Students in the University of Georgia’s College of Engineering put their engineering, teamwork, and communications skills to work in our challenging capstone design course. The year-long course connects teams of senior-level students with business, industry, non-profit, and community partners to find solutions to real-world engineering challenges.

Each spring, capstone teams present their projects to their clients, faculty and the community during our Capstone Showcase. This year’s Showcase highlights the work of 108 interdisciplinary teams including students from all eight undergraduate programs in the College of Engineering. The teams will highlight their work in categories including community impact, innovative computerized system and software design, creative machine design, manufactured system and process design, medical device and biological process design, and sustainable design.
COMMUNITY IMPACT

The Community Impact category challenges teams to develop designs that addresses critical community needs related to infrastructure development and planning, health, and quality of life, resulting in community impact that aids in economic development, safety, and/or overall public welfare.

BOOTH 1
CYANOSENSE 2.0
CLIENT: Cyanosense
SUPERVISOR: Peter Kner, Ph.D.
PROJECT TEAM: Hussein Al-khatib, Jonathan Crowell, Maggie Kurlde, Keshav Raviprakash, Mark Seferian
PROJECT DESCRIPTION
CyanoHABs (known as Cyanobacterial Harmful Algal Blooms) are a phenomenon in which there is overgrowth of algae in a body of water. These CyanoHABs are known to cause health issues in people and wildlife. The objective of Cyanosense 2.0 is to redesign/improve the original system to detect CyanoHABs through optical methods and send the data back to a database where it can be examined.

BOOTH 2
BOYS AND GIRLS CLUB OF MOULTRIE
CLIENT: Archway Partnership
SUPERVISOR: Mi Geum Chorzepa, Ph.D.
PROJECT TEAM: Alex Gallegos, Carla Troll Chavesta, Dunrico Williams
PROJECT DESCRIPTION
The project team was tasked by the Boys & Girls Club of Moultrie to conduct a structural analysis and to provide recommendations on either repair or replacement options on an adjoining building on the south side of the existing Boys & Girls Club.

BOOTH 3
HEARD COUNTY, GA: COMMUNITY TECHNICAL ASSISTANCE FOR DISASTER PREPAREDNESS
CLIENT: US Environmental Protection Agency
SUPERVISOR: Matthew Bilskie, Ph.D.
PROJECT TEAM: Rachel Johnson, Declan McNulty, Benjamin Rockaway
PROJECT DESCRIPTION
RJM Engineering Inc. is designing a water pumping system for Heard County to extract water from a nearby quarry in case of an emergency. This project strives to improve the safety and disaster preparedness of the county.

BOOTH 4
NESBIT FERRY CORRIDOR IMPROVEMENT
CLIENT: Jacobs & City of Johns Creek
SUPERVISOR: Jidong Yang, Ph.D.
PROJECT TEAM: Hunter Rutledge, H. M. Sakib, Zachary Schamos
PROJECT DESCRIPTION
The project team has been tasked with improving traffic flow and safety along the roughly two-mile Nesbit Ferry Road in Johns Creek, GA. Improvements include intersection redesigns, general widening of the road along the corridor, pedestrian improvements, and beautification.

BOOTH 5
TOWNHOUSE COMPLEX STRUCTURAL DESIGN
CLIENT: Armentrout Matheny Thurmond, PC
SUPERVISOR: Mi Geum Chorzepa, Ph.D.
PROJECT TEAM: Elaine Bergeron, Jillian Fezer, Eric Fuqua, Ashley Moore
PROJECT DESCRIPTION
As Athens is continually growing, the need for more housing continues to increase. Our design team was tasked to take a set of schematic architectural drawings for a townhouse complex and create a full set of structural plans.

BOOTH 6
FOOD BANK OF NORTHEAST GEORGIA SITE DESIGN
CLIENT: Armentrout Matheny Thurmond, PC
SUPERVISOR: Sonny Kim, Ph.D.
PROJECT TEAM: Gregory Butler, Rohit Gehani, Matthew McCravy
PROJECT DESCRIPTION
The Food Bank of Northeast Georgia in Athens has outgrown its current facility and is seeking to expand to a new location. Our team has created a full set of civil site plans for the new location, designed for the fulfillment of the food bank’s growing needs.

BOOTH 7
REIMAGINING HARTWELL'S EAST JOHNSON STREET
CLIENT: Archway Partnership
SUPERVISOR: Stephan Durham, Ph.D.
PROJECT TEAM: Jonathan Effert, Evan Lundrigan, Ethan Oneil
PROJECT DESCRIPTION
The city of Hartwell is currently lacking pedestrian access, stormwater management methods, and effective traffic flow along its East Johnson Street. This project aims to improve this road and Hartwell’s accessibility in general through the installation of sidewalks and other roadway modifications.
BOOTH 8
CITY OF GRIFFIN FLOOD STUDY
CLIENT: Archway Partnership
SUPERVISOR: Matthew Bilskie, Ph.D.
PROJECT TEAM: Anna Coble, Andrew Cothran, Asha Noorullah
PROJECT DESCRIPTION
The City of Griffin is experiencing repeated flooding issues in a residential area along Potato Creek. The goal of this project is to mitigate the effects of the flooding through a culvert redesign, and channel alteration. A comprehensive flood study with a HEC-RAS model will be utilized to model changes in the watershed.

BOOTH 9
SPALDING COUNTY HIGH ACTION PARK
CLIENT: Archway Partnership
SUPERVISOR: Stephan Durham, Ph.D.
PROJECT TEAM: Natalie Branand, Hannah Center, Emily Woods
PROJECT DESCRIPTION
The objective of our project is to convert a decommissioned sewer treatment facility into a community park. The park will feature high action activity spaces including an all-wheel pump track, a nerf gun and paintball arena, and an amphitheater. A full site design with trail connections, food truck parking, green space development, and amenities will be presented.

BOOTH 10
HARTWELL CITY HALL PARKING LOT AND POCKET PARK DESIGN
CLIENT: Archway Partnership
SUPERVISOR: Stephan Durham, Ph.D.
PROJECT TEAM: Julia Hauser, William Milling, Kerry Smathers
PROJECT DESCRIPTION
The City of Hartwell has chosen JWK Engineering to design a new parking lot and pocket park for City Hall. The goal is to maximize the space of the parcel to include an accessible parking lot featuring two electric vehicle chargers as well as a splash pad, playground, and picnic tables in the park area. This space is designed for locals and tourists to enjoy the outdoors while having easy access to downtown Hartwell.

BOOTH 11
SR 60 AT I-85: NEW INTERCHANGE
CLIENT: Georgia Department of Transportation
SUPERVISOR: Jidong Yang, Ph.D.
PROJECT TEAM: Jacob Hilpp, Clay Wells, Carson Wright
PROJECT DESCRIPTION
Jackson County has expressed a desire for a new interchange at the intersection of Interstate-85 and State Route 60 that will help reduce congestion and spur economic growth in the community. Our team’s goal is to analyze nearby traffic needs and submit a drawing set of a complete design of the new interchange.

BOOTH 12
MAKING SR 10 LOOP A LOOP
CLIENT: Georgia Department of Transportation
SUPERVISOR: Jidong Yang, Ph.D.
PROJECT TEAM: Abigail Bishop, Hannah Fordham, Daniel Kim
PROJECT DESCRIPTION
Our project team will update the merging lane on the SR 10 Loop near Old Hull Road and US 29 in Athens, GA. The design intends to reduce crash rates at this interchange and make the SR 10 Loop safer for the Athens community.

BOOTH 13
EDGE ROAD DISTRIBUTION CENTER
CLIENT: Eberly & Associates
SUPERVISOR: Sonny Kim, Ph.D.
PROJECT TEAM: John Druckenmiller, Steven Seiler, Kush Vyas
PROJECT DESCRIPTION
Our project team designed a set of civil construction documents for a 350,000 square-foot industrial warehouse located in Villa Rica, Georgia for Eberly & Associates. Unique challenges our team faced included rerouting a sewer line and optimizing the warehouse on an unconventionally shaped site.

