



COLLEGE OF ENGINEERING
THE UNIVERSITY OF TOLEDO



UNDERGRADUATE RESEARCH AND SENIOR DESIGN ENGINEERING PROJECT EXPOSITION



THE UNIVERSITY OF TOLEDO
COLLEGE OF ENGINEERING
FRIDAY, DECEMBER 11, 2015



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NITSCHKE HALL
DESIGN EXPO NOON - 3 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

Bioengineering projects displayed at the Spring Semester Exposition (April 29, 2016)



THE UNIVERSITY OF TOLEDO
COLLEGE OF ENGINEERING

Nagi G. Naganathan, Ph.D., ASME Fellow
Dean and Professor

DEPARTMENT OF
BIOENGINEERING

Arunan Nadarajah, Ph.D.

Professor and Chair

Ronald L. Fournier, Ph.D., P.E.

Professor and Instructor of Senior Design

DEPARTMENT OF CHEMICAL &
ENVIRONMENTAL ENGINEERING

G. Glenn Lipscomb, Ph.D.

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Sridhar Viamajala, Ph.D.

Associate Professor and Instructor of
Senior Design

DEPARTMENT OF
CIVIL ENGINEERING

Ashok Kumar, Ph.D., P.E.

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Cyndee Gruden, Ph.D., P.E.

Associate Professor and Instructor of
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DEPARTMENT OF
ELECTRICAL ENGINEERING
& COMPUTER SCIENCE

Mansoor Alam, Ph.D.

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Associate Professor and Instructor
of Senior Design, LCCC

Mohsin Jamali, Ph.D.

Professor and Instructor of Senior Design

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DEPARTMENT OF MECHANICAL,
INDUSTRIAL & MANUFACTURING
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Abdollah A. Afjeh, Ph.D., P.E.

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Mohamed Samir Hefzy, Ph.D., P.E.

Processor and Associate Dean of Graduate
Studies and Research Administration

Matthew Franchetti, Ph.D., P.E.

Assistant Professor and Instructor of
Senior Design



COLLEGE OF ENGINEERING
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**YOU ARE CORDIALLY
INVITED TO ATTEND
THE SENIOR DESIGN
EXPOSITION:**

You are cordially invited to attend the Senior Design Exposition on Friday, December 11, 2015 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/capstone project, students create 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.

Parking is available on the engineering complex and parking permits are not required on this day.

For more information on the exposition call 419.530.8014 or email [sstewart@eng.utoledo.edu](mailto:ssewart@eng.utoledo.edu)

For more information on the academic programs offered in the college, please call 419.530.8045 or email jon.pawlecki@utoledo.edu

CHEMICAL AND ENVIRONMENTAL ENGINEERING

SRIDHAR VIAMAJALA, PH.D.

SENIOR DESIGN FACULTY COURSE COORDINATOR

Design and Simulation of a Process to Produce Biofuels and other Co-products from Microalgae

FACULTY ADVISOR: SRIDHAR VIAMAJALA, PH.D.

Design Team: Charlotte Ackerman, Murtadha Aljubran, Redah Almarhoon, Abdulrahman Alotaibi, Egor Antipov, Luke Armstrong, Khari Beverly, Vincent Brimmer, Jennifer Brown, Taylor Browning, Courtney Cannon, Nicholas Costello, Jared Dupes, Patrik Eskandari, Zachary Francis, Timothy Frederici, Kevin Garverick, Erin Gordon, Scott Grekowicz, Grant Heil, Sarah Hlass, Lucille Hosenfeld, Kyle Kemenyes, Clinton Kulwicki, Joshua Landrum, Christopher Lawson, Maureen Logue, Shannon Lynam, Evan Mahl, Patrick McEvoy, Alexander Miller, Meri Mullins, Daniel Ostas, Anthony Paul, Nicholas Placko, Hannah Placzek, Lucas Poock, Corey Povenmire, Autumn Redding, Spencer Smith, Mark Sulin, Timothy Szaroleta, Melissa Thoman, Troy Thompson, Amanda Vogel, Thomas Wilkins, Jeffrey Williams, Seth Williams, Jonathan Wills, Jay Wilson, Matthew Wolfe, Derek Zuchowski.

This project focuses on design and simulation of processes for conversion of microalgae biomass into fuels and/or products. There is a growing worldwide interest in production of renewable and sustainable alternate fuels (such as biofuels) due to increasing concerns over global warming. While several methods have been proposed for production of fuels and tested for feasibility at laboratory scale, the economics and scalability of these processes is generally unknown. In this project, Senior CHEE students will develop process designs to assess overall costs and energy use in the production of biofuels.

CIVIL ENGINEERING

CYNDEE L. GRUDEN, PH.D., P.E.

SENIOR DESIGN FACULTY COURSE COORDINATOR

Savage Arena Pedestrian Bridge

FACULTY ADVISOR: DOUGLAS NIMS, PH.D., P.E.

