SENIOR DESIGN
Spring 2019
Team & Projects Guide

Friday, April 26
ENDEAVOR

Welcome

The College of Engineering, Architecture and Technology at Oklahoma State launches a new future this year.

Our new strategic plan integrates new pre-college standards and freshman advising, retention initiatives to provide more pathways to degree completion in four years, accelerated research and development, and a large step forward in interdisciplinary hands-on learning and entrepreneurial opportunities.

In the area of research, we are utilizing the new 72,000-square-foot ENDEAVOR platform to showcase this year's spring senior design projects. ENDEAVOR allows undergraduates to be involved in an interdisciplinary education and houses nearly $5 million in state-of-the-art equipment to train engineering, architecture and technology students. These students will be equipped with advanced knowledge and experiences that they will use to create industry inspired and innovative senior design projects like you will see displayed in ENDEAVOR today.

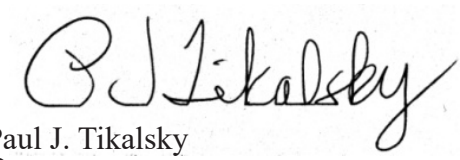
The college's future is about the pedagogy and experiences that graduate world-class engineers and professionals with strong technical knowledge, interdisciplinary training, business acumen and articulate communication skills.

We have engaged industry, alumni, faculty, students and university leaders in our strategic plan that elevates the impact of our research and reputation with leading employers and peers.

None of this would be possible without the generous support of donors and industry partners who are providing the financial support of scholarships, internships, equipment and faculty support. We are truly a Cowboy Family that will endure for generations to come.

I hope you will enjoy getting a look into the bright young minds of these Oklahoma State seniors today. They are preparing to solve the grand challenges that face us and to become valuable contributors to their respective industries. Take some time to get to know them; you won't be disappointed.

Go Pokes!

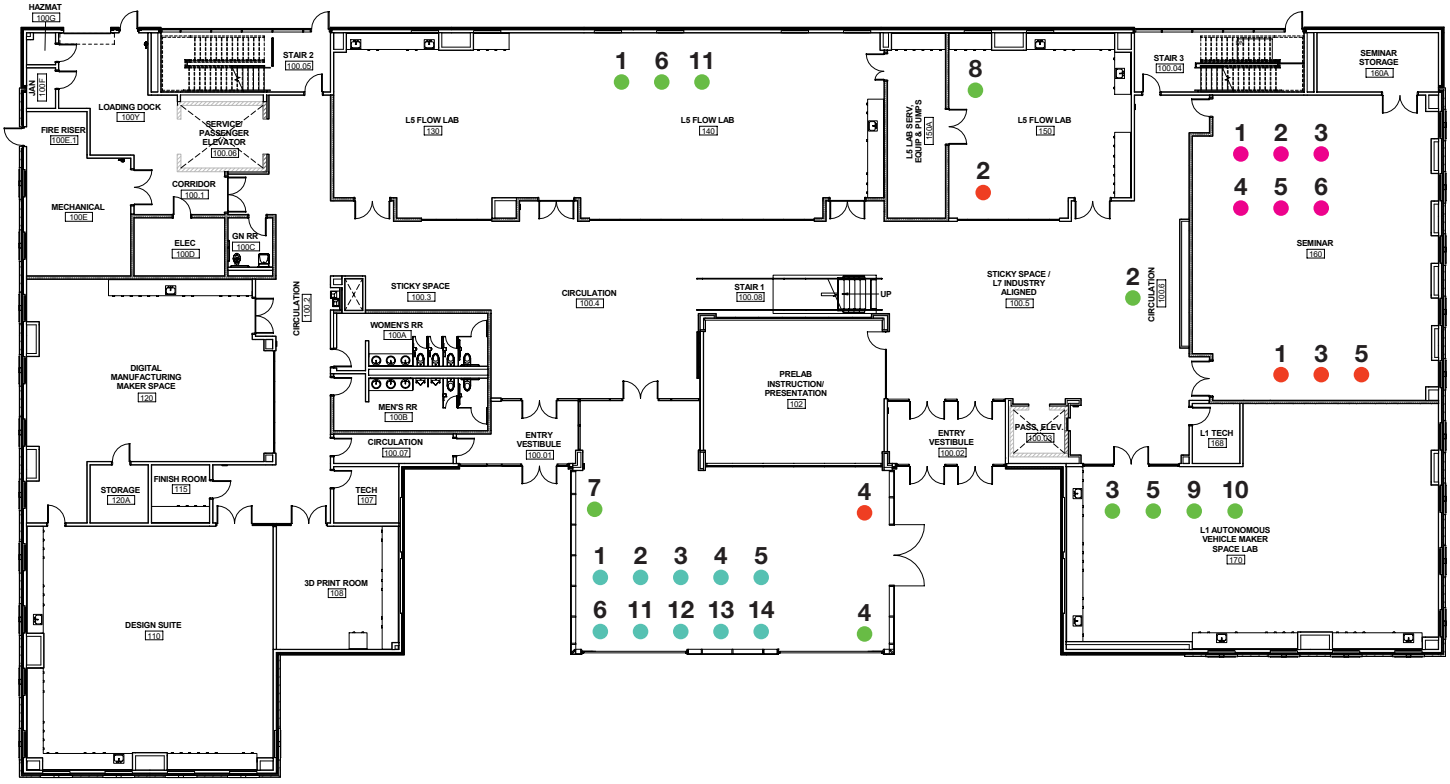


Paul J. Tikalsky
Dean
College of Engineering, Architecture and Technology

Schedule

Biosystems and Agricultural Engineering (BAE)	8A.M. - 3P.M.
Chemical Engineering (CHE)	1P.M. - 3P.M.
Civil and Environmental Engineering (CIVE)	1P.M. - 3P.M.
Electrical and Computer Engineering (ECEN)	8A.M. - 3P.M.
Electrical Engineering Technology (EET)	8A.M. - 12P.M.
Fire Protection and Safety Engineering Technology (FPST)	9A.M. - 12P.M.
Mechanical and Aerospace Engineering (MAE)	9A.M. - 11A.M.
Mechanical Engineering Technology (MET)	8A.M. - 12P.M.
Industrial Engineering and Management (IEM)	1:30P.M. - 3P.M.

First Floor



MAE

1. Aerospace Propulsion Outreach Program JetCat Engine Thrust-to-Weight Ratio Improvement
2. Argonia Cup Competition Rocket Team
3. Automatic Filter Folding Machine
4. Automated Small Sensor Emplacement
5. Down Hole Drone
6. ENDEAVOR Flow Stand
7. ENDEAVOR Ground Source Heat Pump
8. ENDEAVOR Heat Exchanger Stand
9. Go Baby Go, OK Outriders
10. Hypogravity Simulator Project
11. Thermoelectric Cooler Learning Environment

BAE

1. Design of a "cold plasma" food sanitation system
2. Design of an ice cutting machine
3. Development of UAV "Crop Duster" or drone sprayer
4. Water Quality Engineering-Design of a Floating Wetlands
5. Water Resource Design for Tulsa Botanic Garden
6. Water Resource Improvement Design

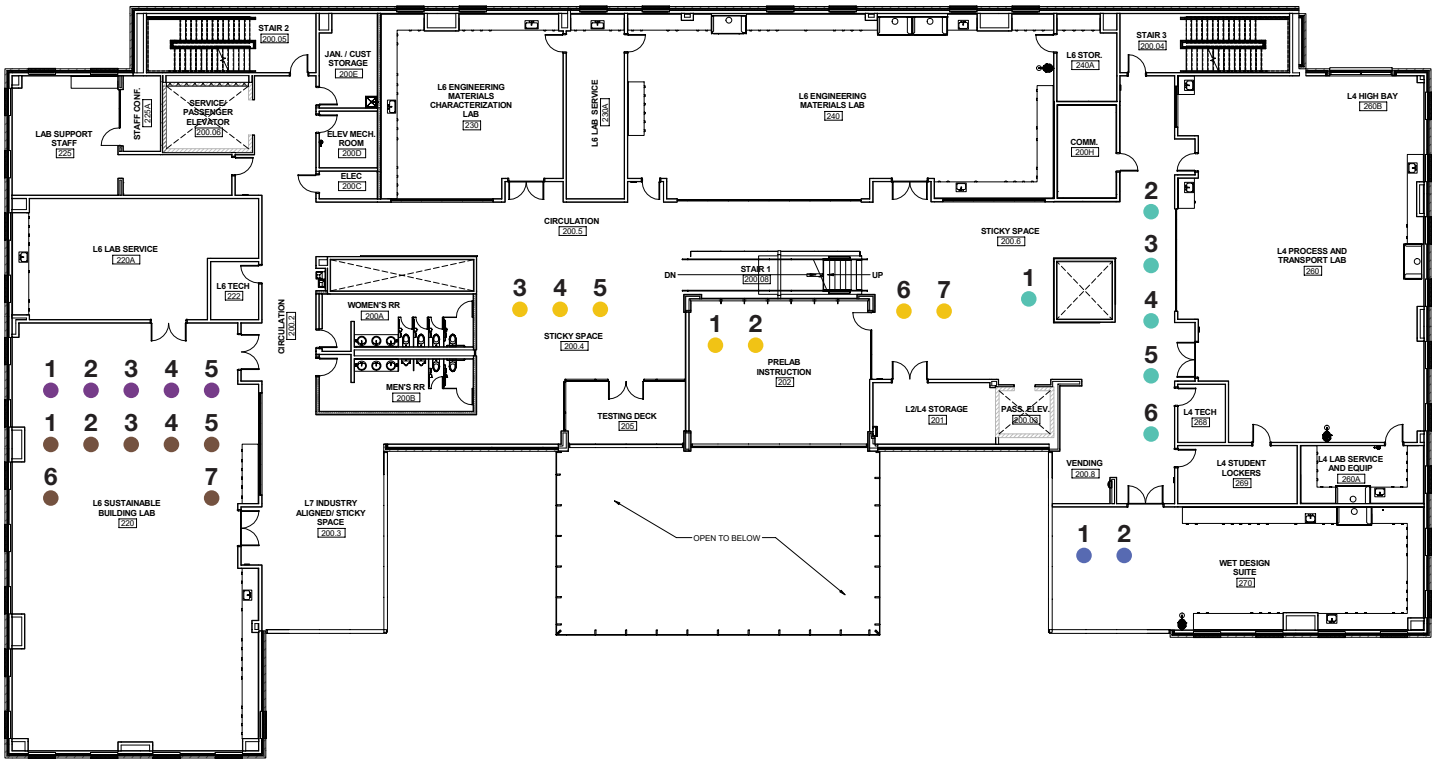
ECEN

1. Locating and Tracking Receiver, team 1
2. Locating and Tracking Receiver, team 2
3. Locating and Tracking Receiver, team 3
4. Locating and Tracking Receiver, team 4
5. Locating and Tracking Receiver, team 5
6. Locating and Tracking Receiver, team 6
7. Locating and Tracking Receiver, team 7
8. Locating and Tracking Receiver, team 8
9. Locating and Tracking Receiver, team 9
10. Locating and Tracking Receiver, team 10

FPST

1. Fire Jet Phenomenon in portable gas container
2. Hazard Identification Laboratory
3. House Dec of the Future
4. Mitigating Fire Spread in Informal Settlements
5. Speedfest Safety

Second Floor



IEM

1. Textron Aviation: Simulation of Aircraft Manufacturing Process
2. INTEGRIS: Increasing Profitability and Utilization of Robotic Operations
3. NSP Quality Meats: Computer Simulation of Food Preparation Process
4. SWEP: Improving Quality Control Operations
5. MUTUAL Girls Club: Improving Space Utilization and Standardizing Sales Operations
6. OnCue Drive-Thru Analysis
7. American Airlines: Enhancement of Inventory simulator for Engine Parts at American Airlines Maintenance Facility

