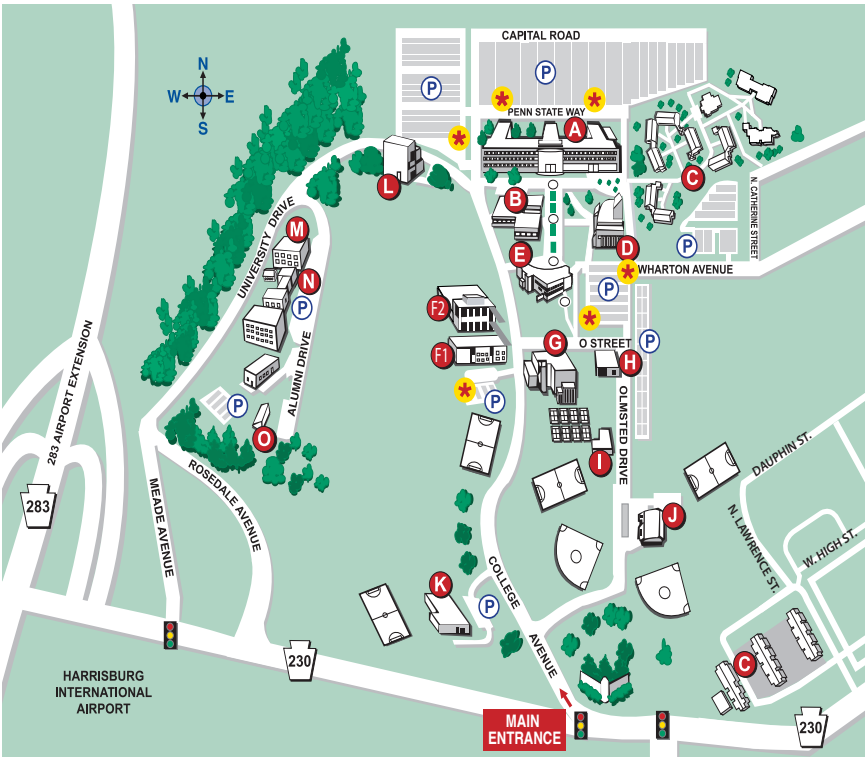
SCHOOL OF SCIENCE, ENGINEERING, AND TECHNOLOGY

CAPSTONE DESIGN CONFERENCE

PennState Harrisburg

SATURDAY, APRIL 23, 2022

Penn State Harrisburg



A. Olmsted Building
- Administrative Offices
- Alumni and Development
- Auditorium
- Chancellor's Office
- Stacks/Biscotti's (food court/ coffee shop)
- Gallery Lounge
- Oliver LaGrone Cultural Arts Center

B. Science and Technology Building (TL)

C. Student Housing

D. Library
- Morrison Gallery

E. Student Enrichment Center
- Bookstore
- Kunkel Career Center
- Counseling and Disability Services
- Lambert Undergraduate Advising Center
- Outpost (food services)
- Provisions (convenience store)
- Russell E. Horn Sr. Learning Center
- Student Life
- Student Conduct
- Russell E. Horn Sr. Spiritual Center
- Kulkarni Theatre

F. Educational Activities Building
1. South (EducAct)
2. North (EAB)

G. Capital Union Building (CUB)
- Fitness Center
- Gymnasium
- Hoverter Tennis Complex
- Pool
- Recreation/Athletics Office
- Events Room
- Wellness Center

H. Swatara Building
- Admissions
- Bursar
- Financial Aid
- Office of Multicultural Recruitment
- Registrar

I. Maintenance and Operations
- Vehicle Registration

J. Susquehanna Building
- Police Services

K. Engineering Technology Laboratory

L. Power Plant

M. Church Hall
- Continuing Education
- Institute of State and Regional Affairs
  - Center for Survey Research
  - Economic Development Course in Pennsylvania
  - Information Technology Center
  - Pennsylvania State Data Center
- Recycling Markets Center

N. Central Pennsylvania Research and Teaching Laboratory for Biofuels
- Select Medical Nursing Simulation Lab

O. Fleet Services

P. Parking Areas
Handicapped parking is available in all parking lots noted on map and also in front of the Olmsted Building and the CUB.

Daily parking permit kiosk

SCHOOL OF SCIENCE, ENGINEERING, AND TECHNOLOGY

CAPSTONE DESIGN CONFERENCE

SCHEDULE OF EVENTS – SATURDAY, APRIL 23, 2022

8:00 a.m. **Breakfast** (Atrium, Olmsted Building)

8:30 a.m. **Moderators of Student Presentations** (Olmsted Building)

Civil Engineering/ Structural Design and Construction Engineering Technology
Dr. Sashi Marikunte – C213 Olmsted Building
Dr. Grady Mathews IV – C211 Olmsted Building

Computer Science
Dr. Hyuntae Na – E209 Olmsted Building
Dr. Hien Nguyen – E219 Olmsted Building

Electrical Engineering and Technology
Dr. Rafic Bachnak – C212 Olmsted Building
Dr. Kiana Karami – E212 Olmsted Building
Dr. Seth Wolpert – E218 Olmsted Building

Mechanical Engineering and Technology
Dr. Ma'Moun Abu-Ayyad – E257 Olmsted Building
Dr. Anilchandra Attaluri – E240 Olmsted Building
Dr. Esfakur Rahman – E254 Olmsted Building
Dr. Hessam Taherian – E244 Olmsted Building
Dr. Fariborz Tavangarian – E243 Olmsted Building

11:45 a.m. **Welcome** (Mukund S. Kulkarni Theatre, Student Enrichment Center)
Dr. Vahid Motevalli
Director, School of Science, Engineering, and Technology

Dr. Omid Ansary
Senior Associate Dean for Academic Affairs and Administration

Keynote Speaker (Mukund S. Kulkarni Theatre, Student Enrichment Center)
Jay Badame
President & COO, AECOM

psu.zoom.us/j/99040328859?pwd=MGtTa0VzR1Uwd3lwdHUzUjBWRmxBQT09
Webinar ID: 990 4032 8859 • Passcode: 085244

12:30 p.m. **Lunch** (Student Enrichment Center)

1:15 p.m. **Student Project Exhibition and Demonstrations** (EAB & Engineering Technology Lab)

3:00 p.m. **Awards Ceremony** (Mukund S. Kulkarni Theatre, Student Enrichment Center)
Dr. Sashi Marikunte

psu.zoom.us/j/98723784898?pwd=SmZ5TTRtMWlCbmhxTUlNOEZUTDdRZz09
Webinar ID: 987 2378 9923 • Passcode: 965959

Capstone Design Conference 2021 Winners

First Place Award, Civil Engineering/Structural Design and Construction Engineering Technology

Team: 115: Limitless Construction and JAB, Inc.
Project: Comfort Inn Design-Build Restaurant
Team Members: Kyle Anderson, Muricio Barrera, Atticus Bierbaum, Lang Chen, Brent Gauntlett, Joshua Howell, Daryn I. Kingsborough, John Porter, Bradley Sweger

First Place Award, Computer Science

Team: 215
Project: Furever Friends
Team Members: Jean Pierre Astudillo Guerra, Sarah Kettell, Disha Patel, Surabhi Sahay
Faculty Adviser: Dr. Blum

First Place Award, Electrical Engineering/Electrical Engineering Technology

Team: 307
Project: Electromagnetic Railgun
Team Members: Steven Barlok, Jacob Langer, Cole Ryder
Faculty Adviser: Dr. Tofighi

First Place Award, Mechanical Engineering/Mechanical Engineering Technology

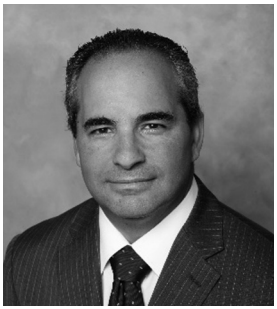
Team: 409
Project: Structural Steel Lifting Device
Team Members: Matthew Lynerd, Jacob Myers, Ashley Ruch, Robert Sirk
Faculty Adviser: Dr. Taherian
Supported by: Kinsley Manufacturing Co.

