a decade of

DECIPHER

Clemson's Creative Inquiry Magazine
Volume 10

ABOUT DECIPHER

Decipher magazine is produced by a team of Clemson University's undergraduate students to highlight the accomplishments of their peers in Creative Inquiry, Clemson's unique brand of academic engagement and undergraduate research. Creative Inquiry is Clemson's way of engaging students in research topics they find interesting in their own, other or cross-disciplinary fields of study.

Each year, more than 4,000 Creative Inquiry students explore topics ranging from engineering nanobiomaterials for delivery of cancer therapy to the effects of high stress environments on team dynamics to gender equity on college campuses. Their Creative Inquiry projects provide them with the tools they need to explore diverse problems and issues in our community and beyond and to come up with possible solutions. Students value these opportunities to exercise the skills they learn in the classroom and apply them to the real world.

From the more than 430 current Creative Inquiry projects, we selected 20 projects to feature in this magazine. Our team interviewed the faculty and graduate student mentors as well as the undergraduate students involved with each of these projects in order to write these articles and produce photographs and illustrations. *Decipher* is printed and distributed to students, faculty, alumni and friends of Clemson to make them aware of the many accomplishments of students in the Creative Inquiry program. To date, Creative Inquiry students and faculty have made more than 1,800 presentations at professional conferences, authored more than 488 professional publications and received more than 433 awards.

Decipher is available in print from the Creative Inquiry office and in PDF on the Creative Inquiry website (clemson.edu/ci).

Decipher articles are also available digitally in our interactive blog on the Creative Inquiry website (bit.ly/CI_Decipher). Visit our blog for more information and interactive project highlights.

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Katie Carey | *Photographer*
Marc McCrary | *Photographer*
Amy Maistros | *Writer*
Piper Starnes | *Writer*
Anna Nottonson | *Marketing*

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PREVIOUSLY FEATURED PROJECTS

Articles with this symbol denote projects previously featured in *Decipher*. Visit the first article by going to the volume number in the symbol. *Decipher* archives are found at: bit.ly/CI_Decipher

HAVE A FAVORITE SUBJECT?

Use the color legend to find articles by their college affiliation.

Visit CI Today to see real-time student and project information (ci.clemson.edu/today).

- AGRICULTURE, FORESTRY AND LIFE SCIENCES
- EDUCATION
- ARCHITECTURE, ARTS AND HUMANITIES
- ENGINEERING, COMPUTING AND APPLIED SCIENCES
- BEHAVIORAL, SOCIAL AND HEALTH SCIENCES
- SCIENCE

DECIPHER THROUGH THE YEARS

In the fall of 2011, the Creative Inquiry office inititated the creation of the first *Decipher* magazine in an effort to highlight Creative Inquiry projects. The magazine was intentionally designed to be written in a popular science format to entertain a wide audience. The magazine is produced entirely by undergraduate students under the guidance of the Creative Inquiry office. More than 80 students have worked to create the 10 years of *Decipher* magazines. Meet a few of our recent *Decipher* members below.

Betsy Boggs, English '16

Assistant Editor 2015
Editor 2016

"Working for *Decipher* was a wonderful experience...it provided me with so many opportunities and connections after college."

Devaun Walker, Packaging Science '16

Graphic Designer 2015 - 2016

"I was able to walk away with 'here's what I actually accomplished.' I was able to put the magazine on the table and say look what I can do."

Joseph Whitt, Architecture '15 + '19

Graphic Designer 2015
Graduate Assistant 2018-2019

"I was really interested in graphic design because I was an architecture major and we incorporated a lot of design into our projects. So, I thought that working on *Decipher* would be a good way to learn more about graphic design and do more design in general."

SPECIAL THANKS FOR GUIDANCE AND ADVICE THROUGH THE YEARS:
PETER KENT, ANNA JENKINS, ROBBY FITZWATER AND CLINTON COLMENARES.

MEET PAST DECIPHER TEAMS

2012 - VOLUME 1

Suzannah 'Zan' Isgett, *Writer*
Briana Kloc, *Writer*
Thomas Larrew, *Writer*
Alex Peterson, *Designer*
Danielle Tom, *Writer*
Juan Villamizar, *Designer*
Rachel Wasylyk, *Editor*

2013 - VOLUME 2

Blake Calamas, *Asst. Editor*
Raquel Cobb, *Writer & Designer*
Amber Day, *Executive Editor*
Timbra Dye, *Writer & Designer*
Meredith FitzGibbon, *Writer & Designer*
Saahirah Goodwin, *Creative Director*
Jessica Heron, *Writer & Designer*
Melissa Jackson, *Writer & Designer*
Jeff Kinnison, *Writer & Designer*
Marissa Kozma, *Asst. Editor*
Jessica Lau, *Writer & Designer*
Abir Mandal, *Writer & Designer*
Marielle Orr, *Writer & Designer*
Katie Ott, *Managing Editor*
Michaela Reinhart, *Asst. Editor*
Bethany Vierling, *Writer & Designer*
Gaines Warner, *Writer & Designer*

2014 - VOLUME 3

Haley Barinowski, *Writer*
Lillian Boatwright, *Writer*
Christina Chappell, *Writer*
Prateek Diwan, *Photographer*
Alyssa Glazener, *Asst. Editor*
Saahirah Goodwin, *Asst. Designer & Writer*
Jessica Heron, *Writer*
Jeff Kinnison, *Writer*
Brian Kirkland, *Writer*
Chelsea Kozma, *Writer*
Marissa Kozma, *Editor*
Colby Lanham, *Writer*
Amelia Marlowe, *Writer*
Gaurav Marmat, *Creative Director*
Katie Ott, *Pearce Center*
Sarah Rains, *Asst. Editor*
Whitney Rauenhorst, *Writer*
Ashley Rodgers, *Writer*
Noah Wisch, *Writer*

2015 - VOLUME 4

Bridada Bethea, *Photographer*
Betsy Boggs, *Asst. Editor*
Victoria Cespedes, *Writer*
Hailey Green, *Writer*
Annie Mitchell, *Graduate Asst.*
Amanda Pridmore, *Writer*
Ackelia Vassell, *Editor*
Devaun Walker, *Asst. Graphic Designer*
Joseph Whitt, *Chief Graphic Designer*

2016 - VOLUME 5

Betsy Boggs, *Editor*
Hailey Green, *Writer*
Haley Blair Jones, *Graphic Designer*
Nichole Martinson, *Writer*
Annie Mitchell, *Graduate Asst.*
Rachael Nuzum, *Chief Graphic Designer*
Wales Toney, *Photographer*
Devaun Walker, *Graphic Designer*
Joe Wortkoetter, *Writer*

2017 - VOLUME 6

Elise Bell, *Writer*
Kiersten Borden, *Asst. Graphic Designer*
Lindsay Bryda, *Editor*
Jason Erno, *Writer*
Polly Goss, *Asst. Editor*
Haley Blair Jones, *Chief Graphic Designer*
Sarah Stewart, *Photographer*

2018 - VOLUME 7

Kiersten Borden, *Chief Graphic Designer*
Polly Goss, *Editor*
Tessa Schwarze, *Writer*
Michala Stewart, *Asst. Graphic Designer*
Sarah Stewart, *Photographer*

2019 - VOLUME 8

Colleen Blaine, *Writer*
Kevin Crumley, *Chief Graphic Designer*
Sarah Dorsey, *Editor & Writer*
Niko Hajimihalis, *Writer*
Emily Pilot, *Asst. Graphic Designer*
Tessa Schwarze, *Writer*
Sarah Stewart, *Photographer*
Stone Washington, *Editor & Writer*

2020 - VOLUME 9

Colleen Blaine, *Editor*
Allyssa Haygood-Taylor, *Writer*
Marilyn Hazlett, *Writer*
Ana Licon Lopez, *Asst. Graphic Designer*
Marc McCrary, *Photographer*
Anna Nottonson, *Marketing*
Casey Pearce, *Asst. Graphic Designer*
Alex Richardson, *Asst. Editor*
Caitlyn Van de Meulebroecke, *Chief Graphic Designer*

TIMELINE OF THE CI + UR PROGRAM

LETTER FROM THE DIRECTOR

Dr. Barbara J. Speziale

As we celebrate Creative Inquiry's 15th year and the tenth *Decipher* magazine, it is time to reflect on what we have accomplished.

Creative Inquiry (CI) figures prominently in Clemson's constellation of undergraduate engaged learning opportunities. Since 2005, CI has enabled more than 50,000 students to engage in research and inquiry early and often, to cultivate relationships with faculty, to achieve exceptional research results, and to take on peer-mentoring and leadership roles. Along the way, we've enhanced CI by adding summer research, seminar series, opportunities for interaction with external companies, and special programs such as the 2020 Clemson COVID Challenge. Each has been greeted with enthusiasm from CI students and mentors.

The credit for the success of Creative Inquiry goes to the more than 1,271 mentors who have guided students through their projects. Not incidentally, these projects have produced more than 488 journal publications and 1,800 presentations at professional meetings, as well as other awards. We congratulate all of the mentors and students for their accomplishments and thank them for their contributions to Clemson and CI.

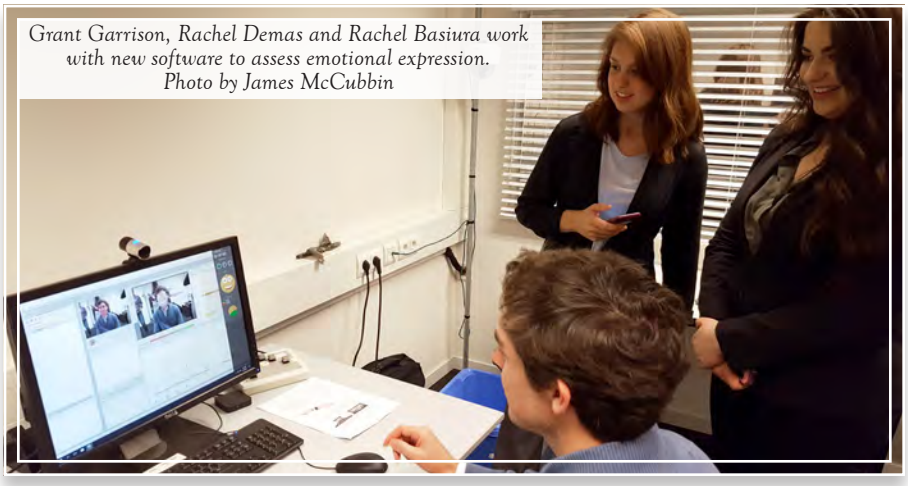
Decipher can feature only a few of the many exceptional CI projects each year. This year's magazine highlights some new projects while also reflecting on past projects and accomplishments. Please enjoy this tenth volume of the *Decipher* magazine.

STAYING ENGAGED IN A GLOBAL PANDEMIC

As Clemson transferred to online learning in March of 2020, it was unclear how classes would continue or if Creative Inquiry projects would be able to continue their work remotely. Creative Inquiry projects inherently involve team interactions and the use of campus research and learning spaces. But as the COVID-19 pandemic and online learning continued through the 2020-2021 academic year, Creative Inquiry projects adapted and incorporated new, innovative ways to stay engaged. Given the considerable challenges posed by the COVID-19 pandemic, these and other Creative Inquiry projects persevered and thrived. Whether it was shifting how they engaged with their research questions, or developing initiatives in response to the pandemic, Creative Inquiry students and mentors continued to conduct research and engage in the world around them. The following are just a few examples of how projects adapted...

Stress, Behavior and Health

Hypertension, also known as high blood pressure, is a very common medical condition in the United States, with a variety of consequences for those affected. The Stress, Behavior and Health Creative Inquiry project led by Dr. James McCubbin in the Department of Psychology is studying behavioral factors in young adults that may serve as indicators for developing hypertension later in life. While specific indicators are still unknown, the team found that individuals with high blood pressure tend to have dampened emotional responses to positive and negative stimuli.



Grant Garrison, Rachel Demas and Rachel Basiura work with new software to assess emotional expression. Photo by James McCubbin

While unable to conduct research in-person, the team analyzed a 10-year-old dataset to identify potential relationships between the incidence of high blood pressure and dampened emotional responses in young adults. The team sent participants with high blood pressure a survey addressing risk behavior during the pandemic, such as how often the individual went outside for unessential items and how often they wore masks. Their preliminary findings indicate that participants with high blood pressure are more likely to engage in risky pandemic behavior.

Larsen Lab Book Club

Dr. Jessica Larsen in the Department of Chemical and Biomolecular Engineering mentors four laboratory-intense Creative Inquiry projects. When the pandemic hit, none of her students were on campus to perform research. Larsen realized that her students were missing out not only on research opportunities, but also on the social interactions that come with working as a team. She decided to start the Larsen Lab Book Club in order to give her students an outlet to continue to learn and connect with one another. They read The Tell-Tale Brain by V.S. Ramachandran since most of her Creative Inquiry projects focus on the brain.

The book club discussions proved helpful for the students' technical and social skills once they returned to the lab. Not only did the book provide a review of the brain, which is often rushed while they are working in the lab, but the group discussions also gave students a space to talk about the struggles they were facing during quarantine. The students' willingness to be vulnerable with each other enhanced their abilities to work together as a team.