Client Advisors/Sponsors: Dan Klett and Dr. Patrick Lawrence - The University of Toledo

Design Team: David Szymanski, Carly Huston, Garrett Darby, Grant Steigerwald, Christine Hoholski, Ahmad ElRefae

The Savage Arena pedestrian bridge has structural issues in both the superstructure and the substructure. The University of Toledo has requested that bridge replacement options be evaluated and preliminary engineering performed on a replacement design. Two bridge design options have been developed to meet this request and better accommodate pedestrian traffic flow.

Carlson Library Revitalization

FACULTY ADVISOR: CYNDEE L. GRUDEN, PH.D., P.E.

Client Advisors: Daniel Klett, Nicholas Hogrefe, Dr. Patrick Lawrence – The University of Toledo

Design Team: Alex Alt, Bryce Haase, Chris Kuzma, Josh McElderry, Michael Pickerel

The current layouts of Carlson Library and the Student Union have created a significant and unwanted flow of pedestrian traffic through the library. University of Toledo personnel would rather see the courtyard between the buildings used for this purpose, as well as being a more popular common area for students, faculty, and visitors. In an effort to address these issues, The University of Toledo Department of Facilities & Construction has requested that the exterior of the library and adjacent courtyard be converted to a more modern, attractive, and functional space.

Douglas Road Bike Path

FACULTY ADVISOR: CYNDEE L. GRUDEN, PH.D., P.E.

Client Advisors/Sponsors: Doug Collins – The University of Toledo, Richard Martinko – Independent Consultant

Design Team: Audrey Bowen, Jessica Ezzie, Casey Heitkamp, Michael Lutes

The Douglas Road Bike Path extends from Dorr Street to Bancroft Street. The goal of this path is to allow pedestrians and cyclists to travel safely along Douglas Road through The University of Toledo. The project provides funding opportunities and incorporates design elements of the Chessie Circle Trail.

N. Towerview Blvd. Complete Streets Redesign

FACULTY ADVISOR: CYNDEE L. GRUDEN, PH.D., P.E.

Client Advisors/Sponsors: Doug Collins – University of Toledo, Richard Martinko – Independent Consultant, Tim Bockbrader – Independent Consultant

Design Team: Shawn Richards, Scott Stelma, Hassan Ajram, Emanuel Marrero, John Scherger, Calvin Mayer

Congestion issues have warranted a Complete Streets redesign of N. Towerview Blvd. The goal is to provide safe and effective flow for pedestrians, cyclists and motor vehicles. The project will include sidewalks, bike lanes and the redesign of the Centennial Drive and N. Towerview Blvd. intersection, where congestion is highest.

EAC Zoo Redevelopment

FACULTY ADVISOR: CYNDEE L. GRUDEN, PH.D., P.E.

Client Advisors/Sponsors: Todd Cereghin - The Toledo Zoo

Design Team: Austin Brahaney, Michael Craig, Adam Donnell, Phillip Gabel, Benjamin Schilling

The Toledo Zoo has requested a conceptual design for redeveloping and expanding the Education Animal Center (EAC) building and surrounding area. This design will include renovating the existing Raptor Barn to accommodate the EAC mammals, giving them separation from the birds in the EAC building. An interactive exhibit will also be designed in order to display these animals to visitors of the zoo. Lastly, outdoor living spaces will be designed as an extension of the EAC building and Raptor Barn, along with a larger caged enclosure beside the EAC building that will enable multiple animals to be contained at one time.

Junction Neighborhood Revitalization

FACULTY ADVISOR: CYNDEE L. GRUDEN, PH.D., P.E.

Client Advisors/Sponsors: Kari Gerwin - TMACOG, Alicia Smith Community Liaison

Design Team: Erika Contreras, Mathew Dorr, Josh Kirk, Paige Kutschbach, Doug Renaud, Nicholas Roof

TMACOG and the Junction neighborhood organizations have requested options to improve the Junction street neighborhood. Included in the final deliverables will be storm water options, creating a community gathering space that incorporates an amphitheater, and improving transportation of the area by creating a Complete Streets redesign.

Toledo Zoo Tunnel Renovation

FACULTY ADVISOR: CYNDEE L. GRUDEN, PH.D., P.E.

Client Advisors/Sponsors: Habib Kaake, Ph.D., P.E. - Ohio EPA, Valerie Wollet, P.E. - HR Gray, Todd Cereghin - The Toledo Zoo

Design Team: Hillary Serem, Mark Brunet, Chen Shen, Aaron Stelzer

Renovation of a historic pedestrian tunnel built in 1936. The tunnel requires an increase in vertical clearance as well as structural, and water infiltration repair. There is currently a pedestrian bridge as the sole means of entrance from the parking area to the zoo. The tunnel would provide a second route.

ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

MOHSIN JAMALI, PH.D. AND WENG L. KANG, PH.D.
SENIOR DESIGN FACULTY COURSE COORDINATORS

Grain Moisture Tester

FACULTY ADVISOR: PROFESSOR BRENT NOWLIN

Design Team: Austin Albrecht, Jordan Higgins

The goal of the project is to design a portable grain moisture tester capable of interfacing with any smartphone or tablet. A companion application will be created for Apple and Android mobile devices for communicating with the tester. Two variants of the moisture tester will be created: one which communicates via the smartphone's audio port and the other that communicates via the Bluetooth wireless communication standard.

