Capstone Design Expo

Fall 2022





December 5, 2022 McCamish Pavilion Atlanta, Georgia



Dear Capstone Design Expo Judges and Guests:

Georgia Tech opened its doors in 1888 with mechanical engineering being its only degree-granting program during the Institute's first eight years. Mechanical Engineering (ME) grew from the original shop or trade culture to a professional curriculum with experimental laboratories and multidisciplinary challenges. Today, with almost 3,000 students, the Woodruff School is the largest mechanical engineering program in the U.S., graduating over 600 bachelor's degrees, 200 master's degrees, and 65+ doctoral degrees each year. From its early beginning and throughout the Woodruff School's history, one thing has always remained constant: excellence in creating and building products, devices, and systems that make the world a better place!

As part of our relentless drive for excellence, the Woodruff School embarked on an ambitious journey to create a renaissance in engineering education and make its undergraduate program among the very best in the world. Part of this initiative was to reintegrate and supercharge the "create-innovatedesign-build" stem of the curriculum. Over the last decade, the Woodruff School has encouraged and enabled all its students to engage in hardware prototyping for validation of their Capstone Design projects. The School continues to provide a variety of resources, including access to state of the art machines, expertise, and assembly space to all its students, through the newly renovated Flowers Invention Studio, the Montgomery Machining Mall, the ME Electronics Shop, and the IDEA Lab – all housed in a contiguous space on the second floor of the MRDC building. This state-of-the-art facility has helped foster the maker culture on campus and support numerous collaborative cross-disciplinary design and innovation projects. Given these facilities, it is not surprising that the Woodruff School also leads the drive for multi-disciplinary Capstone teams, and we can point with pride to strong partnerships with Industrial Design, Computer Sciences, Biomedical Engineering, and Electrical and Computer Engineering.

The Capstone Design Expo, which was started by the Woodruff School over a decade ago, is now held twice per year and attracts several thousand attendees to Georgia Tech to evaluate and celebrate our students' accomplishments. The Fall 2022 Expo will feature 110 teams from five different schools. Of those, ME has the largest number of teams, 23, in addition to the 16 other interdisciplinary teams that have ME students. More than half of the teams have an external sponsor in the form of a company, entrepreneur or non-profit organization supporting their project. A special CREATE-X section focused on supporting entrepreneurial teams will also pitch their startup ideas at the expo.

Going forward we seek to build on our vision and proven record of accomplishment to advance engineering education and to significantly enhance the quality of our graduates as they enter the workforce. We thank you profoundly for joining us on this journey and for your continuous support in educating mechanical engineering graduates who will have tremendous impact and provide positive change in our world. Come see for yourself and let me welcome you to the Georgia Tech Capstone Design Expo!

Amit S. Jariwala

Director, Georgia Tech Capstone Design Expo Director of Design & Innovation, G.W.W. School of Mechanical Engineering

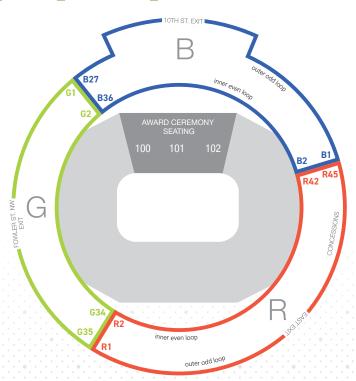
Capstone Design Expo

The Georgia Tech Capstone Design Expo is one of the largest student design expos in the United States, showcasing student innovations designed and built during the Capstone Design Course. Students work in teams to solve industry problems, develop innovative tools to assist researchers, or work on their own entrepreneurial ideas.

Past expos have produced projects that have yielded significant results for industry sponsors, saving them upwards of millions of dollars in research and development costs. The networking experience for students gives them the opportunity to make a lasting first impression on potential employers; some have walked away with an invitation to visit a potential employment opportunity with some of the sponsors. This booklet features a few of the teams from the School of Mechanical Engineering.

http://mecapstone.gatech.edu/

Expo Layout Map



Even-numbered tables follow the inner loop & odd-numbered tables follow the outer loop of each circular section.