Ice Cream Innovation

The Ice Cream Innovation Creative Inquiry project led by Dr. Johnny McGregor in the Department of Food, Nutrition and Packaging Sciences typically uses its food science background to develop new ice cream flavors and enhance frozen dessert technologies. The project partners with the '55 Exchange, Clemson's on-campus ice cream shop, and was preparing to launch a new brand of ice cream when the university shut down last March. Even though their ability to test new products was limited in the first stages of the pandemic, the team stayed engaged by switching their focus from the creation of new products to the marketing of their current products.

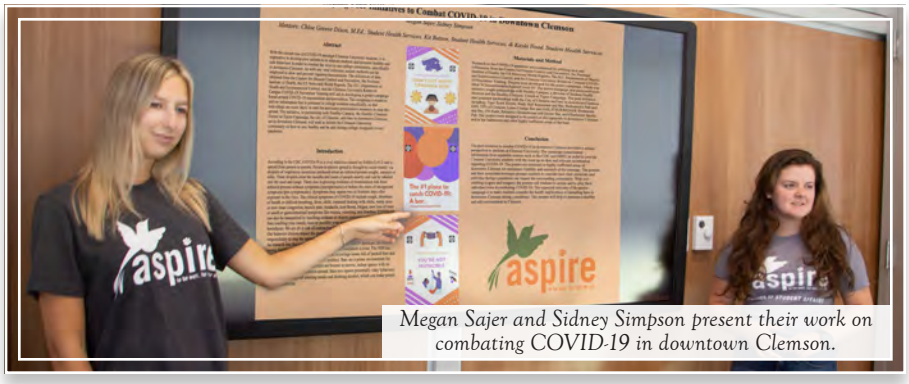
In the fall the team worked with marketing students to create a survey for the '55 Exchange's e-commerce customers. The goal of the survey was to understand consumer attitudes towards their e-commerce platform which allowed the team to suggest more user-friendly website revisions. The team will continue to use surveys to analyze the impacts of the pandemic on consumer behavior and small-business operations.

Colleen Blaine and Anna Nottonson collect votes to name the new ice cream flavor before campus closed.

Aspire: Peer Delivered Initiatives to Foster the Promotion of a Healthy Campus

All incoming students at Clemson are required to participate in The Aspire to Be Well program, a 90-minute, peer-led health and safety dialogue. The Aspire: Developing Peer Delivered Initiatives to Foster Promotion of a Healthy Campus Creative Inquiry project led by Chloe Greene Dixon, the Associate Director for Healthy Campus, continues to train facilitators and work on research projects in light of the pandemic. Currently, the team is raising awareness about safety measures and evidence-based initiatives in response to the COVID-19 pandemic in downtown Clemson.

Megan Sajer, a senior biological sciences major, and Sid Simpson, a senior language and international health major, collaborated during this socially distanced period to develop a poster campaign. The students used the information and initiatives established by the University to protect students, faculty and staff on campus to inform students and other patrons in downtown Clemson. They created posters with short, eye-catching slogans in hopes that visitors will read them and remember that their actions do have consequences.

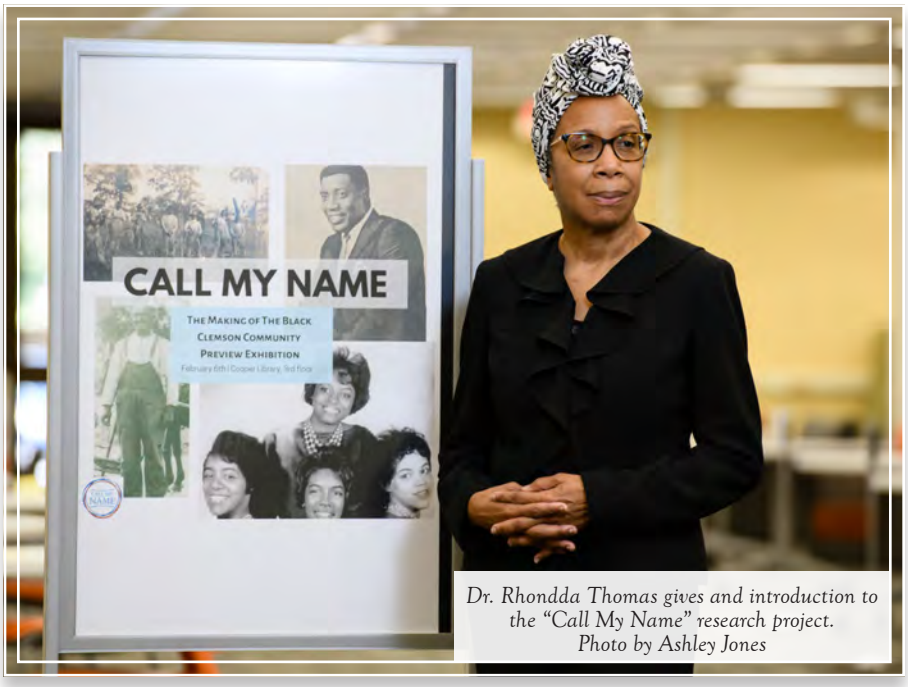


Megan Sajer and Sidney Simpson present their work on combating COVID-19 in downtown Clemson.

CALL AND RESPONSE

by Piper Starnes

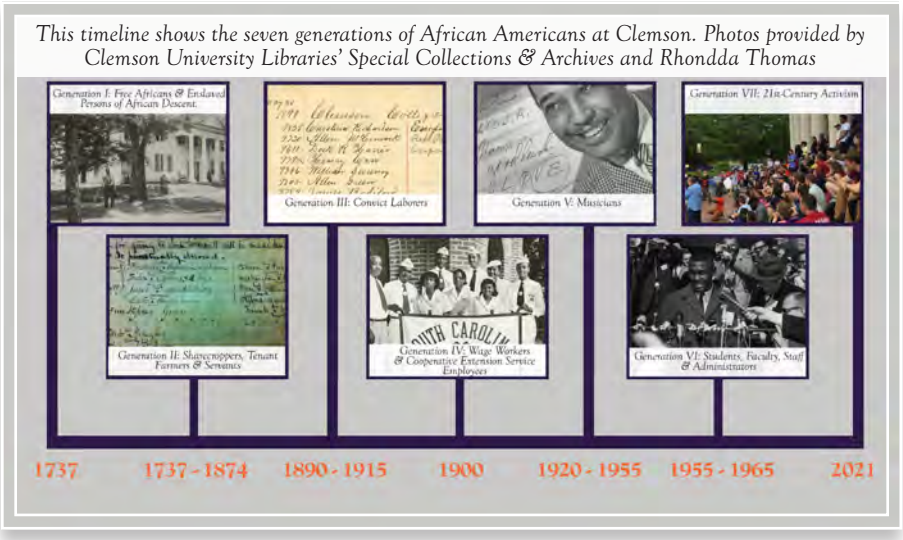
The Call My Name Creative Inquiry project, led by Dr. Rhondda Thomas in the Department of English, has uncovered seven generations of Black history on Clemson University's campus, from the first free Africans and enslaved persons of African descent in 1737 to the 2021 activists of today. The Creative Inquiry team is diligently researching, documenting and sharing stories and legacies that have been forgotten, silenced or lost.



Dr. Rhondda Thomas gives and introduction to the "Call My Name" research project. Photo by Ashley Jones

The project title, Call My Name, is reminiscent of the call-and-response tradition in African American culture of calling one's name to invite them to participate and engage in the conversation. By acknowledging Black people in Clemson's history, people will be contributing to the restoration of African American history at Clemson University. "Embracing the truth of history is important. We don't excise the parts out that are more difficult and painful. We want to tell whole stories as complete as possible," Thomas said. While it may be difficult to reach everyone, Thomas and her students are taking multiple approaches to share the Call My Name project with people of all backgrounds and interests.

This timeline shows the seven generations of African Americans at Clemson. Photos provided by Clemson University Libraries' Special Collections & Archives and Rhondda Thomas



One of the Creative Inquiry project's focuses is The Call My Name walking tour. In this tour students, faculty and community members learn the previously untold histories of 14 campus locations, including the Woodland Cemetery where hundreds of unmarked graves belonging to enslaved people, sharecroppers and incarcerated laborers lay. Beginning in the fall of 2021, the Call My Name Student Advisory Board will offer these in-person tours to continue sharing these buried narratives.

The Call My Name Creative Inquiry team is working to release an immersive learning application (app) in the near future. In the app, users can interact with text, graphics, videos and links to learn about people, places and events in Clemson's Black history and heritage. Other future events and exhibits include a traveling museum exhibition, 5k run/walk, theatrical play and more Black History month events.

This project allows students to think critically about the University's approach to inclusivity. "We use the words 'Clemson family' and 'Clemson legacy' a lot, and that's a great thing, but there are more stories than just those about the Calhoun family. This is about everyone—our family, our history and our legacy, so let's learn about it and talk about it," Sarah Ann Kenneson, a senior health science major, said. The opportunity to learn and reflect on one's place in the Clemson community is invaluable. "We [students] all live and exist here for four years, or longer, at Clemson University. It's important to know the history of what's here because history affects the present, and the present affects the future," Malaysia Barr, a junior communications major, said. By empowering people with the knowledge and awareness to become advocates for positive change, the Call My Name Creative Inquiry project fosters the public virtue of honoring each person's humanity, value and narrative.

Malaysia Barr speaks at a stop on the Call My Name tour. Photo by Sarah Ann Kenneson

Guests learn about the history of Sikes Hall from Jayda Hart during the Call My Name tour. Photo by Rhondda Thomas

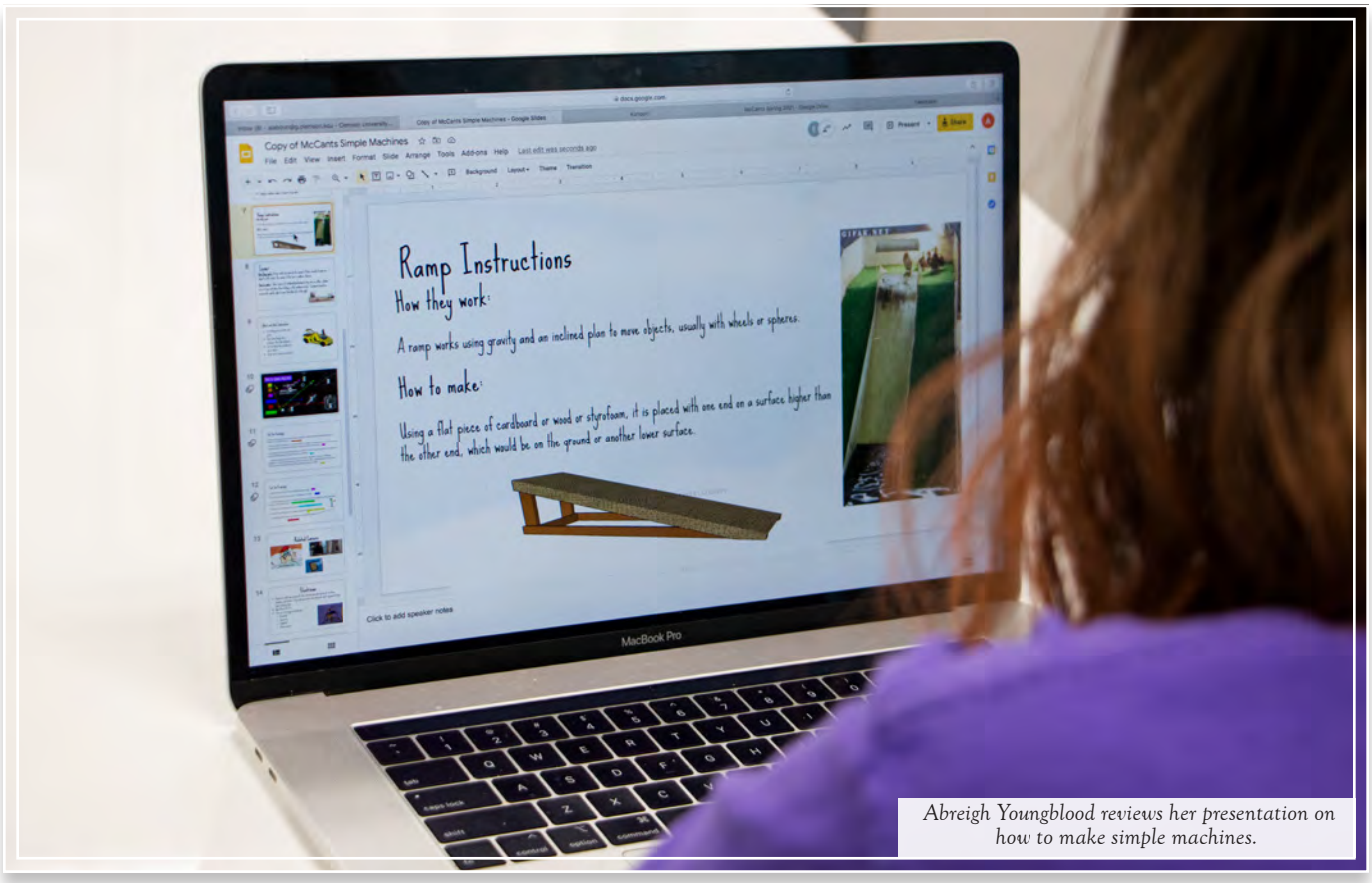
INVESTING IN OUR YOUNG SCIENTISTS

by Jordan Sims

For many students, especially those from lower-income schools, the sciences may seem to be challenging and unattainable fields of study. The Establishing a Clemson University K-12 Research Collaboration/CU INVESTors Creative Inquiry project, led by Jillian Milanes, a graduate student, and Dr. Meredith Morris, both in the Department of Genetics and Biochemistry, aims to combat this misconception by giving middle and high school students in low income school districts the opportunity to participate in scientific experiments led by the Creative Inquiry students.