James A. Andrews Memorial Award for Excellence in Capstone Design

Team: 409
Project: Structural Steel Lifting Device
Team Members: Matthew Lynerd, Jacob Myers, Ashley Ruch, Robert Sirk
Faculty Adviser: Dr. Taherian

SCHOOL OF SCIENCE, ENGINEERING, AND TECHNOLOGY

CAPSTONE DESIGN CONFERENCE SPEAKER



Jay Badame
President and COO
AECOM Construction Management

Jay Badame serves as president of AECOM's construction management business line, which includes AECOM Tishman and AECOM Hunt. Badame is responsible for overseeing operations, administration, personnel, and business development for all Hunt and Tishman offices and entities. During his 42-year career, including 35 years with AECOM Tishman, he has overseen the construction of some of the world's most iconic projects, including One World Trade Center, the Pennsylvania Convention Center Expansion, 30 Hudson Yards, Manhattan West, SoFi Stadium, and many others.

Badame joined AECOM Tishman in 1985 as a project engineer on the South Street Seaport renovation project in Manhattan. He quickly rose through the ranks of the AECOM Tishman organization by continuously demonstrating a thorough understanding of how to manage work effectively on a wide range of projects.

Badame has earned recognition on Commercial Observer's "Power 100," was selected as "Humanitarian of the Year" by the Concrete Industry Foundation and was named the Women Builders Council's inaugural "He for She" awardee. He serves as chair of the Board of the Regional Alliance for Small Contractors, co-chairman of the Building Trades Employers' Association, trustee of the Citizens Budget Commission and serves on the board of Nontraditional Employment for Women (NEW).

Civil Engineering Capstone Design Presentation

C213, Auditorium, Olmsted Building

Moderator: Dr. Shashi Marikunte
Project: Members 1st Federal Credit Union – New Administrative Building
Sponsor: Members 1st Federal Credit Union
Advisors: Dr. Shashi Marikunte, Dr. Sofia Vidalis, and Dr. Saravanan Gurupackiam

Zoom Presentation Webinar Link for TEAMS 101-106:

psu.zoom.us/j/91287163510?pwd=L1Q0V0xVWUc3dlVSaXBPZnN0Mms4UT09

Webinar ID: 912 8716 3510 • Passcode: 088008

The assigned project is the new administrative building for Members 1st Federal Credit Union in Enola, Pennsylvania. The three-story building is in the final stages of completion. The total gross area of the project is 181,828 sq ft with a usable area of 171,234 sq ft. The building predominantly houses office spaces, conference rooms, and community rooms. Mechanical equipment and other facilities are in the basement of the building. Students in the Civil Engineering Capstone Design class worked on this project in small groups to incorporate changes through value engineering, sustainability, energy efficiency, and other modern tools to improve the functionality or other aspects of this project. Six teams diligently worked on this project in true competition style. They will disclose their approach to make the engineering building renovations a "state-of-the-art" construction project, from their perspective.

8:30-9:00 a.m.

Team 101

Project Name: Members 1st FCU – Garden of "1st"
Team Members: Daniel Bakun, Dany Chammas, Brian Eshleman II, Oguzhan Kilic, Joseph Violi

The main focus of our project is to increase the environmental sustainability achieved with a two-pronged plan. First, the large parking lot in the front of the building will be replaced with a garden. This will act as a carbon sink and decrease the amount of runoff water. A similar installation will be put on the roof. The roof installation will include many plants, picnic tables and benches, and several solar panels. Lastly, a parking garage with electric charging stations will be constructed under the main building in order to provide the parking that was previously removed.

9:00-9:30 a.m.

Team 102

Project: Members 1st FCU – Environmental and Transportation Improvements
Team Members: Abdulhammid Ajibade, Carter Barrick, Ian Cunningham, Tyler Haubert, Ibram Reda

For this project we will be analyzing ways to improve traffic flow in the Hampden Marketplace Plaza in addition to several environmental improvements around the Members 1st site. We will be looking at adding a signalized intersection outside of the Giant and adding a lane in the southbound direction from the Members 1st building. We will also be installing solar panels on the hill on the north side of the parking lot, adding a green roof to the building, exploring recycled construction materials, and adding several Tesla charging stations to the parking lot.

9:30-10:00 a.m.

Team 103

Project: Members 1st FCU – Structural Expansion and Quality Improvement
Team Members: Jacob Bertha, Prabin Bhattarai, Christopher Cruz, Megan Hall, Alain Izabayo, Madisan Zechman

The structural expansion and quality improvement project focuses on improving productivity of employees at Member's 1st Headquarters by providing them an opportunity to spend time outdoors, either during lunchtime or to work outdoors. Our group plans to expand the existing structure by constructing a three-story outdoor patio and work space, which also includes parking for electric vehicles and a redesign of the roof for green energy. To reduce carbon emissions due to traffic, a bus stop and shelter are proposed and additional special parking lots for carpoolers to encourage public transportation and the provision of biking paths and parking spots are proposed. Additionally, the transportation team will analyze the traffic flow and will determine if a traffic signal is required for the major road going to the building.

10:00-10:30 a.m.

Team 104

Project: Members 1st FCU – Environmental Impact Reduction: Rooftop Solar Panels, Gardens, and Rainwater Collection
Team Members: Corrinne Cook, Laura Leiter De Zayas, Matthew Liskey, Jordan Payne, Dylan Walborn

Our group is proposing several additions to the new Members 1st Federal Credit Union headquarters building focused on reducing its environmental impacts. The addition of solar panels on the roof can reduce the need for outside power from less sustainable sources. Planting rooftop gardens can improve temperature control of the building. Installing a rooftop rainwater collection and storage system can reduce both stormwater runoff and the building's dependence on local water treatment plants. These innovations to the building can make for a more sustainable work environment, as well as help the building achieve LEED certification.

10:30-11:00 a.m.

Team 105

Project: Members 1st FCU – Improving Traffic and Raising Safety Standards
Team Members: Adam Borton, Eflin Hyass, Murshed Hyass, Zaccary Roberts, Ahmed Touni, Brooke Van Hove

We would like to propose a traffic circle at the intersection of Market Place Road and the new Members 1st building access road, as traffic circles improve the flow of traffic per PennDOT studies as well as boost safety standards. This method will drastically benefit the Members 1st employees' commutes to and from work, as well as benefiting the neighboring communities' normal activities. Our proposed circle will include a fountain in the center with landscaping surrounding the fountain, giving an appealing look.

11:00-11:30 a.m.

Team 106

Project: Members 1st FCU – Entrance Addition and Modification
Team Members: Francisco Cenon, Kai Costello, Kaitlyn Kozick, Trisa Mikhail, Venilin Mitranov

The group is proposing a roundabout at an already existing cul-de-sac on Marketplace Way and the addition of crosswalks and sidewalks. The roundabout addition will improve the flow of traffic in the area, potentially decreasing the risk of accidents, while the crosswalks and sidewalks will create an incentive for workers to walk from Members 1st Federal Credit Union to the surrounding businesses and back.

C211, Olmsted Building

Moderator: Dr. Grady Mathews IV
Project: Proposed Sustainable Addition to the Masonic Village in Elizabethtown
Advisor: Dr. Joseph Seidel

Sponsor: Masonic Village

Zoom Presentation Webinar Link for TEAM 107:

psu.zoom.us/j/99455462732?pwd=dHkvdVNLcDdKVGd6MW42d3ZxbjhwQT09

Webinar ID: 994 5546 2732 • Passcode: 512777

8:30-9:00 a.m.