ECEN

1. Senior Design 2-Team 1 Self Balancing Robot
2. Senior Design 2-Team 2a Model Car Rodeo
3. Senior Design 2-Team 2b Model Car Rodeo
4. Senior Design 2-Team 2c Model Car Rodeo
5. Senior Design 2-Team 2d-Model Car Rodeo
6. Senior Design 2-Team 2e-Model Car Rodeo

CIVE

1. Duncan Street Closure Alternatives Design
2. Storm Sewer Improvement for the Edmond Low Library
3. Design of Comprehensive Residual Management Plan for Stillwater Wastewater Plant
4. Otoe-Missouria Water Distribution System Expansion Design
5. Design of Phosphorous Removal and Treatment for City of Stillwater Wastwater Treatment Plant

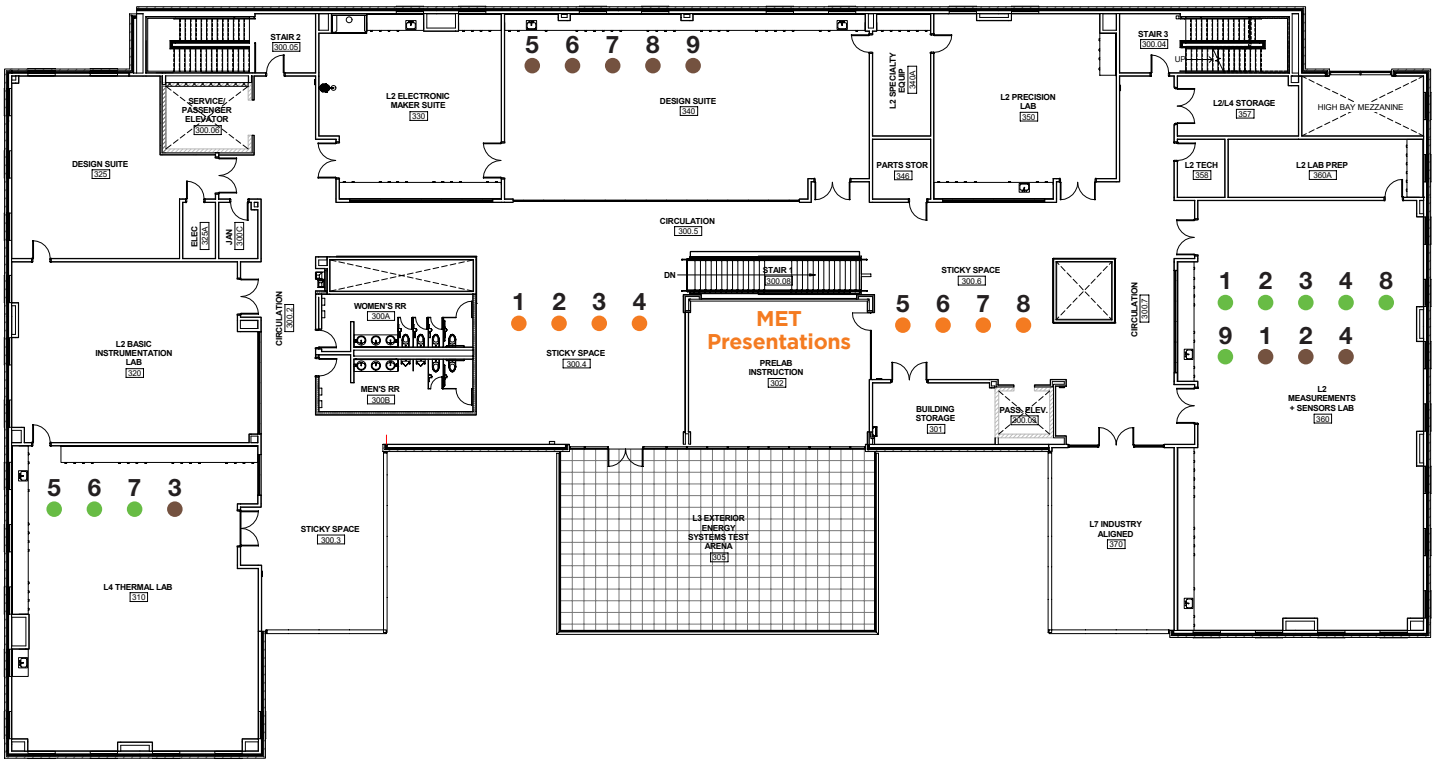
CHE

1. Garz-Carz
2. MCGA-Melania

INTERDISCIPLINARY

1. Block 34 Outdoor Performance Stage
2. Building Envelope Design Team A
3. Building Envelope Design Team B
4. Stillwater Community Center-South Entrance and Elevator Lobby
5. 3D Concrete Printed Affordable Housing : Concrete Printing Team
6. 3D Concrete Printed Affordable Housing : Design Team
7. 3D Concrete Printed Affordable Housing : Resilience Team

Third Floor



MAE

1. CNC Controls Update
2. Improved Small Unmanned Aerial System Network
3. Leg Brace for Neuromuscular Electrical Stimulation
4. Mobile Seismic Data Acquisition System
5. Onboard Lightweight Pressure Maintenance System for Inflatable High-Altitude Kite
6. Psychrometers Measurement: High Accuracy Dew Point Calibration
7. Radial Stretch System for Smart Elastomers
8. Renewable Energy STEM Education Prototype
9. Stillwater Ground Source Heat Pump System

MET

1. Multi-headed Extruder for a 3D Printer
2. Portable Backpacking Bridge
3. Veterinary Dispensing Bottle Modifications
4. Zip-Stop Classroom Protector
5. Optimization of a Part for 3D Printing-Sponsored by Moog, team 5
6. Optimization of a Part for 3D Printing-Sponsored by Moog, team 6
7. Wire Bundle Vibration Testing-Sponsored by Boeing
8. Mechatronic Test Stand of Model Car Wash

INTERDISCIPLINARY

1. Inspector Gadget Magnetic Levitated Drone
2. Parachute Flare Maneuver Improvement
3. Wind Turbine/Sculpture/Light Show
4. Real-Time Detection and Tracking of Moving Vehicles in UAV Videos
5. Autonomous Car, team 1
6. Autonomous Car, team 2
7. Autonomous Car, team 3
8. Autonomous Car, team 4
9. Autonomous Car, team 5

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PROJECT: Design of a "cold plasma" food sanitation system (BAE)
TEAM: (from left to right) Calvin Wynn, Derek Clinton, Sarah Riley, Nicholas Holden
ADVISOR: Dr. Paul Weckler

The objective is to create a cold plasma sanitation system that can sanitize 25-50 lbs. of pecans in batches that must be sanitized for at least two minutes (each) at a time. The system must be designed in a way that is both hygienic (cleanable) and compatible with current equipment. It must be resistant to oxidation as well. Additionally, the distance between the pecans and the sensors must be adjustable. Finally, the system should process the pecan via rotation, and possibly mixing.

PROJECT: Design of an ice cutting machine (BAE)
TEAM: (from left to right) Mitchell Ratke, Marla Huffman, Garrison Hill
ADVISOR: Dr. Paul Weckler

The goal of this project is to simplify and streamline the cutting of ice cubes for Vault Ice. Currently they use a rotary bit to cut the ice blocks into cubes, which leaves behind ice dust or “snow” that needs to be cleaned off before it can be packaged. The purpose of this project is to eliminate the snow that needs to be cleaned off the cubes.

PROJECT: Development of UAV "Crop Duster" or drone sprayer (BAE)
TEAM: (from left to right) Spencer Hayward, Bryce Randall, Charles Rufo, Matthew Snell
ADVISOR: Dr. Paul Weckler

Pecan trees can grow up to 100 feet in height making it hard to spray the tops of the tree canopies. Traditional fixed wing aircraft are not economical for small operations. The goal with this project is to provide a less expensive and more effective way to treat large pecan trees for foliar pests when compared to ground boom or air blast sprayers or large scale crop dusters. The UAS technology developed should be applicable to other tree fruit operations beyond pecans.

PROJECT: Water Quality Engineering-Design of a Floating Wetlands (BAE)
TEAM: (from left to right) William Fulk, Aleski Etter, Alex Gallegos, Miranda Rose
ADVISOR: Dr. Paul Weckler

Excessive levels of nutrients (nitrogen and phosphorous) have caused harmful blue-green algae blooms at Marion Reservoir. To provide a low maintenance solution without encroaching on land reserved for wildlife and recreation, a floating treatment wetland will be designed for placement in a cove near the road and will be accessible to the public for added recreational value.

PROJECT: Water Resource Design for Tulsa Botanic Garden (BAE)
TEAM: (from left to right) Joanna Quiah, Samantha Mackey, Morgan Pearson
ADVISOR: Dr. Paul Weckler

The Tulsa Botanic Gardens was constructed in Tulsa, Oklahoma to promote the beauty and importance of both plants and nature with sustainability in mind. The facility utilizes Tulsa city water to water the plants both by hand and through drip irrigation. The Botanic Gardens are in need of a hydrology study that will assess the watershed of the gardens, quantify the loss of excess water draining out of the large pond, and locate possible secondary retention ponds so the gardens can efficiently and sustainably manage water resources.

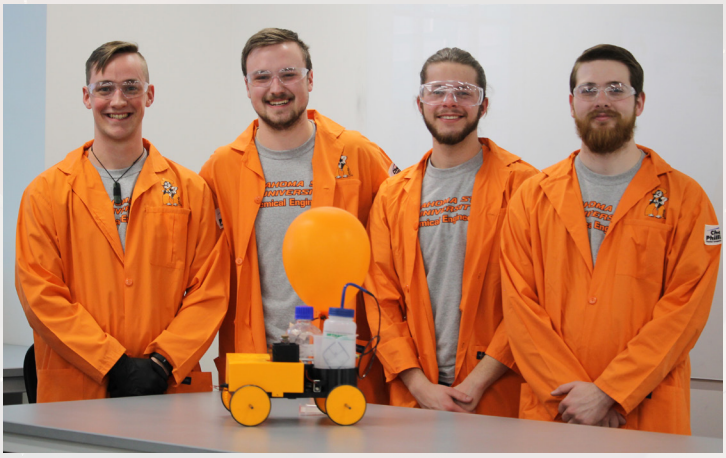
PROJECT: Water Resource Improvement Design (BAE)
TEAM: (from left to right) Taylor Krubilt, William Parnell, Makena Sherrell
ADVISOR: Dr. Paul Weckler

This project will be evaluating and designing improvements for existing water resources on ranching land near Glencoe, Oklahoma. Improvements will correct existing issues such as land erosion caused from uncontrolled runoff, damaged dams, and eutrophication in some existing ponds.

PROJECT: GARZ-Carz (CHE)
TEAM: (from left to right) Gabby Beasley, Alec Stites, Rex Rychlik, Zach Mauck
ADVISOR: Dr. Brad Rowland

GARZ is a competitive team that is part of the Interdisciplinary Design of Chemical Systems course. The Carz is apressure powered car that uses a pneumatic motor and a gas producing chemical reaction for propulsion. The gas is carbon dioxide that is produced by a reaction of acetic acid and baking soda to pressure around 80 PSI, which is used to run the pneumatic motor. The reaction is contained in an approved and tested pressure vessel that has safety features such as a pressure relief valve. The drive train is chain and sprocket that is guard protected.

PROJECT: MCGA-Melania (CHE)
TEAM: (from left to right) Caleb Thomas, Britten Ash, Daniel Archer, Blake Thompson
ADVISOR: Dr. Brad Rowland



Make Chemistry Great Again (MCGA) is a competitive team that is part of the Interdisciplinary Design of Chemical Systems course. The Melania is powered off a proton membrane inside of a hydrogen fuel cell with a gear and motor set up. The chassis is all 3D printed where each component will be affixed to the chassis either through screws or clipped on joints. The wiring for the components will be limited to the middle of the car where they will be double contained to reframe from any outside intervention. During competition, Melania triggers the competition with a long lasting continuous power source and precision stopping mechanism that is based on an iodine clock reaction.