Evan Hulst teaches middle school students basic principles of physics using a clothespin car.

Originally the team visited Richard Northeast High School in Columbia, SC, but they soon realized that they could make a bigger impact by engaging with middle school students. The team now collaborates with Lakeview Middle School in Greenville, SC and McCants Middle School in Anderson, SC. The team visits classes once a month to teach lessons and engage the students in hands-on experiments to hopefully encourage their interest in pursuing careers in science. By using the video conferencing software ZOOM™, the Creative Inquiry team continued its relationship with the middle schools throughout the COVID-19 pandemic. The Creative Inquiry students coordinated with the teachers to plan experiments for their classrooms, then packaged lesson materials to send to the schools. During the lessons they met with the students on ZOOM™.



Abreigh Youngblood reviews her presentation on how to make simple machines.

Adapting to changing circumstances is not always easy. "One of the real strengths of CU INVESTors is that you do fun experiments with the kids and it gets them really into the material, but when we can't be in the classroom and do the experiments with them it's hard to get them invested in it," Evan Hulst, a senior genetics major, said. Despite the barriers, the Creative Inquiry team continually worked to improve the way they engaged with the middle school students. According to Morris, the Creative Inquiry project was nearly put on pause for the year, but the students felt driven to continue. "I think it gives the [Creative Inquiry] students experience in running their own program. I mean, they are doing everything, and they are really invested and engaged," Morris said. With such dedication, the CU INVESTors are truly "**INV**esting in **E**xcellence in **S**cience and **T**echnology" while reinforcing that the middle school students have the skills they need to be successful as scientists.

A virtual meeting with a group of middle school students.

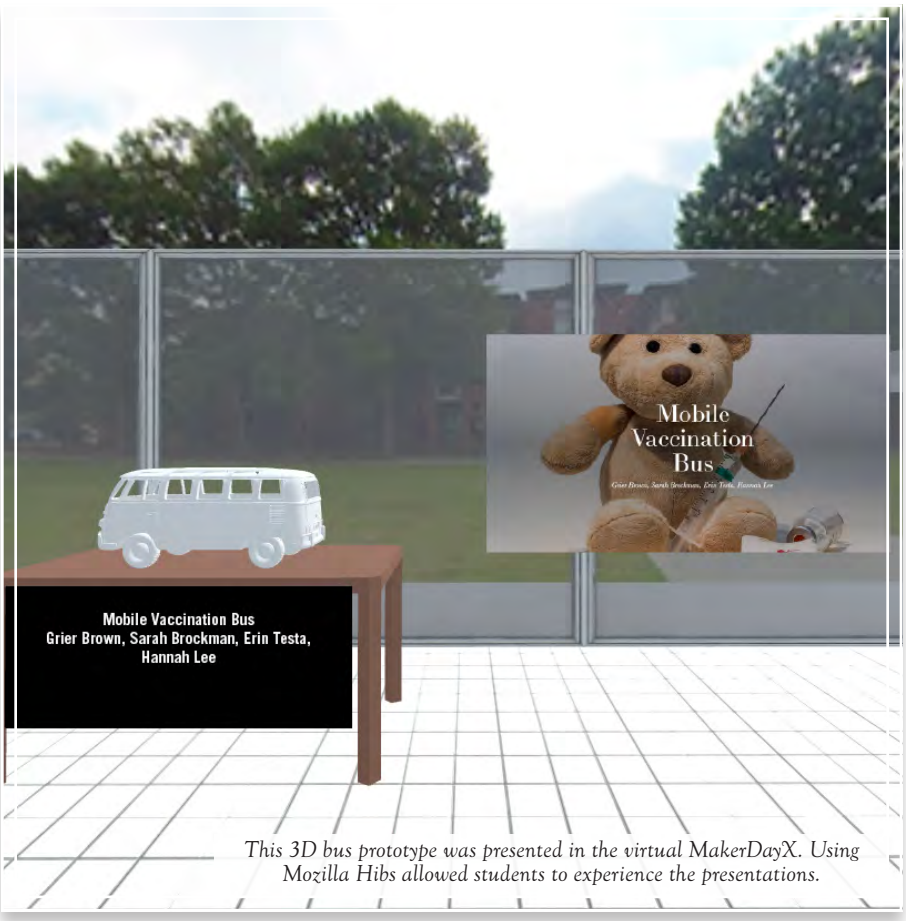
Jordan Sims - Editor

Jordan is a junior English major with a creative writing minor from Mount Pleasant, SC. She enjoys exploring Clemson's beautiful scenery and can usually be found with a book in her hand.

BEHIND THE SCENES OF THE MAKERSPACE

by Emma Williamson

Makerspaces on the Clemson campus offer students, faculty and staff opportunities to take an idea all the way from concept to delivery. The Researching the Need for and Development of an Undergraduate Network for Innovation and Marketable Skills (NIMS) Creative Inquiry project, led by Dr. Barbara Speziale, Associate Director of the Watt Family Innovation Center, focuses on creating opportunities for students to collaborate and showcase their products.



This 3D bus prototype was presented in the virtual MakerDayX. Using Mozilla Hibs allowed students to experience the presentations.

The project began in 2016, driven by a group of undergraduates whose initial focus was to network and bring together all the makerspaces and maker-oriented organizations on campus. The Clemson Makerspace, located in the Watt Center, was the hub of activity, but in the process of identifying and communicating with all the 'maker' groups on campus, the team realized Clemson needed more dedicated space for student makers. The team submitted a proposal to the administration to remodel a portion of the Hendrix Center into a large, student-focused makerspace. Though that proposal is still pending, the team gained valuable experience in developing the plan, from learning to think about budgets to conferring with architects and planners.

One of the ways the team continues to bring makers together is through the biannual MakerDay, an event open to all makers to showcase their work at the end of each semester. The NIMS Creative Inquiry team organizes the event in collaboration with the Watt Center. The students contact and coordinate with student organizations, classes, potential donors, faculty and individual students to recruit projects for display. They also secure the location and advertise the event to attract a broad audience. The first event attracted more than 200 students, and each subsequent MakerDay seems to attract more.

Though the team could not host MakerDay in the spring of 2020, they were able to pivot their platform to host a virtual Fall 2020 MakerDay for students to connect and share their projects. The challenge in offering a virtual event was to determine how to make it as exciting to attend as an in-person event—they decided that Mozilla Hubs was the answer. This platform allowed the students to create unique, virtual rooms and organize them according to project, major and/or organization. Attendees created their own avatars to virtually walk around, which allowed participants to have a similar experience to an in-person event. The virtual event allowed the participants to present in more creative ways than in previous events: virtual reality, 3D models, videos, pictures and websites. The 3D models were popular as they allowed participants to walk around and view them from all sides.

The NIMS Creative Inquiry project might focus on student-driven innovation, but it also builds student's business sense, preparing them for the professional world. "The biggest skill I got was the confidence and ability to have an idea, write a proposal for it and shamelessly shop it around," Owen Phillips (Computer Science '19), a former member and current Amazon Web Service professional, said.

The Baja car was built by students and presented at MakerDay 2018. Photo by Caroline Herring

CHECK IT OUT!

The virtual MakerDay space is still open! Scan this code or visit cumaker.space/makerdayx to access the space and view the MakerDay projects.

HOLISTIC HEALTHY LIVING

by Piper Starnes

The Creating a Health Hub for SC Rural Communities: Prosperity, SC Creative Inquiry project is feeding minds and bodies with education and nutrition. The project is led by Dr. Kirby Player, Coordinator of the Palmetto LEAF (Leadership for the Environment, Agriculture and Forestry) program and lecturer in the Department of Agricultural Sciences. The team is collaborating with non-profit organizations and community members in Prosperity, SC to develop a 2-acre plot into a wellness park to encourage healthy living in the rural area. This project is supported by the Carr Family Endowment, a gift from the Carr family to support Creative Inquiry projects in agricultural and rural economic development (see more on pg. 54). Development of the wellness park and related activities are coordinated through the Living Water Foundation and in cooperation with the adjacent Lovelace Family Medicine Center.

While recognizing the value of modern medicines, this Creative Inquiry team wants the community to learn additional ways to stay healthy. This led them to take a more accessible approach with holistic health—the practice of basing a medical diagnosis or treatment method on an individual's diet, exercise routine and overall lifestyle. "The benefits of this kind of healthcare include physical activity, improved mental health and community betterment," Player said. The Living Waters Foundation Wellness Park plan includes a community garden, health education center, walking trails and green spaces to promote holistic health. Guy Best, a sophomore biological sciences major, joined this Creative Inquiry project to experience a unique research opportunity before applying to medical school. "This project, which also allows for interaction with Dr. Oscar Lovelace, a 1982 Clemson alumnus, provides a learning opportunity for those interested in the medical profession," Best said.

Reagan Ross discusses her experience working in the community garden with the new members of the CI team.

To prepare for the park's programming, Reagan Ross, a senior food science and anthropology double major, interned with the Living Waters Foundation in the summer of 2020 to further the project's progress. Ross researched community capacity building and conducted ethnographic fieldwork. "[This work] determines what the communities' social perceptions of the garden are, and how they are reflected from a socio-economic standpoint," Ross said. Understanding these relationships within the community will help sustain the collective participation in the wellness park's programming.

When designing and managing a garden, there are challenges to consider, including how to keep out unwanted visitors such as white-tailed deer. The team is developing a barrier system to prevent the deer

CLEMSON CREATIVE INQUIRY
CARR FAMILY ENDOWMENT

This project was supported by the Carr Family Endowment. To find out more about the Endowment, visit page 54.

from eating the garden. "Often, it is very easy to overlook the importance of wildlife and wildlife management to the community. As someone who is knowledgeable in this area, I have been able to help come up with ways to help exclude deer from the garden," Anaston Broom, a graduate student assistatnt in agricultural education, stated. "By placing two fences four feet apart, deer damage is less frequent, but financing the fence and other park features are bigger challenges," Broom said.

The Creative Inquiry team anticipates offering many program options to improve nutrition and health education literacy in the future. Amanda Sanko, a sophomore biological studies major, expressed intentions to incorporate cooking classes, gardening workshops as well as other opportunities. "I think this is a really interesting part of the project because it will not just promote eating healthy, but also show people how they can do it," Sanko said. The team hopes their work will help improve the health of the rural community, potentially contributing to positive economic development. With time and nurturing, the seeds planted by the Creating a Health Hub for SC Rural Communities Creative Inquiry team will grow into a sustainable, healthy community.

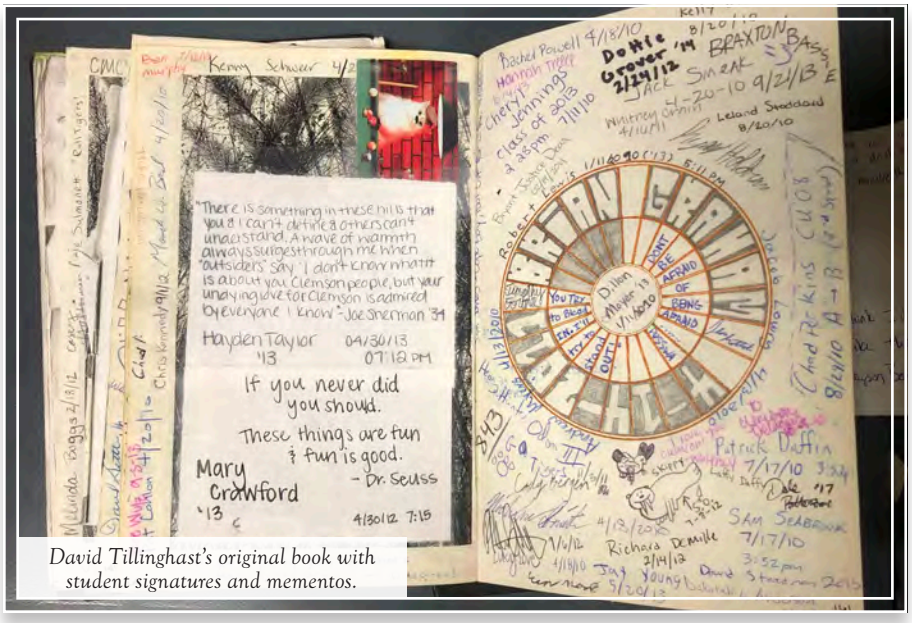
CONCEPT ART OF THE COMMUNITY GARDEN'S SECTIONING, ALONG WITH PLACEMENT PLANNING OF PRODUCE

Image created by CMW Design Strategies LLC, March 2018.