Team: 107

Team Members: Madelyn Krantz, Binghui Li, Carolyn Mack, Justin Robinson, Kyle Streich

The Masonic Village in Elizabethtown, PA, has a plot of land with the potential to be developed. The project goal is to propose a sustainable design that meets the needs/wants of the client, as well as adhering to the design criteria outlined by governing bodies (W. Donegal Twp., Elizabethtown Twp., PennDOT, and PADEP). The design should be technically viable and integrate the various principles of sustainability. A site layout will be designed so that: 1) excavation is kept to a minimum, 2) the natural terrain is accommodated, 3) the storm water is sustainably managed and 4) the housing units/ landscaping features are effectively arranged.

Civil Engineering (Environmental) Capstone Design Presentation

C211, Olmsted Building

Moderator: Dr. Grady Mathews IV
Project: Evaluation and design of aircraft de-icing waste as an alternative carbon source for wastewater denitrification in a sequencing batch reactor (SBR) plant

Advisor: Dr. Yen-Chih Chen

Zoom Presentation Webinar Link for TEAM 108:

psu.zoom.us/j/99455462732?pwd=dHkvdVNLcDdKVGd6MW42d3ZxbjhwQT09

Webinar ID: 994 5546 2732 • Passcode: 512777

9:30-10:00 a.m.

Team: 108

Team Members: Damian Bernstein, Natalie Neptune, Alan Strayer

A local wastewater treatment plant currently uses a commercial carbon source, Micro C, to denitrify nitrate. Aircraft deicing waste contains primarily propylene glycol that may degrade water quality if left untreated. It is, however, also a rich carbon source that can potentially be used for denitrification. This project is to evaluate the efficiency and the dosing need of deicing waste to replace Micro C and design a feeding system. It is expected that the project results can allow the plant to use waste as a resource, reduce chemical cost, and increase revenue from receiving new waste streams.

Structural Design and Construction Engineering Technology

C211, Olmsted Building

Moderators: Dr. Grady Mathews IV
Project: Penn State Harrisburg Classroom Building
Advisors: Dr. Joseph Cecere and Dr. Grady Mathews IV

Zoom Presentation Webinar Link for TEAM 109-110:

psu.zoom.us/j/99455462732?pwd=dHkvdVNLcDdKVGd6MW42d3ZxbjhwQT09

Webinar ID: 994 5546 2732 • Passcode: 512777

Penn State Harrisburg is adding a new 2-story 23,000 sq ft multi-use building to its campus. This building will be used for new classrooms, offices, and research labs, and construction of the building is set to begin December 2022.

Design-build companies will produce a proposal that satisfies the project demands. Each company is composed of a structural firm and a construction company. Each firm must produce a structural design and layout, exterior shell, construction schedule, and cost estimate for the new building. An emphasis is being placed on energy efficient and sustainable design.

10:30-11:00 a.m.

Team: 109: Field of Dreams Construction and Dynamic Designz

Team Members: Jordan Christian, Aaron Davis, Jacob Felty, Amery Huynh, Morgan Thomas, Jeffrey Wampler

11:00-11:30 a.m.

Team: 110: JMJ Construction and Reyform Engineers

Team Members: Courtney Day, Kraig Freeman, Hannah Hess, Christopher Kitsock, Marisa Lucier, Logan Short, Katie Valiga

Computer Science Capstone Projects

E209, Olmsted Building

Moderator: Dr. Hyuntae Na

Zoom Presentation Webinar Link for TEAMS 201-204:

psu.zoom.us/j/91683637716?pwd=cE9VOWV4dk9Gd0FRNmhOb2FsT2ZyUT09

Webinar ID: 916 8363 7716 • Passcode: 914149

8:30-9:00 a.m.

Team: 201

Project: CANN-DIR version 2
Team Members: Renata Calle Falcon, Nan Chen, Joshua Leppo, Ryan Wakefield
Advisors: Dr. Paul Kocis, Dr. Kent Vrana, and Dr. Hyuntae Na

Sponsor(s): Penn State College of Medicine, Department of Pharmacology

CANN-DIR version 2 is the web application that is designed to help medical professionals and patients/caregivers identify drug-drug interactions from a precipitant drug derived from cannabis and other object medications in order to improve patient safety. This application is the second version of the original app and is targeted to align with longevity concerns as well as to build new features by refactoring the original app.

9:00-9:30 a.m.

Team: 202

Project: Pediatric Simulation Tool (PST)
Team Members: Kerem Acar, Ban Khuc, Manoah Mohan, Tam Tran
Advisors: Dr. Adrian Zurca, Prof. Michael C. Melusky, Dr. Hyuntae Na

Sponsor(s): Penn State College of Medicine, Pediatrics, Pediatric Critical Care

Medical simulation is commonly used by pediatric training programs to help pediatric residents practice their resuscitation skills in a safe and controlled environment. Pediatric simulation educators commonly need to write their own simulation scenarios for use at their own institutions. Pediatric Simulation Tool (PST) is a web application that will serve as a pediatric simulation scenario repository. Through

the web application, pediatric simulation experts across the country can share and obtain simulation scenarios, and other experts can adapt the shared scenarios for their residents. The website will allow for the uploading of scenarios that would then be searchable and/or indexed by topic, learner type, and simulated patient age.

9:30-10:00 a.m.

Team: 203

Project: Tom Versus Jerry
Team Members: Nicolas Fuller, Anthony Iskander, Kannarott Nhim, Roger Yu
Advisor: Dr. Jeremy Blum

Tom Versus Jerry is a 3D survival game built with Unreal Engine and C++. The goal of the game is to navigate through an arena to find and collect materials while avoiding predatory AI. The AI uses a behavior tree to determine which actions to take, such as scouting a location, pursuing the player, or engaging in combat. Players can set traps to hinder the AI, after which the AI will "learn" about them and other player behaviors to adapt for future encounters. After collecting all materials, a weapon can be crafted to destroy the AI and win the game.

10:00-10:30 a.m.

Team: 204

Project: Dark Night Hero
Team Members: Collin Barletta, Cristopher Herrera, Justin Ostopick and Micah Wenger
Advisor: Dr. Hyuntae Na

Dark Night Hero is a 3D rogue lite role-playing game that allows the player to use magic spells and fight monsters. The game features a fantasy dungeon environment and action-based combat system with a heads-up display, inventory and equipment system, character status, non-playable characters and merchants, advanced enemy AI, and challenging boss enemies. The game can be played in single-player and multiplayer with an internet connection.

E219, Olmsted Building

Moderator: Dr. Hien Nguyen

Zoom Presentation Webinar Link for TEAMS 205-209:

psu.zoom.us/j/95300502132?pwd=QmpnUjJjNHRoZGo3amk0QlFUSmJodz09

Webinar ID: 953 0050 2132 • Passcode: 340048

9:00-9:30 a.m.

Team: 205

Project: First Response
Team Members: Erin McHugh, Matthew Post, Cory Sauder, Zhenmin Wang
Advisor: Dr. Linda Null

First Response is an open-source app for first responders to communicate when responding to incidents. The app will also help with fire department management and organization. Some of the features include mapping to incidents, sending announcements, planning events, and chatting. Users will be able to customize the app to fit the structure of their fire department.

9:30-10:00 a.m.

Team: 206

Project: Cub Chat
Team Members: Abdullah Alshehri, Daniel Gomez, Craig Moir, Brandon Leger, Matthew Sirkot
Advisor: Professor Michael Melusky

Studying and socializing are critical to the success of Penn State students. This application bridges the gap between students and their community resources. It provides an interactive social network that allows students to communicate and meet with their peers in order to study and participate in extracurricular activities. This application will create a more supportive and engaged campus community.

