COLLEGE OF
ENGINEERING, ARCHITECTURE
AND TECHNOLOGY

SENIOR DESIGN EXPO

Fall 2020 Team & Projects Guide

Friday, Nov. 20
VIRTUAL

A Word from the Dean

The College of Engineering, Architecture and Technology is continuing its transformation as a leading innovator in education, research and extension services. This year has been a trying time for our nation and OSU. However, our college has remained committed to our core land-grant mission.

Our faculty have learned how to deliver content and engage students in the new paradigm. Our students have been resilient and have continued to learn, lead and achieve. They have innovated ways to complete working on complex industry-inspired capstone projects while also following all COVID-19 policy and procedures to keep themselves safe.

We have awarded 1,009 degrees this year and have worked with students, administration and alumni to continue delivering world-class engineers and design professionals. By expanding our facilities and our undergraduate research opportunities, we are pushing forward in creating leaders for the next generation of industry.

This is an unprecedented time for OSU, the state and the nation, and I am proud to say that CEAT faculty and students rose to the challenge. The college could not be at the forefront of innovation without the accomplishments and investments of alumni, friends and industry partners in scholarships, internships, equipment and faculty support.

I hope that, while we are not able to conduct an in-person expo, you enjoy getting a virtual look into the bright young minds of these Oklahoma State seniors. They are preparing to solve the grand challenges that face us and 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

Interdisciplinary Schedule

Black Room 9A.M. - 5P.M.

Meeting ID: 928 6279 3264
Passcode: 651854

Autonomous Prop Wagon 9:30-10:30 AM

Stillwater Community Renewable Energy Education System 10:45 AM-11:45 AM

Renewable Energy STEM Education System-2nd System 12:00 PM-12:50 PM

Renewable Energy STEM Education System-Education User Interface 1:30 PM-2:20 PM

3D Concrete Printer 3:40 PM-4:40 PM

Small Capacity Pump-Boreas Systems 4:45 PM-5:45 PM

Gray Room 9A.M. - 5P.M.

Meeting ID: 937 5271 6385
Passcode: 279268

Positive Displacement Refrigerant Pump-Ridiculous 6 10:00 AM-11:00 AM

SONOR (Electro-Mechanical-Optical) Surgery Aid 1:00 PM-2:00 PM

RF-Assisted Wireless Laster Link Alignment System 4:00-5:00 PM

Orange Room 8:30A.M. - 6P.M.

Meeting ID: 936 5630 9450
Passcode: 389274

Tube End Conditioning Machine 8:55-9:55 AM

Distillation Education Stand 10:00 AM-11:00 AM

Deep Drawing Cup-Die Set 11:05 AM-11:55 AM

ADS-B Data and Video Fusion 1:30 PM-2:30 PM

Autonomous Golf Cart 2:35 PM-3:25 PM

Turbo-Electric Fixed-Wing Unmanned Aircraft System 3:30 PM-4:30 PM

Adaptive Kitchen Cabinet 4:35 PM-5:45 PM

Asfixyators: Autonomous Aircraft Rescue and Firefighting Vehicle 3:00 PM- 4:00PM Dec. 1

Fuel: Autonomous Aircraft Rescue and Firefighting Vehicle 3:00 PM- 4:00PM Dec. 1

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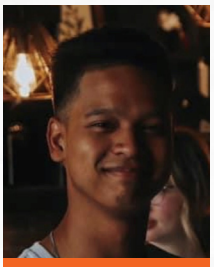
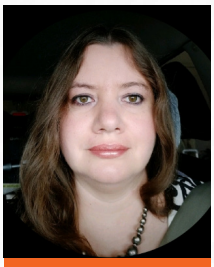
PROJECT: Allied Civil Solutions (CIVE)
TEAM: Joseph Goodhue, Rhianna Hardy-Janisch, Hannah Ryan (not pictured)
ADVISORS: Zachary Henson, Jason Tyler


Joseph Goodhue


Rhianna Hardy-Janisch

Myers Park is a park in Stillwater, Oklahoma that needs storm water subsidization, sidewalks, park improvements, beautification and wastewater lift replacement. Our team is working on this project to utilize the knowledge we have culminated over the years and to apply our strengths to the project at hand and bring the community together with this park.

PROJECT: Stillwater Water Treatment Plant (CIVE)
TEAM: Gabriela Fernandez, Kyle Forsythe (not pictured), Alex Guinn, Cristina Wedler
ADVISORS: Norb Delatte, Greg Wilber


Gabriela Fernandez


Alex Guinn


Cristina Wedler

We have been tasked with expanding the Stillwater Water Treatment Plant so that it can accommodate a 24 MGD flow. The current plant operates at 12 MGD. We will be designing a new plant south of the existing one and bringing much needed technological updates to the new plant.

PROJECT: College Gardens: Drainage and W/WW Utilities (CIVE)
TEAM: James Jurgens, Morgan Miller, Chelsi Mootz
ADVISORS: Norb Delatte, Greg Wilber, City of Stillwater


James Jurgens


Morgan Miller


Chelsi Mootz

The purpose of this project was to solve the drainage problems in the College Gardens neighborhood, and replace the water/waste water utility lines throughout.

The neighborhood sits just south of a large flood plain, and was not designed well enough to move the water it experiences. The only drainage system in place is a narrow channel that runs south through the neighborhood. The rest of the water runs through the streets, flooding several intersections along the way.