THE SECRET BOOK

by Amy Maistros

Many seniors left their last semester of college in 2020 without the time-honored traditions that those before them hold dear. At Clemson, one of those time-honored traditions is The Secret Book, an unofficial time capsule. Traditionally, this book is in the library and seniors write personal messages, draw doodles or do whatever else they can think of in its pages. When campus closed, many seniors did not get the chance to leave their mark in The Secret Book. The Implementation of Public Art for the Clemson University Campus Creative Inquiry project, led by David Detrich, Denise Woodward-Detrich and Joey Manson from the Department of Art, has given that opportunity back to students by making The Secret Book digital.



David Tillinghast's original book with student signatures and mementos.

This Creative Inquiry project, also known as Atelier InSite, is responsible for several art installations on campus. In 2014, they installed their first—The Clemson Genus Project. The Clemson Genus Project consists of 600 individual paintings, each embedded in petri dishes that line the walls of the Life Science Facility. They also installed works in Lee Hall III, outside CORE campus and outside the indoor football complex. In the fall of 2019, the team turned its attention to the artistic work within The Secret Book. Since students could not go into the library and contribute to The Secret Book, the Creative Inquiry created an easy way to access and add to a new, digital platform. To start, they setup an Instagram account and a Google Form link. Anyone can contribute something to the Pandemic Edition of The Secret Book.

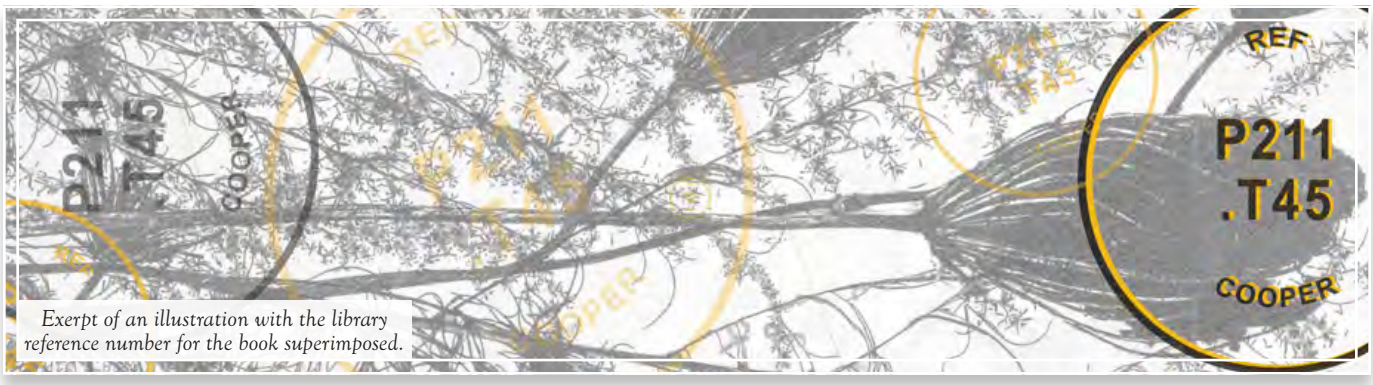
Casey Pearce - Chief Graphic Designer

Casey is a junior architecture and history double major from Chicago, IL. When not in the studio, Casey enjoys hiking, swimming and exploring the Upstate.

With the mystery surrounding The Secret Book gone, since it is no longer a secret, students are discussing what defines the book. Ross Mackenzie, a senior architecture major, thinks that The Secret Book is much more than the sum of its parts. "It has something to say about the Clemson experience overall, it's something unique to the University," Mackenzie said. Many members of the team felt that secrecy was not the point of the book either, but rather an element that keeps the time capsule alluring to students over the years. "I think for me, regardless of whether or not the book is secret, the book is kind of meant to be seen," Susan He, a junior architecture major, said.

The creativity of this Creative Inquiry team is a reminder that Clemson students can make something beautiful together, even when they are far apart. Thanks to their hard work, Clemson students can preserve and build upon their collective creativity and spirit regardless of time or place. All a student needs to do is discover Clemson's open-source secret.

Laurel Massey holds her own submission to The Secret Book. Photo by Meredith McTigue



Exerpt of an illustration with the library reference number for the book superimposed.

GETTING THEIR FEET WET

by Amy Maistros & Allie Cheves

As students enter college, they are often expected to pick a major and thus establish a trajectory for their lives despite their lack of experience. The What's in Our Waters Creative Inquiry project, in the Department of Biological Sciences, seeks to demystify the field of environmental science for pre-collegiate students by teaching them to observe and analyze local natural habitats. This Creative Inquiry project was founded by a group of graduate students; the current team of undergraduates is led by Stephanie LaPlaca, a graduate student in the Department of Biological Sciences.

Aliyah Charlot prepares a water sample for testing.

The What's in Our Waters (WOW) Creative Inquiry project utilizes a community-based science approach to engage pre-college students and community partners through the Adopt-A-Stream network. The WOW team teaches local students about the importance of macroinvertebrates in aquatic systems and how to test local streams to assess water quality. The Creative Inquiry team helps the local students to make final presentations based on their findings and to share their results with Adopt-A-Stream. Engaging young students in hands-on field studies makes learning the scientific process a fun, interactive and personal experience. Traditionally the WOW project works with middle and high school classes but broadened their audience during the COVID-19 pandemic to include other groups such as Boy Scouts of America troops.

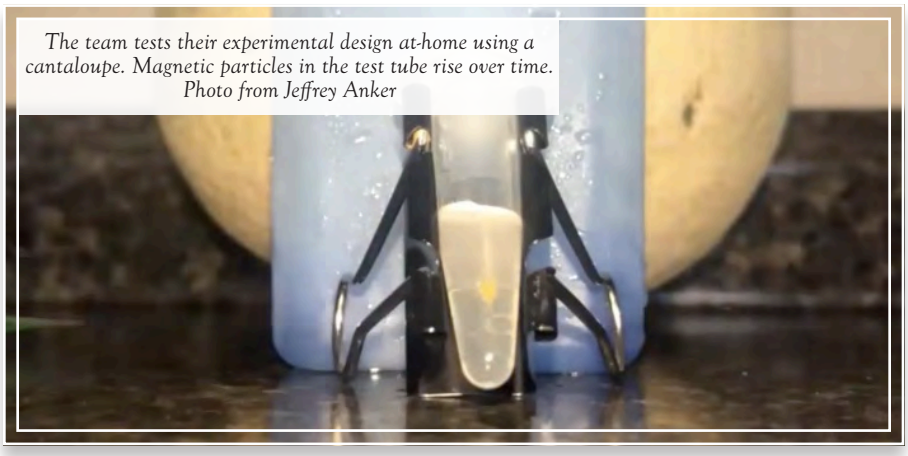
LaPlaca attributes part of her passion for science to having similar experiences as a child. "My passion for all this stuff started way back when I was a kid, when I went to a state park program called Critter Crawl. When I was 10, I had no idea I was doing macro[invertebrate] testing, but it's crazy that that stuck with me," LaPlaca said. The Creative Inquiry team hopes to create similar experiences and to thus cultivate enthusiasm for science among our local youth.

KITCHEN TABLE TEST TUBES

Developing COVID-19 tests from home

by Jordan Sims

Over the past year, many Creative Inquiry projects began conducting research in the homes and dormitory rooms of students, due to social distancing requirements imposed by the COVID-19 pandemic. Some of these projects addressed pandemic issues, including the Rising to the COVID-19 Challenge with Buoyant and Magnetic (BAM) Assays Sensitive, Rapid, On-site Testing in Saliva Creative Inquiry project, led by Dr. Jeffery Anker from the Department of Chemistry.



The team tests their experimental design at-home using a cantaloupe. Magnetic particles in the test tube rise over time. Photo from Jeffrey Anker

This Creative Inquiry project originated from the 2020 Clemson COVID Challenge (CCC), a virtual research and design opportunity for undergraduate teams to work on projects related to the COVID-19 pandemic. They aim to create a COVID test that can accurately and immediately detect the virus in saliva. The team utilizes BAM beads to locate the presence of the viral proteins. The quantity of beads that rise and fall indicate whether the test is positive or negative. The team is currently working on creating a test strip that will release BAM beads into saliva samples.

Conducting this research at home is not easy. "The biggest challenge to making this work smoothly as a research project is the distance. Everyone is working on their own, putting things together at their house and it makes it a little bit harder," Anker said. The remote work makes it difficult for the team to develop a uniform methodology for their experiments, and for students to ask questions and trouble-shoot issues.

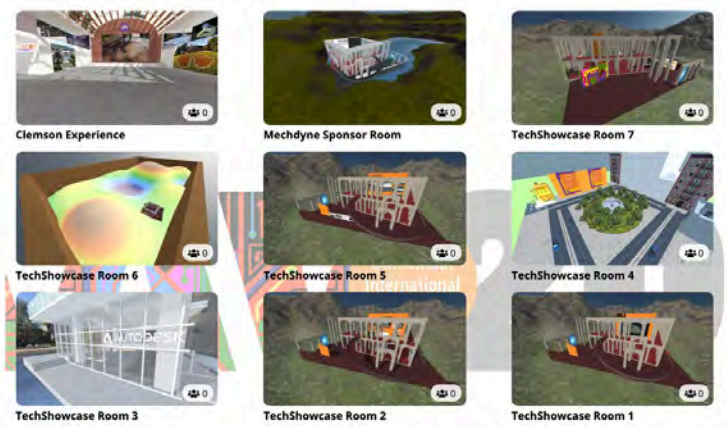
Despite the challenges, at-home research pushes students to take control of their learning. Madison Motes, a senior chemistry major and founding team member, continues to work diligently on the project. "It was a lot more personal than I was used to it being. I am a chemistry major so I've been in lab a lot. It was interesting at home, we really got to do everything ourselves and figure out our own questions," Motes said. With less in-person mentoring, students identify and find their own solutions. Working from home opens the project to non-traditional researchers. "What was really awesome was, I live at home with my parents, and they were actually able to work on the project with me. That was fun. We had friends and family coming in and commenting on it a lot which was really different," Motes said. Motes' experiments were set up on the kitchen counter and, because of this, her parents and friends were able to engage in the work with her. In a normal semester the process of student research is not always intimately shared with family and friends, but remote research provides that opportunity.

Though their work is in its infancy, the team's progress is impressive. Their perserverance has brought them closer to their goal of developing a COVID test that will help Clemson and the world stay safe and healthy.

PUBLIC SPACE IN COVID-19

by Emma Williamson & Matthew Harrington

Throughout the year 2020, the Clemson community experienced a new and unique way of life. From having groceries delivered to front porch steps to attending college classes from bedrooms, the COVID-19 pandemic has catalyzed a different way of interacting with each other and with spaces. The Public Space in the Age of COVID-19: CAAV5 Conference Creative Inquiry project, led by Dr. Winifred 'Elysse' Newman in the School of Architecture and Nathan Newsome, VR Research Associate with the Watt Center, arose from these recent changes in social interaction.



This screen capture of CAAVCon.com shows all of the meeting rooms and technical showcases created for the conference.

An important aspect of education for college students is the experience they gain from being in a collaborative space where they can ask questions and get information from those that are around them. This experience is exactly what the Creative Inquiry project recreated while they developed an online platform for a professional conference. Through the use of Mozilla Hubs, the team designed and implemented a virtual space to host the 2020 CAAV5 Conference. The Campus Alliance for Advanced Visualization (CAAV) is an annual conference and a perfect conference to host virtually.

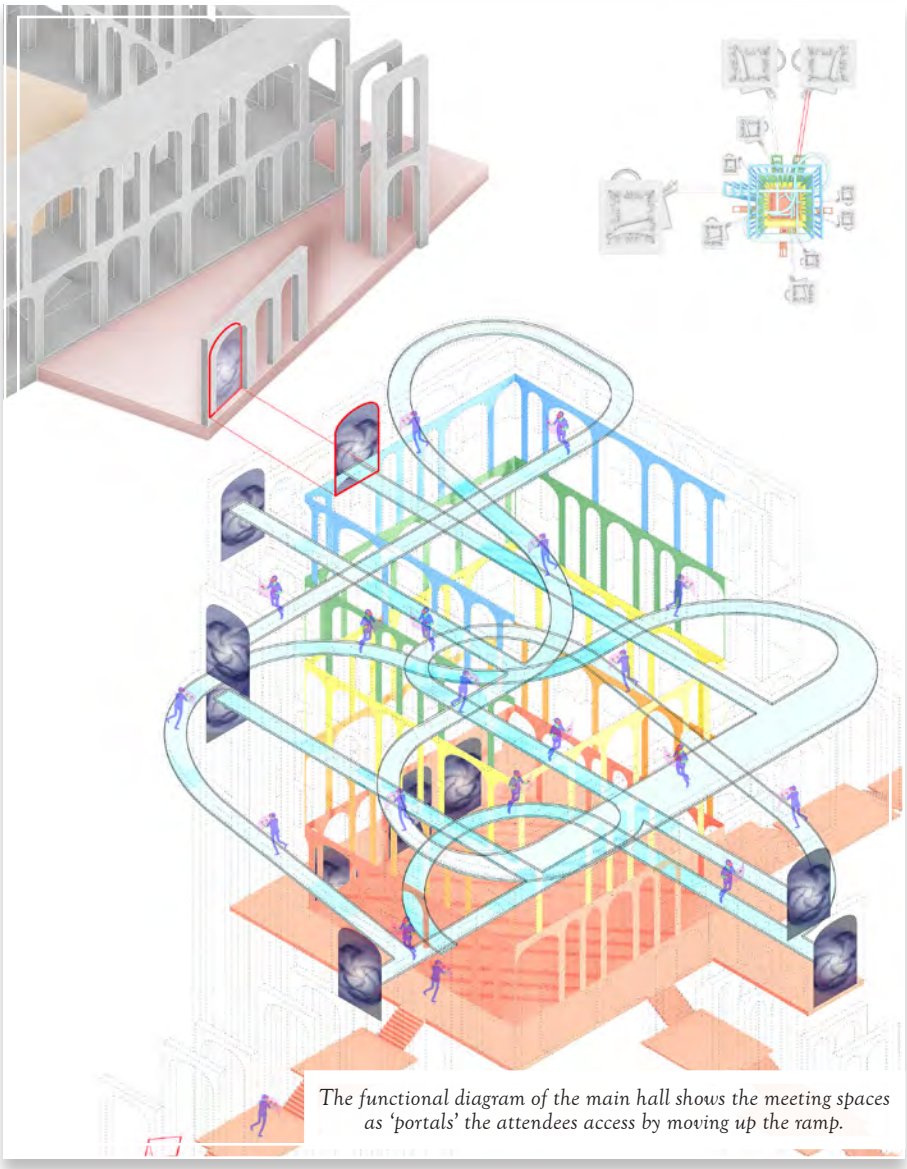
The team used Mozilla Hubs to design unique display rooms for each project presented at the conference. They enhanced the space by incorporating engaging activities such as photo walls and lounges for participants to discuss their work with other attendees. Post conference, the Creative Inquiry team assessed the attendees' experience at the conference compared to an in-person event.