10:00-10:30 a.m.

Team: 207

Project: CodeFlower
Team Members: Karim Ahmed, Vishal Madhav, Jacob Moore, Huy Pham, Zheyu Zhang
Advisor: Dr. Jeremy Blum

CodeFlower is an educational learning program that helps students who want to pursue computer programming in the future. Users will be able to take lessons on various programming-related topics and levels and challenge themselves with problems to gain a better understanding of the subjects.

10:30-11:00 a.m.

Team: 208

Project: Expense Deck
Team Members: Gagandeep Batra, Miles Harrell, Xinyu Li, Julia Rising, Blane Staskiewicz
Advisor: Dr. Hien Nguyen

Expense Deck is an Android application that keeps track of your monthly expenses. Not only does Expense Deck chart your expenses, it also provides payment reminders, speech recognition for transactions, tracking of financial goals and generation of expense reports. Users can also set up alerts for different spending categories and monitor their current balance, past transactions, subscriptions, and monthly income.

11:00-11:30 a.m.

Team: 209

Project: Ensemble
Team Members: Kody Backenstoes, Sabriya Fathima, Josip Kapular, Christopher Roberts, Ryan Ward
Advisors: Dr. Sukmoon Chang, Dr. Dariush Khezrimotlagh

Ensemble is a project management software for companies to assign tasks, manage deadlines and solve conflicts. Ensemble allows you to view timelines, mark tasks and projects as complete, record data, and predict project returns. Ensemble provides enhanced data customization and storage, using "Components" and templates to personalize how your information is recorded. With "Issues", you can post and communicate with team members about events. Using all we have learned, Ensemble represents our experience in and dedication to computer science.

Electrical Engineering and Electrical Engineering Technology

C212, Olmsted

Moderator: Dr. Rafic Bachnak

Zoom Presentation Webinar Link for TEAMS 301-305:

psu.zoom.us/j/96662112558?pwd=bno1OUZtSHl5SzZxNEowUFh3SUN4QT09

Webinar ID: 966 6211 2558 • Passcode: 305957

8:30-9:00 a.m.

Team: 301

Project: Handwritten Digits Recognition Using Artificial Intelligence with Arduino
Team Members: Elias Nemeh
Advisor: Dr. Seth Wolpert

This project applies artificial intelligence algorithm(s) with image signal processing to identify the correct handwritten digits. The digits that the system must process would be directly entered on the input by writing them on a touch screen that is connected to Arduino. Then, the applied neural network algorithm(s) will be used to train the network to make the decision of recognizing the handwritten digits that were entered as input and to detect the closest digits to those handwritten entries.

9:00-9:30 a.m.

Team: 302

Project: Solar Power RC Car
Team Members: Yakira Downes, Frandy Ramirez, Josue Varela, De'Jean Washington
Advisor: Dr. Rafic Bachnak

The Solar Power RC car uses renewable energy for its operation. This vehicle possesses a solar battery equipped with a tracking system that uses deep reinforcement learning to allow the photovoltaic cells to be enhanced and provide optimal power. At the potential driver's discretion, a switch to an additional alternative energy source may be used, when sunlight is not available, in order to maintain all environmentally-friendly options for those who strive to reduce their carbon footprint or simply want the benefit of longer distances with fewer stops.

9:30-10:00 a.m.

Team: 303

Project: Hand Gesture Controller for Medical Devices
Team Members: Peter Lee, Stephen Lee
Advisor: Dr. Susan Lemieux Eskin

This project consists of a camera, which captures hand gesture commands and categorizes them using a neural network, and a microcontroller, which will use detected gestures to adjust the medical device. The proposed device would be used in an operating room to provide ease of operations for

medical staff. It will reduce the need to re-sterilize and re-glove when care providers adjust anesthesia machines, surgical tables, or other medical devices. This project will use a USB webcam, a Raspberry Pi microcomputer, a Raspberry Pi microcontroller, a neural network accelerator module, and will be programmed in Python.

10:00-10:30 a.m.

Team: 304

Project: Bicycle Warning Lights Kit
Team Members: Everardo Ortiz, Devin Reilly
Advisor: Dr. Rafic Bachnak

The Bicycle Warning Lights Kit (BWL Kit) will allow bike riders to fit this universal kit to their bicycle. The kit is designed to be simple and user friendly to install. The BWL Kit will feature a headlight, brake light, turn signals, and a speedometer. It is intended to incorporate all necessary safety lights into one system so that bike riders can be more visible to other divers.

10:30-11:00 a.m.

Team: 305

Project: Precise 3-pin and 4-pin 12V Fan Controller
Team Members: Paul Breeden, Elijah Siegl, Matt Walker
Advisor: Dr. Nashwa Elaraby

There are currently no fan controllers on the market for personal or server use that can utilize both 3-pin and 4-pin fans to their full potential. This project attempts to not only provide such a product to reduce the number of older fans that are discarded, but also provides all project resources online for users to create their own custom solution to fit their personal needs.

E212, Olmsted Building

Moderator: Dr. Kiana Karami

Zoom Webinar link for Teams: 312-316

psu.zoom.us/j/96387811012?pwd=VmcvS25ubi9CTnpqK21EVUtndkZYdz09

Webinar ID: 963 8781 1012 • Passcode: 185849

9:00-9:30 a.m.

Team: 313

Project: 'Farrad' – Regenerative Bicycle Assist
Team Members: Aidan Carrigan, Christian Knade
Advisor: Dr. Seth Wolpert

This product is designed as a bicycle pedaling assist system for use over shorter distances compared to traditional electronic bicycles. This system will be sold as a kit that can be installed on a variety of bicycle models. Electrical power will be collected during the braking process and used to maintain charge in a supercapacitor bank. The supercapacitors allow for rapid charging and discharging rates in short amounts of time. The user can release this energy as needed to provide motorized pedaling assistance. Typical applications may include climbing hills, getting up to speed, or maintaining speed.

9:30-10:00 a.m.

Team: 314

Project: Smart Shoes
Team Members: Tyler Rupp
Advisor: Dr. Nashwa Elaraby

Smart Shoes are a pair of shoes that can track a person's weight, steps, distance traveled, weight distribution, and stride. They will be charged wirelessly and can connect to the user's smart device via Bluetooth. The user will be able to access all their health information from their smart device. The Smart Shoes are for people who want to improve their stride, track their weight more regularly, and be able to track health measurements without having their phone with them.

10:00-10:30 a.m.

Team: 315

Project: Battery Charger
Team Members: Cole Sulzer
Advisor: Dr. Seth Wolpert

This project will provide a lithium-ion battery charger that will track and display the state of charge and potential faults in a battery. The charger will also have a battery health tracking feature which will measure and track the capacity of a battery. The charger will display the measured battery capacity and compare it to the stated capacity to determine the health of the battery.

10:30-11:00 a.m.

Team: 316

Project: D.A.R.M.M. Device (Distance. Area. Rotational. Measurement. Mapping.)
Team Members: Joshua Wright
Advisor: Dr. Nashwa Elaraby

The DARMM device is inspired by work as a senior CAD technician for NB+C LLC. The device would allow the user to gather precise data on "site-walks" in an extraordinary amount of time. Conventionally, taking measurements and taking photos can lead to an average data collection time frame of 1-1.5 hours. The DARMM set upon a tripod mount and rotating to scan an area would provide fast, reliable information. The DARMM would need to be set up in 3 different locations while it performs its 2-minute distancing program, but this is much faster than the conventional methods.

E218, Olmsted Building

Moderator: Dr. Seth Wolpert

Zoom Webinar Link for Teams: 307-311
psu.zoom.us/j/91246616894?pwd=S0VVaWFPa2NMTlV6cklMMnBkcHJvdz09

Webinar ID: 912 4661 6894 • Passcode: 666938

8:30-9:00 a.m.