BOOTH 14
LITTLE RIVER WATER TRAIL BOAT RAMP: ACCESS POINT 2
CLIENT: Archway Partnership: Thomson-McDuffie
SUPERVISOR: Stephan Durham, Ph.D.
PROJECT TEAM: Palmer Henderson, Lillian Wolfe, Andrew Woods
PROJECT DESCRIPTION
The objective of this project is to develop the landing and surrounding area of an existing boat ramp in McDuffie County. This development aims to improve the parking area and recreational amenities to increase recreational tourism to the area.

BOOTH 15
REPLACEMENT BRIDGE PROJECT
CLIENT: Michael Baker International
SUPERVISOR: Mi Geum Chorzepa, Ph.D.
PROJECT TEAM: Zackary Hall, Peter Lu, Alan Ramirez
PROJECT DESCRIPTION
The purpose of the project will be to design a replacement structure using LRFD and GDOT standards, as well as accompanying roadway and drainage improvements following AASHTO and GDOT guidelines. The project team will be provided topography files in MicroStation and InRoads format, along with access to GDOT standards and processes.
**BOOTH 16**
**LIVE STREAM PIPE REPLACEMENT: DESIGN OF CULVERT UPGRADES**

**CLIENT:** Athens-Clarke County Transportation & Public Works  
**SUPERVISOR:** Stephan Durham, Ph.D.  
**PROJECT TEAM:** Christopher Giles, Jack Habib, Leandra Spears  

**PROJECT DESCRIPTION**
Our project team is designing replacement culverts for two project locations in Athens GA. The existing culverts have been inspected and determined to be in need of replacement due to failing conditions. Both culverts have been redesigned to properly convey the 100-year storm discharge and reduce erosion effects downstream.

**BOOTH 17**
**PULASKI COUNTY BOARD OF EDUCATION COMMUNITY EVENT CENTER**

**CLIENT:** Archway Partnership: Pulaski County  
**SUPERVISOR:** Mi Geum Chorzepa, Ph.D.  
**PROJECT TEAM:** Alexander Cook, Jason Dickens, Arthur Taran  

**PROJECT DESCRIPTION**
The project team is designing a renovation for the Jackson House, a 1990’s 5 bedroom home adjacent to Hawkinsville’s new K-12 school. The house will be turned into a community events space with an updated interior, expanded restrooms, and new parking. Additionally, an open pavilion and dock will be incorporated to provide useable events spaces adjacent to the pond on the property.

**BOOTH 18**
**WEBB GIN HOUSE ROAD AT SR 20**

**CLIENT:** KCI Technologies, Inc.  
**SUPERVISOR:** Stephan Durham, Ph.D.  
**PROJECT TEAM:** Dominic Mastronardi, William Powell, Alec Tidmore  

**PROJECT DESCRIPTION**
For this capstone project, KCI Technologies has brought forth the opportunity to redesign the intersection between Webb Gin House Road and State Route 20. Alec Tidmore, Cody Powell, and Dominic Mastronardi are the three UGA civil engineering students who will be in charge of providing the plans for the redesign of this intersection to improve the flow of traffic in the area for the City of Lawrenceville.

**BOOTH 19**
**BURKE COUNTY HIGHWAY 24 PARK**

**CLIENT:** Archway Partnership: Burke County  
**SUPERVISOR:** Stephan Durham, Ph.D.  
**PROJECT TEAM:** Collin Ebenezer, Jackson Popkin, Aaron Whittle  

**PROJECT DESCRIPTION**
Our capstone team designed an 80-acre “passive” park for the Burke County Community. We provided a full design report that strived to take advantage of the land’s natural features and beauty. To accomplish this, our team included a disc golf course, amphitheater, walking paths, and picnic pavilions in our design.

**BOOTH 20**
**FIRST BAPTIST CHURCH OF HAWKINSVILLE: NEW PRESCHOOL DESIGN**

**CLIENT:** Archway Partnership: Pulaski County  
**SUPERVISOR:** Stephan Durham, Ph.D.  
**PROJECT TEAM:** Elena Matarazzo, Jacob McFadden, Emily Sigurdardottir  

**PROJECT DESCRIPTION**
Hawkinsville First Baptist Church has a preschool that has outgrown its existing structure. Our team has worked on a new layout as well as site development for the church that will better fit the needs of the community and support larger enrollment classes.

**BOOTH 21**
**LOW-COST WATER PRESSURE SENSOR**

**CLIENT:** University of Georgia College of Engineering  
**SUPERVISOR:** Peter Kner, Ph.D.  
**PROJECT TEAM:** Noah Samples, Hunter Savage, Elkanah Taye  

**PROJECT DESCRIPTION**
This project aims to design an inexpensive sensor system that monitors the water pressure in salt marshes and grants the ability to view data remotely. The system is designed to aid researchers in providing coastal Georgia communities with the resources needed to implement effective salt marsh oversight. With these resources, the communities can take action to circumvent the effects of flooding in their area.

**BOOTH 22**
**WOODLAND BROOK COMMUNITY AREA BEAUTIFICATION**

**CLIENT:** Woodland Brook HOA  
**SUPERVISOR:** Stephan Durham, Ph.D.  
**PROJECT TEAM:** Matthew Mularski, Nina Odekhiran, Dawson Timmons  

**PROJECT DESCRIPTION**
This project involves developing an empty lot for a homeowners association in Gwinnett County to a usable space for the community to utilize. The additions include a gazebo, a basketball and tennis court combo, and playground equipment. Additionally, a solar study has been conducted on the neighboring club house to see if solar panels could be used in the neighborhood.

**BOOTH 23**
**ROUNDABOUT DESIGN: STATE ROUTE 20 AT WEST HIGHTOWER ROAD**

**CLIENT:** AECOM  
**SUPERVISOR:** Jidong Yang, Ph.D.  
**PROJECT TEAM:** Kevin Albi, Madison Carroll, Carter Stacy  

**PROJECT DESCRIPTION**
Our project team was assigned to develop a design alternative that improves the level of safety and level of service of a 5-legged intersection located in Rockdale County. The determined design alternative for this intersection is a Roundabout.
BOOTH 24
COMMUNITY GARDENS STREAMBANK RESTORATION
CLIENT: City of Doraville
SUPERVISOR: Stephan Durham, Ph.D.
PROJECT TEAM: William Herring, Rylee Horne, Patrick Wahl
PROJECT DESCRIPTION
The City of Doraville has created a project surrounding one of their local community gardens that has experienced severe erosion and a general takeover by invasive species. The basis of the project is to restore the streambank, and prevent and stall further erosion to the area while avoiding intrusion of the community garden itself. The goal is to reestablish the integrity of the environment and maintain community inclusion through increased safety, education, and stability.

BOOTH 25
RICHMOND ROW RESIDENTIAL DEVELOPMENT
CLIENT: Thomas & Hutton
SUPERVISOR: Stephan Durham, Ph.D.
PROJECT TEAM: Benjamin McCoy, Sydney Mehnert, Isabella Morgano
PROJECT DESCRIPTION
The objective of this project is to develop a site design for a residential complex in Gwinnett County that features townhomes and apartments. Our team worked to create an attractive, yet affordable community in the growing population of Suwanee, GA.

BOOTH 26
BENTON TRACT TOWNHOMES/PARK
CLIENT: Thomas & Hutton
SUPERVISOR: Stephan Durham, Ph.D.
PROJECT TEAM: Olivia Ellington, Tatiana Morales, Courtney Wheeler
PROJECT DESCRIPTION
Pooler, GA has recently been experiencing an influx of new residents. Thomas & Hutton recruited the Capstone Design team to design a new residential area to be connected to the existing Tanger Outlets. The objective of this project is to provide site development plans for the Benton Tract Townhomes and Park.