Table numbers listed in colored font

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Gatech Emory Electrotaxis
Capstone (GEEC), G32
Patient Connectivity, B30
Somnus Systems, R6
StretchTech, B32
Team Novacc, B6
The Destroyers, R10

CONSUMER PRODUCTS

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Bunny Hopkins, B28
Easy Mode, R26
Emowergency, R43
Group Zero, G27
Lawn Power, R35
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*This list shows only 39 teams that comprise of students from Mechanical Engineering, out of a total 110 teams

AMAZON SMART KITCHEN

Amazon Lab 126: AI/ML Hardware/Interaction Experiences in the Kitchen



CONSUMER PRODUCTS

SPONSOR

Amazon Lab126

ADVISOR

Wayne Li

MEMBERS

Alex Chung Allen Ding Elizaveta Egorova Isabelle Crumm Kyung Min Kim

DESCRIPTION

Amazon Smart Kitchen's project is focused on designing and prototyping a "Smart-Kitchen" product that will make organizing the kitchen, planning meals, and coordinating people more time-efficient and intuitive for young families and people living together.

PRIMARY EMAIL CONTACT

mink922@gatech.edu

EASY MODE

Energy Efficient Window Coverings



SUSTAINABILITY

SPONSOR

Levelor, Inc.

ADVISOR

Richard Simmons

MEMBERS

Eric Fan Joyce Karanouh-Schuler Lauren Henderson Patrick O'Malley Sathappan Somasundaram Tyrell Ramos-Lopez

DESCRIPTION

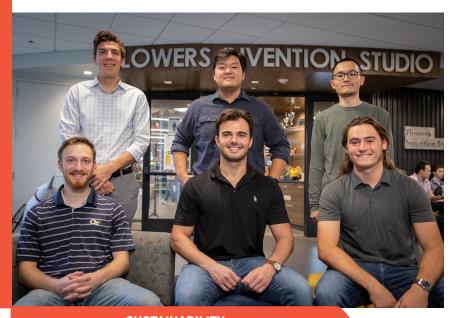
Easy Mode's project is focused on creating energy efficient window coverings to improve residential temperature regulation and lowering electricity bills by increasing the thermal insulation of window coverings and automatically changing their position to either block light and heat energy or allow them to permeate a home depending on desired temperature.

PRIMARY EMAIL CONTACT

pomalley8@gatech.edu

EMOWERGENCY

Micro-generator powered by lawn mower



SUSTAINABILITY

SPONSOR

Georgia Tech Strategic Energy Institute - CNES lab

ADVISOR

Richard Simmons

MEMBERS

Anderson Page Andrew Hintzman Casey Teodecki Jejin Park Jeremy Bers Ju Young Shim

DESCRIPTION

Emowergency's project is focused on designing and producing a low-cost alternative to home generators for use in powering select home appliances in case of a power outage. Given the number of homeowners who own a gas-powered push mower, the product will utilize the existing walk-behind lawnmower engine as the prime mover.

PRIMARY EMAIL CONTACT

ahintzman3@gatech.edu

ENERGY ABSORBER

Minimizing Damage in Rear End Accidents



AEROSPACE/AUTOMOTIVE INDUSTRY

SPONSOR

N/A

ADVISOR

Michael Tinskey

MEMBERS

Antonio Lucas Darren Lim Owen Ribes Richard Sims William Lay

DESCRIPTION

Energy Absorber's project is focused on inventing a solution that removes the additional risks associated with hitch receivers while providing enhanced safety features in vehicles during collisions.

PRIMARY EMAIL CONTACT

dlim64@gatech.edu

FIT-N-GO

Universal Drone Mount



AEROSPACE/AUTOMOTIVE INDUSTRY

SPONSOR

Michael Tinskey

ADVISOR

Michael Tinskey

MEMBERS

Bronson Zell Christina Chan Frederic Chirol Hill Giang Nguyen Lucas Nicewander Mark Hite

DESCRIPTION

Fit-n-Go's project is focused on developing a drone mount for future Vertically- Integrated Project (VIP).

PRIMARY EMAIL CONTACT

lnicewander@gatech.edu

KOWALSKI

Nekton-Autonomous Under-ice Vehicle



MECHATRONICS

SPONSOR

Georgia Tech

ADVISOR

Mick West and Amit Jariwala

MEMBERS

Cody Page Duncan Guy Hamidou Diallo Hanna Goldfarb Luke Maran Nicole Derosa

DESCRIPTION

Kowalski's project is focused on designing and prototyping an autonomous underwater robot to aid scientists in the exploration of sub-ice polar environments.

PRIMARY EMAIL CONTACT

hgoldfarb@gatech.edu

LAWN POWER

Creating an Emergency Use Microgenerator from a Household Lawn Mower



SUSTAINABILITY

SPONSOR

Richard Simmons

ADVISOR

Itzhak Green

MEMBERS

Brendon Hester Jacob Weitzel Jessica Lowe Ryan Giometti Thomas Yocum

DESCRIPTION

Lawn Power's project is focused on developing a low-cost microgenerator attachment that is compatible with a household push lawn mower, designed to be used in emergency situations.