Team: 307

Project: Mobile Training Commissioning Box- SEL 451
Team Members: Madysen Stauffer, Orlando Pham
Advisors: Dr. Rafic Bachnak, Mr. Morteza Talebi

Supported: TRC Field Operations

Due to the nature of utility projects and geographical areas TRC Field Operations covers in the US, offering onsite training for employees and clients has become a strategical path. Onsite training is flexible and cost-effective, which allows TRC to train as many or as few employees as needed throughout the organization. Commissioning boxes can be easily carried and mobilized, enabling TRC to take its unique hands-on training to any location. The project involves the design, construction, and successful testing the of SEL-451 commissioning box that can simulate a feeder breaker protection and circuit breaker control circuit.

9:00-9:30 a.m.

Team: 308

Project: Portable Electric Device Tester
Team Members: Dominic Corma, Jevon Martin
Advisor: Dr. Nashwa Elaraby

This project involves the design and development of a device that measure resistor, capacitor, or inductor values. The device can connect to a user's phone via Bluetooth and display the data. The device should also be able to be a curve tracer for BJT's and diodes, reading the pnp or npn, as well as emitter and collector sides.

9:30-10:00 a.m.

Team: 309

Project: Rhino X-R3 Robot Arm
Team Members: Kanwal Ghori, VJ Patel
Advisor: Dr. Seth Wolpert

The Rhino X-R3 Robot Arm was built to imitate the user's arm actions. The arm has been provided with 6 degrees-of-freedom with the help of DC motors and limit switches. For the project, the team was to fix up the provided AC to DC converter circuit which consists of high pass filter, low pass filters as well as inverter circuits. The team was also tasked with giving the user the ability to move the arm at variable speeds.

10:00-10:30 a.m.

Team: 310

Project: Headphone Amplifier with Tone Control
Team Members: Patrick Lui, John Shultz
Advisor: Dr. Seth Wolpert

This device will take an audio input from a smartphone, computer, or other device, amplifying the sound based on a user adjusted dial. It will then output the audio to a connected pair of headphones. It will also allow the user to control the bass/treble of the audio through dials and will feature a switch to mute the lyrics of a song. An internal speaker will be used if headphones are not connected. A case will house the amplifier. The dials, switches, and ports are mounted on the exterior of the case.

10:30-11:00 a.m.

Team: 311

Project: Guitar Amplifier with FM Transmission and Distortion Setting
Team Members: Sheronda Petgrave, Maria Santos-Espinal, Nicholas White
Advisor: Dr. Seth Wolpert

The amplifier connects to the guitar using a wireless transmitter, which transmits the audio signal from the guitar to a receiver on the amplifier. It also has a distortion setting that can alter the sound of the music being amplified for an overdrive effect. This amplifier also has vacuum tube transistors. These transistors have a more linear output, which aids in producing good audio amplification.

Mechanical Engineering and Mechanical Engineering Technology

E257, Olmsted Building

Moderator: Dr. Brian Maicke
Advisor: Dr. Ma'Moun Abu-Ayyad

Zoom Webinar link for Teams 409, 423-426, 429:

psu.zoom.us/j/97572908023?pwd=TUtlRmNaYXpsZWNTb2xuUFlVaUFxZz09

Webinar ID: 975 7290 8023 • Passcode: 319363

8:30-9:00 a.m.

Team: 409

Project: Off Grid Camper AC and Roof Platform
Team Members: Olivia Budow, Tyler King, Brandon Klein, David Sechler

Supported: Professor Daniel Massey

The sponsor possesses a cargo trailer which has been converted to an off-grid camper powered by a 2000-Watt hour per day solar power system. The sponsor requests the engineering team repurpose an 800-Watt air conditioner, which will be powered by the solar grid. Furthermore, the sponsor wants to collect and repurpose the condensation water from the air conditioner.

9:00-9:30 a.m.

Team: 423

Project: Parcel Singulator
Team Members: Seth Acosta, Nathan Feaser, Francis Lopez, Noah Pennington

Supported: LEWCO

The goal of the project is to assist the sponsor, LEWCO, in the design, manufacturing, and testing of a parcel singulator. The singulator is used to take bulk packages on a conveyor, and 'singulate' (separate, gap, and manipulate into a single file line) using basic mechanical principles of skewed rollers, variable speed belts, and narrowing package lanes. This project incorporates all aspects of mechanical design engineering as well as aerodynamics (drive belts), dynamics (rollers, bearings, motors), and sound damping techniques (overall decibel reduction).

Student-specific responsibilities include the calculation of required drive motor horsepower, belt selection and belt path, and L10 calculation for all bearings in the system. Additionally, the team will design and assist in the manufacturing and assembly of a sensor gantry, a diverter, a package flow manipulator ('shark fin'), and safety/maintenance covers.

9:30-10:00 a.m.

Team: 424

Project: Vertical Stirred Ball Mill
Team Members: Zeke Bennett, Gage Boock, Austin Peinhardt, Nicholas Witiak

Supported: Dr. AHM E. Rahman

For this project, the student team was tasked to design and build a vertical stirred ball mill from a preexisting design. The finished product is designed to fit inside of the Haas Mini Mill in the Engineering lab. The design's goal is to break aluminum powder that is in the micro level into a flaky shape that is in the nano level.

10:00-10:30 a.m.

Team: 425

Project: Improving the Safety of Industrial Hand-held Angle Grinders
Team Members: Jessica Hege, Neil Lerch, Nathan Novinger, Jasdeep Sadam

Industrial jobs in general have always had many safety issues. Some of these issues remain prevalent today and our group attempted to provide a solution. Specifically, our group focused on the issue of grinding vertical surfaces within an industrial capacity. We looked at the preparation and fabrication of structural steel to contextualize our issue. When grinding these surfaces, workers have the potential to be struck by small chips or shrapnel, leading to the potential for injury. Our shield design is an attempt to reduce the chance of injury and discomfort of workers while not compromising quality or efficiency.

10:30-11:00 a.m.

Team: 426

Project: Design and Fabrication of ABS material JIG fixture
Team Members: Joseph Crickenberger, Trey Erisman, Justin Hrusovsky, Timothy Sechler

Supported: Strong Industries, Inc.

Strong Industries, Inc. designs and fabricates the corners of their hot tubs out of ABS plastic. The plastic is vacuum formed to the corner of the tub to have quality fitment and then mounted to a jig. The jig is designed to hold the corner in place while it's trimmed to proper dimension using a die grinder. They need a new and robust jig that is designed out of metal since the existing one is wearing out. The jig needs to conform to the shape of the corner piece to tightly secure it and must be durable.

11:00-11:30 a.m.

Team: 429

Project: Wind Tunnel to be used for the Thermo-Fluids Lab
Team Members: Tyler Noun, Shane Shirk, Dedrick Turner, Joshua Wisor

Supported: Penn State Harrisburg – Mechanical Engineering and Technology Department

After removing and taking apart the previous wind tunnel setup, the Penn State Harrisburg campus requires a new wind tunnel. The group is tasked with designing and assembling a new, more modern wind tunnel in order to demonstrate engineering principles and concepts to students in the Thermo-Fluids laboratory.

E240, Olmsted Building

Moderators: Dr. Anilchandra Attaluri

Zoom Webinar link for Teams: 433, 434, 404, 407, 412, 317
psu.zoom.us/j/92395861007?pwd=OVhTdWEvdDhZdkhMMTROT29uY1V1QT09

Webinar ID: 923 9586 1007 • Passcode: 412776

8:30-9:00 a.m.

Team: 433

Project: Extension Ladder
Team Members: Emily Bretz, Tristan Brown, Ryan Murray, Ethan Shobe

Sponsor: Pennsy Supply Inc.