KK 2.0 Powered Quadcopter

FACULTY ADVISOR: PROFESSOR BRENT NOWLIN

Design Team: Andres Moyet, Devin MacDonald

Many of the drones that are available to the public are very expensive and require a bit of training and practice to become accustomed to. Our senior design project, however, is aimed at creating a less expensive homemade quadcopter that is easier to maneuver. The medium-sized drone is controlled via a Hobbyking remote control.

Laser CNC

FACULTY ADVISOR: RICHARD G. MOLYET, PH.D.

Design Team: Andrew Logan, Chelsea Pusey, Chris Sneider, Rudy Jung

Using a simple workbench CNC and other electronics, our team has focused on powering and controlling a 2W Blue laser diode. We have designed and constructed several components of this system. Our goal is to be able to cut paper and certain types of plastics with precision.

GAT (Gunshot Auditory Tracking)

FACULTY ADVISOR: ROGER KING, PH.D.

Design Team: Daniel Booth, Daniel Diehl, Jon Stone, Joe Mcveen

Our Project will use the sound waves generated from the explosive sound of the guns barrel to track the location of a shooter. When the sound originates, our three microphones on our device will have the ability to use and calculate the angle of the shooters origin. This technology does exist for the military however our primary goal is to create a device that will be in a fiscal range of local law enforcement and rescue response teams.

Castle Defenders: A Digital Board Game Adventure

FACULTY ADVISORS: JACKSON CARVALHO, PH.D.,
AND GERALD HEURING, PH.D.

Design Team: Matthew Sorosiak, Bryan Shaner, Dennis Silva, Dustin Naylor, Sean Mahoney

We are creating a digital board game that will appeal to both video game players and board game players. It features network play, supporting up to four players simultaneously. The objective of the game is to outlast computer AI controlled monsters that assault the player controlled castle. The players can increase their chance of survival by strengthening their characters with gear and items found around the board.

Smart Control System

FACULTY ADVISOR: JUNGHWAN KIM, PH.D.

Design Team: Taylor Depew, Brandon Brigadoi, Kevin Dzienny, Isaac Honigford

The Smart Control System is a universal system that can be used in industrial or commercial settings to allow for optimum working/living conditions. Our system ties together three separate known entities, including security, temperature, and lighting control, to provide simplified building condition controls. Meshing together the three systems in a closed loop feedback design allows the consumer hands off solution to controlling power usage, building security, and ambient conditions.

Self-Checkout Shopping Cart

FACULTY ADVISOR: RICHARD G. MOLYET, PH.D.

Design Team: Priyank Kalgaonkar, Grant Wohl, Forrest Noell-Baba, Sean Oberle, Ahmad Alnakhly

The goal of the self-checkout shopping cart is to enable shoppers to quickly, conveniently, and efficiently check-out from a store. The proposed idea of the self-checkout shopping cart is to include a barcode scanner which will be retrofitted onto the shopping cart's handle. The practice of pre-scanning items while shopping, results in substantial saving of time by skipping long and slow-moving lines at the traditional checkout counters.

Fast Food Decision Maker

FACULTY ADVISOR: RICHARD G. MOLYET, PH.D.

Design Team: Rachel Gerber, Justin Wendel, Josh Byrne, Nick Rose, Steven Dapore

The Fast Food Decision Maker is a system of lights and sensors that is integrated into a restaurant's ordering system. For every possible ingredient there is an associated light and sensor that tells the employee which ingredients and senses that the correct ingredient has been picked. The system also includes temperature probes that log the temperatures of the ingredients. This system allows fast food restaurants to shorten training time, increase order accuracy, and safety in the fast food environment.

Proximity Awareness for the Visually Impaired

FACULTY ADVISOR: JUNGHWAN KIM, PH.D.

Design Team: Bryan Ford, Ivan Palacios, Josh Frey, Belal Obeid

Proximity Awareness for the Visually Impaired utilizes ultrasonic sensors fashioned to different areas of a person's body to aid in avoiding collisions with obstructions. These sensors relay information in conjunction with Bluetooth modules to communicate object locations to an Android smartphone in order to process the signals from the sensors. Sound on the smartphone and vibration modules will also be implemented to allow the user to distinguish which direction each obstacle blocking their path is located. Our group created a simple network of sensors to help give visually impaired persons more mobility.

Portable Orthopedic Measurement Shoe

FACULTY ADVISOR: DANIEL GEORGIEV, PH.D.

Client Advisor: Raghav Khanna, Ph.D.

Design Team: Josh Achinger, Julia Cornett, Taylor Killian, Eric Skaggs

The goal of this project is to design a measurement system that fits entirely in a shoe and can collect pressure data by the use of piezoresistors. With this system, podiatrists can collect data from a patient's normal routine rather than from a static measurement. The data can then be used for designing a shoe implant for anyone with poor foot or ankle support.

Snow Tracks

FACULTY ADVISORS: GURSEL SERPEN, PH.D. AND LARRY THOMAS, PH.D.