PRIMARY EMAIL CONTACT

ryan.giometti@gatech.edu

MACHINE DESIGNERS

Rubble Wrangler



MECHATRONICS

SPONSOR

N/A

ADVISOR

Itzhak Green

MEMBERS

Brian Walker Calvin Sringam Daniel Verlander Morgan Biagioni Nicole Alfano Samarth Saraf

DESCRIPTION

Machine Designers' project is focused on building an autonomous robot used to quickly map areas and new obstacles, and generate a path that is best for first responders to avoid risk and reach victims in a timely manner.

R19

PRIMARY EMAIL CONTACT

nalfano3@gatech.edu

ROUTEWAY

RouteWay



CONSUMER PRODUCTS

SPONSOR

CREATE-X

ADVISOR

Fisayo Omojokun

MEMBERS

Avya Manchanda Ema Goh Fikremariam Mengistu Jeniveve Vaia Raj Srivastava Shengyuan Huang Taryn Edwards

DESCRIPTION

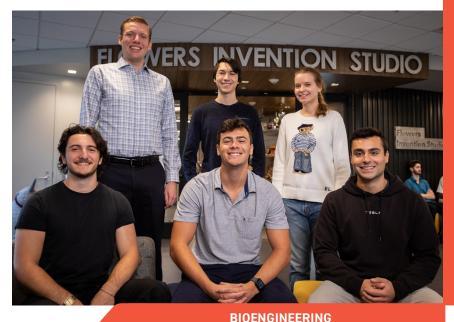
RouteWay's project is focused on building a centralized platform for small VPN provider operations.

PRIMARY EMAIL CONTACT

egoh9@gatech.edu

SOMNUS SYSTEMS

Somnus Sleeper



DIUENGINEERI

SPONSOR

N/A

ADVISOR

Todd Sulchek

MEMBERS

Arina Kochneva Craig Ackerman Dylan Sutch Jacob Evans Matthew Adams Nicholas Walker

DESCRIPTION

Somnus Systems' project is focused on creating a safe and easy to use inclined sleeper that prevents a baby from being able to get itself into a life-threatening position.

PRIMARY EMAIL CONTACT

SomnusSystems.Engineering@gmail.com

SUGAR AND SLICE

Fruit & Vegetable Slicer



SUSTAINABILITY

SPONSOR

Amba Farmers Voice and GT-SLS

ADVISOR

Richard Simmons

MEMBERS

Mason Randall Nicholas Simon-Brecke Nicholas Rokos Zachary Bellis

DESCRIPTION

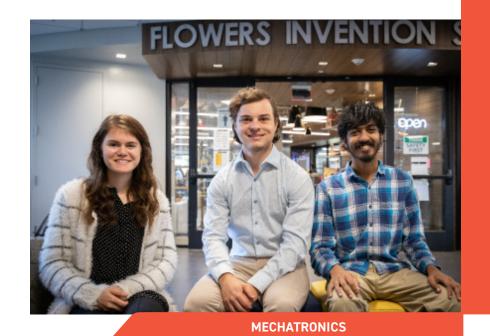
Sugar and Slice's project is focused on designing and configuring a simple, efficient, and cost-effective fruit and vegetable slicer that is capable of improving farmers' ability to preserve and prepare more produce than they are currently capable.

PRIMARY EMAIL CONTACT

mrandall32@gatech.edu

THE ARTISTS OF THE SEA

Prince William Sound Underwater Profiling Vehicle



SPONSOR

Mick West/Georgia Tech Department of Electrical and Computer Engineering

ADVISOR

Mick West and Richard Simmons

MEMBERS

Brandon Woodward Brandon Sutherland Chandler Pitts Tarun Goyal William Moore

DESCRIPTION

The Artists of the Sea's project is focused on creating a new autonomous underwater vehicle to collect data on the water in the sound.

PRIMARY EMAIL CONTACT

tgoyal9@gatech.edu

THE DESTROYERS

Xcalibur Massage Device



BIOENGINEERING

SPONSOR

Xcalibur Massage Devices

ADVISOR

Tequila Harris

MEMBERS

Andrea Vu Andrew Imig Eri Maejima Sawyer Zadan Taylor Teasley

DESCRIPTION

The Destroyers' project is focused on creating a brand-new device to reach those tough-to-reach areas with pulsating massage technology.