Our capstone project's objective is to provide workers at a Pennsy Supply Quarry in Harrisburg a safe access to mining equipment such as CAT 988 and CAT 775. Current ladders cause safety concerns because of the large gaps between the ground and first step of the ladder. Design specifications were developed based on client interviews. Finalized design concepts were designed using commercial computer aided design software. Analytical calculations and finite element analysis were used to optimize the preliminary design. Multiple prototypes of extension ladders will be built and tested to meet the target specifications and MSHA/OSHA safety standards.

9:00-9:30 a.m.

Team: 434

Project: Pelton Wheel
Team Members: Andrew Hackett, Carl Pisack, Austin Saylock
Advisor: Dr. Brian Maicke

Supported: Penn State Harrisburg Mechanical Engineering and Technology Department

Our capstone team is working toward retrofitting an outdated Pelton wheel experimental setup with modern data acquisition (DAQ) and control for the fluids laboratory at Penn State Harrisburg. The current system was redesigned to include accessible and transparent casing to facilitate maintenance and observer visibility. Process parameters are monitored using pressure, flow, speed, and torque sensors. The system includes a valve to regulate the flow and a band brake connected to the load cell to vary the load transferred to the turbine. National instrument (NI) myDAQ with LabVIEW is used to develop DAQ and control with graphical user interface. The retrofitted unit allows users to determine the operation characteristics and hydraulic and mechanical efficiency curves.

9:30-10:00 a.m.

Team: 404

Project: Anesthetic Infusion Pump
Team Members: Joel McEnnis, Joseph Yunginger, Nick Zaruba (EE)
External Advisor: Elie Sarraf

Sponsor: Penn State College of Medicine – Center for Medical Innovation

A Target Controlled Infusion (TCI) pump titrates the drug delivered based on pharmacokinetic models to improve the safety of anesthesia delivery. The goal of this project is to develop a modular program using a Raspberry PI to control TCI pumps for multiple drug models. We developed and verified the program for two drug models. Touchscreen user interface allows the operation of developed system. Additionally, an IV pole bracket attachment for the Raspberry PI and touchscreen was developed.

10:00-10:30 a.m.

Team: 407

Project: Infant Car Seat Airbag Design for Amish Buggy
Team Members: Raykal Adiansjah, Alan Figueira, Gilberto Lee, Julia Wergeland
External Advisor: Shawn Safford

Sponsor: Penn State College of Medicine – Center for Medical Innovation

The Amish community has lost many children resulting from horse-drawn buggy collisions with automobiles. During a collision, the buggy splinters and the occupants are ejected from the interior — resulting in the infant car seat landing face down and sliding on the ground. Our team integrated a safety airbag to a car seat using computer aided design. In the event of the collision, the airbag deploys over the infant. Analytical calculations were used to estimate the force required to trigger the airbag deployment. Multiple prototypes are developed as a part of build, measure, and learn cycle. A prototype of infant car seat with deployable airbag will be demonstrated at the capstone conference.

10:30-11:00 a.m.

Team: 412

Project: Design and Development of In Vitro Medical Induction Heating Experimental Setup
Team Members: Julian Low, Mark Pollock, Robert Yasalonis

Sponsor: Penn State College of Medicine – Center for Medical Innovation

Non-contact induction heating (NCIH) is an attractive method to treat metallic orthopedic implant-related infections. The goal of this project is to develop a high throughput in vitro NCIH system to establish an optimal thermal dose for eradication of biofilms synergistically with antibiotics. Simulation-driven product development was used to design the inductor capable of simultaneously heating three metal coupons to a target temperature of 85° C within 10 seconds. A proportional-integral-derivative controller was implemented to maintain the coupon temperature. The developed system is housed on an equipment cart to facilitate transportation of equipment. This modular, user-friendly system can heat common implant materials: 316L steel, TI64, and Cobalt-chrome.

11:00-11:30 a.m.

Team: 317

Project: Design of Medical Induction Power Supply and Magnetic Field Probe
Team Members: Zachary Kinder (EE), Ethan Quinones (EE), Jason Tang (EET)

Sponsor: Penn State College of Medicine – Center for Medical Innovation

The number of orthopedic implant related infections rises each year. Studies have shown that heat has the potential to be an effective treatment for biofilms, both in isolation and synergistically with antibiotics. The goal of this project was to design an induction power supply to facilitate high throughput in vitro biofilm eradication experiments. A 5-15 kW induction power supply capable of simultaneously powering multiple inductors was designed and simulated. Additionally, a miniaturized magnetic field probe was designed to facilitate alternating magnetic field strength and frequency of small additive manufactured inductors.

E254, Olmsted Building

Moderator: Dr. AHM E. Rahman

Zoom Webinar link for Teams 427, 428, 410, 431:

psu.zoom.us/j/98806674207?pwd=OUtaYStNeERFWlZWNWFqVW1zWGJKdz09

Webinar ID: 988 0667 4207 • Passcode: 692517

9:00-9:30 a.m.

Team: 427

Project: Designing a Spoiler with Perpendicular Movements with a Control Unit for a Mercedes Benz
Team Members: Mohamad Aluraifi, Zachary Bookman, Simon Egolf, Cody Miller
Advisor: Dr. Fariborz Tavangarian

Supported: Dr. Fariborz Tavangarian

The goal of our project was to create a mechanism to supply the vertical actuation to a rear wing as part of an active-aero system for our sponsor's vehicle.

The mechanism design parameters are as follows:

1. Support 200 lbs of down force
2. Actuate to a vertical height of 12 inches above the trunk
3. Fit in the trunk without hindering trunk functionality
4. Controllable by the driver
5. Waterproof
6. Aesthetically Pleasing

This project was part of a joint project to create an active-aero system that vertically actuated and rotated the rear wing. Throughout the design process, we worked with Team 428 to ensure that both goals could be achieved.

9:30-10:00 a.m.

Team: 428

Project: Active Rear Wing for Mercedes Benz C300 – Rotational Section
Team Members: Andrew Aho, Gabriel Allison, Gabriel Figueroa, Katelyn Sharrow
Advisor: Dr. Fariborz Tavangarian

Supported: Dr. Fariborz Tavangarian

Aerodynamic downforce is one of the most critical factors for a sports car's performance. An active rear wing can help optimize a car's performance by adjusting the amount of drag and downforce on the vehicle to fit the needs of a specific driving situation. This team has designed a mechanism to rotate the rear wing of a Mercedes C300 to an air brake position when the braking system is activated and then return to its original position upon completion of braking. The design was then integrated with Team 427's raising mechanism to create a fully functioning active rear wing.

10:00-10:30 a.m.

Team: 410

Project: Log splitter
Team Members: Christopher Friese, Anthony Leung, John McCutcheon, Jennifer Popescu
Advisor: Dr. Anilchandra Attaluri, Professor Daniel Massey
Supported: Professor Daniel Massey
The goal of our capstone team is to develop a manufacturing plan for a log splitter. The log splitter design consists of a lift arm and adjustable wedge to facilitate a four-way split. We applied design for manufacturing and assembly (DFMA) methodology to an existing log splitter prototype. Time-to-market and production costs were reduced by using commercial, off-the-shelf parts, vendor selection, improving ease of part manufacturing, and simplified assembly of the parts. Detailed documentation for part manufacturing and product assembly was developed.

10:30-11:00 a.m.