Emma Williamson - Assistant Editor

Emma is a junior architecture major with a psychology minor. She spends most of her week working on designs in the studio, but enjoys baking, swimming and hanging out with friends in her free time.

In order to effectively translate a physical space into a virtual one, the students needed versed in the virtual world before they could approach their design. With the ability to engage in a virtual space in ways that one normally cannot in reality, the team quickly realized that their conference space did not have to strictly adhere to the physical limitations of reality to be efficient and user-friendly. For instance, the team experimented with different ways that attendees could navigate between rooms in the virtual conference—something not normally considered in the design of a physical space where a door will suffice. However, bending too many of these rules could spell trouble, as well. "Our question was how many of those [rules of reality] need to track… so that the user still projects themselves into the space as though they're in their body," Newman said.

The Public Space in the Age of COVID-19: CAAV5 Conference Creative Inquiry project successfully made the conference a positive, engaging experience. The team hopes their design inspires others to create similar experiences and spaces in future virtual, online and in-person settings.

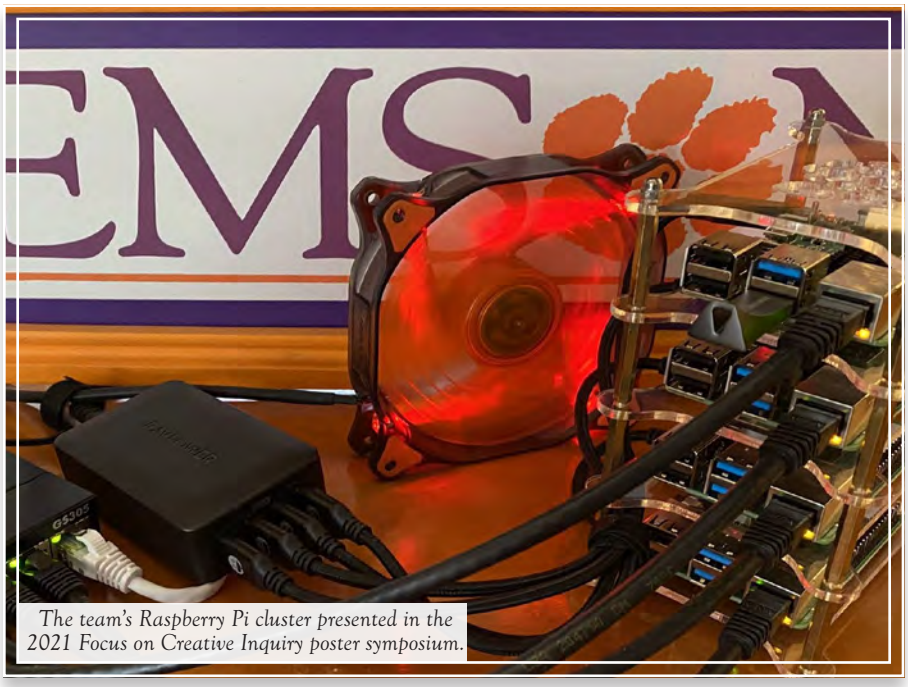


The functional diagram of the main hall shows the meeting spaces as 'portals' the attendees access by moving up the ramp.

COMPUTING WITH RASPBERRY PI CLUSTERS

by Piper Starnes

In the age of rapidly advancing technology and ever-increasing access to information, computers have the ability to solve problems and assist with countless tasks. From most users' perspectives, a simple click of a mouse or tap of some buttons answers their questions, but what the users do not see is the complex computational science that facilitates the efficient operation of these applications. Dr. Jon Calhoun from the Holcombe Department of Electrical and Computer Engineering leads the High-Performance Cluster Computing Creative Inquiry project to engage Clemson undergraduates with these advanced computing processes.



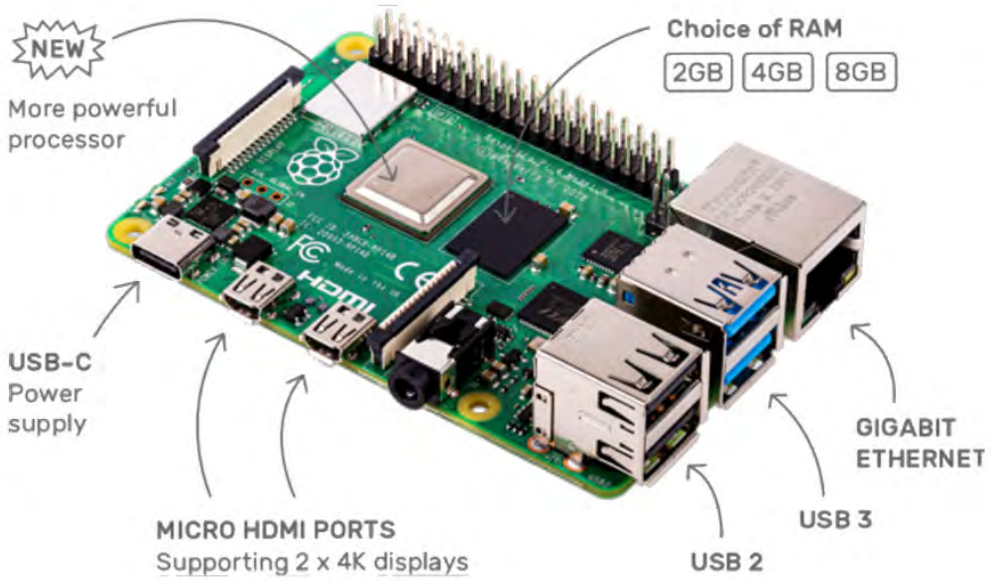
The team's Raspberry Pi cluster presented in the 2021 Focus on Creative Inquiry poster symposium.

High-performance computing combines the power of a cluster of computers, a supercomputer, to process data and perform calculations. Cavender Holt, a senior computer engineering major, explains how solving complex research problems takes an incredible amount of computational power and resources. "[The tasks] are really hard to compute, but if you can break that task down into a bunch of small tasks, which you can do all at the same time, you can get your results a lot faster," Holt said. "This process is known as parallel computing," Cooper Sanders, a sophomore computer engineering major, said. The project uses an array of small, low-cost Raspberry Pi computers. The Raspberry Pi cluster simulates what a supercomputer can do, but on a smaller scale and at a fraction of the cost.

Piper Starnes – Writer

Piper is a junior performing arts major with a focus on music and minors in film studies and writing from Tega Cay, SC. She also writes for the Brooks Center's *Expressions* newsletter to prepare for a career in arts administration or publishing. When she is not writing or practicing piano, Piper is likely reading a murder mystery novel with a cup of coffee.

With these clusters, students explore and experiment with software configurations and high-performance computing applications, ultimately preparing for the 2021 Student Cluster Competition, an event held at the International Conference for High Performance Computing, Networking, Storage and Analysis in St. Louis, Missouri. During the competition, the team's clusters will be evaluated on their speed and accuracy of performance by a benchmark application called LINPACK. "The applications that they are using are applications that scientists and researchers at other universities, in the industry and at national labs, use in their daily lives," Calhoun said. John Hollowell, a computer science graduate student and former participant in this Creative Inquiry project, has already seen how the team's research applies to the real world with his part-time job in cybersecurity. Hollowell is enthralled by what parallel computing can do, "[parallel computing] enables research that we've never been able to do before. Everyone in some way is going to be using or influenced by parallel computing," Hollowell said. From YouTube video recommendations to weather predictions to life-saving medical research, parallel and high-performance computing are becoming more widespread across all fields of science. "For cutting edge science and engineering research, the supercomputer is the scientific instrument of the 21st century," Calhoun said. With the experience gained from this Creative Inquiry project, these Clemson students have the tools necessary to compute at an advanced, high performance level and solve the world's most complex issues.



The team uses the Raspberry Pi 4, shown here. Image from raspberrypi.org

HIDE AND SEEK

Tracking snakes in the Appalachians

by Piper Starnes

There are more than 3,000 snake species on earth, dwelling in deserts, wetlands, mountainous regions and almost everywhere in between. They slither on land, swim in water and burrow underground. Perceived to be sneaky and secretive animals, snakes generally remain unnoticed. The Landscape Ecology and Conservation in the Appalachians Creative Inquiry project, led by graduate student Bryan Hudson and Dr. Kyle Barrett, both in the Department of Forestry and Environmental Conservation, studies amphibian and reptile responses to large-scale stressors such as climate change and land use change. Currently, the team's focus is on the elusive pinesnake, *Pituophis melanoleucus*, and the Eastern kingsnake, *Lampropeltis getula*.

Jonathan Witt handles a pinesnake during monitoring. Photo by Bryan Hudson

When Hudson joined the Barrett Lab, he was excited to have the opportunity to engage undergraduates in research. "I was thrilled to provide my own spin on the CI," Hudson said. Barrett has been impressed with Hudson's leadership and enthusiasm. "It's easy to lead a fun CI when everyone is out in the field together, but Bryan has had to adapt to restrictions associated with COVID-19. In response, he's developed engaging and informative videos and kept the class a great experience for our undergraduate researchers," Barrett said. Mackenzie (Mac) Barrett, a junior wildlife and fisheries biology major, thinks the experience is formidable. "It has not only shown me what a possible career in my field looks like, but also taught me so many hands-on skills that traditional courses wouldn't," she said.

The team is investigating the effects of land use land cover (LULC) on snake movement, disease and population genomics. Pinesnakes are difficult to find because they can travel long distances over short periods of time, but the students are able to track their movement using radio telemetry. When they capture a new snake, the team attaches a transmitter which enables radio signal transmission from the transmitter to a receiver. This allows the team to locate the snake for continuous data collection. The students in the Creative Inquiry project are gaining valuable experience in wildlife and ecology field methods by learning techniques for surveying and monitoring cryptic species such as the pinesnake.

Given this species' elusive nature, it is not a surprise that the team is collecting some of the first data on the effect of LULC on the pinesnake. "Some of the preliminary evidence that we are uncovering on pinesnakes in southern Appalachia is some of the only empirical data to exist for the species and is thus valuable to any agency tasked with making regional conservation plans," Hudson said. The team hopes their results will inform listing agencies and conservation planners of the significant role of pinesnakes in the ecosystem. "Snakes are simply another component in any functioning ecosystem. Understanding how they fit in is just as beneficial as understanding how we fit in," Hudson said.

Even though this research is powered by a team of Creative Inquiry students, anyone can help. The Barrett lab loves to hear of leads on snake locations. If you see a pinesnake or an Eastern kingsnake (a focal species in metro Atlanta, GA), please take a picture, mark the location and contact the Barrett Lab!

Mackenzie (Mac) Barrett and Henry (Jack) Robinson evaluate the microhabitat use of a pinesnake following a prescribed fire in the foothills of northeast Georgia. Photo by Bryan Hudson

Marc McCrary - Photographer

Marc is a senior visual arts major with an emphasis in photography. His main focus as a photographer is animal photography, and hopes to one day work for National Geographic. When not taking photos, Marc is usually at home with his German shepherd and husky.

CORPORATE CI

There is no 'typical' Creative Inquiry (CI) project. From the start of the CI program, projects have originated from many diverse sources, including from a professor's research, students' ideas, or observations of community or campus needs.

A founding tenant of CI is the intent to help Clemson students become better thinkers, leaders and entrepreneurs, to be able to approach a task or problem and figure out how to solve it—and to do so in a wide range of disciplines.

A Glimpse at Recently Supported Projects

In recent years, businesses have discovered the power of CI to develop talent, to attract interns and employees and to familiarize college students with the workings of their companies. The Corporate CI program allows industries to engage Clemson's creative, talented undergraduates in industry-relevant research projects.