BOOTH 27
AIRPORT PARKING ENHANCEMENT PROJECT
CLIENT: Pond & Company
SUPERVISOR: Stephan Durham, Ph.D.
PROJECT TEAM: Jackson Bryan, Nicholas Howcumfu, Liam Sullivan, Brittany Woodard
PROJECT DESCRIPTION
The objective of this project is to successfully design a new 1350 space employee and customer overflow parking lot at the Jacksonville International Airport by replacing an existing gravel overflow lot with a paved surface. The team has been tasked with designing the layout, grading, stormwater control, a detention pond, and accounting for effective car and bus routes.

BOOTH 28
LANDFILL GAS TO RENEWABLE NATURAL GAS FACILITY UPGRADE
CLIENT: Southern Company
SUPERVISOR: Eliza Banu, Ph.D.
PROJECT TEAM: Deemah Alamoudi, Diego Alarcon Verlezza, Audrey Li, Alexander Mesa, Nathan Stein
PROJECT DESCRIPTION
Developing the necessary design packages (Process Flow Diagram, P&ID’s, site development) to take an existing landfill gas to electricity generation facility and convert it to a Renewable Natural Gas facility. The new facility will be connected to the Southern Company Gas distribution network throughout the state of Georgia.

BOOTH 29
COLLISION DETECTIVES
CLIENT: University of Georgia Innovation District
SUPERVISOR: Kevin Wu
PROJECT TEAM: James Argo, Ammar Aurangzeb, Matthew Ely, Collins Rakowski
PROJECT DESCRIPTION
The Collision Detectives project aims to revolutionize the traffic control industry by utilizing cameras that predict traffic collisions before they happen. By employing Dr. Jidong Yang’s patented algorithm to determine object trajectory, this application can be used to improve road safety by proactively restructuring roadways from data collected by the video analysis performed on the device.
**CREATIVE MACHINE DESIGN**

The Creative Machine Design category challenges teams to design innovative machines or improvements of an existing mechanical device or system by identifying materials, describing machine characteristics (mechanical and/or electrical), testing and evaluating, and determining an appropriate manufacturing process for fabrication of the components or the entire machine.

**BOOTH 64**
**KUBOTA: AUTOMATIC GUIDED VEHICLE EXTENDED OPERATING TIME**

**CLIENT:** Kubota  
**SUPERVISOR:** Chris Herring, Ph.D.  
**PROJECT TEAM:** Kelvin Meregildo-Varona, Jason Moran, Anthony Petti

**PROJECT DESCRIPTION**
Kubota Industrial Equipment utilizes many Automatic Guided Vehicles (AGV’s) to move heavy materials around assembly warehouses. Our project aims to greatly increase the operating time of these AGV’s in order to improve productivity at KIE. Our design will further act as a prototype for a solution that may be mass-implemented at a future date.

**BOOTH 65**
**HYDRAULIC ENERGY RECOVERY SYSTEM FOR A SCOOTER**

**CLIENT:** University of Georgia College of Engineering  
**SUPERVISOR:** Ben Thomas, Ph.D.  
**PROJECT TEAM:** Adam Brooks, Perry Hamlin, Maxwell Morlan, Kevin Rappeal, Zachary Stadler

**PROJECT DESCRIPTION**
The objective of this project is to provide a visual learning tool for Dr. Thomas’ Hydraulics class. This will be done by designing and building a hydraulic system, specifically with an accumulator, to capture energy when braking an electric scooter. This energy will then be used to propel the scooter.

**BOOTH 66**
**DESIGN OF A LOW-COST DOG HOUSE USING RECYCLED MATERIALS**

**CLIENT:** University of Georgia College of Engineering  
**SUPERVISOR:** Ben Thomas, Ph.D.  
**PROJECT TEAM:** Sean Berry, Opurbo Biswas, Hannah Chaffee, Ian McMillan, Chase Rogers

**PROJECT DESCRIPTION**
Our project team is tasked with utilizing recycled and repurposed materials to create an affordable, modular dog house. This project is intended to showcase the capabilities of recycled materials in panel and structure construction.

**BOOTH 67**
**VIDEO IMAGING CHAIR REDESIGN**

**CLIENT:** Graham-Field  
**SUPERVISOR:** Ben Thomas, Ph.D.  
**PROJECT TEAM:** John Bare, David Pendergrast, Joshua Stinson, Ansley Tucker

**PROJECT DESCRIPTION**
The Hausted Video Imaging Chair (VIC) is designed specifically for modified barium swallow studies and AP (anteroposterior) and lateral imaging and functions as a procedural chair for diagnosis and treatment. This procedural chair has not had any design modifications since its inception, so we are modernizing the unit to include powered operation, rotation of the seat, removable arm rails, and a fully radiolucent back.

**BOOTH 68**
**AUTOMATED POLYETHYLENE FLANGE MACHINING TABLE**

**CLIENT:** Poly Tech Industries, Inc.  
**SUPERVISOR:** Kun Yao, Ph.D.  
**PROJECT TEAM:** Garrett McCullough, Joel Milford, Sameer Mohammed, John Nelson, Joseph Olivares

**PROJECT DESCRIPTION**
Our project team is updating an inoperative flange machining table for Poly Tech Industries. We are updating the electronics to reduce the amount of human interaction required to run the machine, and we are enhancing the structural integrity of the table to make our tolerances tighter.

**BOOTH 69**
**DRONE NET RETRACTION SYSTEM**

**CLIENT:** University of Georgia College of Engineering  
**SUPERVISOR:** Adam Wineland, Ph.D.  
**PROJECT TEAM:** Trent Dvorsky, Bryan Evarts, Matthew Franks, Benjamin Hall

**PROJECT DESCRIPTION**
Our team is designing a net system to protect students and equipment in the innovation factory from drones being flown in the room. Because of the lack of any protection system currently, drones must be flown outdoors. Our system will enable indoor drone flights.

**BOOTH 70**
**INCREASE PRODUCTION CAPACITY ON CR2 REWINDER AND ROLL HANDLING PLATFORM**

**CLIENT:** Rayonier Advanced Materials  
**SUPERVISOR:** Ben Wagner, Ph.D.  
**PROJECT TEAM:** Stone Crook, Corey Farber, Mohamad Ibrahim

**PROJECT DESCRIPTION**
In order to increase the production of their CR2 rewinder Rayonier has tasked us with automating the core taping. We have been working alongside an original equipment manufacturer(OEM) to develop a concept design for a device to automatically apply tape to paper cores and reduce the need for manual labor.
BOOTH 71
NASA PSYCHE: FUTURE POWER SOLUTIONS FOR EXPLORING HYPOTHESIZED SURFACES
CLIENT: NASA, Arizona State University
SUPERVISOR: Jorge Rodriguez, Ph.D.
PROJECT TEAM: Saaketh Bukka, Christopher Protzman, William Scruggs, Saggi Tal
PROJECT DESCRIPTION
The objective of this project is to design a creative way to generate power on asteroid 16 Psyche. Current, conventional methods to generate power such as nuclear or solar are not great methods in the context of Psyche due to the unique constraints of deep space. We plan on accomplishing our goal by using a stirling engine.

BOOTH 72
NASA PSYCHE: ROBOTIC EXPLORER FOR HYPOTHESIZED SURFACES
CLIENT: NASA, Arizona State University
SUPERVISOR: Beshoy Morkos, Ph.D.
PROJECT TEAM: Jacob Cotton, Pandora Paterson, William Snapp
PROJECT DESCRIPTION
Our team has been tasked by the NASA Psyche team from ASU to construct a robotic navigator for the surface of Psyche, an asteroid in the asteroid belt that is believed to be a former planetary core. This design must be capable of navigating efficiently in low-gravity, steep, uneven terrain without being stranded or stuck.