PROJECT: Duncan Street Closure Alternatives Design (CIVE)
TEAM: (from left to right) Cody Forell, Kyle Johnson, Josh Fisher, Matt Granger
ADVISOR: Dr. Norb Delatte

Our project involves the closure of Duncan Street between 8th Avenue and 10th Avenue in downtown Stillwater as part of the Block 34 development. The purpose of this closure is to make the street more pedestrian friendly so it is safer and easier for pedestrians to travel from the Community Center to the Performance Stage that is going to be built on Block 34.

PROJECT: Storm Sewer Improvement for the Edmond Low Library (CIVE)
TEAM: (from left to right) Cainan Anthony, Brittan Peterson, Emily Haines, Casey Kunze
ADVISORS: Dr. Norb Delatte, Dr. Gregory Wilber, Dr. Yongwei Shan

The project will either reroute current drainage flow, or will design the addition of retention/detention system of the Edmon Low Library, located on the Oklahoma State University – Stillwater, Oklahoma campus. As a group, we were asked to design some alternatives and find the most cost-efficient solution that will last a 50-year event. The current storm sewer system in place does not have the capacity to retain and control the flow, therefore, pipes are backing up and causing water to flood into the basement of the Edmon Low Library every time there is significant rainfall.

PROJECT: Design of Comprehensive Residual Management Plan for Stillwater Wastewater Plant (CIVE)
TEAM: (from left to right) Addison Vandersypen, Kaci Hokett, Emily Reideout, Becca Perez
ADVISOR: Dr. Gregory Wilber

The team is tasked with designing an alternative to the Stillwater Wastewater Treatment Plant's existing residual management plan. The existing plan uses land application and has been in place since 1992. Land application can lead to future complications due to the metal content of the sludge not being monitored. This will result in buildup of the contaminants at the application sites. Additional laws and regulations are assumed to change in the future, and will likely cause conflict with the current land application system. This project will be to select another feasible alternative for sludge deposition. Additionally, the design and application of the alternative selected will be evaluated and calculated. Ultimately, the goal is to deliver a plan that the Stillwater Wastewater Treatment Plant could be set in place if laws or regulation were to change.

PROJECT: Otoe-Missouria Water Distribution System Expansion Design (CIVE)
TEAM: (from left to right) Hailey Goodale, Mitchell Sawtelle, Braden Brown, Katelynn Purdy
ADVISORS: Dr. Norb Delatte, Dr. Gregory Wilber

Somewhat Civil Engineering Group was awarded the task of designing the extension of the water distribution system from the Otoe-Missouria Nation to two separate residential lots and to the town of Red Rock, Oklahoma.

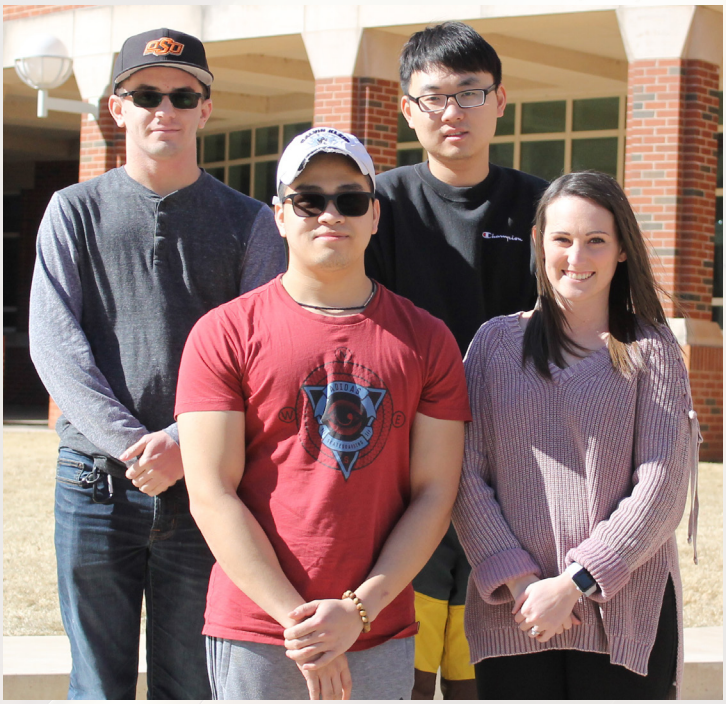
PROJECT: Design of Phosphorous Removal and Treatment for City of Stillwater Wastewater Treatment Plant (CIVE)
TEAM: (from left to right) Ryan Travelletti, Jasmyn Lee, Asma Lama Tamang, Patrick Lowe
ADVISOR: Dr. Gregory Wilber

Phosphorus is a chemical element that is highly reactive and occurs as inorganic and organic phosphates in soil, sediments and water. Phosphorus is released from plant tissues and the weathering processes for rocks, and it is absorbed from the soil by plants, plant-eating animals, and humans who eat the plants. While phosphorus acts as a very effective and beneficial fertilizer for plant growth, too much phosphorus can be toxic. It is important that wastewater treatment plants monitor the levels of phosphorus being released.

PROJECT: Locating and Tracking Receiver, team 1 (ECEN)
TEAM: (from left to right) Cameron Jump, Victoria Bauer, Barrett Schwandt, Ellie Eakin
ADVISOR: Dr. Michael F. Gard

Students enrolled in ECEN 4013 during Spring 2019 are organized into ten teams. Each team has the same task- to design a battery-powered portable instrument which satisfies two related, but different, objectives. The instrument's first objective is to act as a locating receiver, a device used to locate and estimate the depth of buried utility lines. The instrument's second objective is to allow the instrument operator to follow progress of a subsurface drilling operation by receiving magnetic field signals from a special signal source (called a beacon) installed directly behind the drill bit. This information also allows depth estimation. These functions are usually done with two separate devices but the student instruments will be capable of satisfying both tasks in a single device.

PROJECT: Locating and Tracking Receiver, team 2 (ECEN)
TEAM: (from left to right) Travis West, Nathan Nguyen, Jishuo Li, Taryn Lewis
ADVISOR: Dr. Michael F. Gard



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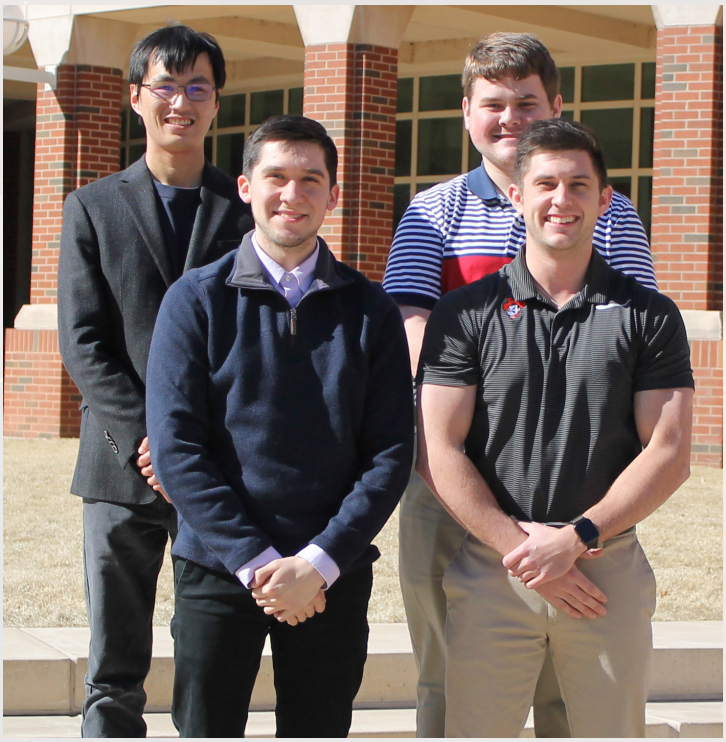
PROJECT: Locating and Tracking Receiver, team 3 (ECEN)
TEAM: (from left to right) Kelvin Leu, Carlos Cardenas Huizer, Tyler Barbee, Garrick Prelesnick
ADVISOR: Dr. Michael F. Gard



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PROJECT: Locating and Tracking Receiver, team 4 (ECEN)
TEAM: (from left to right) Colin Hicks, Dalton Green, Alex Ott, Emilee Drumwright
ADVISOR: Dr. Michael F. Gard

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PROJECT: Locating and Tracking Receiver, team 5 (ECEN)
TEAM: (from left to right) Mark Zajac, David Andy Phillips, Ali Khan, Berny Flores
ADVISOR: Dr. Michael F. Gard

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PROJECT: Locating and Tracking Receiver, team 6 (ECEN)
TEAM: (from left to right) Austin Kirk, Travis Lowe, Landon Burleson, Ben DeVary
ADVISOR: Dr. Michael F. Gard

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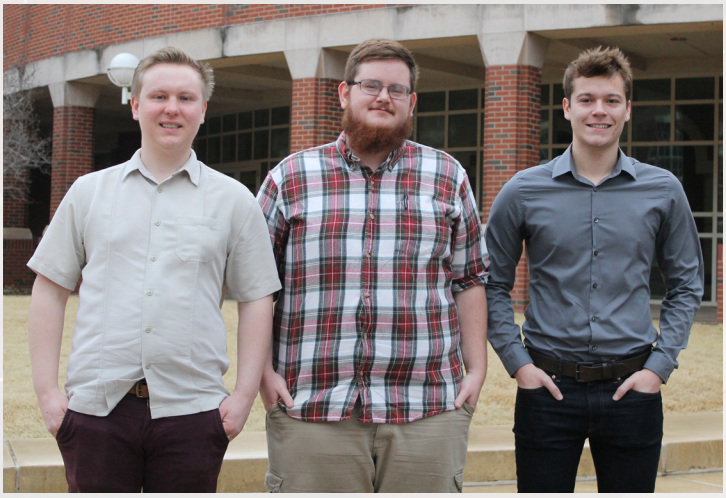
PROJECT: Locating and Tracking Receiver, team 7 (ECEN)
TEAM: (from left to right) Dylan Shadoan, Clint Dillard, Josh Young
ADVISOR: Dr. Michael F. Gard



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PROJECT: Locating and Tracking Receiver, team 8 (ECEN)
TEAM: (from left to right) Andersen Iin, Henry Koh, Omar Alchami
ADVISOR: Dr. Michael F. Gard

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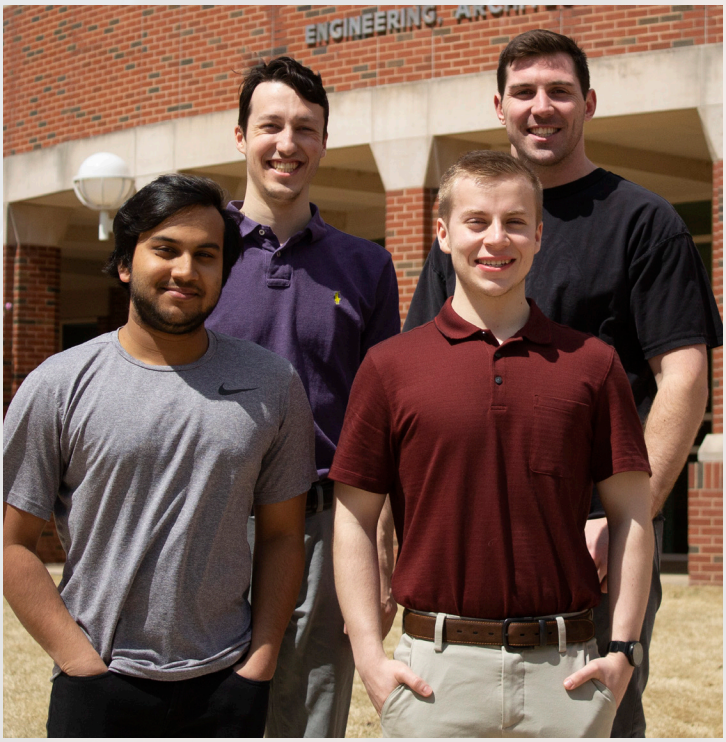
PROJECT: Locating and Tracking Receiver, team 9 (ECEN)
TEAM: Shabab Chowdhury, Conner Begansky, Kevin Glenn, Kyle Cowan
ADVISOR: Dr. Michael F. Gard