The results benefit all. Students gain understanding of real-world topics and opportunities to network with potential employers. Companies gain visibility on campus, insights into selected project topics and relationships that help recruit interns and employees.

The ideal Corporate CI project involves open-ended topics that can be addressed over two or more semesters of iterative exploration, design, implementation and evaluation cycles.

CI and industry—a natural expansion for the inquisitive minds of Clemson students and a contribution to building the workforce of the future.

Dora Yang uses a 3D scanner to scan a piece of metal dented by hail. Read more about this CI funded by Ally Financial in Decipher 9, page 40.

CORPORATE CI SPOTLIGHT: SONOCO FRESH

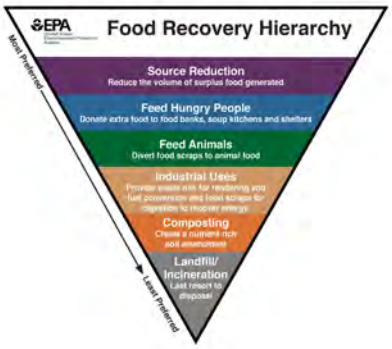
Thanks to a generous gift from the Sonoco Foundation in 2019, Sonoco FRESH (Food Research Excellence for Safety and Health) was established to drive solutions through faculty-sponsored research, Creative Inquiry projects and an annual Food, Packaging and Sustainability Summit.

With top academic experts involved in every step of the food value chain, FRESH serves as a catalyst and unifier on campus, working closely with external partners, for food waste and sustainability initiatives. Sonoco FRESH has thus far sponsored three Creative Inquiry activities (two projects and a COVID Challenge team).

Food Waste Recovery Initiative

2019 - 2020

Students were introduced to the Environmental Protection Agency's hierarchy of food recovery, and developed a guide on prioritizing activities to divert food waste from landfills. The Creative Inquiry team benchmarked Clemson's activities against practices at other universities to determine possible additional efforts.



The Impact of COVID-19 on Packaging, Safety and Food Waste

Clemson COVID Challenge Summer 2020

This virtual research and design opportunity allowed students to address problems related to safe, secure and sustainable packaging during a pandemic. McCall Farms, Titan Farms and Sonoco offered students real world insights to the challenges facing the food production and packaging industries.

Sustainable Packaging: Beginning with the End in Mind

2020 - 2021

This Creative Inquiry project examined the hurdles packaging materials present to the recycling industry and how to develop a truly sustainable/recyclable package. Then they reviewed current literature on sustainable packaging design and life cycle analysis and studied differences among the environmental impacts of various materials by learning and applying COMPASS life cycle analysis.

MAKERSPACES AND MODERN LEARNING

by Jordan Sims

Clemson's Watt Family Innovation Center is home to the Clemson Makerspace, a student created innovation space. The technology in the Makerspace gives students the opportunity to make their ideas come to life. The Makerspaces and Modern Learning Creative Inquiry project, led by Dr. Ryan Visser in the Department of Education and Human Development and Nate Newsome, Research Associate, in the Watt Family Innovation Center, is establishing the best practices for K-12 schools to develop and integrate makerspaces into their students' education.

A gift from the Sharp Foundation allowed this Creative Inquiry team to collaborate with The Steward School in Richmond, Virginia on a project of mutual interest—student innovation. Like the Watt Center, The Steward School is home to its own innovation space—the Bryan Innovation Laboratory, a space built to provide students with the opportunity to become better thinkers, innovators and problem solvers. The team used the school's innovation lab to identify needs in a K-12 makerspace and provide guidance as to the best uses of these spaces in K-12 schools.

The project's goal was to implement and establish best practices for three technologies at The Steward School: augmented reality (AR) and virtual reality (VR); computational thinking and coding robots; and 3D printing. The Creative Inquiry team met weekly, via ZOOM™, with teachers and student clubs that support each technology at The Steward School. Meeting with the Clemson team empowered the Steward students to pursue their own interests and dreams with the technology provided in the lab. "It's always nice to see students taking initiative and being very passionate and motivated about something they can make an impact on, and it's going to help them in the future in leadership, building that skill, learning to make connections," Yan-Jian Ni, a senior mechanical engineering major, said.

Tate Haraway explores the uses of virtual spaces for classrooms.

The Creative Inquiry team enjoyed working with the teachers, too. Visser hopes this project is a catalyst that encourages the teachers to further develop their skills and implement more new technologies into their classrooms. "We want to teach them the questions to ask, the process that goes into the purchasing of the equipment. It's not just going out and getting what's shiniest and newest. It's really considering your needs, the school's needs that is, and the students' needs," Visser said. Not only is this project empowering K-12 students to take initiative in their education, it's providing teachers with the resources necessary to build the spaces to do so.

A CI student demonstrates how to use VR controllers to students at Steward School in Richmond, VA.

"The Creative Inquiry program at Clemson is exactly what I was seeking while I was a student 25 years ago. A program that allows the mind to explore subject matter for which there is a natural inclination. But mostly, it is a safe place to fail. Notably in traditional academia where letter grades apply, versus merit for creativity and innovation.

The Sharp Foundation is excited to be a supporter of this program with the idea of bringing the program to middle and high school students."

- Craig Suro, Sharp Foundation

Katie Carey - Photographer

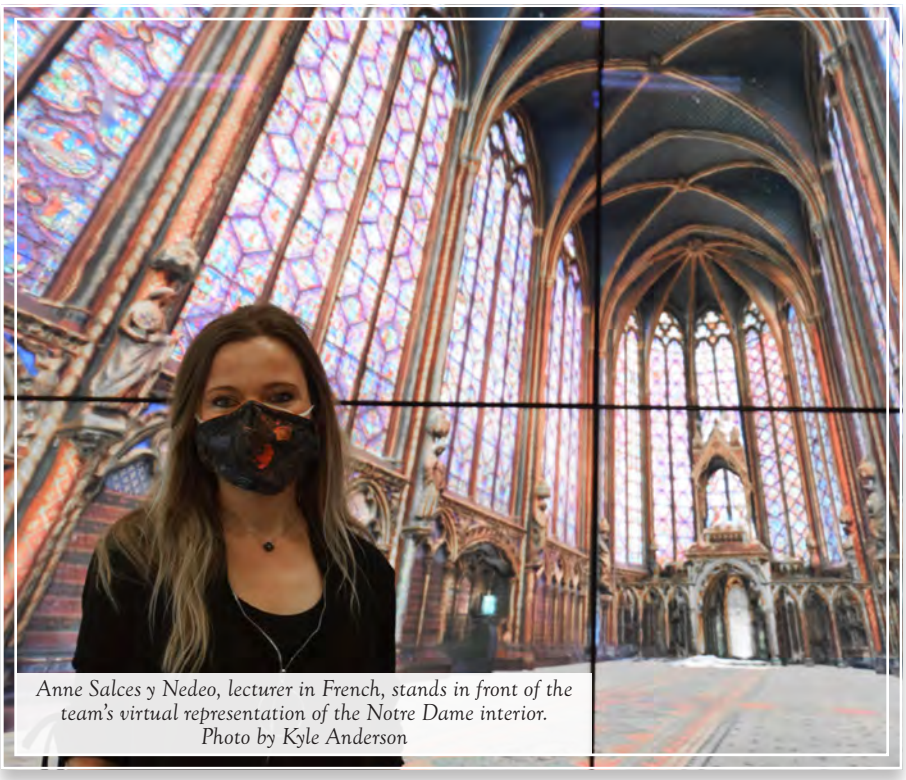
Katie is a senior visual arts major with an emphasis in photography. After she graduates from Clemson, her goal is to move to New York and work for a gallery or museum. In her free time, she likes to travel to cities she has never been to before, or stay in town to hangout with friends.

VIRTUAL REALITY

The future of global learning

by Jordan Sims

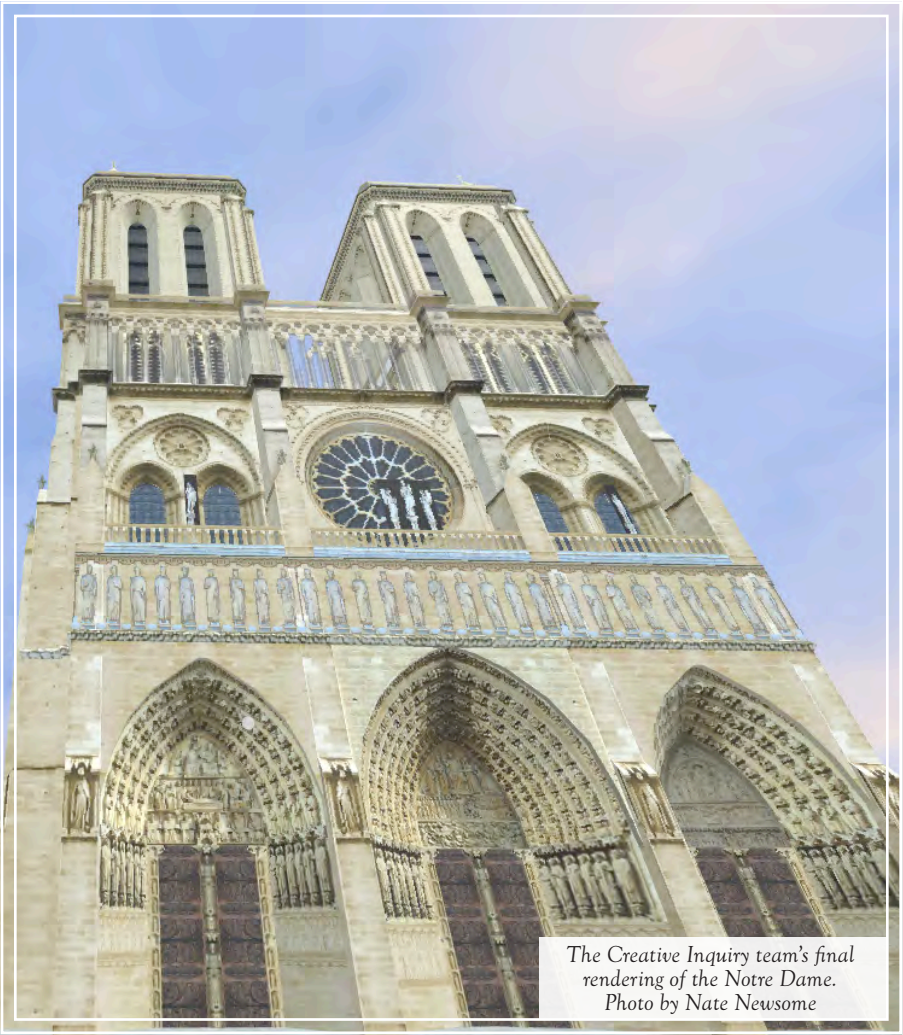
When countries shut their borders and universities sent their students home in March of 2020, it was clear that study abroad would not be a possibility for the foreseeable future. Thanks to the work of the Virtual Reality (VR) and Global Learning Creative Inquiry project, led by Dr. Kyle Anderson, Senior Director for Global Engagement, and Nate Newsome, VR Research Associate in the Watt Family Innovation Center, Clemson students are engaging in global learning environments without traveling out of the country.



Anne Salces y Nedeo, lecturer in French, stands in front of the team's virtual representation of the Notre Dame interior. Photo by Kyle Anderson

The Virtual Reality and Global Learning Creative Inquiry project began work during the 2020 Clemson COVID Challenge, a virtual research and design challenge which addressed solutions to problems related to the COVID-19 pandemic. The team's preliminary research determined that virtual reality is the best way to learn online as it creates an immersive experience that also helps to develop intercultural and communication skills that students miss from in-person study abroad. The team's proof of concept was a virtual reality model of Plaza St. Martin in Cordoba, Argentina. The team worked closely with administrators and students from the Universidad Blas Pascal in Argentina to identify which buildings to incorporate into the virtual reality environment. They selected structures with educational and cultural significance, such as the Cathedral of Cordoba and the State of General San Martin. Students entered the virtual reality environment to learn about the history of the buildings and the city, Argentinian cuisine and to practice speaking Spanish with their peers from the Universidad Blas Pascal.

After the COVID Challenge, the Creative Inquiry team established the VRMondi Global Learning Lab and completed a multi-room Paris environment for Clemson's French program. The Paris environment was launched in the Spring of 2021, allowing French professors to bring textbook descriptions of French history and architecture to life. The Creative Inquiry team is currently working with professors in Spanish and the Department of Biological Sciences to build new virtual reality environments to augment classroom instruction.



The Creative Inquiry team's final rendering of the Notre Dame. Photo by Nate Newsome

The expansion of the project gives team members, such as Michael (Mike) O'Brien, a junior computer science major, the opportunity to develop their professional skills. "One of the big things that Mike and his peers do—great practice for them in the professional world—is engaged in a provider-client relationship. They're consulting with the faculty member, asking 'What is it you want in your class that VR can provide? What global learning outcome do you want students to get out of their interactions in VR?'" Anderson said.

This Creative Inquiry project offers its team members the ability to step out of their comfort zones. "I've learned to really enjoy working with people and I think a lot of young kids would benefit [from] putting themselves out there and actually trying to work with other people. I went into computer science thinking 'I'm going to be alone, because that's what I want' and that was just two years ago. Now I have a completely different view," O'Brien said.