The other portion of our project involves the utilities within the neighborhood. Most of the lines are older than their recommended service life, and are deteriorating. These lines are also made with materials that are not normally used in standard practice today, as they can be potentially harmful to consumers. Our task is to identify the most critical lines, and update them to modern standards.

PROJECT: Preliminary Analysis of Accumulation of Carcinogenic Contaminants in Retired Turnout Gear (FPSET)
TEAM: Jake Mitchell
ADVISOR: Rob Agnew


Jake Mitchell

Personal protective equipment is designed to protect firefighters from the hazardous conditions encountered on the fire scene, including heat and toxic chemical exposures. Decontamination practices have been developed to remove toxic combustion products from the fabric. However, there is speculation that chronic exposures to residual contaminants could be a contributing cause to firefighting occupational-related illnesses.

In order to achieve the goal of identifying and quantifying these residual contaminants, samples were taken from decommissioned structural firefighting ensembles and analyzed by layer (outer shell, insulation, and inner liner for textile integrity via electron microscopy and quantity of polynuclear aromatic compounds (PNA) levels by liquid chromatography with ultraviolet/fluorescence detection. The results of these analyses provided evidence of the presence of residual carcinogenic contaminants.

Laboratory data did not support the hypothesis by observation (staining) of dermal absorption of contaminants via PNA migration through structural firefighting ensembles. These findings provide additional information to investigators developing methods for the evaluation of contamination levels of turnout gear.

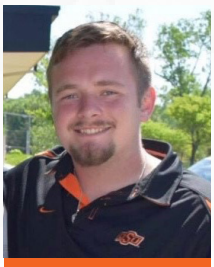
Project Presentation

PROJECT: AstraZeneca Team (IEM)
TEAM: Robby Cabello, Robert Hammersmith, Jax Silva, Jake Ward
ADVISOR: Sundaresh Heragu


Robby Cabello


Robert Hammersmith


Jax Silva


Jake Ward

We are working with AstraZeneca to provide a new planning tool that will help health clinics host an efficient drive-thru influenza vaccination clinic. This will be a computer program that will be able to recommend different variations of drive-thru flu clinics based on the capabilities of the health clinic.

The output of the program will have a queueing network model that will tell them how many PODs (points of distribution) and staffing they would need, along with a library of documents that will be customized to each variation of the drive-thru flu clinic.

PROJECT: Oncue Express Team (IEM)
TEAM: Kaitlyn Close, Vince Humerickhouse, Susan Weckler
ADVISORS: Bill Dueease, Sunderesh Heragu, Joseph Nuamah


Kaitlyn Close


Vince Humerickhouse

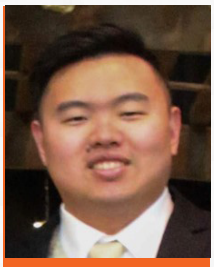

Susan Weckler

This senior design team is using simulation tools to evaluate alternatives to increase the production of tacos by 300% for the OnCue Express production facility.

PROJECT: WebCo Team (IEM)
TEAM: Cassie Johnson, Iker Larraz, Liu Lefu
ADVISORS: Frank Groenteman, Sunderesh Heragu


Cassie Johnson


Iker Larraz


Liu Lefu

Webco is a leading manufacturer of specialty tube products. The site in Kellyville, Okla., primarily manufactures stainless steel tubes used for drilling oil. Webco will open a new facility adjacent to the current Kellyville facility to keep up with growing production demands. Our team is responsible for designing the new facility layout. The new facility will house the final processes for several product groups. Our team is using IEM tools such as simulation modeling, facility layout techniques, and cost analysis to efficiently design this new facility layout.

PROJECT: Autonomous Golf Cart (MAE)
TEAM: Gabriel Fatone, Bailey Sutherlin
ADVISORS: He Bai, Rushikesh Kamalapurkar, Laura Southard, Collin Thorton


Gabriel Fatone


Bailey Sutherlin

The Autonomous Golf Cart Project has been a multi-semester, interdisciplinary project. Now that it successfully runs autonomously at a level 2 automation, specific safety features need to be implemented. Such safety features include two automatic kill switches that shut down all power supply to the vehicle and a switching system that will allow the driver to switch the golf cart function from autonomous mode to manual mode at any time by grabbing the steering wheel. We are also working to develop a steering wheel system that will allow the driver the capability to easily maneuver the vehicle effectively once power has been cut to the system.

Video of the Project

PROJECT: Deep Drawing Cup-Die Set (MAE)
TEAM: William Henderson, Phillip McClure
ADVISOR: Hadi Noori


Gabriel Fatone

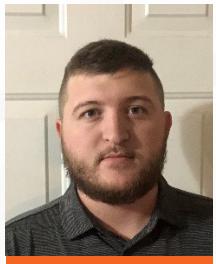

Bailey Sutherlin

The goal of this project is to create a die set that will create a deep drawn cup. To create the die the team is using a three tier die show for the process. The process will be taking place on a modified H-frame press with dual action capability. This die set will serve as an educational tool for MAE students to learn more about manufacturing processes, metal forming and hydraulic presses.