BOOTH 73
NASA PSYCHE: SIMPLE ACQUISITION FROM HYPOTHESIZED SURFACES
CLIENT: NASA, Arizona State University
SUPERVISOR: Beshoy Morkos, Ph.D.
PROJECT TEAM: Benjamin Burnett, Alexander Partin, Peijun Wu
PROJECT DESCRIPTION
The NASA Psyche project is a theoretical project planning how to land on the Psyche asteroid and collect samples of precious metal found on the surface. The overall goal of the project is to land on Psyche, drive a rover across the surface, collect samples, and propose how we can bring them back to Earth. Our main goal is to propose possible methods could be used to collect samples from the surface.

BOOTH 74
INFOREST UAV
CLIENT: University of Georgia Precision Forestry
SUPERVISOR: Jorge Rodriguez, Ph.D.
PROJECT TEAM: Hunter Defore, Jacob Hopkins, Nipun Patel, Stephen Rogers, Paul Stanley
PROJECT DESCRIPTION
The purpose of this project is to design a UAV that will be able to maneuver under the forest canopy undisturbed from foliage to collect data regarding forest inventory and health. This will ultimately reduce required timber cruising time and allow for greater land coverage.

BOOTH 75
DESIGN, BUILD AND FLY FOR AIAA COMPETITION: STRUCTURE
CLIENT: University of Georgia College of Engineering
SUPERVISOR: Wayne Johnson, Ph.D.
PROJECT TEAM: Jack Dufresne, Lucy McCance, Dulcea Summers
PROJECT DESCRIPTION
The 2023 AIAA mission is to design, build and test an aircraft to execute electronic warfare (EW) missions. Flight missions will include staging of the aircraft, surveillance, and jamming. The structure team will focus on designing and building a structurally sound airframe capable of meeting the mission requirements.

BOOTH 76
DESIGN, BUILD AND FLY FOR AIAA COMPETITION: PROPULSION AND CONTROL
CLIENT: University of Georgia College of Engineering
SUPERVISOR: Wayne Johnson, Ph.D.
PROJECT TEAM: Cole Haney, Samuel Stewart, Oswaldo Taborda, Jenna Williamson
PROJECT DESCRIPTION
The AIAA DBF Propulsion & Control team is designing, testing, and integrating the propulsion and avionics, as well as developing stability and control characteristics, for a remote control (RC) aircraft that is optimized for the 2022-2023 AIAA Design/Build/Fly competition.

BOOTH 77
DESIGN, BUILD AND FLY FOR AIAA COMPETITION: AERODYNAMICS AND PERFORMANCE
CLIENT: University of Georgia College of Engineering
SUPERVISOR: Wayne Johnson, Ph.D.
PROJECT TEAM: Benjamin Harris, Jeffrey McCool, Karan Shah, Margaret Voss
PROJECT DESCRIPTION
The AIAA team’s objective this year is to design, fabricate, and demonstrate a functional electronic warfare aircraft that can carry an electronic payload, fly with a jamming antenna at the tip of one wing, and compete in the American Institution of Aeronautics and Astronautics’ (AIAA) competition this semester in Tucson, Arizona. As the Aerodynamics & Performance sub-team, our focus is to ensure the aircraft has the most efficient and functional flight possible based on its build and design.

BOOTH 78
LEAF CLIPPER FOR UNMANNED AERIAL VEHICLE (UAV)
CLIENT: University of Georgia Precision Forestry
SUPERVISOR: Jorge Rodriguez, Ph.D.
PROJECT TEAM: Zachary Brennan, Michael Caraway, Kyler Mitchell
PROJECT DESCRIPTION
Our client is a UGA professor conducting research in the Forestry Department. The goal of this project is to design a device for the UGA Forestry Department to cut and collect samples of pine trees utilizing a DJI M300 RTK drone. This device would be used to assist in the verification of data collected by a separate drone that takes spectral scans of pine trees.
BOOTH 100
FORMULA SAE ICE: BODY DESIGN
CLIENT: UGA Motorsports, University of Georgia College of Engineering
SUPERVISOR: Roger Hilten, Ph.D.
PROJECT TEAM: Alex Calvert, Noah Lamb, Anthony Muralles
PROJECT DESCRIPTION
The objective of our project is to design a body for the 2023 Formula SAE race car. Our primary focus is the design and manufacturing of the nose cone of the vehicle while using innovative methods to cover the remainder of the vehicle. We intend on using ceconite fabric (commonly aircraft use) to cover chassis components that need to be protected and carbon fiber for the nose cone. It will ultimately be wrapped in red and white vinyl showcasing our sponsors and the University of Georgia logo.

BOOTH 102
FORMULA SAE ICE: POWERTRAIN TEAM
CLIENT: UGA Motorsports, University of Georgia College of Engineering
SUPERVISOR: Roger Hilten, Ph.D.
PROJECT TEAM: David Colon, Michael McArdle, Rebecca Nolton, Smaran Ranjit
PROJECT DESCRIPTION
Intake: The intake system is responsible for delivering oxygen, which is necessary for combustion in the engine.

Exhaust: The system of components which direct flow of exhaust gas from the engine exhaust port to the atmosphere.

Cooling: The system in which heat is removed from the powertrain.

Final Drive: The system that increases torque through gear reduction or changes the direction of power flow.

BOOTH 103
FORMULA SAE ICE: SUSPENSION TEAM
CLIENT: UGA Motorsports, University of Georgia College of Engineering
SUPERVISOR: Roger Hilten, Ph.D.
PROJECT TEAM: Trevor Cook, Brandon Molina, Jarod Riegel, Alan Tran
PROJECT DESCRIPTION
The Formula SAE Suspension team designs and implements a spring and damper system for the 2023 competition vehicle. This team designs, fabricates, and selects parts and components that will provide the car optimum control. The team will focus on designing vehicle suspension geometry, steering and braking while complying to Formula SAE rules.

BOOTH 104
LITHIUM-ION BATTERY FOIL SCRAP DISPOSAL
CLIENT: SK Battery America
SUPERVISOR: Sidney Thompson, Ph.D.
PROJECT TEAM: Colton Anderson, Nicholas Chen, Michael Chong, Connor McDaniel, Samuel Snyder, Taike Tolbert
PROJECT DESCRIPTION
The goal of this project is to redesign the scrap foil disposal method at SK Battery. In an effort to limit machine downtime and increase operator safety, a vacuum based scrap foil transfer method will be designed to eliminate strenuous lifting and reduce the required number of operators for the process.

Click each project to view the abstract.
INNOVATIVE COMPUTERIZED SYSTEM OR SOFTWARE DESIGN

The Innovative Computerized System or Software Design category challenges teams to develop and/or integrate software into the operation, management, or control of a system or device.

BOOTH 49
ModµMIDI: A MICROTONAL KEYBOARD
CLIENT: University of Georgia Hugh Hodgson School of Music
SUPERVISOR: Donald Leo, Ph.D. & Kevin Wu
PROJECT TEAM: Hunter Becker, Andrew Burnes, Matthew Olson, Adam Schwarzenbach, Landon Smith
PROJECT DESCRIPTION
There are no modular MIDI instruments available for the composition and performance of microtonal music. Our team is designing an open-source keyboard that consists of an expandable housing and removable keys, giving the musician full control of the keyboard's range. Ultimately, the traditional feel and wide accessibility of this MIDI instrument will lower the barrier to entry to microtonal music.

BOOTH 50
AUGMENTED REALITY CLOUD ECOMMERCE: HUMAN MEASUREMENTS
CLIENT: Capgemini
SUPERVISOR: Renny Badra, Ph.D.
PROJECT TEAM: Sterling Strohauer, John Wetterhan
PROJECT DESCRIPTION
The goal of the Augmented Reality Cloud Ecommerce design project is to create a web application that, using a user's camera feed, can measure, calculate, and overlay customers' body measurements. The sponsor, Capgemini, has partnered with the capstone team to create this Software as a Service to improve customers' online shopping experiences.