While virtual reality is a relatively new tool in higher education—an even newer one to global learning—educators and researchers are discovering many unanticipated benefits. Instruction in virtual spaces offers increased levels of immersion and interaction between students globally, makes intercultural experiences and foreign language practice more accessible and facilitates further development of communication skills. As technological applications in higher education continue to evolve, interacting with the world through virtual reality just might become a necessary hyperlink in the old, traditional textbook.

BLAZING NEW TRAILS

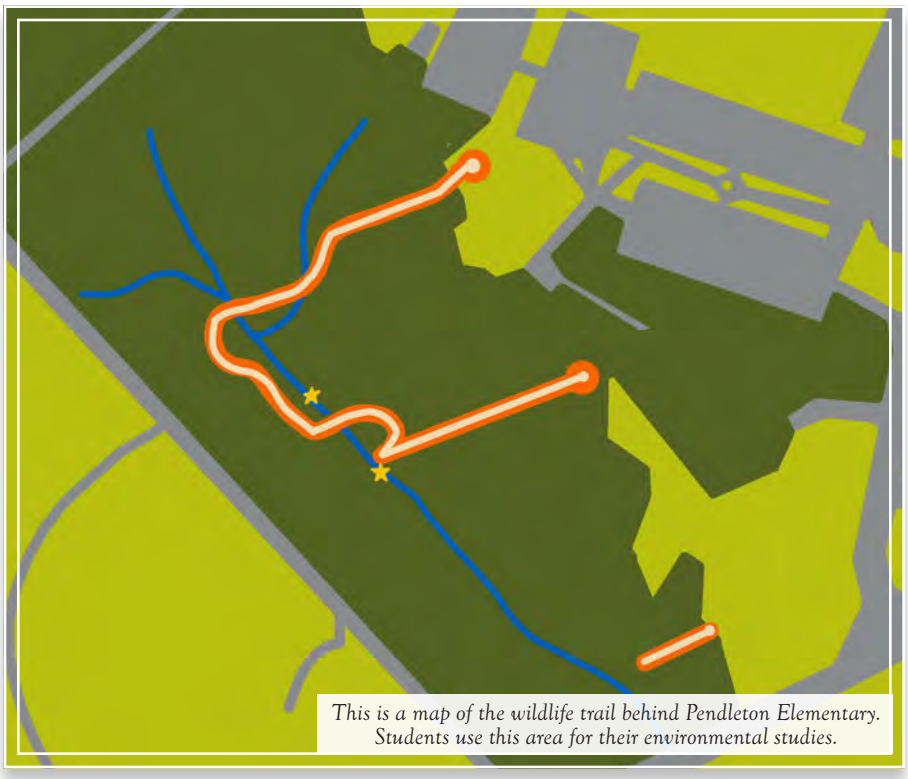
by Amy Maistros

The campus of Pendleton Elementary School in Pendleton, SC is home to a winding woodland trail. At first glance, it is easy to dismiss the path behind the school as a superfluous feature, perhaps used for laps during gym class on sunny days. However, the South Carolina Natural History Schools Outreach Project Creative Inquiry team led by Heather Wright, a senior computer science major, and Dr. John Wagner, Professor Emeritus in the Department of Environmental Engineering and Earth Sciences, knows that learning takes more than textbooks in a classroom. Using the trail, they take the learning outdoors as they study, survey and map the surrounding woods and its inhabitants. They use trail cameras to monitor wildlife and chemical tests to assess stream quality. They also investigate distributions of plant communities and survey populations of amphibians and macroinvertebrates living in the stream. The ultimate goal of the project is to engage the elementary students in hands-on environmental studies by designing lesson plans that provide fun learning experiences using the ecosystems in their own backyard.

Students and teachers from Pendleton Elementary in Pendleton, SC explore their nature trail with the CI team. Photo by John Wagner

The South Carolina Natural History Schools Outreach Project is one of the oldest Creative Inquiry projects—16 years of work with elementary through high school students and teachers in South Carolina. Accomplishments range from the Pendleton nature trail, which has been the primary focus of the project for the last seven years, to teaching students how to geocache and designing virtual field trips so teachers can highlight local sites of environmental interest. Previous undergraduate participants have prepared interactive lessons on topics from nuclear waste disposal to global warming and climate change. "It's a mission of sorts for me to make education accessible and local for students to use. Before these children begin middle school, this is a blank slate for them to learn, make connections and build a positive perception of school. That's something I really want to invest in," Connor Moore, a senior mathematics student, said. The COVID-19 pandemic introduced new challenges, but this team has remained motivated to make natural history research and activities accessible to Pendleton Elementary through engaging, virtual lessons and an interactive website. "The students really enjoyed seeing a 'real, live scientist' conduct an experiment here at Pendleton," Stephanie Brothers, a teacher at the school, said. Even without the option of traditional on-site field trips this year, the Creative Inquiry team has found ways to entertain and engage the students just as effectively as they had in previous years.

What might first appear to be just a nature trail along a small stream has rippled out into a multi-year enchanting and enjoyable experience for students and teachers alike, all thanks to the Creative Inquiry team. The dedication to exciting and innovative teaching has given Pendleton students a greater understanding of their environment through fun activities and has given the Creative Inquiry team invaluable teaching experience. No one is more passionate about this cause than Wagner. Despite retiring in 2010, he has continued to mentor undergraduate students through the generous support of his department chair, Dr. David Freedman. Wagner has long been a strong proponent of place-based learning, commenting that "the best way to engage students is to get them outside to investigate their own local environment."



This is a map of the wildlife trail behind Pendleton Elementary. Students use this area for their environmental studies.

Anna Nottonson - Marketing

Anna is a junior marketing major with a minor in general communication. She is from Boston, MA and loves snowboarding, hiking, traveling and dogs. Designing content for social media was her favorite part of the job.

HIDDEN FIGURES

by Piper Starnes

Even though there have been significant advancements in science and medicine over the last few decades, not everyone who worked towards these successes has received the recognition they deserve. The Mary Bruce Project: Women and the Golden Age of Tropical Medicine Creative Inquiry project, led by Dr. Kimberly Paul from the Department of Genetics and Biochemistry, aims to shine a light on the contributions made by unsung heroes of science. Over the past two years, the Creative Inquiry team collected and documented information about the accomplishments and contributions to scientific and medical advancements made by various hidden figures. After compiling their findings, each student wrote a blog post to be published on the team's newly launched website, The Mary Bruce Project. By making these lost stories known, the Creative Inquiry team hopes the website will accurately represent history and honor these innovators' legacies.

Aimey Jimm discusses her contributions to The Mary Bruce Project.

Hunter Gentry, a junior genetics major, introduced the blog with an in-depth life story of the project's eponymous hidden figure, Mary Bruce, a researcher who worked alongside her husband and fellow microbiologist David Bruce. Mary and her husband discovered the causes of Malta Fever and African Sleeping Sickness, but unfortunately, Mary never received the credit or renown of her male counterpart. To their amazement, other Creative Inquiry students found that Mary was not the only uncredited researcher in the couple's work. Feeling compelled to bring justice to these unsung heroes, the Creative Inquiry team decided to revive their stories and highlight their achievements.

Honing in on the Bruces' work, Samah Malik, a senior biochemistry major, wrote about "flyboys," the nameless contributors that assisted in the couple's research on African Sleeping Sickness, a disease transmitted by tsetse flies. Europeans studying this disease used "flyboys," groups of native young boys and men, as test subjects that were exposed to tsetse fly bites. When a person is infected with African Sleeping Sickness, they often experience hallucinations, fever, seizures and even a reversal in their sleep-wake pattern, as alluded to by the disease's name. "In scientific papers that refer to sleeping sickness, [the authors] don't really focus on [the flyboys] like they do the scientists, who are often times colonizers," Malik said. Aimey Jimm, a junior biological sciences major, expanded on similar controversies in her blog post on

CHECK OUT THEIR BLOG: MARYBRUCEPROJECT.ORG

medical experimentation and ethics. "When French military and researchers came to Africa, they started using African villagers in their experiments where no consent was involved—people were just taken advantage of," Jimm said. As a result of that exploitation, there remains a strong distrust in medicine today in regions where Sleeping Sickness was highly prevalent.

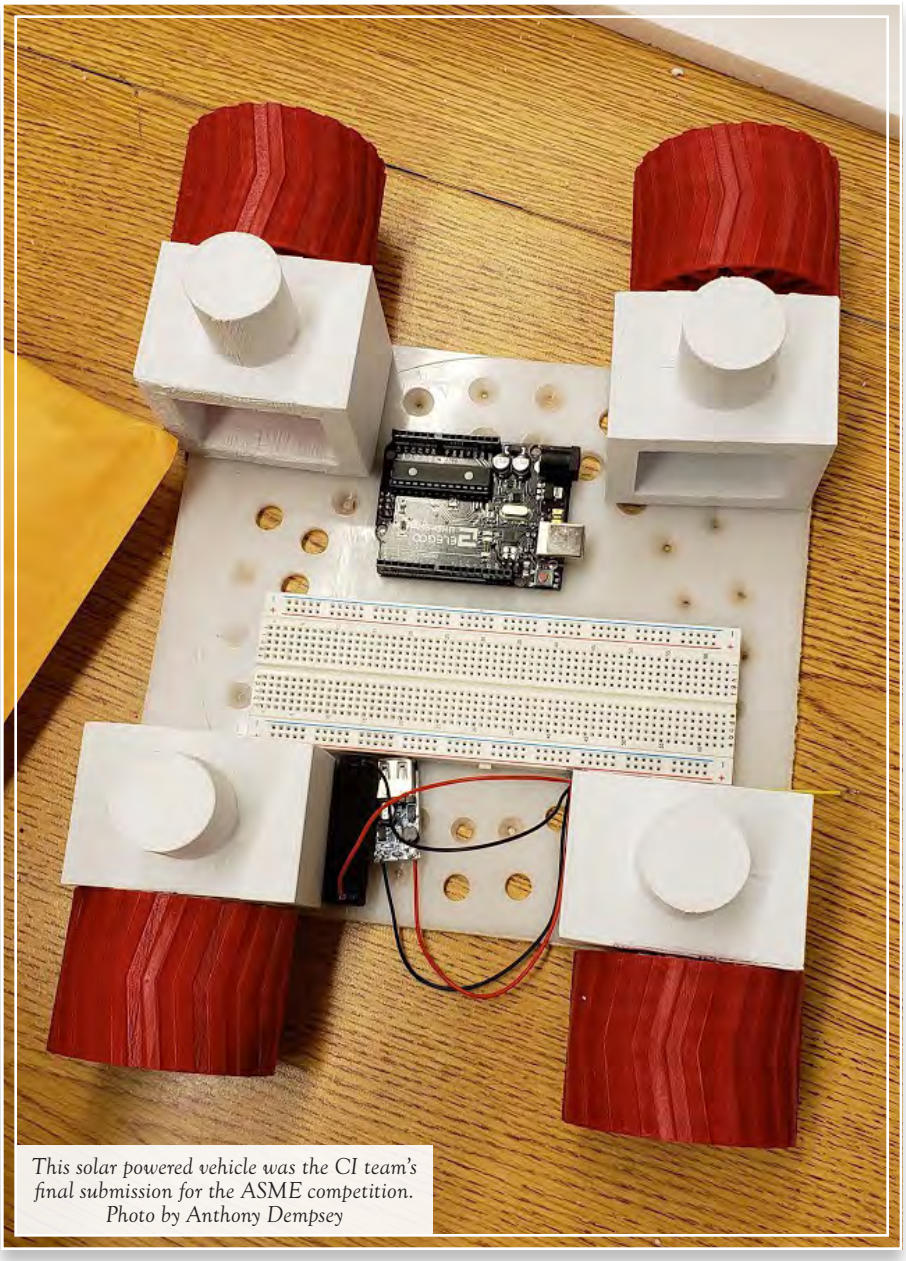
Each Creative Inquiry student's blog post ties into the others, all of which exemplify the theme of recognizing hidden figures in science, medicine and healthcare. As more students joined this Creative Inquiry project, the team expanded their topics, ranging from the consequences of commercialized medicine to American gynecology's dark history to lesser-known modern science trailblazers. Paul and her students hope that people will interact with their site to learn something new, understand how this history affects today's world and draw inspiration from these heroes of science. Thanks to the Mary Bruce Project, these great stories and contributions will no longer be swept under the rug, but shared for all to see.

Samah Malik and Hunter Gentry discuss their work on The Mary Bruce Project blog.

HARVESTING THE SUN AND WIND

by Emma Williamson

Technology improves every day and with the constant demand for new and improved gadgets, there is an even greater demand for the entrepreneurs who invent them. The ASME Student Design Competition Team Creative Inquiry project, led by Dr. Suyi Li in the Department of Mechanical Engineering, works to fill this need by guiding students in creating designs of their own.