Video of the Project

PROJECT: Active Shooter Door Latch (MET)
TEAM: Garret Brown, Matt Drake, Gage Wells
ADVISOR: Robert Taylor


Garrett Brown

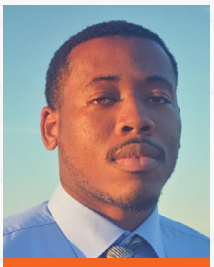

Matt Drake


Gage Wells

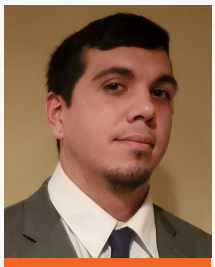
This project title was unanimously chosen by all team members. Each of us are avid hunters, outdoorsmen and firearm enthusiasts. While each of us are well experienced and understand the responsibility and respect that is necessary in relation to handling firearms, there has been so much negative publicity associated with the firearms community due to mass shootings at schools, churches and other public venues. While we fully support the second amendment for the right of security and self-protection, the ability to carry a firearm is not always accepted in some public locations.

Our goal for this project was to create a universal latch mechanism which could withstand the high energy impact of multiple calibers to deter the assailant until law enforcement personnel are able to eliminate the threat. Our product has been carefully designed and budgeted to allow for universal access to schools, churches and other institutions which feel the need for such protection while on a limited budget. We hope to see this product be adopted and available for use should the need arise.

PROJECT: Compact Multistage Composter (MET)
TEAM: Yhan Francis, Chris Henry, Lex Giddings, Zane Winkelman
ADVISOR: Robert Taylor


Yhan Francis


Chris Henry

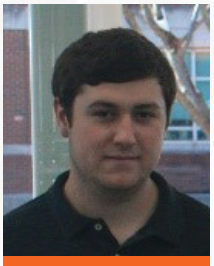

Lex Giddings


Zane Winkelman

Composting is an everyday environmentally healthy task for a home gardener or person of agricultural interest to add into their gardening process. Most composters have a single barrel to which plant material is added for rapid decomposition. This facilitates the production of nutrient dense compost for soil enrichment and plant fertilization.

The senior design team was tasked with designing their own multistage composter to satisfy the household composting needs of the normal citizen. This product was modeled and created with two composting barrels which are attached to a sturdy steel frame. Within the barrels lie tilling shafts with separated tilling teeth to boost aeration and speed the production of the compost. The composter is equipped with a transportation chute as well as crank handles to turn the tilling shafts. These shafts are turned easily by the gears connected to the system. After modeling this product, several tests were run within Ansys and SOLIDWORKS to figure out what materials were needed to satisfy safety requirements for the product. The product has since been modified for prototyping within a budget. Most of the system has been 3D printed with the exception of a few purchased parts and a wooden frame. Physical testing is currently underway.

PROJECT: DNA Sample Card Assembler (MET)
TEAM: Chad Bowman, Shelby Garvey, Bruce Heller
ADVISORS: Jeeyeon Hahn, Robert Taylor


Chad Bowman


Shelby Garvey


Bruce Heller

The largest problem encountered with obtaining a DNA sample is contamination. Biospec Products produces DNA sample cards which make it easier for the average person to take a DNA sample of their plant or crop. Farmers want the best possible crop genetics that are on the market and this ensures a crop is behaving how the farmer desires. In order to monitor the variations, mutations, genetics etc. a DNA sample must be taken and sent to a lab for testing. The sample cards will allow the customer to take a plant sample without contaminating it. Currently, the cards are assembled by hand and/or with crude devices, but Biospec Products need to increase the speed of production so they can meet a yearly quota of 10,000 sample cards per year.

The solution was to develop a device that can complete the necessary actions needed to create a finished sample card, simply called: DNA Card Assembler. The device makes the creases and folds the cards and the second arm staples them together and presses a metal ring onto them. The metal ring is used to line up a vice which will crush the sample against the interior filter paper in the field which allows the sample to be taken.

PROJECT: Landing Gear Dolly (MET)
TEAM: Ibrahim Alsaigh, Sara Shanklin, Blake Williams
ADVISORS: Jeeyeon Hahn, Robert Taylor


Ibrahim Alsaigh

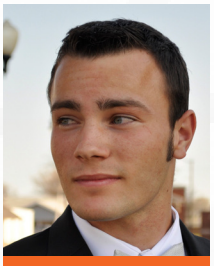

Sara Shanklin


Blake Williams

The Boeing Company has tasked this team to design a new, more efficient aircraft landing gear dolly. Boeing's current design requires an excessive number of personnel to operate, resulting in extended man-hours. The new design will require fewer operational personnel, improved maneuverability over obstacles, and a sharper turning radius.

The improved dolly will be implemented world-wide as a universal tool for transporting aircraft landing gear. When in operation, the dolly will able to raise the landing gear by two feet, load the landing gear, lower, transport, and unload with a minimum number of personnel, while maintaining a safe work environment in accordance to OSHA standards.

PROJECT: Passive Fire Protection in Informal Settlements (MET)
TEAM: Jesse Bachman, Cody Ray, Drayke Thompson
ADVISORS: Virginia Charter, Jeeyeon Hahn, Robert Taylor


Jesse Bachman


Cody Ray


Drayke Thompson

To help solve an unsafe housing problem in South Africa, this team designed a hopper to speed up the construction process. The hopper needed the ability to efficiently fill bags with a soil mixture for building homes. The finished project will be a feasible and light hopper design that can be moved easily and stored in a small area.