BOOTH 51
INSPECTION MEASUREMENT JIG FOR HOSE CRIMP: HEAVY-DUTY AGRICULTURAL EQUIPMENT
CLIENT: Kubota
SUPERVISOR: Ben Thomas, Ph.D.
PROJECT TEAM: Colby Gann, Brody Hutton, Kishan Patel, Bradley Piper, Taylor Reese
PROJECT DESCRIPTION
This a hardware and software based project to design and implement a device capable of measuring and logging hose crimps for Kubota. The goal is to make their current process more efficient while tracking measurement data.

BOOTH 52
AUGMENTED REALITY HOLOLENS
SUPERVISOR: Kyle Johnsen, Ph.D.
PROJECT TEAM: Orain Ferguson, Jeff Njogu, Jorge Olivares, Juan Rivas, Blake Strauss
PROJECT DESCRIPTION
We use the HoloLens 1 to develop a training program because of its low cost in comparison to its newer generation counterpart. In addition to a training program, a data collection, storage, and analysis process would complement the training program and further improve the training program compared to traditional methods such as reading papers or user manuals. We use a game engine, Unity, that is beginner friendly to software developers to develop VR/AR applications. We also chose to use Flask for straightforward use in uploading and downloading our data onto PowerBI for data visualization.

BOOTH 53
‘GET COMFORTABLE’ VOLUNTEER TRACKING APP
CLIENT: Creature Comforts Brewing Company
SUPERVISOR: Renny Badra, Ph.D.
PROJECT TEAM: Rishi Patel, Sara Sileshi, Garrett Will
PROJECT DESCRIPTION
Creature Comforts’ Get Comfortable program works to increase 3rd grade literacy rates within the Clarke County School District. Our team has designed a volunteering tracking app to manage the data collected during their sessions with students. We’ve converted their existing website into a fully functioning iOS and Android compatible application with upgraded features.

BOOTH 54
WAREHOUSEPAL: A POWER APPS SOLUTION FOR VISUALIZING BECTON DICKINSON’S INTERNATIONAL SHIPPING OPERATION CAPACITY
CLIENT: Becton Dickinson
SUPERVISOR: Jorge Rodriguez, Ph.D.
PROJECT TEAM: Hannah Dodd, Davis Farmer, Pedro Gonzalez, Max Suther, Lakshmi Yetukuri
PROJECT DESCRIPTION
Becton Dickinson needs a comprehensive analysis of the current international shipping operation and a potential redesign that will achieve a 48-hour pick, pack, and ship. Time studies performed from February to March help us determine warehouse capacities and aid in the creation of a capacity dashboard through Microsoft Power Apps. The goal is to reduce cost, increase efficiency and productivity, and improve quality.

BOOTH 55
GULFSTREAM AI/ML PDF SORT, ORGANIZE, SEARCH
CLIENT: Gulfstream Aerospace
SUPERVISOR: Kyle Johnsen, Ph.D.
PROJECT TEAM: Benjamin Gily, Celena Michaud, Muhammad Zafar
PROJECT DESCRIPTION
This tool uses artificial intelligence to improve the search process through Gulfstream’s aircraft maintenance manuals. It employs natural language processing to interpret users’ questions and identifies key words to be used in a search algorithm, then displays the most relevant search results.
BOOTH 56
MACHINE LEARNING IN BATTERY CELL MANUFACTURING
CLIENT: General Motors
SUPERVISOR: Renny Badra, Ph.D.
PROJECT TEAM: Drew Herlyn, Alexis Manriquez, Charles Meyer, Devin Shelton
PROJECT DESCRIPTION
General Motors aims to optimize its manufacturing of lithium-ion batteries using machine learning. Our project will help them accurately predict the outcome of several steps within the electrode production process by utilizing several ML models and a set of given input parameters.

BOOTH 57
PORTABLE SYSTEM FOR MEASURING COGNITIVE AND EMOTIONAL IMPACTS OF MUSIC
CLIENT: University of Georgia Hugh Hodgson School of Music
SUPERVISOR: Cheryl Gomillion, Ph.D.
PROJECT TEAM: Cuthbert Fonjungo, Sarem Fransua, Andrew Kim, Arianna Medina
PROJECT DESCRIPTION
There is no instrument that helps to quantify the cognitive and emotional state of a person while playing music. Musicians, music researchers, and music educators will benefit from the use of a portable, unobtrusive system that quantifies, in real time, the cognitive and emotional state of a person when performing music. Our goal is to provide a verified portable device that can track, eye-tracing, heart rate, breathability, whilst being synchronized with audio in hopes that the user may study trends in their performed piece.

BOOTH 58
LIFTED AUDIO
CLIENT: University of Georgia Hugh Hodgson School of Music
SUPERVISOR: Kevin Wu
PROJECT TEAM: Kaseton Badger, Berek Ha, Zachary Rogers, Harrison Vital
PROJECT DESCRIPTION
To improve ease of use and efficiency of setting up audio equipment, our team was tasked with creating a remote controlled and motorized solution to the UGA Dance Studio’s current microphone setup. This goal was accomplished by the use of stepper motors and python-based boards.

BOOTH 59
FOOTBALL REHABILITATION TRACKING SOFTWARE
CLIENT: University of Georgia Athletic Association: Sports Medicine
SUPERVISOR: Cheryl Gomillion, Ph.D.
PROJECT TEAM: Ethan Abraham, Lekshmi Kumar, Emma Tharp, Jackson Whitehead
PROJECT DESCRIPTION
The UGA Football team currently enters all data regarding injury rehabilitation manually. This project aims to streamline this process by allowing the data to be entered digitally and to be stored in a cloud server.

BOOTH 60
PlantFi: SMART AGRICULTURE MONITOR WITH IoT
CLIENT: PlantFi
SUPERVISOR: Kevin Wu
PROJECT TEAM: Andres Bethancourt, Alex Breazu, Rebecca Garner, Layla Parsa
PROJECT DESCRIPTION
This project aims to design and construct an IoT plant sensor that keeps track of critical details that factor into plant growth and health. This information would be transmitted to users alongside recommendations that would help better manage the resources they give to plants and decrease their water and energy use.

BOOTH 61
FACTORY LOGISTICS OPTIMIZATION SIMULATOR (FLOS)
CLIENT: A&E Engineering
SUPERVISOR: Kyle Johnsen, Ph.D.
PROJECT TEAM: Ethan Laken, Adam Lewis, Warwore Omot
PROJECT DESCRIPTION
Our team is designing a factory simulator that will allow for AGVs, their routes, and consumption points to be customized. The simulation will track data such as delivery time and battery use to give us insights on how AGVs in the factory space can be optimized.

BOOTH 62
VIRTUAL REALITY IMMERSIVE CONTROLLER
CLIENT: University of Georgia
SUPERVISOR: Kevin Wu
PROJECT TEAM: Ethan Bowmar, Bryan Hammond, Maxwell Meyhoefer, Ryan Samples, Jonathan Vu
PROJECT DESCRIPTION
Our objective is to provide a new solution to Virtual Reality controllers that offer new levels of immersion and enhances the overall user experience in VR. Our controller solution will not only offer finger tracking but will also provide haptic feedback all while being low profile and comfortable.

BOOTH 63
SENSOR BASED ADDITIVE WORKPIECE QUALITY
CLIENT: Siemens Industry, Inc.
SUPERVISOR: Peter Kner, Ph.D.
PROJECT TEAM: Owen Conrad, Andrew Hixon, Eric Laurin, Nathaniel Mathers, Hayden Odum
PROJECT DESCRIPTION
The purpose of this project is to improve quality of prints during additive manufacturing. This will be done by identifying sensors that can be mounted to the machines in such a way as to produce usable data and not disrupt workflow. The data will then be analyzed to see what improvements are needed in the manufacturing process.
MANUFACTURED SYSTEM OR PROCESS DESIGN

The Manufactured System or Process Design category challenges teams to design a system and/or process by which raw materials are transformed into products with specific physical and chemical properties. The system will typically include casting and molding, machining, joining, and/or shearing and forming within an appropriate manufacturing environment.