Team: 431

Project: Tabletop Rolling Mill
Team Members: Joseph Aman, Christopher Kane, Scott Lacey, Alex Reed
Advisor: Dr. AHM Esfakur Rahman

Supported: Dr. AHM Esfakur Rahman

The goal of this capstone project is to design, build, and test a tabletop rolling mill to custom manufacture foil from metal alloys. A semi-automated tabletop system applies heat and pressure to roll metal alloy sheets into thin gauge foil. Rolling force applied by two heated rollers causes plastic deformation and reduces the sheet thickness. The roller is powered by a low-speed motor. The designed system can dynamically vary process parameters such as temperature, rolling force and rolling torque to achieve the required foil thickness. The effect of process parameters on mechanical properties of the foil will be investigated.

E244, Olmsted Building

Moderator: Dr. Richard Ciocci
Advisor: Dr. Hessam Taherian

Zoom Webinar link for Teams 401, 413, 414, 416, 402, 432:

psu.zoom.us/j/95224900985?pwd=ckJKSGdZOUkzQVZOMWRyVWFNWjNtdz09

Webinar ID: 952 2490 0985 • Passcode: 666035

8:30-9:00am

Team: 401

Project: Remote Study for Greenhouse Battery
Team Members: Joseph Bambile, Gabrielle Beatty, Mark Marzouk, Michael Mills
External Advisor: Tim Clymer

Supported: Threefold Farm & Atmos Greenhouse Systems

Atmos Greenhouse is planning on mimicking sensor layout throughout North America in order to record climate change data. In working with Tim Clymer at Atmos Greenhouse Systems, our group is responsible for determining sensors and effective criteria for remote study of the climate battery greenhouse performance. Ideally, the selected sensors were required to be robust, cost-effective, and able to resist a vast temperature range. Additionally, the group was to establish a credible method for collecting and storing data over a long period of time. This data will be compared to other greenhouse collections and climates, from the Carolinas through Canada.

9:00-9:30 a.m.

Team: 413

Project: Thermodynamic Lab Demonstration Unit
Team Members: Meet Patel, Ebram Samouel, Rutvik Shah, Sachin Venkatesh

Supported: Penn State Harrisburg – Mechanical Engineering and Technology Department

Dr. Hessam Taherian has requested a live demonstration lab unit that demonstrates the first law of thermodynamics. The goal of this project is to obtain pressure and temperature sensors to

automatically collect data from a sample of water in a vacuumed space. With this, we can easily provide a visual representation of the first law of thermodynamics. To satisfy all the constraints and requirements of the customer, the team decided on using two in-line sight glasses, to demonstrate the first law of thermodynamics and the phase change of water.

9:30-10:00 a.m.

Team: 414

Project: Stirling Cryocooler
Team Members: Joshua Malloy, Joel Salmon, Alex Winslow, Brendon Zell

Supported: Penn State Harrisburg – Mechanical Engineering and Technology Department

Design of a functioning cryocooler utilizing a stirling engine. The cryocooler must reach a temperature of -50 degees Celcius in less than 5 hours; have a usable storage space of around two gallons; be practical for the user. The cold space must be modeled on ANSYS ICEPAK to identify the best orientation for the cold plate and meet the needs of the project.

10:00-10:30 a.m.

Team: 416

Project: Geothermal Heat Pump System at Pine Street Elementary School
Team Members: Osman Acar, Alexander Martin, Matthew Prosser

External Advisor: John Hadden

Supported: Penn State Harrisburg – Mechanical Engineering and Technology Department

Our team is evaluating the energy use at Pine Street Elementary School and making energy saving recommendations to the Palmyra School District. While we are evaluating many aspects of energy use, our main focus is the Geothermal Heat Pump System. Our goal is to simulate the current HVAC system and recommend units to replace the aging heat pumps as they begin to fail.

10:30-11:00 a.m.

Team: 402

Project: Novel Greenhouse Insulation Methods
Team Members: Eric Divet, Clare Hudak, Matthew Marshall, Jessaca Rusnov

External Advisor: Tim Clymer

Supported: Threefold Farm & Atmos Greenhouse Systems

Our mission is to design insulation for a greenhouse that allows the customer to extend their growing season and maintain a 40° F internal temperature in the winter. The new greenhouse will increase the customer's profit and crop output. The final goal is for the customer to have a structure that can adapt to both winter and summer climates and extend the growing season year-round.

11:00-11:30 a.m.

Team: 432

Project: Energy Efficient Retirement Home for People with Huntington's Disease
Team Members: Kaleb Asgedom, Ford Bradbury, Christopher Flynn, Deshane Knowles, Tristan Vogel
Advisor: Dr. Richard Ciocci

Supported: Dr. Richard Ciocci – Smart Home Research Initiative

The goal of this project is to design an energy efficient house for people with Huntington's disease. Energy requirements for a model cottage at Masonic Village in Elizabethtown, PA, were modeled using a Building Energy Optimization Tool. The developed energy model was verified using the energy consumption data. Additional energy consumption for people with Huntington's disease was estimated by modifying the verified model with required furnishings, appliances, and smart-home technologies. The modified model is used to identify economically feasible, energy efficient options and renewable energy sources such as solar or ground-source heat pumps to design an energy efficient home.

E243, Olmsted Building

Moderator: Dr. Amit Banerjee
Advisor: Dr. Fariborz Tavangarian

Zoom Webinar link for Teams 418, 420, 421, 422/318, 417, 430:

psu.zoom.us/j/95742519329?pwd=V09GamFXZEJkZkk5Unp1RkxRUnQ1Zz09

Webinar ID: 957 4251 9329 • Passcode: 193247

8:30-9:00 a.m.

Team: 418

Project: TE Bending Test Fixture: Design and Testing
Team Members: Garrett Baronner, Alfonso Gil D'Aiuto, Raymond Kozen, Eric Nelson

Sponsor: TE Connectivity

TE Connectivity has been having difficulty with obtaining precise results for bending tests of electrical connectors. One reason may be that the fixture that is used is introducing variability. Our team was tasked with designing a new test fixture system to decrease the variability in bending test results.

9:00-9:30 a.m.

Team: 420

Project: Predictive Shrinkage Tool for DLP 3-D Printed Parts
Team Members: Gary Baicy, Tyler Dreher, Stephen Meholic, Jakob Wagner

Sponsor: TE Connectivity

The purpose of this project is to investigate and determine the appropriate dimensional adjustment needed by feature and material to ensure an accurate print the first time. Shrinkage and/or over curing is found during the DLP process, which can result in variation of adjustment needed based on feature type (hole, wall, etc) and size. Characterization of three to four materials utilizing different print processes.

9:30-10:00 a.m.

Team: 421

Project: Design and Build a Rotary 3D Printer
Team Members: Diocel Almacen, Kayla Cade, Katherine DiMatteo

External Advisers: Bob Zubrickie, Xiaoming Luo

Sponsor: TE Connectivity

TE connectivity has tasked us with designing and building a rotary 3D printer that can print on a cylinder bed. This printer must be able to switch automatically between materials and have the ability to have more nozzles added to it in the near future. Team 421 has designed this 3D printer using a C-frame added on top of a lathe to fulfill the expectations of it printing on a cylinder.

10:00-10:30 a.m.

Team: 422/318

Project: GEN II DLP Parts Washer
Team Members: Alexander Heller, Abbey Lytle, Angel Rondan-Vela (EE), Isaac Shenk

Sponsor: TE Connectivity

The purpose of this project is to create a centrifugal parts cleaner for DLP 3D printed parts. The machine removes leftover resin from parts via spinning and spraying cleaner. Parts are printed onto a build plate, which is then inserted into this machine for the cleaning process. Around 96% of the remaining resin is removed through use of this machine.

10:30-11:00 a.m.

Team: 417

Project: Scrap Reduction using Lean Six Sigma
Team Members: Ian Adams, Ahmed Alanazi, Oluwaseyi Sule

Supported: Strong Industries. Inc.

