT

3pm

Verti-Glazer: Automatic Vertical Window Glazer — Andersen Window

Jon Brinker, Remy Page, Tylor Wright

Advisor & Mentor: **Mert Bal**

Student engineers have designed and constructed a vertically positioned automatic window glazer that integrates into current production lines at Andersen Window Corporation. The glazer is aimed to move along the three Cartesian axes and glaze any size window automatically while in the vertical position using a variety of guidance sensors and lasers.

3:30pm

Slot Car Track*

Jason Clemons, Jason Lamb

Advisor: **Rob Speckert**

Student team has designed and built a functional and portable slot car circuit racing track for use by the Columbus State Community College Engineering Department. The purpose of the track is to be used as a bridge to local high school students to utilize their 3D CAD programs and 3D printers to design slot car bodies which they will race against other students.

4pm

3D Printed Gear Assembly for Classroom Demonstrations

Logan Crawford, Nathan McCarnan

Advisor: **Gary Drigel**

Mentor: **Mazyar Amin**

Student engineers design and printed a series of gears which in combination can provide a wide range of gear ratios. This device is powered by a DC motor and is capable of several speeds. This device will be used as a demonstration device for the Mechanical Machine design course.

ROOM 2 PRESENTATIONS (Concurrent Sessions)

9:30am

Home Automation Based on Wireless Sensor Networks

Nathan Grant, Brandon Telljohann, Tyler Watson

Advisors: **Reza Abrishambaf, Mert Bal**

Student engineers have designed and built a home automation system prototype using Internet-of-Things and Wireless communication technologies for controlling light fixtures with the purpose of increasing energy efficiency and improving system functionality. The system aims to help those who have less or restricted mobility to control devices in home with greater ease.

10am

Parking Distance Detection System*

Paul Anderson, Robert Craft

Advisor: **Mert Bal**

Student engineers have designed an automated parking distance monitoring system

to improve general safety during parking in enclosed garages. The system monitors and gives distance warning when pulling a vehicle into a small garage or backing up a large trailer into a barn. This function is achieved by wirelessly communicating external sensors, which are wall-mounted in a garage.

10:30am

Automated Component Delivery System — Pentair & Ashland

Wes Metek, Zack Wheeler

Advisor: **Rob Speckert**

Student team developed an automated component delivery system used with an industrial assembly line. The integration of a power corner conveyor with gravity roller conveyors allows for sustained and continued operation with minimal hang ups.

11am

Defensive Alert Safety Unit (DASU)*

Jordan Dunkel, James Morris, Haitam Sheikh

Advisor: **Rob Speckert**

The Defense Alert Safety Unit is an integrated system of sensors and defensive counter measures made for motorcycles to decrease the alarming number of fatal accidents. DASU alerts the rider of potential dangers around the motorcycle. DASU utilizes audio and visual alerts to assist the rider so s/he can maintain a safe distance from other motorists.

11:30am

Enforc-Hygiene Hand Hygiene Control System

Tommy Geer, Jessica Hoch, Ashley Roberts, Valeri Yunusa

Advisor: **Mert Bal**

Student engineers have designed and built functional prototypes of various components for the Enforc-Hygiene automated hand hygiene control system, which includes an integrated system of automated faucets and soap dispensers to enforce its users to wash their hands with soap for at least 20 seconds as recommended by Center for Disease Control and Prevention (CDC). The system also utilizes an integrated video display in order to show and teach its users CDC approved hand-washing techniques.

12-1:30pm

LUNCH BREAK & AWARDS CEREMONIES

1:30pm

Spray Valve Test Bench — Machine Concepts Inc.

Jason Bender, Jeffery Wentz

Advisor: **Mert Bal**

Student engineers have designed and built a portable test station for Machine Concepts Inc. for testing coolant spray valves, used in the steel and aluminum mill industry. The test bench will be used to test the operations as well as measure the capacity of various size spray valves at different operating pressures.

2pm

Axle Wheel End Turn Effort Measuring Device: Dana Holding

William Freitz, Chris Hurtig, Scott Steward

Advisor: **Mert Bal**

Student engineers have designed and constructed a station for measuring the breakaway torque and angle of an axle wheel end while rotating the axle wheel assembly. The measuring device is to be used in the axle wheel end production line of the Dana Holding Corporation for consistent, detailed and reliable measurement of the breakaway torque.

2:30pm

Design Improvement of Airflow System for B-10 Sewer Truck — Hi-Vac

Carrie Adams, Kelli Skinner

Advisor: **Mert Bal**

Student engineers have redesigned the airflow system components of a B-10 type sewer truck, which is manufactured by the Hi-Vac Corporation for improvement of its efficiency. With the improved design of its cyclones and filters, the B-10 sewer truck's airflow system has been tested to be more cost effective and efficient in its operations.

3pm

Remote Controlled Snow Blower — Crawford Construction

John Poffenbaugh, Jerimiah Baker, Dominick Strassell

Advisor: **Rob Speckert**

This snow blower has been converted to radio control to help decrease the growing number of deaths/ heart attacks by people that are out in the cold shoveling their driveways every winter. The Radio Controlled Snow Blower is a modular system of a propulsion unit and a snow blower unit.

3:30pm

Kinematic Controller for Mitsubishi RM-501 Robot

Justin Bonifield, Rob Loewendick, Aaron Singer, Dustin Steed

Advisor: **Mert Bal**

Student engineers have designed and built a distributed kinematic controller for a Mitsubishi RM-501 6-axis Robot arm in order to improve its operations and fault tolerance. The project involves replacing the centralized robot drive controller with multiple decentralized axis controller units.