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PROJECT: Locating and Tracking Receiver, team 10 (ECEN)
TEAM: (from left to right) Will Linihan, Shawn Babu, James Hood
ADVISOR: Dr. Michael F. Gard

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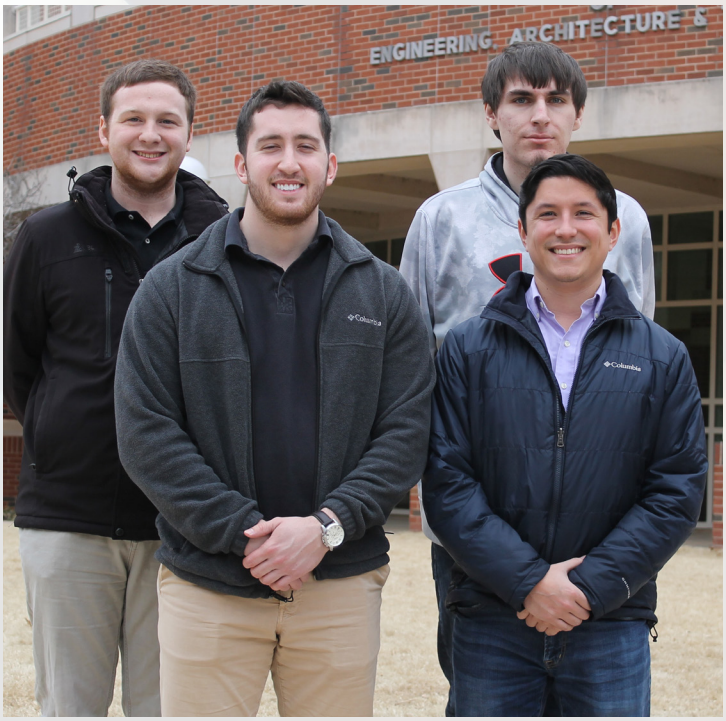
PROJECT: Senior Design 2- Team 1 Self Balancing Robot (ECEN)
TEAM: (from left to right) Blake Giles, Samuel McAnelly, Luis Gomez, Steven Mead
ADVISOR: Dr. Keith Teague

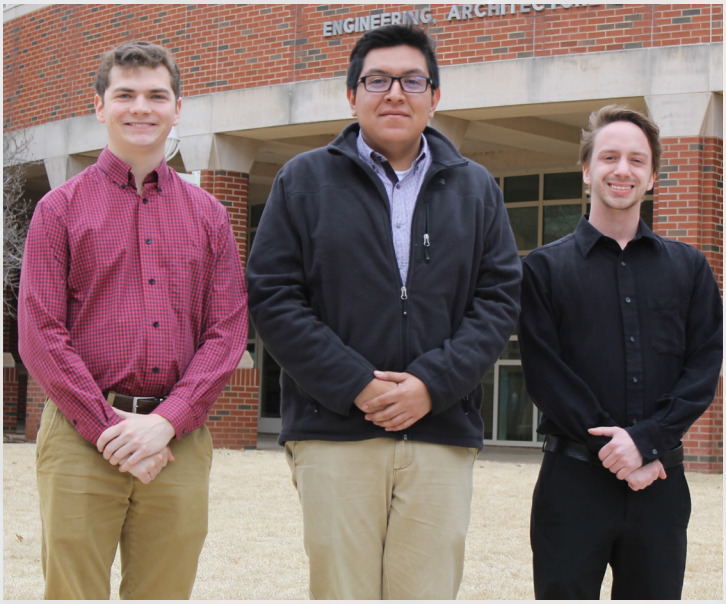
The objective is to make a four wheel car with an inverted pendulum on top of the car. Motion of the car is controlled by a joystick and inexpensive radio link from a toy car or something similar, while a microcontroller on board of the car uses data from sensors and the joystick adjusts acceleration of the car in such a way that the unstable inverted pendulum remains in the upper position. We will have to use position and velocity feedback. Hardware is very simple and the main effort is on computer/software tasks.

PROJECT: Senior Design 2-Team 2a-Model Car Rodeo (ECEN)
TEAM: (from left to right) Brandon Alexander, Christian Hamilton, Caleb Ross, Jake Hansen
ADVISOR: Dr. Fan Guoliang



The objective is to make an autonomous car for a race in one of the ECE hallways. The controller will have only two control signals - START and STOP. The rest of the vehicle control must come from autonomous system. The car, after receiving the START signal, starts the race driving as fast as it can along the hallway to the end slows down to a manageable speed and makes a 180 degree turn around a barrel at the end of the hallway, sets direction along the hallway and runs at max speed to the finish line, or a similar track.

PROJECT: Senior Design 2-Team 2b-Model Car Rodeo (ECEN)
TEAM: (from left to right) Kobe Reeves, Edgar Viveros, Connor Hood
ADVISOR: Dr. Weili Zhang



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PROJECT: Senior Design 2-Team 2c-Model Car Rodeo (ECEN)
TEAM: (from left to right) Nick Hawkins, Kayla Barrow, Servando Hernandez, Nick Norris
ADVISOR: Dr. Gary Yen

The objective is to make an autonomous car for a race in one of the ECE hallways. The controller will have only two control signals - START and STOP. The rest of the vehicle control must come from autonomous system. The car, after receiving the START signal, starts the race driving as fast as it can along the hallway to the end slows down to a manageable speed and makes a 180 degree turn around a barrel at the end of the hallway, sets direction along the hallway and runs at max speed to the finish line, or a similar track.

PROJECT: Senior Design 2-Team 2d-Model Car Rodeo (ECEN)
TEAM: (from left to right) James Shields, Gabriel Louis, Brian Clark, Corey Carter
ADVISOR: Dr. Weihua Sheng

The objective is to make an autonomous car for a race in one of the ECE hallways. The controller will have only two control signals - START and STOP. The rest of the vehicle control must come from autonomous system. The car, after receiving the START signal, starts the race driving as fast as it can along the hallway to the end slows down to a manageable speed and makes a 180 degree turn around a barrel at the end of the hallway, sets direction along the hallway and runs at max speed to the finish line, or a similar track.

PROJECT: Senior Design 2-Team 2e-Model Car Rodeo (ECEN)
TEAM: (from left to right) Ryan Swann, Braden Hawkins, Colton Strabala
ADVISOR: Dr. Nishantha Ekneligoda

The objective is to make an autonomous car for a race in one of the ECE hallways. The controller will have only two control signals - START and STOP. The rest of the vehicle control must come from autonomous system. The car, after receiving the START signal, starts the race driving as fast as it can along the hallway to the end slows down to a manageable speed and makes a 180 degree turn around a barrel at the end of the hallway, sets direction along the hallway and runs at max speed to the finish line, or a similar track.

PROJECT: Speedfest Safety (FPST)
TEAM: Seth Myers, Hunter Hudson, Ty Sutter, Abdullah Alghamdi
ADVISORS: Leslie Stockel, Rob Agnew, Dr. Aaron Alexander

The scope of our project is to create and supply a full Safety Hazard analysis and Safety plan to the annual Speedfest event. Speedfest is an annual model aeronautics competition that is put on by Oklahoma State University. This event attracts around a 1,000 visitors throughout the course of the day. We were approached by the MAE department to provide this safety analysis and plan, but we were also tasked with testing and potentially finding a newer and more improved fuel source for the model aeronautics being used in the competition.

PROJECT: Fire Jet Phenomenon in portable gas container (FPST)
TEAM: Abdulrahman AlAmri, Faisal Aldreewish, Zain Omran, Zach Harrell
ADVISOR: Dr. Haejun Park

The fire jet phenomenon is a sudden internal combustion that occurs inside an enclosed container with a small opening such as a gasoline container that causes a pressurized vigorous flame through the outlet. The study behind the phenomenon involves the pressurized air particles mixed with fuel entering and exiting the small outlet of the container near an open flame. The phenomenon typically occurs when the container is tilted, and vapors being exposed to air entrained in the container which dilutes the rich fuel vapors to reach flammable limits with causing the open environment to be a source of flammability and danger. The reason for collecting data, conducting experiments, and researching the fire jet is to distinguish what variables cause the jet fire to occur and to mitigate the problem by expressing our experimental results through the study of fire dynamics. Compared to previous manual fire jet experiments, this experimental design reduces human error and provides accuracy of the container under experimentation.

PROJECT: Hazard Identification Laboratory (FPST)
TEAM: Tanner Baird, Adam Hoak, Lain Wright, Joshua Yates
ADVISOR: Leslie Stockel

The hazard identification laboratory provides students with a high engagement learning experience. This lab allows students to see real world scenarios of industry practices and potential hazards one might encounter. The objective will be for students to examine each scenario and identify various hazards that have been placed in each unit. This laboratory will be utilized by students in the fire protection program as well as working professionals taking OSHA courses. The multidisciplinary application of this lab allows students from all educational backgrounds to gain knowledge of industry hazards. The units will cover the following topics: confined space hazards, cranes/rigging hazards, excavation/trenching and soil recognition, damaged equipment identification, and walking/working surface hazards.

PROJECT: House Dec of the Future (FPST)
TEAM: Wesley Hallof, Charles Poppe, Jake Barry, Rocky Koinm
ADVISOR: Dr. Rob Agnew

There is an excessive amount of risks associated with constructing the homecoming decs. Through project design the House Dec of the Future will reduce the associated risk to students by 50 percent. Our project is a scaled version of what spectators see at homecoming constructed with the proposed methodology. Not only is it safer, but it will save time, money and overall student stress.

PROJECT: Mitigating Fire Spread in Informal Settlements (FPST)
TEAM: Alex Cooper, Chris Holdmeyer, Jacob Branstetter, Justin Rubio
ADVISOR: Virginia Charter

In many developing countries, such as South Africa, there is a large housing deficit. This housing deficit causes people to build houses out of whatever materials they can salvage. This leads to a large number of informal "shacks" that people live in. There has been a large number of fires that cause massive amounts of destruction, displacing thousands at a time. Our team has researched a cost effective way to slow or stop fire spread in these settlements. By altering the construction materials we believe fire can be controlled around the shack of origin, limiting the amount of damage.

PROJECT: Enhancement of Inventory Simulator for Engine Parts at American Airlines Maintenance Facility (IEM)
TEAM: (from left to right) Michael Moylan, Andrew Browning, Ahmed Almuhanna, Erica Crain
ADVISOR: Dr. Balabhaskar Balasundaram

The group is pictured at the Tulsa AA Maintenance facility in front of a GEnx Engine which pushes 787 Dreamliner Aircraft.

The American Airlines facility in Tulsa has an engine maintenance process that boasts a turnaround time of fifty-three days. Recently they have introduced a new engine type, the CFM56-5B, which is very similar to one of their existing engines, the CFM56-7B. The two engines share most of their parts, which means that they can share the same pool of spare inventory. Due to this interchangeability of parts, there is great potential for improvement within the inventory management system, Shop Pool, specifically in its simulation component. Regarding how well Shop Pool simulation models the current repair process, the fidelity of the model needs to be improved so that American Airlines can better forecast the number of spare parts needed, thereby reducing inventory costs. The goal of the team is to better characterize the input parameters of the simulation model and to analyze and update its process flow map to better represent the repair processes of both engines.