BOOTH 79
IMPROVE CYCLE TIME OF LEAK/FUNCTIONAL TEST STATION FOR PRESSURE REGULATORS

CLIENT: Harris Products Group
SUPERVISOR: Eliza Banu, Ph.D.
PROJECT TEAM: Matthew Dees, Alex Komendantov, Matthew Seitz, Mckenna Young

PROJECT DESCRIPTION
Harris Products - a Lincoln Electric subsidiary - tests gas pressure regulators to ensure defects do not leave the facility. The goal is to make testing quicker by augmenting the system without sacrificing the accuracy of leak testing. Our team will use pneumatic actuators and pressure sensors to create a design to complement steps already taken to increase throughput.

BOOTH 80
THE WIRELESS ELECTRIC SOCKET TRAY (W.E.S.T) PROJECT

CLIENT: Kubota
SUPERVISOR: Peter Kner, Ph.D.
PROJECT TEAM: Mary Hall, William Kellum, Karsten Smith

PROJECT DESCRIPTION
Our team is designing a wireless electric socket tray for Kubota to improve efficiency of socket removal and replacement. By wireless connecting to logic controllers, this socket tray will automatically adjust settings on the assembly line at a much cheaper cost than existing, wired, socket trays.

BOOTH 81
DESIGN A WASTEWATER TREATMENT PROCESS TO REMOVE/REDUCE ARSENIC AND SELENIUM (TEAM 2)

CLIENT: University of Georgia College of Engineering
SUPERVISOR: Jim Kastner, Ph.D.
PROJECT TEAM: Fred Lee, Luiza Pereira Goncalves, Conner Tate, Armando Zavala

PROJECT DESCRIPTION
Our team is designing a wastewater treatment process that uses zero valent iron to reduce arsenic and selenium levels in FGD wastewater. Our goal is to create the most efficient and cost effective method to mitigate pollution of areas surrounding the power plant.

BOOTH 82
IMPROVEMENT OF TOOL CHANGE PROCESS FOR MACHINE OPERATOR

CLIENT: Haering Precision USA LP
SUPERVISOR: Wayne Johnson, Ph.D.
PROJECT TEAM: Robert Benge, Saint Chung, Robert Maxwell, Mariko Shaw

PROJECT DESCRIPTION
Our team is developing organizational systems that are necessary for the implementation of a new methodology for changing tools on SG-18 Multi-Spindle Screw Machines. The ultimate goal is to reduce machine downtime due to tool changes by 15%.

BOOTH 83
AUTOMATED TEFNON TAPE APPLICATOR FOR NPT THREADS

CLIENT: Harris Products Group
SUPERVISOR: Adam Wineland, Ph.D.
PROJECT TEAM: Emmett Day, Olivia Fountain, Jack Fox-Marrs, Kathia Jaramillo-mayo

PROJECT DESCRIPTION
The Harris Products Group currently requires manual labor in the application of Teflon tape to an assortment of pressure regulator components. Our project develops a robotic automation of the entire taping process, repurposing operator time, reducing overhead costs, and eliminating an imposing bottleneck within the facility.

BOOTH 84
THREE PART SAFETY IMPROVEMENT PROGRAM FOR BD GDC

CLIENT: Becton Dickinson
SUPERVISOR: Jorge Rodriguez, Ph.D.
PROJECT TEAM: Robert Fain, Andrew Headley, Christopher Northrup, Roberto Paz, Kevin Zheng

PROJECT DESCRIPTION
Our team will be creating a 3 part safety program for Becton Dickinson to implement at their Global Distribution Center. This plan will include safety training videos, auditory reminders, and improved ergonomics to create a safer work environment.

BOOTH 85
TERRAPIN PIPING REDESIGN

CLIENT: Terrapin Beer Co.
SUPERVISOR: Tom Lawrence, Ph.D.
PROJECT TEAM: Antonio Annable, Joshua Dejongh, Jacob Hale, Mckinley Milner, Kyle Zifchak

PROJECT DESCRIPTION
Terrapin Beer Co. has requested their non-process, and bright tank piping be redesigned. This redesign should simplify maintenance and cleaning, and eliminate safety hazards as well as optimize access to necessary dropdowns.
BOOTH 86
PALLETSIZE EFFICIENCY STUDY: GDC/STERILIZATION

CLIENT: Becton Dickinson
SUPERVISOR: Wayne Johnson, Ph.D.
PROJECT TEAM: Giovanni Fabris, Rebecca Francis, Matthew Freeman, Justin Zhang

PROJECT DESCRIPTION
Our team was tasked with analyzing the Global Distribution Center (GDC) for Becton Dickinson (BD). The goal was to increase efficiency within the GDC by streamlining pallet usage and reducing costs without sacrificing safety.

BOOTH 87
VINYL RECORD RECYCLING PROGRAM

CLIENT: Kindercore Vinyl
SUPERVISOR: Adam Wineland, Ph.D.
PROJECT TEAM: Vanessa Avdic, Ian Moore, Damario Walden, Zoza Winful

PROJECT DESCRIPTION
Kindercore Vinyl has experienced an excess amount of polyvinyl chloride material at their facility. The goal of this project is to create a device that will help maximize the amount of waste recycled and/or repurposed at Kindercore Vinyl’s facility.

BOOTH 88
INDUSTRIAL PRODUCTION OF PYURVIC ACID BY FERMENTATION

CLIENT: University of Georgia College of Engineering
SUPERVISOR: Jim Kastner, Ph.D.
PROJECT TEAM: Zachary Lefevre, Ann-Marie Omoamu, Michael Wieczorek

PROJECT DESCRIPTION
The objective of this project is to design a plant which annually produces 20,000 metric tonnes of pyruvic acid by fermentation. Our design goal is to more efficiently and sustainably produce pyruvic acid to lower costs across the pharmaceutical, agricultural, and food manufacturing industries.

BOOTH 89
PRESS 14 ROBOTIC PART TRANSFER

CLIENT: SRG Global
SUPERVISOR: Roger Hilten, Ph.D.
PROJECT TEAM: Ian Bonam, Joshua Defir, James Joehl, Bailey Martinez

PROJECT DESCRIPTION
Currently, SRG Global manually transfers automotive trim parts from one station to another. This project entails designing a new automated process utilizing a Fanuc robot arm for the part transfer, as well as designing any components to assist the new process.

BOOTH 90
PRESS 30 ROBOTIC TRANSFER AND VENT TUBE LOADING

CLIENT: SRG Global
SUPERVISOR: Roger Hilten, Ph.D.
PROJECT TEAM: Jacob Brannon, Matthew Kwon, Melody Molinaro, Robert Penland

PROJECT DESCRIPTION
The objective of the Press 30 Robotic Transfer project is to utilize a FANUC CRX10ia collaborative robot to automate the installation of push-push and vent tube components onto a fuel housing before transferring the assembly to the next operator. This project presents the client, SRG Global, an estimated savings of $50k per year based on one operator per shift for one shift per day.

BOOTH 91
DESIGN A WASTEWATER TREATMENT PROCESS TO REMOVE/REDUCE ARSENIC AND SELENIUM (TEAM 1)

CLIENT: University of Georgia College of Engineering
SUPERVISOR: Jim Kastner, Ph.D.
PROJECT TEAM: Jeongeun Lee, Carissa Pangilinan, Margarita Tadeo

PROJECT DESCRIPTION
The objective is to design a wastewater treatment process that can remove or reduce arsenic and selenium using the ZVI method. Zero-valence Iron method has been proven to be a great method for reduced levels of selenium so this method was desired. A new design for wastewater treatment is important for the reduction or removal of arsenic and selenium due to the revised regulations of the US EPA.