Design Team: Joshua Smith, Ronald Sutter, Jacob Krogman, Thomas Royko, Joseph Tommasi

Snow Tracks will provide greater insight on the location and operation of snowplows and other road condition restoring vehicles by being able to report their locations and operational states. By collecting this information, the public can be shown a map highlighting which routes should have the safest road conditions. At the same time, managers and other logistics personnel are provided with fine-tuned data analytics. This will help maximize the effectiveness and efficiency of deployed snow removal services.

Simulation Technology Engine

FACULTY ADVISOR: HENRY LEDGARD, PH.D.

Design Team: Chris Goodwin, Nikki Etgen, Ryan Hunt, Andrew Michalczyk, and Victor Corsi

Our engine is aimed at aiding in the development of simulations and simulation games. By using this engine, you will be able to incorporate Excel Workbooks as the algorithms for your simulations. In addition, this engine also generates most of the application code and the SQL Database for your simulation.

J.A.C.K. Tracker - Real Time Output Management

FACULTY ADVISOR: JACKSON CARVALHO, PH.D.

Design Team: Kevin Sklarek, Jayde Carney, Christopher Clay, Austin Norden

Production lines have always been judged on efficiency, and companies are looking for new ideas to improve the process. The J.A.C.K. Tracker is an Android application that provides real time output management and downtime tracking. Operators benefit from being able to see the production status at all times to know if they are ahead or behind of schedule. With the downtime tracking capability, production supervisors now have a better understanding as to why the line met or did not meet the target production. This application increases the overall efficiency of any production line.

ENGINEERING TECHNOLOGY

PROFESSOR RICHARD A. SPRINGMAN, P.E.
SENIOR DESIGN FACULTY COURSE COORDINATOR

ATV Hydraulic Powerhead

FACULTY ADVISOR: CARMEN CIOC, PH.D.

Client Advisors/Sponsors: Chris Ball, Motion Industries; Charlie Graves, Fluid Concepts, Inc.; Patrick Sanay, Certified Power Solutions

Design Team: Steven R. Fortner (MET), Matthew C. Holland (MET), Shane A. Jamerson (MET), Erik Lesniewski (MET), Thomas F. Patrick (MET)

This project seeks to address the two main weaknesses that exist within the growing market of ATV implements: the lack of substantial lifting capability and the lack of necessary down force — both of which are requirements in using ATV-based agricultural equipment. This is accomplished via the use of a gas-powered hydraulic powerhead that is mountable on an ATV rack system. The powerhead itself can be attached to numerous other tools that use hydraulic cylinders; but, it is specifically applied herein to a two-inch, receiver-mountable, single-point lift with a detachable forklift capable of lifting and maintaining a three-hundred pound load. The powerhead may be mounted on either the front or rear rack — whichever is desired — so long as the lift is mounted on the opposing receiver to maintain the machine's original design balance. The lift mechanism is specifically designed to accept most commercially available ATV agricultural tools such as plows, cultivators, and graders provided that they utilize a two-inch receiver.

Wheeling Shooters Automated Mount

FACULTY ADVISOR: JAMES L. KAMM, PH.D.

**Client Advisors/Sponsors: Whitetails Unlimited,
Thanks to Our Yanks, National Wild Turkey Federation**

Design Team: Eric D. Huelskamp (MET), Dylan F. Kollmorgen (MET), Cory M. Mescher (MET)

The objective of the Wheeling Shooters Automated Mount is to give quadriplegics the opportunity to take part in the exciting sport of shooting. With the use of this mount, the user will be able to aim the system in all directions and when ready and the range is clear, he/she will fire the weapon down range. The Automated Mount will facilitate the attachment of a variety of firearms to any powered wheel chair. This will give the user a sense of independence in being able to do something on his/her own for a change without the need to rely on others.

The Third Hand

FACULTY ADVISOR: CARMEN CIOC, PH.D.

Design Team: Majed M. Alotaibi (MET), Brandon Z. Maran (MET), Joseph G. Solano (MET), Levi D. VanVlerah (MET)

The objective of The Third Hand is to create an accessory for a truck bed that can be loaded and assembled in the truck bed that will assist in the loading of ATVs, dirt bikes, motorcycles, or any other heavy object. It will use a collapsible ramp to conserve space and a winch to further help load unpowered or inoperable objects.

DDG Gauges

FACULTY ADVISOR: PROF. RICHARD A. SPRINGMAN

Client Advisors/Sponsors: Tim Kohart and Matt Stringer, Tenneco Inc.

Design Team: Jared B. Dunn (MET), Kurt A. Jackisch (MET), Jacob J. Leffel (MET)

The Double Disc Grinder Gauge is the solution to a problem that is faced by Tenneco Inc. With a V-block design and multiple part masters for comparison, the DDG Gauge is capable of measuring part length to a tolerance of +/- 0.0005 inches. The new gauge will replace the old style gauges currently used in the production of bushing inner tubes. With the ability to hold a tighter tolerance, the new style gauge will help to improve the quality of the parts produced by Tenneco and enhance customer satisfaction in the future.