The goal of the project was to create a hopper system capable of sifting, mixing, and filling bags full of various earth-based materials. This was done with the end goal of being able to fill bags used for the construction of housing in areas of informal settlement.

PROJECT: Roller Brush Detangler (MET)
TEAM: Zaki Alhashem, Kevin Bruce, Nikita Cash
ADVISOR: Robert Taylor


Zaki Alhashem


Kevin Bruce


Nikita Cash

The idea for this project comes from a complaint made by fellow college students, on how their vacuum brushes were tangled, limiting or outright impairing the function of the vacuum. Many stated how frustrating and inconvenient it can be to correct this problem.

From a combination of anecdotal evidence from frustrated peers when using their vacuum cleaner, and the request for a solution, it was concluded that the failures are due to string, hair and other debris jamming the rotating brush. After using multiple times, the rotating brush in the vacuum causes increased stress on the drive belt.

The purpose of this device is to remove tangled debris on the surface of the brush in order to increase the longevity of the vacuum as well as improving the maintenance experiences that detangling would require.

Project Presentation

PROJECT: SAE Baja Continuously Variable Transmission (MET)
TEAM: Nick Bouckaert, Carson Depew, Camden Rader
ADVISORS: Jeeyeon Hahn, Robert Taylor


Nick Bouckaert


Carson Depew


Camden Rader

The purpose of this project is to design and manufacture a variable speed pulley drive for the OSU SAE Baja Team. The CVT that the Baja team currently uses is heavy, inefficient, costly, and difficult to tune. The Baja Team has requested a cheaper alternative that will reduce weight and grant them the ability to tune for the sake of effeciency, speed, and torque transfer.

PROJECT: Smart Recycling System (MET)
TEAM: Ali Almutawa, Jake Corbin, Tyler Marley
ADVISOR: Robert Taylor


Ali Almutawa


Jake Corbin

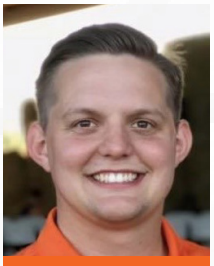

Tyler Marley

The Smart Recycling System is a device that can sense different material and place them in their correct bins. The housing on the exterior will be of average size to suit a business or home.

A person will deposit the bottle into the opening and the sensing process will begin. Once a bottle is deposited into the insertion point, the bottle is taken by conveyor belt and dumped into one of three receptacles (depending on the material of the bottle). The three receptacles will be rotating to the correct placement, determined by sensors. Once the material has been determined then it will be deposited further into its' correct bin. All of the bottles will be presumed empty.

Many countries across the world struggle with citizens not recycling. This causes many materials, which could easily be recycled, to end up in the trash with non-recyclable material. Sorting recyclable materials into seperate bins is a tedious task. Therefore, most recyclable material goes into the trash and into landfills causing environmental damage. The smart recycling system's goal is to make recycling a non-hassle activity. The system will sort various recyclable materials into seperate bins, making recycling easier for the user.

PROJECT: The Overlook Chair (MET)
TEAM: Joe Carrick, Rob Stone, Brandon Zamorano
ADVISOR: Robert Taylor


Joe Carrick


Rob Stone


Brandon Zamorano

During examinations, dental professionals must lean over their patients for prolonged periods with arms extended. This leads to constant lower back pain for many in the industry.

The Overlook Chair's main feature is the chest support, which is designed to provide comfortable frontal support to the user while leaning forward over the patient. Arm support is also provided. The Overlook Chair is also able to be used for general office purposes, which dental workers often must perform in the same space as the examination. This dual purpose eliminates the need for two different chairs in the same small space.

The Overlook Chair is intended to be a low-cost, modestly sized, helpful tool which dental workers will be happy to use.

PROJECT: Large Residential Scale Wind Turbine System (CIVE, MAE)
TEAM: Dakota Brewster, Charles Cooper, Nathan Yolte, Cody Winkle
ADVISORS: Norb Delatte, Deb Mishra, Greg Wilber

Our team is to provide a tower analysis to support a small 15 kW wind turbine. We have also been tasked with providing a foundation design. Key restraints include limiting our site impact so that the turbine could potentially be part of a multi-turbine complex.

PROJECT: Adaptive Kitchen Cabinet (ECE, IEM, MAE)
TEAM: Taylor Boyd, Brooke Burnett, Cameron Esmon, Gary Hall, Zachary Neighbors
ADVISORS: Michael Gard, Chenang Liu, Laura Southard, Robert Taylor


Taylor Boyd


Brooke Burnett


Cameron Esmon


Gary Hall


Zachary Neighbors

The goal of the Adaptive Kitchen Cabinet is to provide a solution for accessible upper storage to users who previously may have been unable to utilize it.

The device has a simple user interface that requires only the press of a switch to move the cabinet from the wall down to the surface level of the countertop below it. The design offers built-in safety features including a pressure plate and door sensors to provide protection for the user, preventing the device from moving when objects are present below it or when the doors are open. The movement is provided by a linear actuator, which is mounted behind the cabinet inside the mechanical harness. This device is capable of holding upwards of one hundred pounds of storage items and can support cabinet widths from twenty-seven to thirty-six inches.