BOOTH 92
OPTIMIZING MATERIAL HANDLING WITH AUTOMATED GUIDED VEHICLES FOR JUMBO ROLL TRANSPORTATION

CLIENT: Rayonier Advanced Materials
SUPERVISOR: Beshoy Markos, Ph.D.
PROJECT TEAM: Clayton Brown, Andrew Canada, AmyBeth Lee, Asif Rahaman, Colton Spillers

PROJECT DESCRIPTION
The project aims to find a solution for the transportation of jumbo rolls, which are large rolls of pulp that weigh approximately 16 metric tons, in the Rayonier Advanced Materials facility in Jesup, GA. The goal of this project is to reduce downtime, maintenance costs, and labor force hours by investigating the conversion of current jumbo roll transportation equipment to Automated Guided Vehicles, with the ultimate goal of minimizing dead time, improving production efficiency, and creating a safe working environment.
BOOTH 93
CHILLED BEAN AIRFLOW/PRESSURE KIT
CLIENT: Price Industries
SUPERVISOR: Eliza Banu, Ph.D.
PROJECT TEAM: Harrison Hoffmann, Thomas Khoo, Zachary Osner, Joshua Penner, Collin Waterfill
PROJECT DESCRIPTION
Our project is to improve Price Industries’ current portable chilled beam airflow and pressure kit. Our new test kit will be able to provide up to 250 CFM and measure airflow and differential pressure with an accuracy of +/- 5%.

BOOTH 94
UTILIZING ADDITIVE MANUFACTURING AND TOPOLOGY OPTIMIZATION IN THE AEROSPACE INDUSTRY
CLIENT: Bell Textron Inc.
SUPERVISOR: Roger Hilten, Ph.D.
PROJECT TEAM: Rosemary Durant, Chase Moore, Martin Sobczak, Chase Stokes
PROJECT DESCRIPTION
We will be utilizing additive manufacturing and topology optimization to structurally optimize a wing attach fitting for Bell Flight. Our team was tasked with generating material properties for the available additively manufactured metals, and then applying these figures to our simulations and designs.

BOOTH 95
TRACEABILITY SYSTEM OF PEANUTS AT LONG TERM WAREHOUSE
CLIENT: Premium Peanut
SUPERVISOR: Sidney Thompson, Ph.D.
PROJECT TEAM: Landon Bentley, Kimberly Erett, John Harwell, Addison Wiggins
PROJECT DESCRIPTION
Our design team is tasked with implementing an RFID tracking system that will help track peanuts entering and leaving the long-term warehouses. The RFID system will connect to the already existing inventory/data software at Premium Peanuts in order to improve the tracking of specific information regarding the loads.

BOOTH 96
SWARM ROBOT DESIGN AND CONTROL FOR MULTIDIMENSIONAL DOCKING FORMATIONS
CLIENT: University of Georgia
SUPERVISOR: Kun Yao, Ph.D.
PROJECT TEAM: William Bradford, Aidan Delliponti, Caroline Lassiter, Jackson Snow, Michael Starks
PROJECT DESCRIPTION
We developed a novel swarm robotics system integrating mechanical, electrical, and computing aspects. Using the CubeSat design specifications, we designed miniature robots capable of holonomic motion and autonomous docking. A cooperative control framework will facilitate formation navigation. Robots can share power and data between themselves while docked in an arbitrary formation.
The Innovative Medical Device or Biological Process Design category challenges teams to create a design that combines fundamental principles in biology, chemistry, and engineering disciplines to develop innovative solutions that address a biomedical, biological, and/or chemical engineering system, device, or process.

**BOOTH 38**
**AMBULATORY ECG MONITOR FOR DOGS**
**CLIENT:** University of Georgia College of Veterinary Medicine  
**SUPERVISOR:** Cheryl Gomillion, Ph.D.  
**PROJECT TEAM:** Bill Cheng, Tea Gibson, John Hodges, Victoria Lam, Mikayla Morris  
**PROJECT DESCRIPTION**  
The objective of this project is to provide an ambulatory at home ECG monitor to aid in diagnosing high blood pressure in dogs. It is meant to remove any false diagnoses of high blood pressure due to veterinarian induced stress.

**BOOTH 39**
**DEVELOPMENT AND OPTIMIZATION OF A CHO CELL GROWTH MODEL FOR BENCH-SCALE BIOREACTORS**
**CLIENT:** Boehringer Ingelheim  
**SUPERVISOR:** Jim Kastner, Ph.D.  
**PROJECT TEAM:** Emily Chancellor, Crimxon Guillermo, Jessica Shiffman, Sarah Torbert, Andres Villalobos  
**PROJECT DESCRIPTION**  
Our team is developing a computational model that predicts CHO cell growth such that growth parameters within 3L and 7L bioreactors can be optimized. This mitigates the clients’ need for physical experimentation, saving them resources, money, and time, while simultaneously improving the growth of CHO cells in their bench-scale bioreactors for biopharmaceutical purposes.

**BOOTH 40**
**COOLING A BRAIN SECTIONING DEVICE**
**CLIENT:** University of Georgia College of Veterinary Medicine  
**SUPERVISOR:** Cheryl Gomillion, Ph.D.  
**PROJECT TEAM:** Nicholas Cox, Anastasia Marx, Conner Sweat, Grace Yankus  
**PROJECT DESCRIPTION**  
Our project concept is to create a cooling device for a brain sectioning matrix. The device must maintain a temperature range of 0 – 10°C while allowing access to the matrix for sectioning over a period of 30 minutes. Our device utilizes Peltier cooling technology to optimize cooling while allowing for a manageable budget and longevity of our device.

**BOOTH 41**
**RERAINT DEVICE FOR CANINE SWALLOW STUDIES**
**CLIENT:** University of Georgia College of Veterinary Medicine  
**SUPERVISOR:** Cheryl Gomillion, Ph.D.  
**PROJECT TEAM:** Jarod CUTSRIES, Myddelton Parker, Maya Patel, Lucas Pence, Diego Quiroz  
**PROJECT DESCRIPTION**  
The purpose of this design project is to develop a restraint device that can be efficiently implemented during live VFSS (video fluoroscopy swallow studies) in canines. This design initiative is led by Dr. Jo Smith and Dr. Mike Perlini of the UGA Veterinary school, as well as Dr. Gomillion of the UGA College of Engineering. The primary purpose of VFSS, in this context, is for diagnosing physiological issues where aphasia manifests as a symptom.

**BOOTH 42**
**BIOREACTOR DESIGN FOR THE EXPANSION OF CAR T-CELLS IN MULTIPLE MYELOMA PATIENTS**
**CLIENT:** University of Georgia College of Engineering  
**SUPERVISOR:** Jim Kastner, Ph.D.  
**PROJECT TEAM:** Ellena Augh, Daniel Hossack, Alexander Yun  
**PROJECT DESCRIPTION**  
To reach the necessary cell dosage for CAR T-cell therapy in multiple myeloma patients, our team is tasked with designing a bioreactor for cell expansion that reduces cost and susceptibility to cell contamination.

**BOOTH 43**
**NEUROBLASTOMA TARGETING CAR T-CELL BIOREACTOR**
**CLIENT:** University of Georgia College of Engineering  
**SUPERVISOR:** Jim Kastner, Ph.D.  
**PROJECT TEAM:** Shruti Kumthekar, Mackenzie Marvin, Carly Moss, Chaudhry Rasool  
**PROJECT DESCRIPTION**  
Chimeric antigen receptor or CAR T cells are a rapidly growing method of cancer treatment in personalized medicine. Our project designs a bioreactor and process that expands the cells to levels required for patient treatment that reduces costs and susceptibility to contamination.

**BOOTH 44**
**BIOLOGICAL PRODUCT PRODUCTION OPTIMIZATION (GENETIC & BIOPROCESS)**
**CLIENT:** Alma  
**SUPERVISOR:** Kevin Wu  
**PROJECT TEAM:** Jordan Bragg, Isabella De Luna, Taylor Gonzalez, Liam Kozma  
**PROJECT DESCRIPTION**  
L-asparaginase is an enzyme that removes carcinogens produced by the 140-billion dollar food processing industry. By using metabolic and bioprocess engineering, we are ultimately designing a sustainable and scalable process to manufacture this enzyme at an increased efficiency and at a lower cost than our competitors. To create this optimized design, we will be placing new genes into microorganisms and experimenting with the environment in which these microorganisms produce this scarce and highly valuable enzyme.
Teams in the Sustainable Design category are required to develop designs that incorporate innovative solutions that develop a sustainable system, process, device, building, site, or other resulting in the reduction of carbon emissions and/or waste materials.