University of Toledo DC Motor Lab

FACULTY ADVISOR: PROF. ZACHARY D. LINKOUS

Design Team: Ali K. Alghamdi, (EET), Qasem H. Aljaber (EET), Daniel L Anderson (EET)

The goal of this project is to redesign the existing DC motor lab used by students in the EET 4350 Electric Power Systems course. A microcontroller is used to control the speed of the motor and collect the speed, voltage, and current draw of the motor. The microcontroller uses an LCD to display the motor characteristics. The user will be able to adjust the speed, direction, and load on the motor and to observe the resultant effects on the motor.

Automatic Rep Counter

FACULTY ADVISOR: W. TED EVANS, PH.D.

Design Team: Nashmi A. Alsenani (EET), Ryan A. Cleghorn (CSET), Thomas P. Drouillard (EET), Jordan E. Gonzales (EET), Bradley A. Rymers (EET)

The Automatic Rep Counter will be a sensor programmed in a microprocessor to keep track of how many reps you have done, how many you have left to do, how long to rest between sets and will have an alarm to notify you to start your next set. All of this will be visible on an HMI screen right in front of you. It will be an adjustable sensor on the side of the frame so it will be applicable to anyone at any height.

The TABBS Automated Can Crusher

FACULTY ADVISOR: W. TED EVANS, PH.D.

Design Team: Bashir E. Elashi (EET), Brian E. Ellithorpe (EET), Andrew P. Fitzsimmons (MET), Tyler J. Hoffman (EET)

The TABBS Automated Can Crusher: Transforming a drinking problem into an environmental solution. The objective of this project is to create a fully automated and fun way to encourage the recycling of empty cans. This project will be an improvement upon current manual can crushers that are available today.

The Smart Pantry

FACULTY ADVISOR: CARMEN CIOC, PH.D.

Design Team: Cameron L. Brown (MET), Travis J. Chase (CSET), Robert F. Lindsey (CSET), Michael P. Seemann (CSET), Kavon N. Murden (CSET)

The Smart Pantry will be designed to make the information stream from the kitchen to the home owner or renter as seamless as possible. The Smart Pantry will be able to scan the barcode on virtually any grocery item using the built-in scanner on the mobile app. The Smart Pantry will then automatically add every food item to the user's personal virtual pantry. From there, the user could access The Smart Pantry in a variety of different ways including using the system's automatic grocery list, access a plethora of recipes using the items already found in the user's kitchen, access the social application that allows users to share new creations using what's in the user's virtual pantry, as well as utilize automatic dispensers for measurements and increments for items harder to track such as powdered ingredients and seasonings.

Bancroft & Westwood Bike Trail Improvements

FACULTY ADVISOR: PROF. LINDA S. BEALL

Design Team: Matthew J. Guy (CET), Zachary S. Lambert (CET), Kevin D. Watts (CET), Alexander M. Weiss (CET)

The project involves utilizing a sought-after resource for the greater good of the community. It consists of converting abandoned railroad tracks near the intersection of Bancroft St. and Douglas Rd. into a useful bike trail. The railroad bridge across Bancroft St. will be reconstructed allowing for a safer environment for pedestrians and motorists. Signage will be installed on the bridge for a more aesthetically pleasing campus entry. Along with the bike path, a parking lot will be constructed for the university to better suit peak traffic hour needs. Once finished, the project will increase campus parking capacity and recreational opportunities for students and the community alike.

Smart Power Strip

FACULTY ADVISOR: W. TED EVANS, PH.D.

Design Team: Kevin D. Bernhard (EET), Stephen J. Cardina (CSET), Patrick A. Rediger (EET)

The goal for this project is to provide consumers with a method to control devices within the residence while away from home. Users will be able to turn on/off various outlets in the house via a web app at any time.

Controlling a Mobile Trash Can with iPhone via Bluetooth

FACULTY ADVISOR: PROF. FATHI AMSAD

Design Team: Khalid Z. Alrasheedi (MET), Ahmed K. Alrashidi (EET), Hameed K. Alrashidi (EET)

In this project, a trash can is boosted with four wheels. Two of these wheels are for moving forward and backward and the other two control turning right and left. Digital pins of an Arduino UNO microcontroller are connected to the remote controller of the wheels. In this way, the remote controller is under control of the Arduino. The Arduino is connected to an app on iPhone via nRF8001 Bluetooth low energy (BTLE) module. In addition, a customized app on iOS will be designed. The interface of this app should be user friendly for a variety of users. This personal assistant robot could be used at office, home, hospitals, and etc.

Parking Availability & Location Mapping

FACULTY ADVISOR: W. TED EVANS, PH.D.

Design Team: Jeremiah J. Bauerschmidt (CSET), Changming Hu (MET), Andrew M. Lynch (EET)

The goal of this project is to improve the ease of parking at The University of Toledo by monitoring available parking places and pinpointing their locations for easier accessibility. This would be accomplished by placing displays at the entrances to the lots as well as using indicator lights showing which spots are vacant. The entrance displays would have a mapping system to show users the location of vacant spots.