Video of the Project

Project Photos

PROJECT: ADS-B Data and Video Fusion (ECE, MAE)
TEAM: Emilie Jenkins, William Karika, Ethan Vascellaro
ADVISORS: Cole Kelly, Ryan Paul, Laura Southard, Jim West


Emilie Jenkins


William Karika


Ethan vascallaro

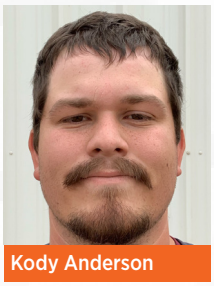
This project is Phase II of a project that began the semester of Fall 2019. The original design team was able to produce a prototype system capable of capturing video and aircraft ADS-B outdata simultaneously.

The goal of Phase II is to improve upon the initial design both in software functionality and hardware capability. The software improvements must take the data streams of the existing prototype and correlate them to create a more complete picture of an aircraft's final approach without the need for an external processor. The hardware improvements must improve the weatherability, durability, portability, and operability compared to the original. The project sponsor, the Federal Aviation Administration (FAA), is interested in using this system to gather information at primarily small airports with airstrips that have difficult terrain or other obstacles surrounding them. By collecting data based on the approaches of aircraft, it will be possible for Air Traffic Control to better inform landing pilots of local obstacles or airport characteristics unique to each airstrip.

Video of the Project

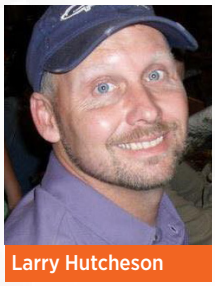
PROJECT: Asfixyators: Autonomous Aircraft Rescue and Firefighting Truck (EET, MET)
TEAM: Mohammed Alfaihan, Kody Anderson, David Chuning, Tim Hardick, Larry Hutcheson, Brandon Kelley, Chance Krumsiek, Beau Malloy, Turner McCoy, Anthony Mica, Joshua Stevens, John Watson, Thomas Zacher
ADVISORS: Jeeyeon Hahn, Avimanyu Sahoo

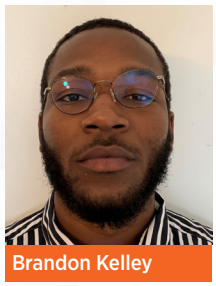

Mohammed Alfaihan


Kody Anderson


David Chuning

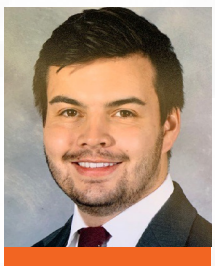

Tim Hardick


Larry Hutcheson


Brandon Kelley


Chance Krumsiek


Beau Malloy


Turner McCoy


Anthony Mica

Joshua Stevens


John Watson


Thomas Zacher

This team will design an Autonomous Aircraft Rescue and Firefighting (AARFF) vehicle, which can navigate through a prescribed ground course autonomously, extinguish a pot fire, and return to the "fire station" while avoiding obstacles. In Spring 2021, the teams will complete building the AARFF truck and participate in Speedfest 2021. The maximum budget limitation for the vehicle is $3000 excluding the cost of provided parts. The vehicle will be electric powered with two batteries (6000 mAh max capacity). The wheel base can be a maximum of 22 inches. The vehicle will carry a fire extinguishing mechanism capable of extinguishing a Jet A fire.

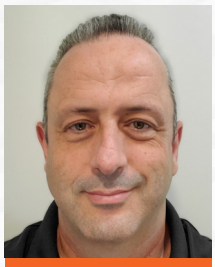
PROJECT: Fuel: Autonomous Aircraft Rescue and Firefighting Vehicle (EET, MET)
TEAM: Mustafa Alfakih, Alejandro Becerra, Coleman Briscoe, Kye Collins, Michael Davidson, Ky Davis, Chris Gosie, Kyle Griffith, Blaine Harris, Aaron Houtchens, Trevor Janda, Zeke Leyba
ADVISORS: Jeeyeon Hahn, Avimanyu Sahoo


Mustafa Alfakih


Alejandro Becerra

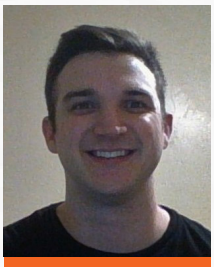

Coleman Briscoe


Kye Collins


Michael Davidson


Ky Davis


Chris Gosie


Blaine Harris


Aaron Houtchens


Trevor Janda

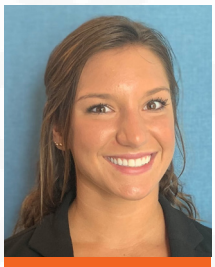

Zeke Leybe

The team will design an Autonomous Aircraft Rescue and Firefighting (AARFF) vehicle, which can navigate through a prescribed ground course autonomously, extinguish a pot fire, and return to the "fire station" while avoiding obstacles. In Spring 2021, the teams will complete building the AARFF truck and participate in Speedfest 2021. The maximum budget limitation for the vehicle is $3000 excluding the cost of provided parts. The vehicle will be electric powered with two batteries (6000 mAh max capacity). The wheel base can be a maximum of 22 inches. The vehicle will carry a fire extinguishing mechanism capable of extinguishing a Jet A fire.