**BOOTH 45**

**MULTI-FUNCTIONING AND STRETCHABLE FIBER OPTIC SENSOR USES FOR PODIATRISTS**

**CLIENT:** University of Georgia Innovation District  
**SUPERVISOR:** Kevin Wu  
**PROJECT TEAM:** Steven Binder, Thomas Anton, Denzel Cunningham, Anika Duff

**PROJECT DESCRIPTION**

Dr. Mable Fok and Dr. Xiangqiao Wang have developed and patented a stretchable fiber optic-based sensor that offers multiple functionalities. The objective for this project was to discover a market and build a prototype with this technology. The team has developed a smart shoe in-sole with fiber optic sensors laced throughout serving to provide a variety of readings for the users.

**BOOTH 46**

**COMPRESSION THERAPY TRAINING DEVICE**

**CLIENT:** University of Georgia College of Engineering  
**SUPERVISOR:** Cheryl Gomillion, Ph.D.  
**PROJECT TEAM:** Andrea Banys, Jonathan Cooper, Jacob Cummings, Audrey George, Abigail Wendt

**PROJECT DESCRIPTION**

Nurses have limited feedback during compression wrap training so our team has designed a pressure sensitive leg for nurses to practice on using targeted wrapping areas. After becoming accustomed to the pressure gradient up the leg, nurses will be able to more effectively treat diabetic patients with a decrease in care related injuries or faulty bandaging.

**BOOTH 47**

**IDENTIFICATION OF PSEUDOMONAS AERUGINOSA FOR HOME HEALTHCARE**

**CLIENT:** University of Georgia College of Engineering  
**SUPERVISOR:** Cheryl Gomillion, Ph.D.  
**PROJECT TEAM:** Dagney Crowley, Grayson Even, Shraya Gumudavelli, Jacob Hartman, Elias Karaki

**PROJECT DESCRIPTION**

Our goal for this project is to assist Home Healthcare nurses in the Piedmont Athens Regional Healthcare system more efficiently identify Pseudomonas Aeruginosa in diabetes related wounds. Our new process will consist of a modified gram stain with UV activated fluorescence to quickly identify the bacteria on site and save Home Healthcare nurses valuable time.

**BOOTH 48**

**SHEPHERD DRONE**

**CLIENT:** University of Georgia Innovation District  
**SUPERVISOR:** Kevin Wu  
**PROJECT TEAM:** Justin Anderson, Seth Daniels, Marcus Dibattista, Reed McPherson

**PROJECT DESCRIPTION**

The Shepherd Drone Project’s goal is to detect Bovine Respiratory Disease in cattle in an easier and more time efficient way. The team decided to create a drone with a radiometric thermal camera used to identify cattle with an elevated body temperature, making disease detection easier, faster, and safer for both cattle and humans.
**BOOTH 33**

**PHILIPPE PARK LIVING SHORELINE PROJECT**

**CLIENT:** Atkins  
**SUPERVISOR:** Matthew Bilskie, Ph.D.  
**PROJECT TEAM:** Scott Bogarde, Autumn Coughlin, Olivia Duncan, Sarah Moore  

**PROJECT DESCRIPTION**

Philippe Park’s Northern seawall is starting to show signs of needing repair due to repeated wave action. Since the wall protects a nationally recognized historic site, it must remain in place. The goal of this project is to develop a shore protection solution with living shoreline elements in order to extend the service life of the seawall.

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**BOOTH 34**

**SOUTHERN COMPANY GAS: LANDFILL GAS TO ELECTRICITY GENERATION FACILITY UPGRADES (CVLE & ENVE)**

**CLIENT:** Southern Company  
**SUPERVISOR:** Stephan Durham, Ph.D.  
**PROJECT TEAM:** Lauren Kostuchenko, Anna Lentz, Ava Wonn  

**PROJECT DESCRIPTION**

University of Georgia College of Engineering partners with Southern Company Gas to propose upgrades to the existing Athens Clarke County (ACC) landfill biogas (LFG) facility. The LFG facility will be upgraded to a renewable natural gas (RNG) plant and interconnect to the existing Atlanta Gas Light infrastructure in the area. The current ACC infrastructure is about ten years old, so the proposed upgrade to the plant will potentially allow for ACC to create additional value from RNG as well as provide ACC insight into the potential for an RNG project from both an environmental and economic perspective.

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**BOOTH 35**

**AUTONOMOUS DESIGN OF FOOD WASTE CAPTURE TECHNOLOGY**

**CLIENT:** University of Georgia  
**SUPERVISOR:** Cheryl Gomillion, Ph.D.  
**PROJECT TEAM:** Daniela Cardona, Bremie Lindner, Lucien Prothero, Carter Spivey  

**PROJECT DESCRIPTION**

Due to the lack of food waste services for residential areas, we have been tasked with designing a pre-composting device for neighborhoods to divert food waste from landfills in Athens–Clarke County. The primary objective of this project is to create a device that can accept food waste and turn it into a readily compostable material to be picked up by an existing city service and brought to a composting facility.

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**BOOTH 36**

**ALGAE TREE-ENTREPRENEURIAL CAPSTONE**

**CLIENT:** University of Georgia College of Engineering  
**SUPERVISOR:** Jim Kastner, Ph.D.  
**PROJECT TEAM:** Abena Agyekum-boateng, David Baker, Rajin Karpen, Kipling Len, Jeffery Whitmire  

**PROJECT DESCRIPTION**

Algae Tree's photo bioreactors aim to address important global issues such as excess carbon, fuel shortages, and food shortages by combining aesthetics and sustainability. The company’s product serves as both a decorative piece and a practical solution for companies to show their commitment to sustainability.

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**BOOTH 37**

**CarbonFinity: DIRECT AIR CAPTURE OF CARBON DIOXIDE FOR VERTICAL FARMS**

**CLIENT:** University of Georgia College of Engineering  
**SUPERVISOR:** Kevin Wu  
**PROJECT TEAM:** Joseph Fleming, Matthew Gatto, Dylan Jones, Jonah Margosis, Shweta Vedanarayanan  

**PROJECT DESCRIPTION**

Our team has designed a small-scale direct air capture unit for vertical farms to stimulate plant growth in their facilities. The design uses induction heating instead of traditional heating methods for a faster, more efficient cycle.

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**BOOTH 99**

**PROMOTING ELECTRIC PROPULSION**

**CLIENT:** American Society of Naval Engineers  
**SUPERVISOR:** Peter Kner, Ph.D.  
**PROJECT TEAM:** Kyle Capozzi, Keith Castro, Cathryn Davis, Logan Merry, Edward Payne  

**PROJECT DESCRIPTION**

Promoting Electric Propulsion (PEP) for Small Craft is an educational and competitive program to foster the development of electric boats in the United States. College teams are challenged to safely construct an electric-powered boat that can complete a five-mile race. The fourth PEP competition will be held May 2023 in Virginia Beach, VA. The race site, the Elizabeth River, will require boats to have enough power to navigate winds of 10 knots and waves between 3 and 9 inches.

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**BOOTH 108**

**MOBILE SOLAR CHARGING SOLUTION**

**CLIENT:** University of Georgia Facilities Management Division  
**SUPERVISOR:** Peter Kner, Ph.D.  
**PROJECT TEAM:** Terrence Bee, Elaina Davis, Josiah McDonald  

**PROJECT DESCRIPTION**

As the UGA groundskeeping teams begin to use electric equipment, they need a way to charge the equipment’s batteries on the go. Our team has mounted solar panels on to the new groundskeeping EV to provide a lightweight and mobile solution to this problem.