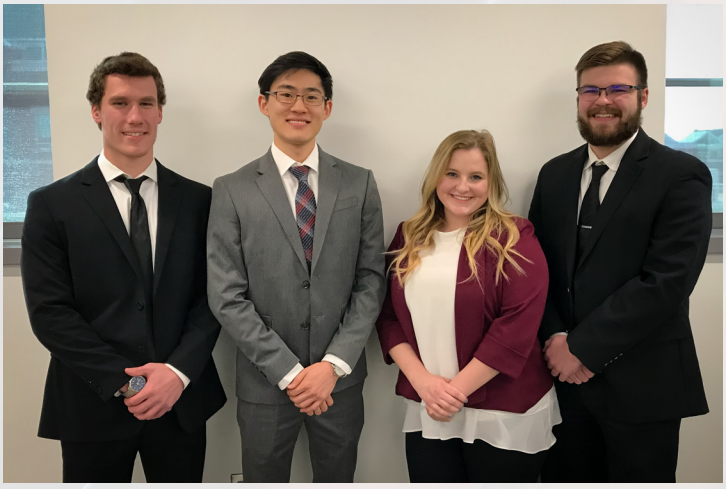
PROJECT: Simulation of Aircraft Manufacturing Process (IEM)
TEAM: (from left to right) Kevin Fabian, Chisom Anunobi, Brittany Windsor, Justin Chan,
ADVISOR: Dr. Farzad Yousefian

Textron Aviation Inc. is the leading general aviation authority and home to the Beechcraft, Cessna and Hawker brands, which account for more than half of all general aviation aircraft flying. Textron Aviation's Independence facility opened in 1996. The Independence facility now produces the Cessna Citation M2 jet and Cessna Grand Caravan turboprop, along with the Cessna Stationair, Skylane and Skyhawk piston aircraft. Each aircraft model has an expected throughput rate. When there are changes for an aircraft, part changes, or staffing changes, they conduct capacity analyses to assess the impact of those changes. Their capacity analysis modeling is done in excel spreadsheets and is challenging to incorporate all the consequences of the changes in the four buildings. The Senior Design Team will create a Simio model (simulation model) of the Single Engine High Wing 172 production line to plan for production changes and develop solution alternatives to increase output.

PROJECT: Increasing Profitability and Utilization of Robotic Operations (IEM)
TEAM: (from left to right) Maddie Hawkins, Miguel Leal, Kalley Schwind, Megan Basenfelder
ADVISOR: Dr. Austin Buchanan

INTEGRIS Health is the largest not-for-profit and Oklahoma-owned healthcare system within the state with an emphasis in efficiency. The Process Improvement team for the INTEGRIS network is not satisfied with the profitability and utilization of robotic equipment (da Vinci Xi) and the robotic operation room at Bass Baptist Health Center (Bass). Our team was tasked to find the best location for the robotic equipment within the INTEGRIS network through an economic analysis. Additionally, our team was tasked with creating a scheduling policy for robotic cases under the assumption that the da Vinci Xi is kept at Bass, with the goal of increasing profitability and utilization of the robotic surgical service line. The objectives will be completed in hopes to increase profit, utilization, and physician satisfaction.

PROJECT: Computer Simulation of Food Preparation Process (IEM)
TEAM: (from left to right) Logan Price, Duke Hwang, Maddie Marko, Caleb Coats
ADVISOR: Dr. Tim Hardin



NSP Quality Meats is a meat manufacturing and packaging company that provides chicken and beef products to large scale restaurant chains. They receive raw, unprocessed meat from suppliers before cutting, trimming, cooking, marinating, and packaging flash frozen finished goods. NSP's engineering team has proposed a new manufacturing facility layout to increase production and reduce labor costs. This project will evaluate and analyze the chicken processing line in its current state and proposed state in terms of production output through a simulation design. Additionally, the senior design team will propose facility layout improvements using the simulated models if economically justified.

PROJECT: Improving Quality Control Operations (IEM)
TEAM: (from left to right) Blake Fabian, Abbye Coan, Elle Doyle, Jessica Tyler
ADVISOR: Dr. Juan Borrero

SWEP is a leading manufacturer of brazed plate heat exchangers (BPHE), providing efficient use of energy, material, and space, to provide premium performance at the lowest life-cycle cost. The objective of this project is to improve the quality of the connection assembly process by identifying and eliminating the sources of error that result in incorrect connection compatibility for custom BPHEs. The main goal is to reduce the number of customer complaints due to incorrect configurations of connectors by 75% as well as reducing internal defects by 90%. The project will include error proofing the placement of connections on heat exchangers. The project will not include the analysis of logistics operations, complaints related to heat exchanger leaks, product tipping over in the furnace, packaging, traceability, or work order schedule optimization.

PROJECT: Improving Space Utilization and Standardizing Sales Operations (IEM)
TEAM: (from left to right) Cynthia Craig, Noah Seltzer, Emilie Ritz, Hannah Anthony
ADVISOR: Dr. Manjunath Kamath

The Mutual Tuesday House is a local thrift store located in Bartlesville, OK that supports the MUTUAL Girls club, a club that teaches and empowers young women. The purpose of our project is to increase space utilization in the main facilities and standardize sales operations. The first goal is to reduce congestion for volunteers and customers while improving safety throughout the facilities. The second goal is to decrease the complexity of the checkout process for cashiers while minimizing the steps of pricing intake.

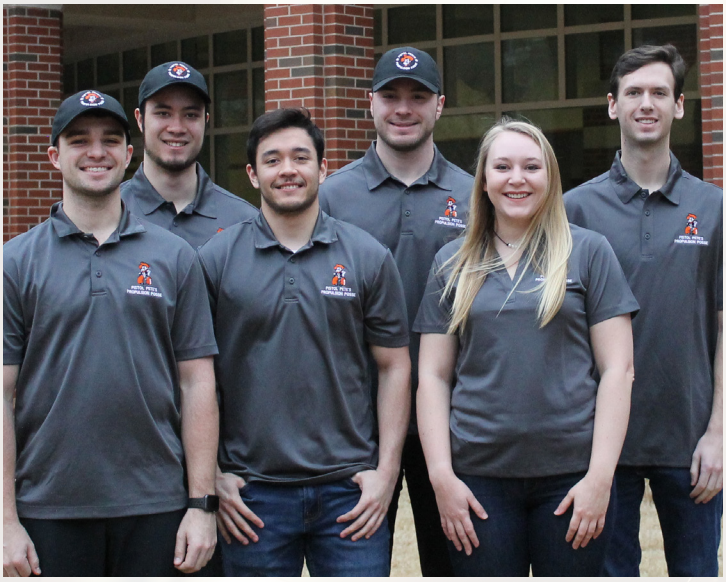
PROJECT: Retail Drive-Thru Operations Analysis (IEM)
TEAM: (from left to right) Willis Cook, Taylor Lambdin, Rania Farhani, Jordan Spencer
ADVISOR: Dr. Sunderesh Heragu

Stillwater-based OnCue is a growing innovator in the Oklahoma convenience store market. OnCue seeks to maximize the revenue of their drive- thrus while minimizing the supporting workload by providing a standard set of best practices or guidelines to operate them. This project will analyze the current operating processes and sales performance and seek to evaluate what factors affect the revenue. Some of those factors include breadth of product offerings, order fulfillment methods, drive-thru marketing, speed of service and others. The project will require the team to develop solution ideas and a recommended approach for implementing those ideas.

PROJECT: Renewable Energy STEM Education Prototype (MAE)
TEAM: (from left to right) Kyle Schrader, Mohammed Alali, Mohammed, Alajmi, Zachary Williams, Jin Song Chen, Patrick Steichen
ADVISORS: Dr. Robert Taylor, Jim Beckstrom

The objective of the project is to create a Science, Technology, Engineering and Mathematics (STEM) education/outreach focused system that creates awareness about alternative electrical energy systems. The final product will include a wind turbine, solar panel and internet connection capabilities. A user interface will allow educators to show students real-time data about renewable energy and its applications.

PROJECT: Aerospace Propulsion Outreach Program JetCat Engine Thrust-to-Weight Ratio Improvement (MAE)
TEAM: (from left to right) Grant Schumacher, Thomas Coulon, Michael Mines, Colton Swart, Lauren Jones, Riley Johnson **ADVISOR:** Dr. Kurt Rouser



The purpose of this year-long project is to increase the thrust-to-weight ratio of a JetCat P100 turbojet engine as part of a national collegiate competition sponsored by the Air Force Research Laboratory. This semester, the team designed, tested and analyzed a new nozzle with a flow area optimized for increased exhaust velocity and integral exit guide vanes to reduce swirl. A parametric cycle analysis showed the potential to increase exhaust flow to Mach 0.89. Experiments were conducted in a 3-ft by 3-ft wind tunnel test section to evaluate exhaust characteristics and engine thrust with the original and new nozzle configurations. Engine exhaust was measured with a high-temperature Inconel 5-hole pressure probe to determine velocity, pressure and flow angularity, as well as a K-type thermocouple to obtain temperature. The new nozzle design is additively manufactured from titanium for reduced weight. The combined effect of improving thrust and reducing weight enables a potential 20 percent improvement in thrust-to-weight.

PROJECT: Argonia Cup Competition Rocket Team (MAE)
TEAM: (from left to right) Patrick Cortes, Nicholas Rozell, Kyle Hickman, Austin Stottlemyre, Carter Clark, Caleb O'Quinn, James Cantrell
ADVISOR: Dr. James Kidd, Dr. Jamey Jacob

The goal for the 2019 Argonia Cup competition is to launch a rocket powered vehicle containing a golf ball payload to an altitude in excess of 8,000' AGL and to recover the payload safely at a predetermined location on the rocket range. The OSU "AstroPokes" team design uses a deployable, autonomous glider to return the payload to a soft precision landing.

OSU took 1st place in the Argonia Cup competition for the third year in a row. OSU was part of the inaugural competition in 2017 and has dominated since. This year, the competition was the largest ever with over a dozen teams and included entries from as far away as Michigan, Mississippi and Colorado. The competition requires teams to launch a rocket over to 8,000 feet and return a payload safely back to the launch platform. The OSU team's design included an autonomous deployable glider ejected from the rocket at apogee. The OSU team's rocket was launched to over 12,000 feet altitude above ground and returned the payload to less than 2 tenths of a mile away.

PROJECT: Automatic Filter Folding Machine (MAE)
TEAM: (from left to right) Sydney Pinegar, Michael Selenke, Hana Dickens
ADVISOR: Dr. Robert Taylor

AAF Flanders manufactures a large array of air filters for home HVAC systems. These filters are fabricated by folding the filter bottom, inserting the filter media and then folding the filter top onto the assembly. The goal of this project is to design and fabricate an automated process for one of the steps in producing these air filters. The team must design, fabricate, and demonstrate an automated process that folds the filter tops and bottoms including inserting the corner tabs that hold the sides in place while minimizing contact of the unfinished side, which will be covered in a layer of glue. The entire process must be completed in less than 12 seconds.

PROJECT: Automated Small Sensor Emplacement (MAE)
TEAM: (from left to right) Luke Spaulding, Eric Abele, Chris Totty, Dalton Forsythe
ADVISOR: Dr. Robert Taylor

The customer has requested a demonstration of a proof of concept (POC) by utilizing an unmanned aerial system to place four sensors within 300-500 m from the target area.

It is desired that the system be capable of delivering the sensors into concealment and recovery of the sensors on command. The vehicle should be minimally noticeable at the target area and should be able to operate in uncontrolled airspace and non-permissive environment.

The sensors must be placed so as to provide overlapping coverage of the building, with emphasis on the front door and roadway into the target area. Measures of viability for the requested POC include its level of autonomy, level of visual and acoustic signature at the target area, as well as its adaptability and scalability. The Sensors must also be placed within +/- 1 m of the desired location with a threshold of +/- 1.5 m horizontally. The vehicle must be capable of transporting a 10 pound payload with a threshold of seven pounds.

PROJECT: CNC Controls Update (MAE)
TEAM: (from left to right) Amber Simpson, Jake Bigby
ADVISOR: Dr. Joe Conner

The CNC Update Control team has been assigned to update a 1984 Matsuura MC-1000V-DC-3 CNC Machine with a Fanuc 6M-Model B control system that was donated to Oklahoma State University. Our goal is to get the machine in operation again. The current control system is obsolete, and our ultimate goal is to update the controls to interface with computer programs, such as SolidWorks or MasterCam.

PROJECT: Down Hole Drone (MAE)
TEAM: (from left to right) Haden Kolmer, Jerod Goodman, Michael Strawn
ADVISOR: Dr. Jamey Jacob, Dr. Robert Taylor

The goal is to design an Autonomous Downhole Drone that sustains conditions of 250 and 2000 psia whose primary purpose is to relay data (temperature, pressure, and the Gas-Oil ratio) to an Electronic Submersible Pump 1,500 ft away. We will demonstrate the drones ability to move laterally in a 3.995 inch inside diameter pipe and stay stationary inside that pipe during pumping operations.