PROJECT: Autonomous Stage Wagon (ECE, MAE)
TEAM: Logan Downs, Jacob McMillen, Allie Stern, Garrett Woodbridge
ADVISORS: Joe Conner, Carl Latino


Logan Downs


Jacob McMillen


Allie Stern


Garrett Woodbridge

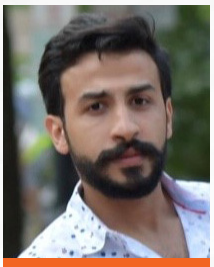
The OSU Theatre Department has requested a device to assist their fluid approach regarding scenes in a production. Currently, sets are designed to serve many roles with little to no additional preparation or changes. Our goal is to create a device that expands their creative capabilities by using the latest technologies. Our vision is to create a 'smart' stage wagon that fits into the dynamic and fluid environment of OSU Theatre's preferred mode of operation.

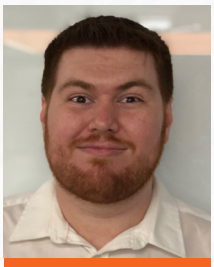
Stage wagons are also known as scenery wagons and are mobile platforms that can be rolled on-and-off the stage during a play. They generally support large 3D prop displays or scenic backgrounds. To change scenery, the curtains may be closed while stagehands roll out the wagons and quickly assemble the new set. Alternatively, theatres may have elaborate and expensive systems permanently built into the stage to assist in changing scenes. Not only are these methods labor and cost-intensive, but they also limit the possibilities for dynamic sets in productions.

To help overcome these limitations and expand the creative potential of our theatre department, we have been tasked with creating an autonomous stage wagon (ASW) that is capable of preprogrammed movements between and throughout scenes.

Video of the Project

PROJECT: Distillation Education Stand (ECE, MAE)
TEAM: Mohanned Alkhazal, Dorian Cathey, Jack McBryde
ADVISORS: Michael Gard, Shelley Potter, Brad Rowland, Laura Southard, Gary Don Thacker


Mohanned Alkhazal


Dorian Cathey


Jack McBryde

The Distillation Education Stand is a large scale laboratory apparatus for the distillation of hydrocarbon chemicals. The assembly includes:

- State of the art sensors for measuring temperature and volume
- Control Valves, Pumps, Flowmeters, and Level Switches
- New Chemical Resistant Tubing and Stainless Steel Pipe
- Industrial Three-Phase Power Setup and Emergency Shutdown
- Standard Reboiler, Distillation Column, and Condenser

The stand has been used for around 61 years. The team has been working to refurbish the stand so it can be used at OSU for many years to come.

Video 1 of the Project

Video 2 of the Project

PROJECT: Electric Guitar Effects Pedal (ECE, MAE, Music Industry)
TEAM: Daniel Rodriguez, Max Sise, Skyler Smith, Draven Thomas, William Tarwater
ADVISORS: James Beckstrom, Chuck Bunting, Mark Perry, Laura Southard


Daniel Rodriguez


Max Sise


Skyler Smith


Draven Thomas


William Tarwater

The key aspects of this project are to create two market-ready effects pedals that incorporate buttons/switches, compared to larger treadle types of pedals that currently dominate the market. We are working to develop a button-testing device to measure life-cycle expectancy of the push-button switches.

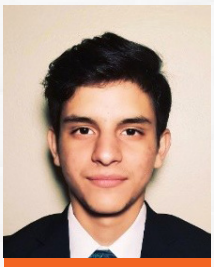
First, our team is finishing the design and prototype of the "Bali Shimmer," a delay/reverb effect with a unique expression control started by last semester's team.

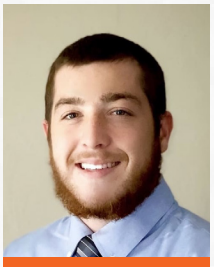
Second, we are starting the design and prototype of a second pedal named the "Scoville Screamer" which is a distortion effects pedal with a display screen depicting a cartoon pepper that grows angrier/rowdier as distortion increases. We are to develop and beta-test both pedals as well as design each so that they are capable of being mass-produced by Keeley Electronics.

Third, our two Mechanical Engineering majors are tasked to develop a button-testing device that will test and measure the life-cycles of the push-button type switches. The main goal for this device is to test the mechanical integrity of the proprietary IR button on the Bali Shimmer pedal and also be adapted to use for all pedals and buttons.

PROJECT: Renewable Energy STEM Education System - 2nd System (MAE)
TEAM: Ibrahim Al-Saggaf, Javier Lopez Armendariz, Logan McEntire, Ryan Nelson
ADVISORS: Jim Beckstrom, Joe Conner, Laura Southard


Ibrahim Al-Saggaf


Javier Lopez Armendariz


Logan McEntire


Ryan Nelson

Our team was given the opportunity to construct a solar and wind power system similar to the small renewable system located in downtown Stillwater.

This system will generate up to 600W of power through renewable and clean energy. Our project is also intended to teach children more about the benefits of renewable energy by uploading weather and power data to a website that can be easily accessed.

In the future we want this system to be easily manufactured and installed at schools across the globe to give students a broader understanding of renewable energy systems. (Click for project video)

PROJECT: Renewable Energy STEM Education System - Education User Interface (RENEWINT)(ECE)
TEAM: John Mark Seward, Kanong Nikki Yang
ADVISORS: James Beckstrom, Joe Conner, Weihua Sheng


John Mark Seward


Kanong Nikki Yang

The goal of this project is to build a low-cost renewable energy education feature that could be used by schools all over the world. It will help students better understand renewable energy, weather, and geography. The systems will be connected to the internet so students, K-12, from all around the planet can retrieve real-time data from any one of the operating weather stations. Each weather station will be powered using self-sustaining renewable energy via a wind turbine and solar panels.