PRIMARY EMAIL CONTACT

andrew.imig@gatech.edu

TRANZSPORTER 2.0

TranzSporter 2.0



INDUSTRIAL TOOLING/MANUFACTURING

SPONSOR

Tie Down

ADVISOR

Yan Wang

MEMBERS

Brooke Waller Daniel Rogers Justin Bates Molly Colburn

DESCRIPTION

TranzSporter 2.0's project is focused on creating a new design for Tie Down Engineering's best-selling product, the TranzSporter, that will reduce operation hazard, mechanical complexity and remove freefall hazards.

PRIMARY EMAIL CONTACT

jbates47@gatech.edu

WORKER BEES

Beach Glider



CONSUMER PRODUCTS

SPONSOR

Florida Toy Company

ADVISOR

Jianxin Jiao

MEMBERS

Clara Buckley Gabriel Krikorian Joao Felipe De Avilez Demoro Kathryn Ollenburg William Avery

DESCRIPTION

Worker Bees' project is focused on designing a toy glider that will be used as entertainment for young children.

PRIMARY EMAIL CONTACT

GTWorkerBees@groups.gatech. edu

BUNNY HOPKINS

Bunny Hopkins Wooden Climbing Toy



SUSTAINABILITY

SPONSOR

Shamik Dasgupta

ADVISOR

Steven Sprigle and Wayne Li

MEMBERS

Blake Underwood Christian Manabat Hunter Schaufel Karlijn Verberne Sophia Abreu

DESCRIPTION

Bunny Hopkins' project is focused on designing an extensible, sustainable, and openended climbing play structure to encourage active play for children from ages 12 to 60 months old.

B28

PRIMARY EMAIL CONTACT

sophia33abreu@gmail.com

HOMECOMING

Mars Sample Return: Energy Efficient Low Profile Gripper



AEROSPACE/AUTOMOTIVE INDUSTRY

SPONSOR

Self-Sponsored

ADVISOR

Richard Simmons

MEMBERS

Dylan Phelps Jorge Gutierrez Joshua Zeisloft Nicolas Gomez Olivia Lenaghan Richard Husemann

DESCRIPTION

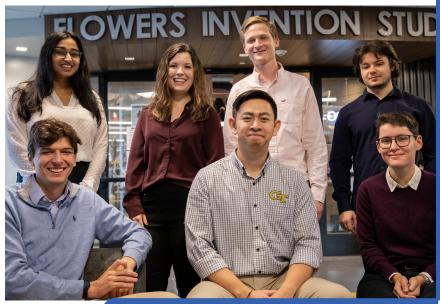
Homecoming's project is focused on designing an energy efficient low profile gripper intended for use on the Mars Sample Return Mission (estimated: 2028).

PRIMARY EMAIL CONTACT

olivialenaghan@gatech.edu

MATERIALS

Cloth Material Handling and Feeding



INDUSTRIAL TOOLING/MANUFACTURING

SPONSOR

YKK (USA) Inc

ADVISOR

Tequila Harris

MEMBERS

Bonnie Brownlee Charu Malhotra Floyd Horton Kendrick Dang Lydia Stanford Tudor Hadade Zachary Nease

DESCRIPTION

Materials' project is focused on developing a device which automates the separation of bundles of fabric to ready a swatch for feeding into a sewing machine.

PRIMARY EMAIL CONTACT

bbrownlee7@gatech.edu

PATIENT CONNECTIVITY

C.A.R.E. (Connectivity Across Remote Environments)



BIOENGINEERING

SPONSOR

AstraZeneca

ADVISOR

Timothy Brothers and Amit Jariwala

MEMBERS

Aditya Singh Kunal Patel Noah Horton **Towfigh Noparast** Wesley Sweeney **Zachary Cardin**

DESCRIPTION

Patient Connectivity's project is focused on designing a nonintrusive wearable device that passively monitors the health data of residents within underserved rural communities where there is little digital infrastructure to interpret which locally prevalent ailments may be attributed to their environment.

PRIMARY EMAIL CONTACT

wsweeney3@gatech.edu

SNAKES

Graffiti Robot



MECHATRONICS

SPONSOR

Tristan Al-Haddad, Gerry Chen

ADVISOR

Yan Wang

MEMBERS

Derrick Richardson Jerred Chen John Kim Phillip Kim Ricky Patel William Li

DESCRIPTION

Snakes' project is focused on working on GTExpo Robot, a fast and quiet cable-driven robot that will be installed to create complex dry erase marker art on the Price-Gilbert library windows.