Strong Spas, a leading manufacturer in the production of hot tubs, is facing a large issue where scrapped materials are costing them in excess of a quarter million dollars annually. Using lean six sigma ideologies, our team came up with concepts such as digitalizing the scrap report using VBA with Microsoft Excel, designing a jig to aid with drilling holes in the hot tubs, and weighing small scraps using an industrial scale to both cut down on wasted time and increase accuracy of scrap tracking.

11:00-11:30 a.m.

Team: 430

Project: A Different Differential
Team Members: Michael Bohnert, Evan DeBonis, Eugene Kudlanov, Matthew Rice

This project will be to design and manufacture a differential "bolt-on" unit with sprocket and brake rotor (and caliper) with couplers on each side to connect a multitude of CV axles from the differential to each tire. This allows reliable power transmission to independent rear suspension.

The project should include production/material cost optimization for the everyday hobbyist, current and future CV axle designs on the market for fitment and a comprehensive stress analysis of components and cyclic loading to meet a wide range of torque demands for >10^6 cycles.

SPECIAL THANKS

On behalf of the School of Science, Engineering, and Technology, I would like to extend a special thanks to the Capstone Design Conference committee and capstone project instructors for their hard work and dedication in organizing this conference.

Vahid Motevalli, Ph.D., P.E., Fellow ASME
Director, School of Science, Engineering, and Technology

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Capstone Design Conference Awards

Please join us at 3:00 p.m. on Saturday, April 23, 2022, for the presentation of awards to the student teams. There are a total of five awards:

- First Place Award, Civil Engineering/Structural Design and Construction Engineering Technology
- First Place Award, Computer Science
- First Place Award, Electrical Engineering/Electrical Engineering Technology
- First Place Award, Mechanical Engineering/Mechanical Engineering Technology
- James A. Andrews Memorial Award for Excellence in Capstone Design

Zoom Webinar Link:
psu.zoom.us/j/98723784898?pwd=SmZ5TTRtMWlCbmhxTUlNOEZUTDdRZz09
Webinar ID: 987 2378 9923 • Passcode: 965959

The James A. Andrews Memorial Award for Excellence in Capstone Design

The James A. Andrews Memorial Award for Excellence in Capstone Design was established to recognize and encourage students who best demonstrate interest, motivation, and ability in identifying and solving an engineering problem that addresses a real-world concern. The award is intended to honor students who couple creative approaches with practical ability to successfully resolve a situation. James (Jim) Andrews was that kind of engineer. He applied his skills at work for several companies, but the longest as senior field support engineer for Rockwell Automation. This award was established in admiration of Jim's flexible, can-do spirit.

SPONSOR A PROJECT

The purpose of the Capstone Design Engineering Project is to help bring the real-world into the classroom by providing engineering students with practical, hands-on experience.

PARTNERSHIPS WITH INDUSTRY: WIN-WIN

This program was instituted following recommendations from our industry partners who recognized the need for graduates who are well-trained in the engineering fundamentals and professional skills necessary to effectively compete in today's marketplace, such as teamwork, project management, cross-functional networking, communications, and design.

For small companies, Capstone Design Engineering Project teams can be a boost to an engineering workforce. For larger companies, these teams help develop new ideas or improve current practices, both of which can positively impact a company's bottom line.

Cooperative projects are a great way for companies to get to know students when looking for new interns or employees, and they are also helpful in training junior-level engineers and managers by providing project management experience in a low-cost, low-risk, potentially high-payoff setting.

SPONSOR BENEFITS

Some of the benefits of sponsoring a Capstone Design Engineering Project are:

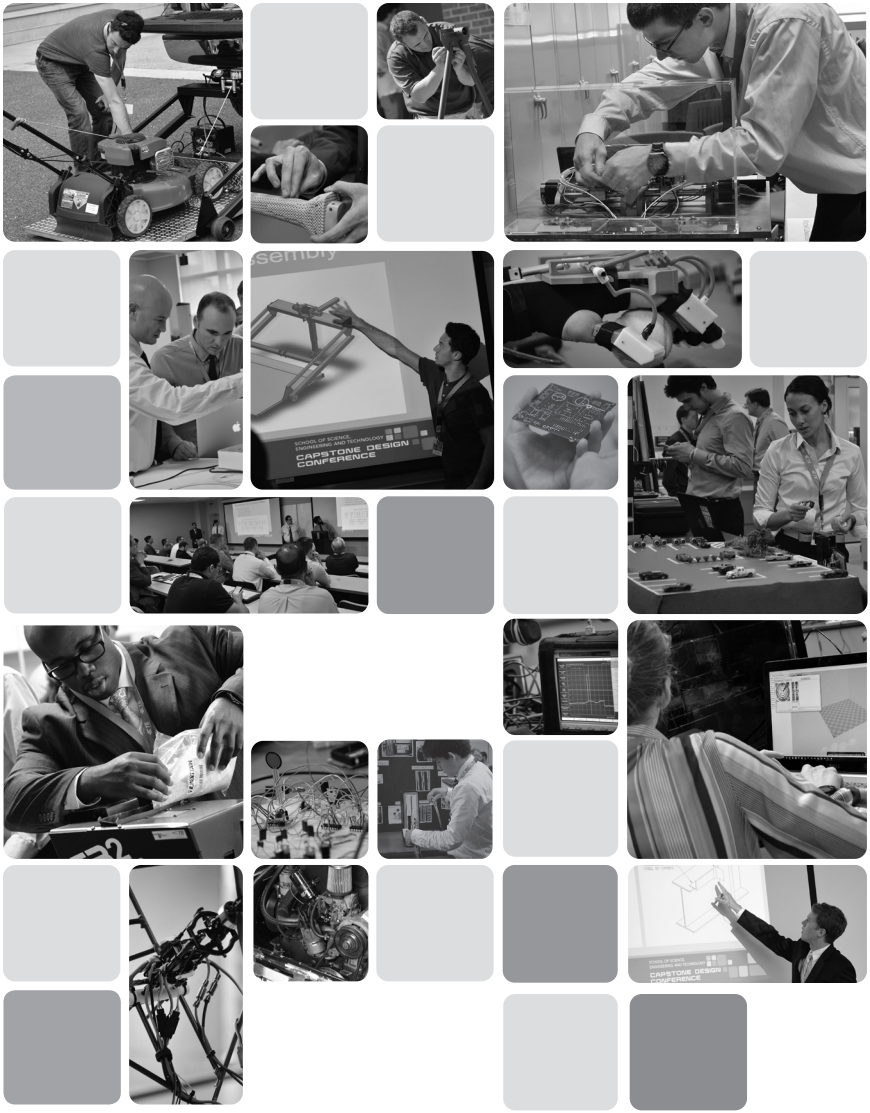
1. Work on "back burner" projects and help refine ideas
2. Help start-up and small companies with prototyping and development work (while flushing out a business plan through collaboration with a team of students)
3. Direct access to some of the best Penn State students (15-week interview)
4. Company liaison overseeing the project gains valuable project management experience
5. Increase company brand awareness among Penn State students and faculty
6. Network with other companies through events and cross-promotions
7. Opportunity to give back to the college and influence the education and careers of many students
8. Invited to attend the annual Capstone Conference

SPONSOR RESPONSIBILITIES

Sponsors are expected to make a tax-deductible contribution, submit a proposal explaining the scope of the project, identify an industry liaison to serve as the team's point of contact for the project, interact regularly with the student team, review reports and provide feedback, and evaluate the students' performance at the Capstone Design Conference.

ADDITIONAL DETAILS

For additional information and details on how sponsoring projects can work for your company, please contact the School of Science, Engineering, and Technology at 717-948-6116 or by email, pshcapstoneproj@psu.edu, or submit a proposal harrisburg.psu.edu/webform/capstone-design-engineering-proposal



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harrisburg.psu.edu/science-engineering-technology/capstone-design-conference

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