This team's specific area of design is the data acquisition system and website creation. The data acquisition system will collect and transmit data from sensors on-board the weather station. The website will display the information collected in a kid friendly educational way.

Video of the Project

PROJECT: 3D Concrete Printer (ECE, MAE)
TEAM: Weston Allen, Faraz Khan, Myung Kim, Adam O'Connor, Noah Rhinehart, Ryan Smeeton
ADVISORS: Jim Beckstrom, Tyler Ley, Gary Yen


Weston Allen


Faraz Khan


Myung Kim


Adam O'Connor


Noah Rhinehart


Ryan Smeeton

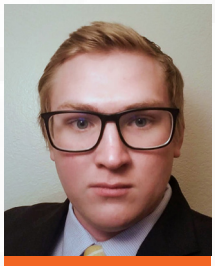
The 3D Concrete Printer will consist of mechanical systems and electrical systems. The mechanical systems include a hopper, nozzle and auger, consolidation plates and a support arm. The hopper will be filled with concrete and the nozzle will connect to the bottom of the hopper. When the auger is activated, concrete will be collected from the hopper and extruded out of the nozzle. At the end of the nozzle, the concrete will pass between a set of two parallel consolidation plates. One plate is supported by the nozzle and the other is supported by the support arm. The support arm will attach to the hopper and reach up and over the region where a wall would be printed, allowing the wall the be printed with rebar reinforcements. All of the above sub-systems will be mounted and moved with a Bobcat skid steer. After a single layer of concrete is printed (for the desired length), the skid steer's forks will raise and print additional layers until the wall is at a desired height.

The electrical system will include the use of string potentiometers and various computer codes in order to collect navigation and positioning data. This data will be processed and used to automate the printing process by telling the skid steer when and where to print. The entire positioning and navigation system will be accessible via a user interface. (Click for project video)

PROJECT: RF-Assisted Wireless Laser Link Alignment System: LINK (ECE, MAE)
TEAM: Zach Atnip, Austin Davis, Patrick Looney, Jordan Paul
ADVISORS: He Bai, Wooyeol Choi, Sabit Ekin, John O'Hara, Ickhyun Song


Zach Atnip


Austin Davis


Patrick Looney


Jordan Paul

Our goal is to develop a proof of concept for a long ranged or deep space communication system that uses radio frequency as a means to align a high speed laser transmitter and receiver.

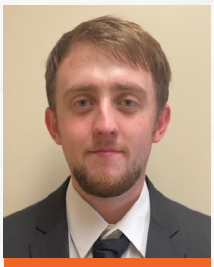
By utilizing this laser communication channel, higher data rates can be achieved when compared to what would be possible transmitting solely over radio frequency. This methodology could be used to transmit between satellites or possibly as a solution to future interplanetary communication.

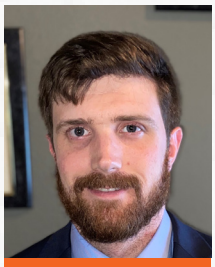
Our proof of concept will be able to demonstrate the ability to align the beam of a laser to a specified receiver at a distance of 10 meters utilizing radio frequency positioning methods.

Video of the Project

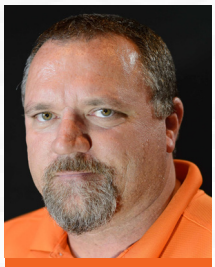
PROJECT: Small Capacity Pump-Boreas Systems | Small Capacity Pump-Ridiculous 6 (MAE, MET)
TEAM: Ryan Crawford, Nathan Fikes, Dylan Glidewell, Matt Hartshorne, Joe Maehs, Ben Manning, Bryant Messerli, Cooper Parsons, Arin Retan, Hank Schulz, Zach Westerman, Ben Worwag
ADVISORS: Christian Bach, Ilchung Park


Ryan Crawford


Nathan Fikes


Dylan Glidewell

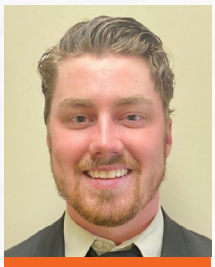

Matt Hartshorne

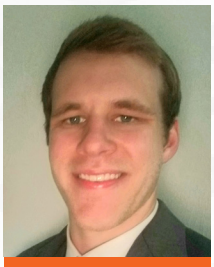

Joe Maehs


Ben Manning


Bryant Messerli


Cooper Parsons


Arin Retan


Hank Schulz

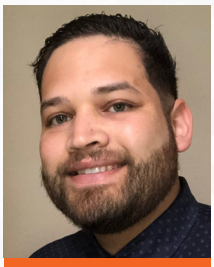

Zach Westerman


Ben Worwag

This project will develop refrigerant pumps to be used for various HVAC&R small scale heat transfer experimental setups. For this capstone design project, our team will design, build, and test a small capacity pump. These pumps will be used in a follow up senior design project that will develop a small capacity refrigerant calorimeter for testing of heat exchanger samples. (Click for project video)

PROJECT: SONOR (Electro-Mechanical-Optical) Surgery Aid (ECE, MAE)
TEAM: Brody Consolino, Steven Coronado, Landon Drebes, Jiyeol Meang
ADVISORS: Jerome Hausselle, Daqing Piao


Brody Consolino


Steven Coronado


Landon Drebes


Jiyeol Meang

Laparoscopic surgery, pure or robot assisted, is a minimally invasive procedure that is becoming increasingly popular for surgical management of solid organ conditions such as cancers in the abdominal cavity, gastrointestinal procedures and hernia surgeries. A common problem with the procedures is that tactile feedback and stereotactic reference is limited due to the small incisions that are made to the affected areas. In some cases, procedures that were initially intended to be minimally invasive, convert to open surgery due to these complications.