B15

PRIMARY EMAIL CONTACT

jchen788@gatech.edu

STRETCHTECH

StretchTech



BIOENGINEERING

SPONSOR

N/A

ADVISOR

Todd Sulchek

MEMBERS

Anna Lummus Banks Jackson Caleb Sparks Jacob Wang Jessica Bradley

DESCRIPTION

StretchTech's project is focused on creating an independently-controlled stretching device for those in wheelchairs with limited mobility who are unable to stretch without assistance.

PRIMARY EMAIL CONTACT

alummus6@gatech.edu

TEAM NOVACC

Novacc Breathing Apparatus



BIOENGINEERING

SPONSOR

Ken Wright - Novacc

ADVISOR

Tequila Harris

MEMBERS

Chanyeong Choi Eugene Kim John Vaughan Kevin Li Myung Chul Kim Zhaozhou Tang

DESCRIPTION

Team Novacc's project is focused on creating a safe and portable breathing device that will efficiently kill airborne respiratory viruses in order to protect front-line health care professionals.

PRIMARY EMAIL CONTACT

jvaughan42@gatech.edu

YOU'VE GOT A FRIEND IN ME

Vibration minimization across dynamic links of magnetically levitated nano-precise scanning stage



INDUSTRIAL TOOLING/MANUFACTURING

SPONSOR

ASML

ADVISOR Yan Wang

MEMBERS

Anshul Vardhan Deepkumar Patel Dhruv Tripathi Johnson Ngo Karthik Chennupati

DESCRIPTION

You've got a friend in ME's project is focused on proving one or multiple effective yet novel solutions that could act as a basis for further research and integration by ASML engineers. This will be accomplished through simulation software and calculations.

PRIMARY EMAIL CONTACT

anshul.vardhan@gatech.edu

ADAPTABLE MECHANICS

Quiet cooling alternatives to direct water cooling of magnetically levitated nano-precise scannin



INDUSTRIAL TOOLING/MANUFACTURING

SPONSOR

 ASML

ADVISOR

Jianxin Jiao

MEMBERS

Andrew Tai Heather Jo Kyeonghun Min Nelson Jiang Rachel Yun En Goh Sze Hou Loh

DESCRIPTION

Adaptable Mechanics' project is focused on identifying alternative thermal cooling solutions that have high heat dissipation capacity and low vibrational effects on photolithography machines.

PRIMARY EMAIL CONTACT

sloh7@gatech.edu

ASTRAEUS

Astraeus



SPONSOR

N/A

ADVISOR

Michael Tinskey

MEMBERS

Eric Abel Joshua Bredbenner Max Gagnon Rohit Vepa

DESCRIPTION

Astraeus' project is focused on designing a satellite communication device for hikers or other travelers that often experience situations of poor cell coverage. The device will serve as a mobile hotspot that will allow customers to send messages from any location.

PRIMARY EMAIL CONTACT

eabel6@gatech.edu

BEE SAFE

Safe and Motorized Bee Smoker



SUSTAINABILITY

SPONSOR

Student

ADVISOR

Itzhak Green

MEMBERS

Dillan Morrison Jose Gomez Kyle Murphy Liza Sheen Praneet Ramakrishnan William Garner

DESCRIPTION

Bee Safe's project is focused on creating a safe and motorized bee smoker.

PRIMARY EMAIL CONTACT

dmorrison39@gatech.edu

BIONIC ARM

Mobile Arm Support



BIOENGINEERING

SPONSOR

Craig H Neilsen Foundation

ADVISOR

Stephen Sprigle

MEMBERS

Catherine Sun Chinonye Mbeledogu Madison Lovelace Tynan Purdy

DESCRIPTION

Bionic Arm's project is focused on designing a mobile arm support for persons with central cord spinal cord injury (SCI) to assist them in performing a series of functional activities to increase their level of independence.

PRIMARY EMAIL CONTACT

csun315@gatech.edu

FRED AND FRIENDS

Lovely Interactive Robotic Worm



MECHATRONICS

SPONSOR

N/A

ADVISOR

Mary-Ann Weitnauer and Amit Jariwala

MEMBERS

Bailey Griffin Bailey Rende Garrett Botkin Kakeru Kobayashi Riley Wilkins

DESCRIPTION

Fred and Friends' project is focused on designing, building, and testing a mechanical worm that will reside in an interactive art exhibit in the Ferst Center.