Whitmer High School Indoor Practice Facility

FACULTY ADVISOR: PROF. LINDA S. BEALL

Client Advisors/Sponsors: Kevin Friedman, Coil Steel Processing

Design Team: Omar A. Almazrouei (CET), Joshua D. Hutchison (CET), Dalton P. Landers (CET), Adam W. Recker (CET), Derrick Stechschulte (CET), Chakiera A. Tipton (CET)

This project proposes building an indoor practice facility for Whitmer High School's athletic programs. This building will be located on Whitmer's campus directly behind Jefferson Junior High School in Toledo, Ohio. It will consist of a full size football field which will also serve as a soccer field. A track will encircle the field and the design will include batting cages capable of being mechanically lowered into place. Locker rooms with showers will also be included in the proposed practice facility. The purpose is to provide the school with a state of the art facility where its athletes will be able to train all year without having to worry about inclement weather.

VPeN

FACULTY ADVISOR: TBA

Design Team: Zachary T. Bierbaum (CSET), Daniel J. Coffman (CSET), Marvin E. Donner (CSET), Mark A. Frazier (CSET)

The goal of this project is to provide an established connection to a VPN (Virtual Private Network) with only one device, a USB flash drive. The idea is to turn an ordinary USB flash drive into an automated device that will contain all the procedures and credentials required for a VPN client connection. The user need do nothing but plug the device into the Windows PC's USB port in order to create a VPN connection.

Retail Wireless Network Design

FACULTY ADVISOR: PROF. JASON M. SLAGLE

Designer: Eric J. Stover (IT)

The goal of this project is to design a wireless network capable of securely connecting employees to corporate wireless networks and to allow customers to connect to an isolated public wireless network. The network will be designed in a way to be PCI compliant, support wireless voice over IP telephony, support two-factor authentication, and utilize current wireless standards such as 802.11ac.

MECHANICAL, INDUSTRIAL & MANUFACTURING ENGINEERING
MOHAMED SAMIR HEFZY, PH.D., P.E. AND MATTHEW FRANCHETTI, PH.D., P.E.
SENIOR DESIGN FACULTY COURSE COORDINATORS
MR. ADAM SCHROEDER, TEACHING ASSISTANT

Assisted Tricycle

FACULTY ADVISOR: MEHDI POURAZADY, PH.D.

Client Advisors/Sponsors: Angie Hiser - The Ability Center of Greater Toledo

Design Team: Tyler Mathes, Kevin Malak, Peter Sraj, Emmanuel Kariotakis

The objective is to further design, construct, and test a self-propelled vehicle which is already partially completed. This vehicle will improve the client's current mobility. The client has a lower right leg amputation and this vehicle must be hand-powered and suitable for all weather conditions.

Detachable Wheelchair Attachment

FACULTY ADVISOR: MEHDI POURAZADY, PH.D.

Client Advisors/Sponsors: Angie Hiser - The Ability Center of Greater Toledo

Design Team: Aaron Schicker, John Myers, Justin Conrad, Joseph Michalak

Design an attachment for the client's wheelchair. The attachment should be easily removable and, when installed, will enable the client to travel longer distances with less fatigue. The attachment should not require any permanent modification to the wheelchair and should be easily transportable.

Water Flippers for Double Amputee

FACULTY ADVISORS: MOHAMED S. HEFZY, PH.D. AND BRIAN TREASE, PH.D.

Client Advisors/Sponsors: Angie Hiser - The Ability Center of Greater Toledo

Design Team: Bryan Bussing, Julia Starr, Jeffrey Fuzinski, Bezan Madon, Michael Peruski

Design an articulating set of prostheses for a client, who is a double amputee. The prostheses should allow him to put on a set of commercial water flippers, walk some distance to the water, and swim. The client desires that the knee may be locked at specific angles most conducive to walking and swimming.

Pressure Reducing Spine Board

FACULTY ADVISOR: MOHAMED S. HEFZY, PH.D.

Client Advisors/Sponsors: Dr. Nemunaitis – Cleveland Clinic

Design Team: Mitchel Poepelman, John Tebbe, Austin Tebbe, Tyler Bruns, Kia Potts

Improve the design of a spine board used to immobilize victims of accidents which will reduce the extreme pressure and subsequent tissue damage resulting from being fixed to the board for some amount of time. Currently, tissue damage is common at the sacrum, heels, shoulders, and head. This continues the work of previous groups.

3D Printer for Glass Artwork

FACULTY ADVISORS: SARIT BHADURI, PH.D. AND MOHAMMAD ELAHINIA, PH.D.

Client Advisors/Sponsors: Adam Lavine, Ph.D.-The Toledo Museum of Art

Design Team: Ralph Bednarz, Andrew Jones, Benjamin Nielsen, Jamie Slyder, Lauren Marshall

Research and ascertain current state of the art for the 3D printing of glass. Develop a concept machine which could 3D print smooth, transparent glass comparable to that of mass produced glass products.

Rivet Machine with Pressure Gauge Sensor

FACULTY ADVISOR: SORIN CIOC, PH.D.