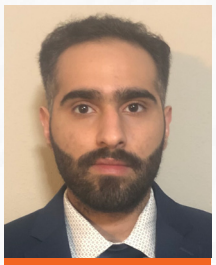
The objective of this project is to develop a device that can detect anatomic structures underlying the tissue plane of dissection intraoperatively. The SONAR (Small Optical Non-destructive Operating Risk) detection device is to be used in the context of laparascopic surgery to find danger zones such as arteries/veins, ureter, bowel, bile duct and other tubular structures beneath the skin. The self-powered device will need to implement a high-powered, light-emitting diode and photodiode as a sensor to enable the ability to process and transmit live data wirelessly.

Surgeons need a way to see what is beneath the surface of the skin to reduce iatrogenic injuries. We designed a device that will allow doctors to visualize the danger zone structures and increase the adoption of minimally invasive surgery. A paper by Amal Chatuvedi, published to the National Center for Biotechnology Information, explained the process of how devices using near-infrared LED and a linear image sensor can detect blood vessels embedded within the tissue. Our SONAR detection device will use the principle of a near-infrared LED and a photodiode as the sensor.

Video of the Project **Project Presentation**

PROJECT: Stillwater Community Renewable Energy Education System (SCRE) (ECE, MAE)
TEAM: Sara Aldawood, Hussain Al-Hashim, Zach Rayner, Ethan Renard
ADVISORS: James Beckstrom, Ekneligoda Nishantha, Laura Southard


Sara Aldawood


Hussain Al-Hashim


Zach Rayner


Ethan Renard

The project (SCRE) was created to educate the public about renewable energy being used to power the equipment around the wind turbine enclosure in downtown Stillwater. Information about the enclosure will be presented on TV monitors, which are powered by solar panels and wind turbines.

Video of the Project

PROJECT: Tube End Conditioning Machine (ECE, MAE)
TEAM: Joshua Cole, Tiger Jacobs, Nathan Lay, Ben Lueken
ADVISORS: Gouliang Fang, Kyle Ingram, Robert Taylor


Joshua Cole


Tiger Jacobs


Nathan Lay


Ben Lueken

Webco Industries manufactures a small diameter radiator tube through several linear processes including cold working, heating, welding and cutting. Webco has asked us to develop a prototype machine that accepts the radiator tubes after the last process (cutting) and automatically reconditions the ends of the tubes and inspects them.

The final product must be a tube end that meets several size constraints with a tolerance as small as 0.001". If any tube in the process does not meet these constraints, it is to be rejected by the inspection process. This reconditioning and inspection process must be completed in two seconds or less per tube.

PROJECT: Turbo-Electric STOL Fixed-Wing UAV (ECE, MAE)
TEAM: Joshua Drake, Joshua Ivey, Eric McKinney, Howard Sinor
ADVISORS: Jonathan Burgess, Hamid Nazaripouya, Kurt Rouser


Joshua Drake


Joshua Ivey


Eric McKinney


Howard Sinor

Turboelectric aircraft is a new and developing market. Oklahoma State University has taken the challenge of designing, building, and testing the capabilities of such systems.

Given a 7 kW gas-powered turbine coupled to a generator and a Mugin 4500mm frame, the goal of this project was to implement a battery circuit in addition to the turbine in order to take advantage of gas-burning engines and batteries as well as adding two new propellers to the leading edge of the aircraft. Our project added a battery and a battery management system to the electrical system that can supplement the turbine when extra power is needed, take over for the turbine when the pilot needs, and recharge the battery safely. The motors were mounted using 3D printed Carbon Fiber infused materials that fit seamlessly into the aircraft profile to reduce drag.

Video of the Project

PROJECT: Wind Turbine Blade Repurposing Team 1 (CIVE, MAE)
TEAM: Cody James, Kyle Kasper-Lewis (not pictured), Armando Perez, Jordan Scott (not pictured), Marlo Zoller (not pictured)
ADVISORS: Jim Beckstrom, Mohamed Soliman


Cody James


Armando Perez

Blade Repurposing aimed at finding commercially viable use. Blades are FRP, 100 ft. long and weigh 6 tons.

PROJECT: Wind Turbine Blade Repurposing Team 2 (ARCH, IEM, MAE)
TEAM: Brooks Hansen, Alexis Severson, Hannah Walters, Kelsey Wagner, Mandy White
ADVISORS: Jim Beckstrom, Jeanne Homer, Cole Kelly, Bryce Randall, Bing Yao


Brooks Hansen


Kelsey Wagner


Hannah Walters


Mandy White

Thousands of blades are currently being thrown into landfills, as it is the easiest way to dispose of them. Although recycling methods exist, they are not widely excepted or commercially viable. Our team's task is to produce at least one commercially viable product using a part of or all of a commercial wind turbine blade that has been taken out of service. (Click for project video)

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