PRIMARY EMAIL CONTACT

bgriffin41@gatech.edu

GEPPETTO SQUAD

Mechatronic Push Puppet Toy



CONSUMER PRODUCTS

SPONSOR

Florida Toy Company

ADVISOR

Jianxin Jiao

MEMBERS

Ashaan Facey Bijee Jackson Jadon Pauling Martha Woldeab Oliver Low

DESCRIPTION

Geppetto Squad's project is focused on improving upon existing push puppet design to add an impressive variety of user control through the use of software to manipulate motions.

PRIMARY EMAIL CONTACT

bjackson@gatech.edu

GROUP ZERO

Automated Solar Panel Cleaning



SUSTAINABILITY

SPONSOR

N/A

ADVISOR

Jianxin Jiao

MEMBERS

Abdallah Mansour Dylan Mason Vishwajit Subramanian Yinan Li

DESCRIPTION

Group Zero's project is focused on developing an automated solar panel cleaning system using electrostatic repulsion.

PRIMARY EMAIL CONTACT

vsubramanian44@gatech.edu

GUTTER GEEKS

Dedicated Gutter Cleaning Tool



CONSUMER PRODUCTS

SPONSOR

TTI

ADVISOR

Richard Simmons

MEMBERS

Brett Delozier Jesus Franco Joshua Mosher Joshua Herrera Kaitlyn Comstock Tyler Leach

DESCRIPTION

Gutter Geeks' project is focused on creating a gutter cleaning tool that can eliminate current problems and alleviate the mundane nature of the job.

PRIMARY EMAIL CONTACT

jfranco34@gatech.edu

ION CARE

Design of Trapped Ion Quantum Computer Chamber



INDUSTRIAL TOOLING/MANUFACTURING

SPONSOR

Yan Wang

ADVISOR

Yan Wang

MEMBERS

Daniel Costantini Dojun Lee Ian McCune John Respert Katherine Elliott Nadim Kanazi Robert Dunning

DESCRIPTION

Ion Care's project is focused on designing an ultra high vacuum and vibration isolated chamber for a quantum computer.

PRIMARY EMAIL CONTACT

kjelliott@gatech.edu

SENIOR DESIGNERS

Interactive Blooming Flowering Plant



MECHATRONICS

SPONSOR

Mary Ann Weitnauer

ADVISOR

Mary Ann Weitnauer and Amit Jariwala

MEMBERS

Aditya Munagapati Audrey Ahlenius Elena Michnovicz Katie Bishop Matthew Johnson Mohit Singh

DESCRIPTION

Senior Designers' project is focused on creating an animatronic, realistic blooming flower with petals that bloom in response to changes in a participant's relative hand height.

PRIMARY EMAIL CONTACT

emichnovicz@gatech.edu

THE 1000LB CLUB

Strawsquatch



INDUSTRIAL TOOLING/MANUFACTURING

SPONSOR

Swift Straw

ADVISOR

Yan Wang

MEMBERS

Alexander Naphin Andrew Rohweder Brandon Mack Cameron Collins Luke Teverino Samuel Derry

DESCRIPTION

The 1000lb Club's project is focused on combining a tractor's passes 1-3 into one single pass, reducing the total number of passes from six to four.

PRIMARY EMAIL CONTACT

anaphin3@gatech.edu

THE BETA BEES

Small Hive Beetle (pest) Removal System



SUSTAINABILITY

SPONSOR

Sandia Sawin and GT-SLS

ADVISOR

Jianxin Jiao

MEMBERS

Advik Jain Antonio Alexandre Mendonca Athina Maria Bellonia Connor Price Luo-Yu Shieh Sabrina Castro

DESCRIPTION

The Beta Bees' project is focused on prototyping a device that removes the small hive beetles and their larvae from the hive without hurting the surrounding bees and the wax.

PRIMARY EMAIL CONTACT

scastro@gatech.edu

THE KIWIS

Hedge Trimmer with Removable Blades



CONSUMER PRODUCTS

SPONSOR

TTI

ADVISOR

Amit S. Jariwala

MEMBERS

Alexander Vitale Amarsaikhan Jargalsaikhan Hasanain Karim Mary Judson Michael Dean

DESCRIPTION

The Kiwis' project is focused on re-designing the RYOBI Hedge Trimmer with a way to temporarily reduce the existing blade length for shipping to be re-sized by users upon purchase of tool.

PRIMARY EMAIL CONTACT

amara.13@gatech.edu



























me.gatech.edu