Client Advisors/Sponsors: Joseph Gabriel-Marathon Special Products

Design Team: Ethan Gerken, Tyler Campbell, Timothy West, Andrew Gerth

Improve a riveting process which is performed by an operator manually locating the work part and activating a rivet machine. The main aims are to decrease the number of defective parts, and inspect finished parts for defects. Because the equipment being considered for modification is currently used for production, it will be important to minimize the time and effort needed to upgrade.

Renal Surgical Training Device

FACULTY ADVISOR: MOHAMMAD ELAHINIA, PH.D.

Client Advisors/Sponsors: Dr. Samay Jain-UTMC

Design Team: Robert Bender, Stephen Feczner, Andrew Mueser, Fan Yang

For the purpose of training surgical residents, it is desired to have a life like kidney which closely approximates a patient's kidney. This would include finding an appropriate material, and using a 3D printing process. Specific anatomical features including inter-renal veins and arteries should be represented down to approximately 4mm. It is also desired that renal tumors be included and accurately represented.

Recycling Collection Center at UT

FACULTY ADVISOR: MATTHEW FRANCHETTI, PH.D.

Client Advisors/Sponsors: Neil Tabor, Energy Management - UT

Design Team: Hunter Rupp, Adam Bess, Benjamin Swanson, Thomas Nordyke

The task is to improve the process and physical equipment of the recycling collection center at the University of Toledo. This will include actions to ease the task for the facilities personnel and actions seeking to improve the facilities processing capabilities such as improving the center's layout, improving existing equipment, and potentially purchasing new equipment.

Adjustable Anti-Roll Bar for FSAE Car

FACULTY ADVISOR: RAY HIXON, PH.D.

Design Team: Bret Paul, Andrew Lesiecki, Neal Wagner, Kyle Zepp

It is desired to design an anti-roll bar for the FSAE car that allows for in-car adjustment while driving. Different driving conditions call for a stiffer or softer anti-roll bar and currently adjustments can only be made from outside the car and require some amount of downtime. The ideal system would allow for sufficient adjustment range and not require major modifications to the existing car.

Refurbish R4360 Aircraft Engine

FACULTY ADVISOR: RAY HIXON, PH.D.

Design Team: Leonard Karcsak, Craig Thomas, Mackenzie Kuieck, Bengamin Wardeiner, Danielle Williams

The MIME department possesses a R4360 radial aircraft engine that requires restoration so that it could be used for undergraduate labs. The largest goals are to design some type of oiling system to properly prime the engine and to ascertain why the engine is seized. It is important that no components are damaged in the process as replacement parts are no longer readily available.

Refurbish Superflow Flow Bench

FACULTY ADVISOR: RAY HIXON, PH.D.

Design Team: Matthew Vielhaber, Tyler Schroeder, Ryan Miglets, Kyle Evers

The Superflow Flow Bench provides a way of measuring how much air is flowing through a component, most typically, an ICE cylinder head. The Flow Bench does not currently function and some modifications have been performed which decrease the measuring precision. It is desired to bring it back to working order so that it may be used for undergraduate labs.

Greenbox Food Waste Recycling System

FACULTY ADVISOR: MATTHEW FRANCHETTI, PH.D.

Client Advisors/Sponsors: Ohio EPA

Design Team: Cortney Crable, Nicholas Oen, Logan Rickle, John Martillotta

The concept of the Greenbox, which takes its name from the popular Redbox, is to provide a means and infrastructure for the collection of food waste whereby the food waste could be transported to a facility capable of using it to produce energy, and which prevents the food waste from being brought to a landfill. This project will create a prototype Greenbox for proof of concept.

BattleBot I

FACULTY ADVISORS: BRIAN TREASE, PH.D. AND MATTHEW FRANCHETTI, PH.D.

Design Team: Kyle Johnson, Joshua Moser, Sawyer Wick, Amber Studer

Conforming to the rules and regulations established for the popular BattleBot competition, hosted by ABC, the goal is to design and build a BattleBot for the 2016 regional competition. This will included specifying the drive system, weapons, and communication components.

BattleBot II

FACULTY ADVISORS: BRIAN TREASE, PH.D. AND MATTHEW FRANCHETTI, PH.D.

Design Team: Tyler Everman, Zhongli You, Charles DeRaedt, Kenny Ekquist

Conforming to the rules and regulations established for the popular BattleBot competition, hosted by ABC, the goal is to design and build a BattleBot for the 2016 regional competition. This will included specifying the drive system, weapons, and communication components.