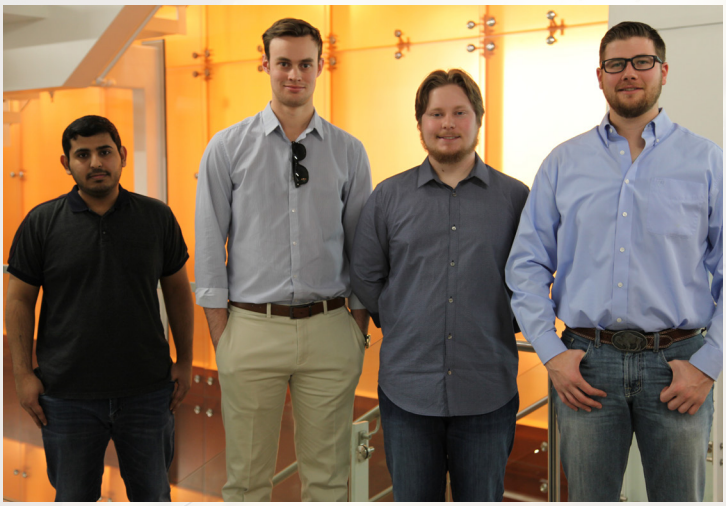
PROJECT: ENDEAVOR Flow Stand (MAE)
TEAM: (from left to right) Adam Catlin, Charles Makinde, Bryce Duhon, Mitch Reed
ADVISOR: Dr. Arvind Santhanakrishnan

The objective for this project is to design, prototype, and test a flow system using water as the working fluid to be used for educational purposes in ENDEAVOR. The fluid flow system will have a tank at the bottom of the stand holding the water supply. The water will be moved throughout the system by a centrifugal pump. This will allow it to flow through the pipe network until it returns back to the holding tank at the bottom of the stand. Then the water will be continuously circulated through the system by the pump. The flow rate at the inlet of the pipe network can be adjusted using a valve and measured using a flow meter. Most of the pipe network will consist of PVC while also having sections of copper and galvanized steel connected by a combination of different fittings. Flow meters will be used to monitor the flow rate in the different pipe sections. Along one stretch of constant straight pipe, there will be a system of manometers to show the pressure drop throughout. The piping will all be mounted on a metal stand that can be moved around the room.

PROJECT: ENDEAVOR Ground Source Heat Pump (MAE)
TEAM: (from left to right) Parker Prough, Tagen McMurphy
ADVISOR: Dr. Brad Rowland

The ENDEAVOR ground source heat pump is currently installed but lacks proper instrumentation to conduct undergraduate experiments. Our project will install pressure, temperature, flow and power instrumentation for student experiments.

PROJECT: ENDEAVOR Heat Exchanger Stand (MAE)
TEAM: (from left to right) Mohammed Aldawsari, Caleb Austin, Thomas Mosley, Aaron Elliot
ADVISOR: Dr. Brad Rowland



The objectives of this project are to design and build a portable Heat Exchanger (HX) system that will be used in ENDEAVOR for teaching and research purposes. This phase of the project will focus on creating a water-water shell-and-tube HX system. The system will consist of two heat exchangers that can run in co-flow or counter-flow, and will also be able to run in series or parallel with each other. The stand will use the ENDEAVOR water supply for the cold water source, but will have its own hot water reserve. Another feature of the stand will be to have the ability to replace the shell-tube HX's with plate-frame HX's.

PROJECT: Go Baby Go, OK Outriders (MAE)
TEAM: (from left to right) Christopher Young, Hannah Cox, Colton Mullin, Ben Davis, Colton Tubbs
ADVISOR: Dr. Jerome Hausselle

Go Baby Go is a non-copy written program that provides modified ride-on power wheel cars to pediatric individuals with disabilities. Modified ride-on cars provide a low-cost approach to powered mobility for children diagnosed with mobility impairments. With the assistance of Oklahoma ABLE Tech, the OK Outriders team is tasked with the design and construction of one demonstration car and two adapted ride-on cars for two children.

PROJECT: Hypogravity Simulator Project (MAE)
TEAM: (from left to right) Katrine Hareland, Mary Kelly Chance, David Watt
ADVISOR: Dr. Jerome Hausselle

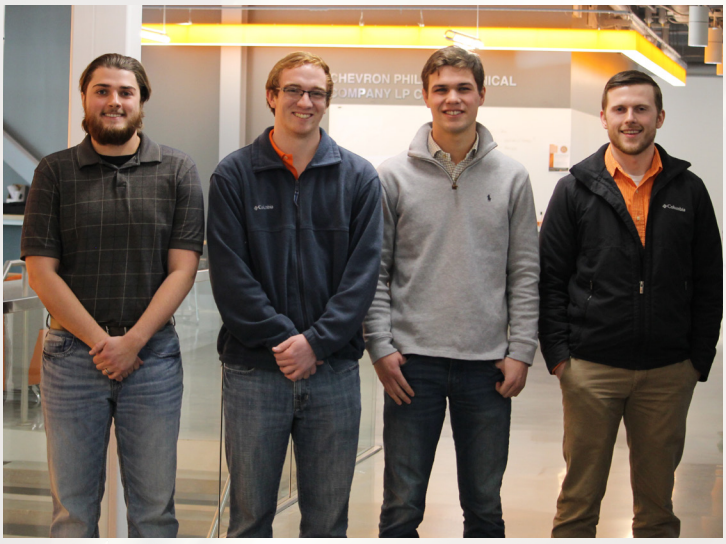
With the increase of space exploration, scientists and researchers want to know the long term effects reduced gravity has on bone density. The hypothesis is that with reduced loading on the body, due to hypogravity, there will be a result in loss of bone density. This in turn would increase the likelihood of fracture when back on Earth. This apparatus simulates reduced gravity and will be used in research to help determine the long term effects reduced gravity has on the body. The scope of this project is to improve the current system, and add functionalities to the system. Functionalities include: adding an automated pulley system and a leg exoskeleton. Improvements include: replacing 3D printed parts with steel or aluminum.

PROJECT: Improved Small Unmanned Aerial System Network (MAE)
TEAM: (from left to right) Godwin Ekpek, Justin Fredenburg, Ryan Benardy
ADVISOR: Dr. Robert Taylor

Our project is improving a Small Unmanned Aerial System (sUAS) network with a ground station using a directional antenna that automatically tracks a single unmanned vehicle. Our goal is to strengthen the signal connection between the control station and the target vehicle with the improved radiation field of a yagi antenna without the setback of manually re-adjusting antenna direction.

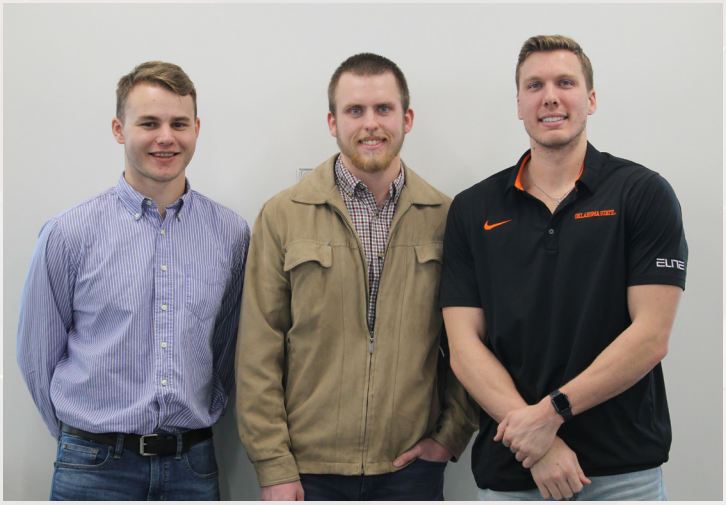
We are incorporating the tracking antenna into an easy to transport, set up, and take down ground control station for use in the field. This station will be self-contained in its' own carrying case made of a pelican case that it will fold into for storage and transportation and fold out of and lock into place for use. The station will include a laptop to run vehicle control software (mission planner), a battery to power components, and an arm with the antenna tracker consisting of a gimbal with a yagi antenna and a Pixhawk mounted for communications and gimbal control respectively. Since quality signal between the controller and the vehicle are critical we will evaluate and demonstrate radio communication at a test site and use a smaller scale demo at the expo to show the antenna tracking a drone.

PROJECT: Leg Brace for Neuromuscular Electrical Stimulation (MAE)
TEAM: (from left to right) Joshua Boehs, Greg Hockaday, Brent Wilson, Jordan Byars
ADVISOR: Rushikesh Kamalapurkar



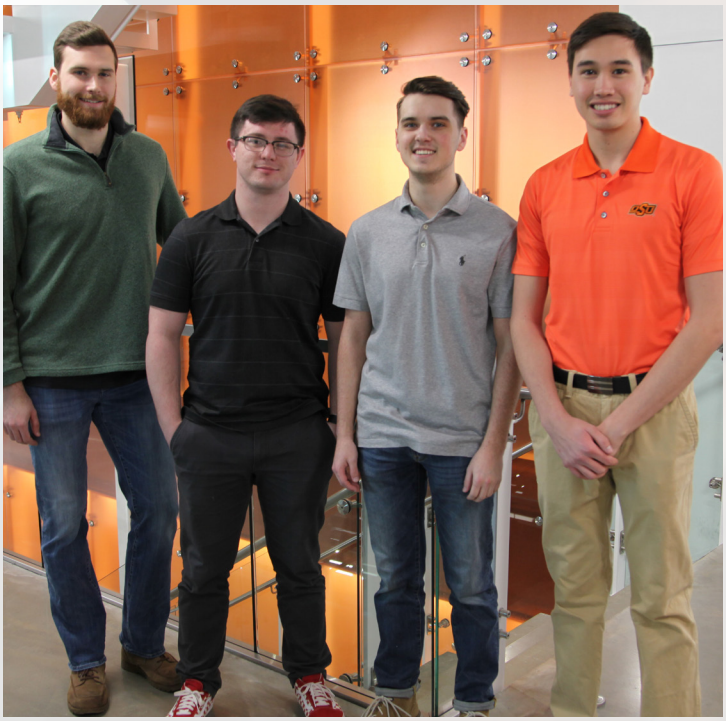
The focus of this project is to construct a knee exoskeleton to ensure safety and to measure the angle of rotation in varus and valgus directions during the testing of active orthotic devices. To prevent patient injury, rotation in the frontal axis must be limited to a maximum of 10 degrees. The measurement system must be capable of detecting angle changes with a minimum resolution of 0.1 degrees. The device must have several degrees of adjustability including accommodating a wide range of body types and to operate over a small range of fixed knee positions.

PROJECT: Onboard Lightweight Pressure Maintenance System for Inflatable High-Altitude Kite (MAE)
TEAM: (from left to right) Trei Staggs, William Carroll, Jared (JC) Hartzler
ADVISOR: Dr. Robert Taylor



The design will be a fully functioning pressure maintenance system for ground and flight testing of inflatable systems. The design will have a maximum weight of two pounds, maintain a pressure range of 0-10 psi +/- 0.5 psi, and withstand an internal air leak rate of 1.0L/min at six psi differential pressure with an operation range of sea level to 10,000m.

PROJECT: Psychrometers Measurement: High Accuracy Dew Point Calibration (MAE)
TEAM: (from left to right) Nick Krause, Corey Todd, Justin Mahan, Cody Massion,
ADVISOR: Dr. Christian Bach



Our project is a wine cooler that we modified into a calibration environment that allows us to simultaneously calibrate two dew point meters for enhanced measurement accuracy of latent capacity. We will be measuring how temperature, pressure, and other variables will affect the accuracy of the dew point meters. Our goal is to create an environment that will allow us to control the temperature, relative humidity, and pressure of the fridge regardless of the ambient conditions.

PROJECT: Radial Stretch System for Smart Elastomers (MAE)
TEAM: (from left to right) Sergio Piedra, Mark Finnicum, Beau Goddard
ADVISOR: Dr. Aurelie Azoug

The goal of the project is to build a radial stretch system able to radially stretch soft smart materials and measure the associated force. Material properties under a radial stretch are different from the properties under a uniaxial tensile test. We want to be able to measure material properties under any stretch. In addition, smart materials can be programmed to behave a certain way with a radial stretch. The system is bench-top size and cost-efficient. It should allow for increasing diameter by ~500 percent of an elastomer membrane while measuring the applied force. A low-force load cell will be integrated to the set up. Grips will be design to attach to a soft material. Mechanical or magnetic grips are some of the options. An Arduino controller and a motor will be used to activate the machine, control the displacement and collect the load data.

PROJECT: Stillwater Ground Source Heat Pump System (MAE)
TEAM: (from left to right) Max Darrow, Jacob Shafer, Dylan Snyder, Greg Fisher
ADVISOR: Dr. Jeffrey Spitler

This project is a feasibility study for a Ground Source Heat Pump (GSHP) system for the City of Stillwater's downtown cultural district. It is hoped that the system will serve future restaurants and galleries on Block 34 and be retrofitted to some of the existing community buildings, including the Stillwater Community Center, Stillwater Public Library and Prairie Arts Center. By developing a comprehensive design for the GSHP system, the team will deliver concept drawings and an economic study that will indicate the value of installing a borehole field on Block 34.

PROJECT: Thermoelectric Cooler Learning Environment (MAE)
TEAM: (from left to right) Jack Cook, Jake McDonald, James Straight, Lujia Wang
ADVISORS: Dr. Craig Bradshaw, Dr. Arvind Santhanakrishnan

This system will be modular and mobile and connect to infrastructure available in ENDEAVOR. It will use 110V A/C to power the thermoelectric modules and lasers and tap water as a water source. This learning environment will leverage a Continuous Wave Laser and high-speed camera, which the department owns for instruction. It will have two tanks, metallic heat sinks and a plumbing system.

PROJECT: Wire Bundle Vibration Testing-Sponsored by Boeing (MET)
TEAM: (from left to right) Cole Bibee, Christopher Doidge, Colton Jung, Aaron Parks
ADVISOR: Dr. Aaron Alexander

Electrical issues on aircraft can be difficult to diagnose due in part to intermittency during flight, and the inability to replicate them on the ground. Being unable to replicate them in turn costs time and money as the root problem goes further unidentified. One of the biggest detriments to wiring performance in aircraft is vibration in the wiring and wire bundles experienced during flight. Throughout the course of this project the team will design a new system for the Wire Vibration Replicator which is used to test the simulated vibrations of wires on an airplane during flight. By replicating the conditions wires undergo during flight, we will be able to test the durability and failure potential of wires inside of the aircraft.

PROJECT: Multi-headed Extruder for a 3D Printer (MET)
TEAM: (from left to right) Gannon Griffith, Benjamin Davenport, Daniel Bruton
ADVISOR: Dr. Aaron Alexander

The design for our Senior Project incorporates five different nozzles with diameters ranging from 0.4 to 1.2 to be used on a 3d printer. The advantages of blending faster print times with a higher resolution prints.

PROJECT: Portable Backpacking Bridge (MET)
TEAM: (from left to right) Karl Crick, Benjamin Farris, Chance Alley
ADVISOR: Dr. Aaron Alexander

Our project is to design and create a lightweight portable bridge that will collapse down to fit inside a backpack. The bridge will also be designed to be used as a game/gear carrier with attachable wheels and a ladder.

PROJECT: Veterinary Dispensing Bottle Modifications (MET)
TEAM: (from left to right) Justin Messner, Connor Fischer, Jake Standridge
ADVISOR: Dr. Aaron Alexander

Oklahoma has one of the largest cattle industries in the nation. You can find feedlots across the majority of the state. One of the main processes of a feedlot is to distribute medicine to each head of cattle that is delivered to the location. Considering the vaccination process is more time consuming, it is one that most feedlots would like to speed up and make more efficient. This is where our project comes into play. Feedlots need a container for their bottles that allow easier handling while trying to deal with the unpredictability of a calf. Our product will aid feedlots, as well as individual farmers and ranchers, by protecting their medicine bottle while also speeding up the process of changing out these bottles during the vaccination process. The "sleeve" we designed will allow farmers and ranchers to have easier access to their medicine bottle during the vaccination process. Another benefit of our design is that it promotes a faster method of changing out the typical medicine bottle. The sleeve will also allow processors to protect the glass bottle of damage and prevent from breakage or injury.

PROJECT: Zip-Stop Classroom Protector (MET)
TEAM: (from left to right) Garrett Negen, Luke Boevers, Mitchell Graf
ADVISOR: Dr. Aaron Alexander

Zip Stop is a device that can be used to secure any door with a gap under it to prevent access by an assailant. It utilizes friction and mechanical advantage to accomplish this task. The device is deployed by sliding it under a door and pulling the zip tab to lock it in place. Zip Stop works on both inward and outward opening doors. To remove the device simply grasp the release tab and lift.

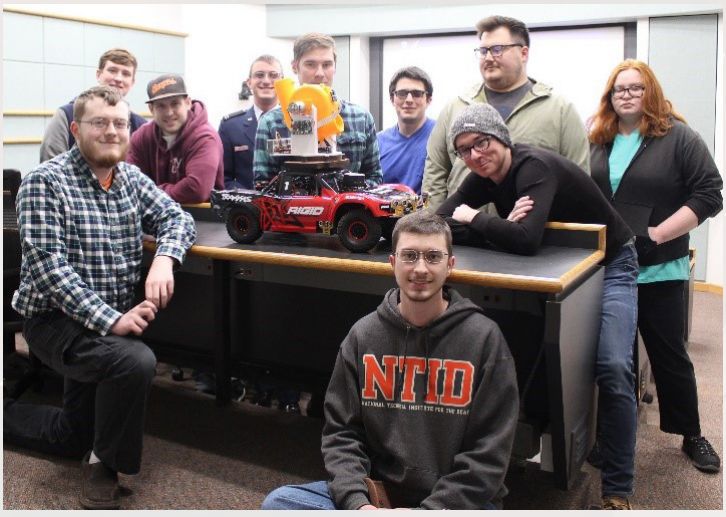
PROJECT: Optimization of a Part for 3D Printing-Sponsored by Moog, team 5 (MET)
TEAM: (from left to right) Norman Howard, Corey Rhees, Jared Pierce
ADVISOR: Dr. Aaron Alexander

Our project is working with Moog on a more efficient enclosure for an electronic card. We will be using laser powder bed fusion additive manufacturing, meaning we can easily manufacture organic geometries. The electronic card will use natural convection for cooling.

PROJECT: Optimization of a Part for 3D Printing-Sponsored by Moog, team 6 (MET)
TEAM: (from left to right) Nick Herrin, Daniel Carne, Luke Green
ADVISOR: Dr. Aaron Alexander

Our project is working with Moog on a more efficient heatsink for a microprocessor. We will be using laser powder bed fusion additive manufacturing, meaning we can easily manufacture organic geometries. The heatsink will be vertically mounted and will use natural convection.

PROJECT: Autonomous Car, team 1 (EET, MET)
TEAM: Sterling Qualkenbush, Bryant Jackson, Logan Shreve, Haley Ritchie, Hussain Alkhamis Zachary Tomblin, Bradley Ingram, Zachary Dallen, Alex Hromas, Nathan Jackson, Andrew Smith
ADVISORS: Dr. Aaron Alexander, Dr. Avimanyu Sahoo



The student team will work on designing scale-model racing cars, which can autonomously navigate around a given course while avoiding obstacles to complete the assigned mission. The cars will use GPS navigation to navigate around the course with additional sensors to avoid obstacles and other cars. The mission objective is to shoot two small tennis balls towards a target. The team will participate in Speedfest 2019.

PROJECT: Autonomous Car, team 2 (EET, MET)
TEAM: Matt Kline, Sean Casey, Kylene Stevens, Billy Edwards, Kelsey Schoonover, Jordan Diebold, Garret McCafferty, Zach Wood, Gregory York, Alex Segovia, Dylan Flugge, Micah Smith
ADVISORS: Dr. Aaron Alexander, Dr. Avimanyu Sahoo

The student team will work on designing scale-model racing cars, which can autonomously navigate around a given course while avoiding obstacles to complete the assigned mission. The cars will use GPS navigation to navigate around the course with additional sensors to avoid obstacles and other cars. The mission objective is to shoot two small tennis balls towards a target. The team will participate in Speedfest 2019.

PROJECT: Autonomous Car, team 3 (EET, MET)
TEAM: (from left to right) Ansley Cloward, Darla Escota, Kyle Vandenberg, Connor Parish, Collin Sanders, Ansley Cloward, Merek Hodges, Roberto Enriquez, Will Vasil, Matthew Anderson
ADVISORS: Dr. Aaron Alexander, Dr. Avimanyu Sahoo

The student team will work on designing scale-model racing cars, which can autonomously navigate around a given course while avoiding obstacles to complete the assigned mission. The cars will use GPS navigation to navigate around the course with additional sensors to avoid obstacles and other cars. The mission objective is to shoot two small tennis balls towards a target. The team will participate in Speedfest 2019.

PROJECT: Autonomous Car, team 4 (EET, MET)
TEAM: Trevor Has, Tom Hathcock, Chance Logston, Jesus Dealatorre, Matthew Idleman, Landen Peeler, Catherine Sheehan, Collin Potter, Evan Alexander, Mitchell Solomon, Will Gibson
ADVISORS: Dr. Aaron Alexander, Dr. Avimanyu Sahoo

The student team will work on designing scale-model racing cars, which can autonomously navigate around a given course while avoiding obstacles to complete the assigned mission. The cars will use GPS navigation to navigate around the course with additional sensors to avoid obstacles and other cars. The mission objective is to shoot two small tennis balls towards a target. The team will participate in Speedfest 2019.

PROJECT: Autonomous Car, team 5 (EET, MET)
TEAM: (from left to right) Michael Tillett, Erick Davis, August Laue, Aaron Yancey, Gregory Hardway, Ryan McLoughlin, Thomas Meadows, Trevor Pigeon, Carter Landrum, Jason Travis Alex Lee, Kevin Howard, Thacker Thacker **ADVISORS:** Dr. Aaron Alexander, Dr. Avimanyu Sahoo

The student team will work on designing scale-model racing cars, which can autonomously navigate around a given course while avoiding obstacles to complete the assigned mission. The cars will use GPS navigation to navigate around the course with additional sensors to avoid obstacles and other cars. The mission objective is to shoot two small tennis balls towards a target. The team will participate in Speedfest 2019.

PROJECT: Carwash System (MET)
TEAM: (from left to right) Ebrahim Alsoleebi, Ali Alzouri, Ahmed Alanazi, Jiachen Guo
ADVISOR: Dr. Aaron Alexander

Our task is about Carwash System. We need to do it by solid work in the spring 2019, at that point we need to apply the structure by submit the Fall 2019. It's sort of instructional exercise project for the EET and MET offices. It can help teach how the bully moves the vehicle in the specific speed, the nozzles foam and water when should shower and when should stop by the sensor device, additionally the motor work with the pressure driven brushes, and the dryer fans at last. It teaches how examinant the stress and how to compute capability the car speed, the foam, and the water (air).

PROJECT: Block 34 Outdoor Performance Stage (ARCH, CIVE)
TEAM: (from left to right) James Berndt, Bretlyn Opfer, Alyssa Rogers, Jacob Pekrul (behind Mayra), Mayra Salazer, Rachel Horsman
ADVISORS: Dr. Norb Delatte, Jeanne Homer

For our senior project, we were tasked with designing a stage that will be used on block 34. The stage will be used for concerts, events, and as a central meeting place for Stillwater to use. The stage needs to be able to hold a band and all the equipment, while also being able to support the amount of power that is needed for the different events. Other considerations that are needed to be addressed are drainage and incorporating with the Duncan street design team.