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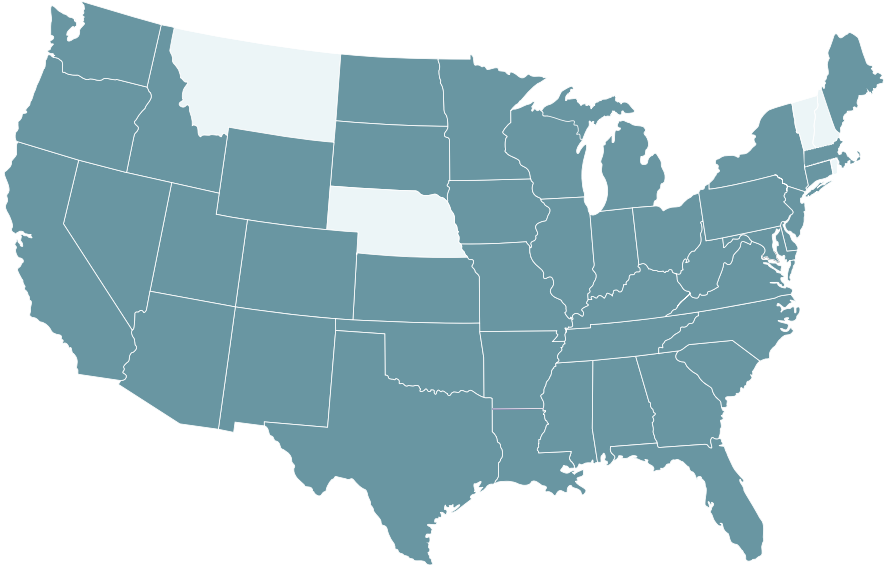
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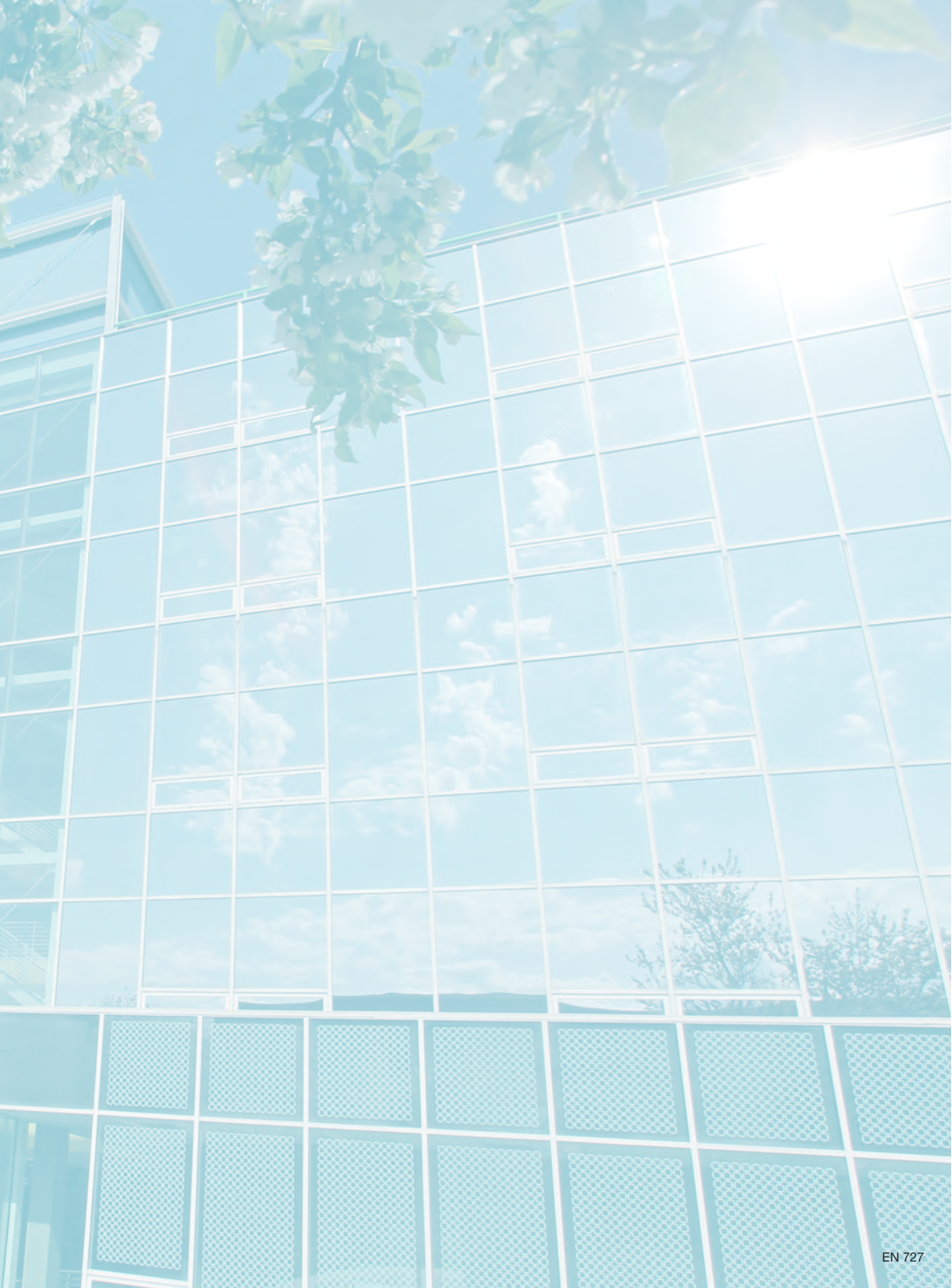
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For more information on our co-op program, contact Vickie L. Kuntz, Ph.D., at vickie.kuntz@utoledo.edu



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