PROJECT: Building Envelope Design TEAM A (ARCH, CIVE, MAE)
TEAM: (from left to right) Megan Crabaugh, Austin Cratty, Madeline Beichler
(not pictured) Ashley Snelling, Ryan Chamberlain
ADVISORS: Jeanne Homer, Dr. Julie Ann Hartell, Dr. Norb Delatte

We have been tasked with designing a building envelope for Wallace Engineering in Tulsa, Oklahoma. This interdisciplinary team is focused on improving the thermal bridging and thermal efficiency of the downtown Tulsa building without sacrificing aesthetics. The main issue lies in the west façade, which is a completely glass wall. While the glass allows for natural light and a great view, it causes a glare in the building and lacks the efficiency that our client is searching for. Sustainable additions, such as solar panels, will also be investigated.

PROJECT: Building Envelope Design TEAM B (ARCH, CIVE, MAE)
TEAM: (from left to right) Sarah Bowlin, Jackson Emery, Caleb Bennett
(not pictured) Daniel Cranford, Jericho Kindsvater
ADVISORS: Jeanne Homer, Dr. Julie Ann Hartell, Dr. Norb Delatte

The west facade of Wallace Engineering located in scenic downtown Tulsa currently has an issue with the effects of the sun getting into the building. Because of the facade being made almost entirely out of glass, the main problems facing Wallace are heat and glare as the sun sets. Through an innovative redesign of the building envelope, we aim to eliminate or decrease all heat and glare issues that Wallace Engineering has regarding their west facade as well as find creative solutions to make Wallace Engineering a more sustainable building.

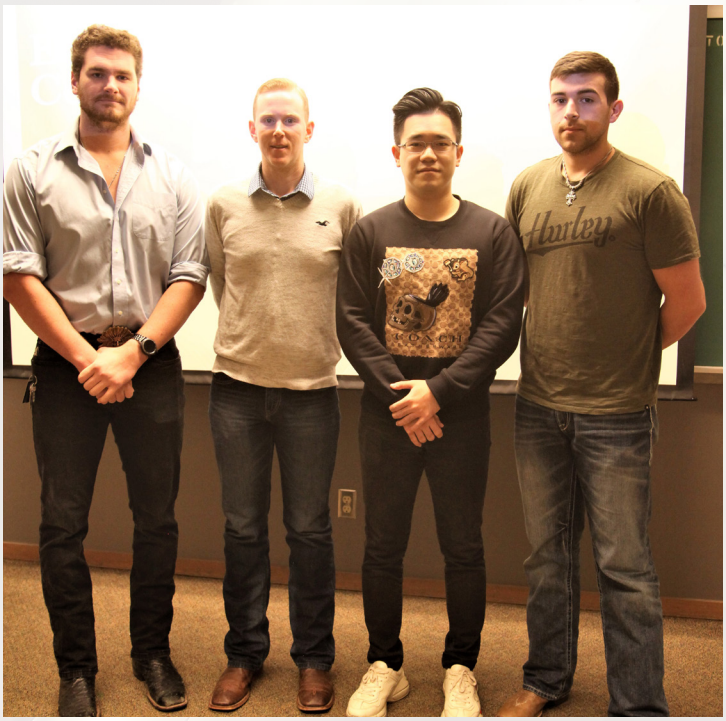
PROJECT: 3D Concrete Affordable Housing: Concrete Printing Team (CIVE, MAE)
TEAM: (from left to right) Michael Dickey, Erinn McArtor, Loren Emerson, Zac Wilson
ADVISOR: Dr. Tyler Ley

Our group has been tasked with the problem of providing an affordable design for two- or three-bedroom housing with 3D concrete printing technology for Arrowhead Construction and the Choctaw Nation in southeast Oklahoma. The priority is to design a concrete mixture that is able to flow through a 3D printer head while providing enough stability to hold an edge with minimal use of formwork. Deformations must be avoided in order for the mix to carry its own weight, as well as the layers above it. This will be the main problem that our group will face over the course of this project.

PROJECT: 3D Concrete Affordable Housing: Design Team (ARCH, MAE)
TEAM: (from left to right) Audrey Hampton, Luke Carnes, Trevor Deen, Tyler Hamm, Hamzah Alzaki
ADVISOR: Jeanne Homer

The purpose of this project is to design a 3D printer that can create affordable homes made out of concrete. We are working with the Choctaw Nation to help bring these houses to southeast Oklahoma in a way that both celebrates the technology of concrete 3D printing and Choctaw culture.

PROJECT: 3D Concrete Affordable Housing: Resilience Team (CIVE)
TEAM: (from left to right) Max Barton, Jay Joslin, Shengxu Qi, Brad Martin
ADVISOR: Dr. Norb Delatte



Edison Concrete Company, LLC is split into three separate, but vital, divisions. The first division is the design, which will determine the shape, height, thickness of walls, and HVAC system, among other things. The second is the concrete design and printing technology. Their job is to create a concrete mix that will work with the three dimensional printer with the right size of aggregate and print a concrete house. The third team is ours, the resiliency team. Our job is to research, test, and break the structures in order to find out whether or not the concrete and structural design can withstand nature's forces such as earthquakes, tornadoes, hurricanes, fire, and even freeze-thaw conditions.

PROJECT: Inspector Gadget Magnetic Levitated Drone (ECE, MAE)
TEAM: (from left to right) Tucker Reed, Shanatu Chatterji, Ricardo Hernandez, Michael Ferguson, Austin Rolen, Tanner Stokes
ADVISORS: Dr. Imraan Faruque, Dr. John O'Hara

The purpose of this project is for use in research to analyze the aerial maneuvers of flying insects. By creating a product capable of manipulating an object in 3D space, researchers will be able to examine the movements of airborne insects in relation to avoidance maneuvering, path convergence, and swarm behavior.

PROJECT: Stillwater Community Center-South Entrance and Elevator Lobby (ARCH, CIVE, ME)
TEAM: Madison Nicholas, Ethan Stringer, Dorion Hasty, Ahmed Alhaddad, Will Coleman, Mohammad Buzaid, Sam Cargo, John Fisher
ADVISOR: Jeanne Homer

The Stillwater Community Center is a vital establishment within the community. Many elements of this complex of buildings are used every day, but the function of its operations could be much better facilitated by a renovation to the building through a revised south entrance, elevator and lobby. The movement flow issues begin off-site and through the drop-off area. The scope of this project includes considering access into and through the site and building, including the passenger bus drop-off, accessible access, and elevator access to several second-floor spaces. We are also to consider user flow, directly incorporating the needs of the city and its managers at the Community Center, as well as life safety, constructability, maintenance, cost and aesthetics.

PROJECT: Mobile Seismic Data Acquisition System (Geology, MAE)
TEAM: (from left to right) Ahmed Alsalman, Isaac Hernandez, Will Walderbach
ADVISOR: Dr. Robert Taylor

The desire has been expressed for a small mobile vehicle platform capable of carrying and deploying a Geophone system for remote data acquisition. It is the goal of this project to design, manufacture, test and deliver a prototype unit to fulfil the requirements of the customer within the time and budget allotted. The customer has specified that the vehicle footprint be roughly 18-inches long and 10-inches wide. Customer has also advised that the electronics support package for the geophone system weighs no more than 10 to 15 pounds, and so the vehicle should be able to carry at least 20 pounds.

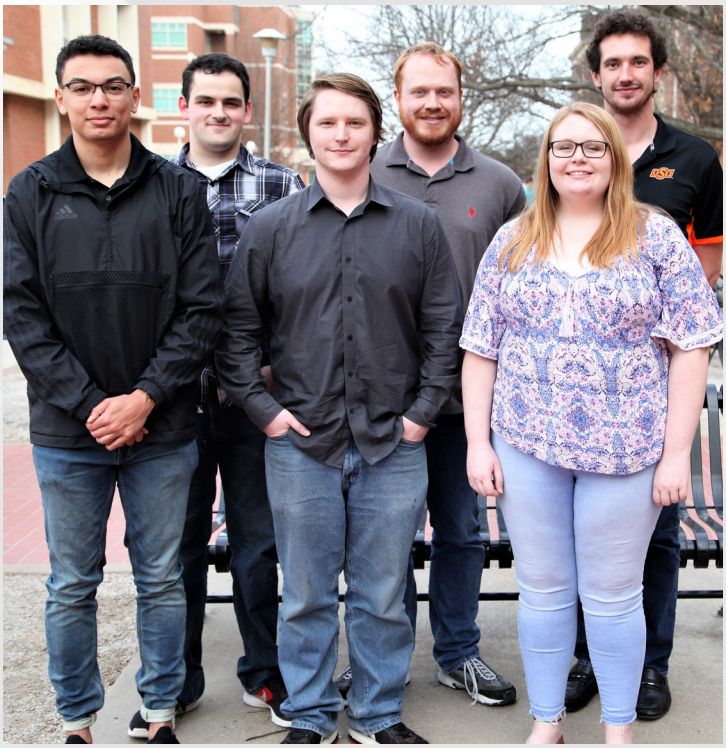
PROJECT: Parachute Flare Maneuver Improvement (ECEN, MAE)
TEAM: (from left to right) Aaron Frerichs, Trevor Keen, Casey Easter, Brandon Lundmark
ADVISORS: Dr. Robert Taylor, Gary Ambrose, Laura Southard

Our project is to create a device which notifies a parachutist when to "Flare" their parachute. A "Flaring" of a parachute is when the user pulls downwards on the outer strings to increase camber of the chute thus creating lift and slowing to a stop right before landing. Currently, low visibility drops create situations in which Navy Seals and other Paratroopers hit the ground harder than necessary due to the inability to time their flare maneuver. This device will read speed and sense when the maneuver should be performed regardless of human visibility such that the user flares blindly at an appropriate time.

PROJECT: Wind Turbine/Sculpture/Light Show (MAE, ECEN)
TEAM: (from left to right) Tanner Couch, Carson Dickerson, Peter Newell, Hannah Lancaster, Abbey Robinson, Thomas Koemel, Tucker Smith
ADVISOR: Dr. Robert Taylor

As a part of the Block 34 Trust Projects, this team was tasked to design and install a 40-foot-tall art piece driven by wind power. With a large horizontal-axis turbine on top of the 40-foot pole and five smaller vertical-axis turbines in a downward spiral, the sculpture stores wind energy (supplemented by solar panels) that powers an LED light show at night. The sculpture is designed to be self-sustaining and aesthetically pleasing, drawing focus to a block that will soon be a gathering place for the community and a staple in downtown Stillwater.

PROJECT: Real-Time Detection and Tracking of Moving Vehicles in UAV Videos (ECEN, MAE)
TEAM: (from left to right) Chris Mathews, Nate Morton, Matthew Whitlock, Russ Messenger, Jordan Fox, Erik Spong (not pictured) Layne Claggett, Leland Palmer
ADVISORS: Dr. Sabit Ekin, Dr. Jamey Jacob, Dr. Christopher Crick



The overall objective of the "UAS-Assisted Work Zone Traffic Management" project is to investigate the feasibility of utilizing UAS technology for real-time traffic monitoring and management of work zone traffic impacts. This innovative approach is likely to offer a safer, faster, and more reliable traffic data collection (surveillance) system. The aim is to minimize work zone traffic impacts by providing reliable and timely data to drivers, workers, traffic control/operations center personnel, and law enforcement. The outcomes of this project will help mitigate the safety risks at work zones, save lives and money, minimize traffic congestion, and protect the environment.

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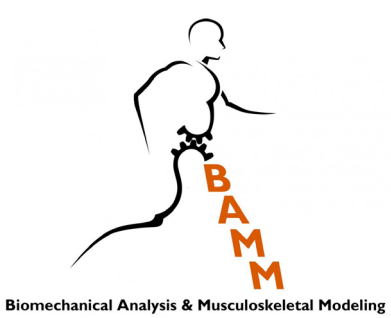

David Hite

The Block 34 Trust

Shawn Allen, SCC

Natalea Watkins

Daniel Parks and Ethan Dodd of Printed Earth

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4015 N. Clay Rd. Glencoe, OK 74032

We hope to see you there!