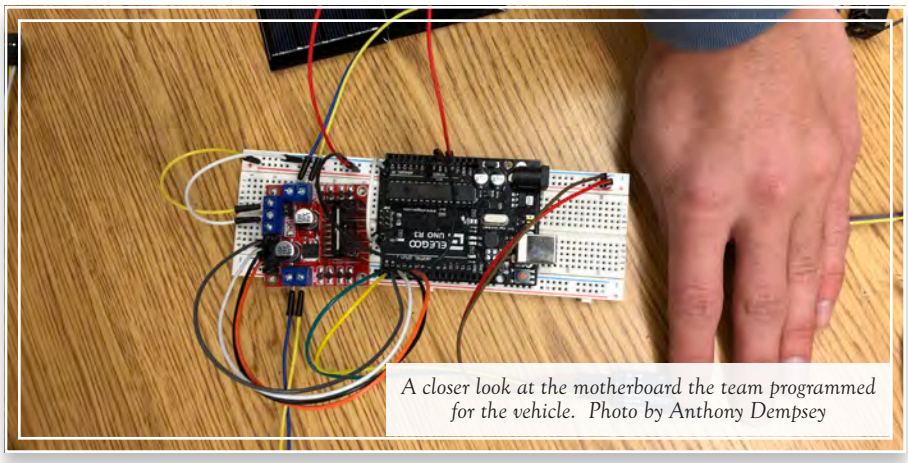
This solar powered vehicle was the CI team's final submission for the ASME competition. Photo by Anthony Dempsey

The American Society of Mechanical Engineers (ASME) Student Design Competition is an annual event that offers a platform for students to present solutions for a wide variety of design problems. These problems range from simple household struggles to space exploration, offering students the opportunity to think outside the box with their designs. Each year, a phrase is presented as the theme for the competition; this year's phrase is "Harvesting the Sun and the Wind." The team's goal is to design and build a solar and wind powered vehicle that can be controlled remotely. The vehicle is evaluated by its performance navigating a course while transporting weights. "We're using a huge array of solar panels to power our battery, and that's going to sit on top of the car. We're utilizing as much space as possible because the more surface area you have, the more energy you're going to generate using the solar panels," Anthony Dempsey, a sophomore mechanical engineering major, said. The annual ASME Student Design Competition consists of multiple rounds over the course of two days, whittling down the contestants to just three prize-winners in the end.

The team is student-driven which offers many benefits for participating undergraduates. "Gaining the experience with 3D printing has been great because when making prototypes, it's really useful to have that experience and knowledge," Garren Adamson, a sophomore mechanical engineering major, said.

This year the competition went virtual. Each team submitted a video of their vehicle completing a homemade course. With submissions due in March 2021, the team planned accordingly. Although the design process is never finished, the team determined their vehicle design before winter break and continued to the manufacturing phase in the spring semester. They hope that their prototype will win first prize, but either way, the students see the project as a way to improve and develop as mechanical engineers while addressing the world's energy needs.

Anthony Dempsey works on the circuits of the solar powered vehicle. Photo from Anthony Dempsey



A closer look at the motherboard the team programmed for the vehicle. Photo by Anthony Dempsey

MEET THE EXPERTS

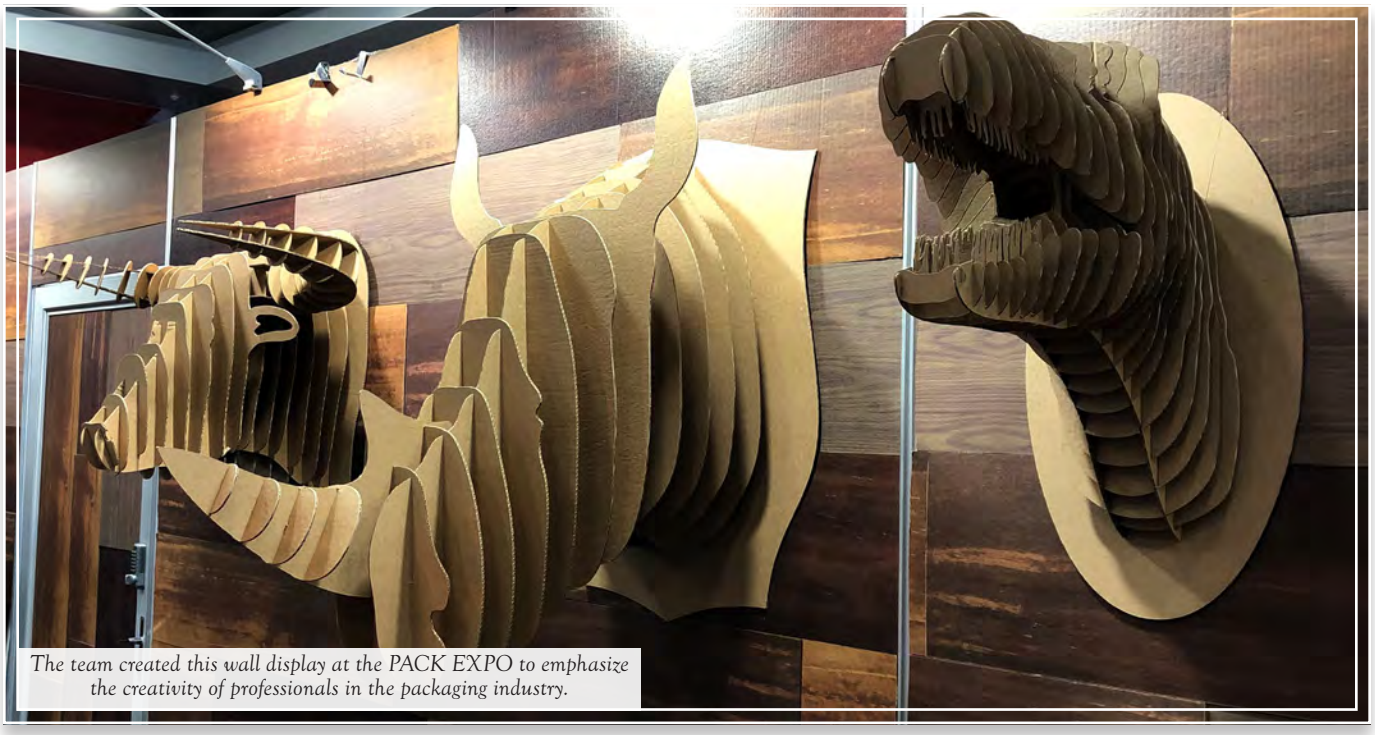
by Piper Starnes & Matthew Harrington

Packaging science is one of the world's largest industries; it plays a vital role in myriad fields such as health and beauty, mechanical and industrial engineering technology and food packaging. From perfume bottles to coffee pods to palletizing robots that load and unload products, packaging science impacts practically every commodity. Even the automotive industry relies on packaging; a single car is made up of approximately 30,000 parts, all of which must be packaged and shipped. Such a wide reaching field requires an extensive range of experience and education in order for incoming professionals to succeed. And that is precisely what Dr. Rupert 'Andrew' Hurley's students are achieving, thanks to the long-running PACK EXPO Exhibit: Design, Build, Research Creative Inquiry project in the Department of Food, Nutrition and Packaging Sciences.

The PACK EXPO CI team with John Henry, renowned packaging science professional and author of several books. Photo by Andrew Hurley

For nearly 10 years, students in this project have represented Clemson University at the annual PACK EXPO, the leading packaging and processing exposition in the country. Each year, the team develops an exhibit to showcase their products and current research on relevant technologies to industry professionals. Recently, the team's focus has been on applications of new biometric technology and the potential implications it has for the future of design and commerce. New products such as the Tobii Eye Tracker provide designers with quantifiable data on the attractiveness and clarity of their graphic design by mapping how long a shopper looks at a specific package.

Research on cutting-edge technologies always draws industry leaders and packaging professionals to Clemson's exhibit, which allows the students to learn from and network with some of the strongest professionals in the industry. "The biggest benefit the students get out of the experience is that they're connecting with decision-makers and potential employers at the show. Many students walk away with internships and the beginnings of a relationship with folks in their field," Hurley said. However, due to the uncertainties of the pandemic, the team made plans to engage with industry leaders virtually this year, creating their own virtual exposition while focusing on what they could learn from the best in the business.



The team created this wall display at the PACK EXPO to emphasize the creativity of professionals in the packaging industry.

To organize their own event, students first identified packaging professionals to interview, with each interview focused on a topic crucial to new graduates entering the workforce in packaging. The team prepared for interviews by conducting research on the represented companies and collaboratively generating a list of questions to ask during the interviews. The Creative Inquiry team interviewed more than 70 professionals, representing all areas of the trade: designers; engineers; researchers and more. Morgan Gavin, a senior packaging science major, sees these interviews as an opportunity to step out of her comfort zone. "Prior to this semester, I had a relatively small network and was not particularly confident in my interviewing skills…The advice I received from the professionals I interviewed will stick with me throughout my entire career," Gavin says. She and her teammates are editing the interview videos to compile them into the final virtual exposition, using the Adobe Creative Suite and other software.

Designing a virtual exhibit has enabled students to exchange ideas, network and engage in meaningful conversations with professors, peers and packaging professionals. "That demonstrates the power of this CI. The veterans of the industry that these students are learning about are educating them. It's like a different classroom experience, but it's the real deal," Hurley said. With an opportunity like this to learn and innovate in an ever-evolving field, these Clemson students will be ready to take on all of the packaging industry's challenges.

Matthew Harrington – Student Assistant

Matt is a junior genetics major with an engineering minor from Greenville, SC. On campus, he serves on the executive board of his service fraternity and is on the Cabinet of the Student Body President. Off campus, he can usually be found watching or acting in movies and videos.

BREAKING THE PATTERN

Erasing disease from our genes

by Emma Williamson & Allie Cheves

Since the Early Middle Ages, society has pondered the question of how to treat disease. Even with a modern health care system, diseases are far from being eradicated and some have minimal treatments. The Targeted Gene Editing in Mammalian Cells Creative Inquiry project, led by Dr. Renee Cottle from the Department of Bioengineering, is seeking solutions to inherited diseases by starting at the source of the problem—genes.

The Creative Inquiry project is exploring gene therapy techniques for inherited diseases. "My lab is actually focused on developing cell-based gene editing therapies for inherited metabolic diseases of the liver," Cottle said. Gene therapy takes cells from a patient, edits the genes to treat the disease by reconstructing the defective genetic material, then reintroduces the cells into the patient in order to combat the disease. To fully immerse in the research, students participate in training for laboratory safety and procedures such as cell culturing, fundamentals of gene editing and polymerase chain reactions (PCR).

The students made significant progress this year. The team's observations led to a change in their gene editing methodology resulting in a more efficient technique. Using the new method, they create genetic mutations that result in a frame shift, the insertion or deletion of a specific nucleotide, which reduce the expression of a target gene. This mutes the effects of an inherited disease, thus acting as a viable therapeutic solution.

The Targeted Gene Editing in Mammalian Cells Creative Inquiry project provides research experiences in the growing field of gene editing. Cottle hopes to provide students with opportunities to co-author a publication and attend conferences which will enhance their application materials for future job or professional school applications. The students not only gain real-world experience in this project, but they learn "how [gene editing] can really change society and how to stay abreast of developments in the field," Cottle says.

Dr. Renee Cottle observes student Tanner Rathbone's pipetting technique. Photo by Josh Wilson

Ilayda Ates discusses images with CI student Kienan Salvafre. Photo by Josh Wilson

DEVELOPING GLOBAL LEADERS

by Jordan Sims

As globalization brings people of different backgrounds together, the need for intercultural understanding is growing. The ACTIVA TU SPEAKING–Global Intercultural Challenge Creative Inquiry project, mentored by Dr. Jorge Rodriguez in the College of Engineering, Computing and Applied Sciences, allows students to explore that understanding by interacting with international peers. The project connects students from Clemson to students at the Universidad de Guadalajara in Guadalajara, Mexico to collaborate on challenges that address scientific curiosity and communication.

Each semester, students are split into three intercultural teams that also include students from a high school in Guadalajara. The teams identify a global problem of interest and work together through weekly meetings to exchange ideas (in both languages) and identify solutions. The goal is not necessarily to solve the problem, but to foster conversations which are not covered in the students' language classes. Examples of projects include how music affects stress levels, a healthy planet challenge and how happiness is perceived during the pandemic. The ability to practice Spanish in the context of these projects enhances the students' communication skills and intercultural experiences by allowing open, intellectual conversations instead of those in a moderated environment which is typical of a foreign language class. After working on the project for a year, students see the value in these interactions. "I am able to hold more intellectual conversations in Spanish as opposed to just the cookie-cutter things they teach you in a Spanish class," Jackson Sanders, a senior biological sciences major, said.

The team structure of this Creative Inquiry project not only enhances the students' communication skills, but emphasizes the importance of knowing how to work with a diverse group of people. "I wanted [the students] to learn to work in teams. I worked in industry for six years, and I know it's one of the skills you need to have, even dealing with people who don't speak your language," Rodriguez said. Living and working in an interconnected world requires people to not only know another language, but to truly understand the people who speak it. Having these skills is crucial in the professional world and by learning them in college, these Clemson students will be prepared to step into leadership positions in the future.

Though international experiences such as study abroad are not new, these Clemson students are taking the first steps to become global citizens by immersing themselves in their projects with their Spanish-speaking collaborators. In doing so, they are also setting themselves apart as leaders in the professional world. Whether they are studying and working abroad or staying in the United States, these students are developing the expertise that they need to be global leaders.

Margaret 'Allie' Cheves – Student Assistant

Allie is a sophomore bioengineering major with a chemistry minor from Spartanburg, SC. In her free time, she likes to listen to music and read. Helping with *Decipher* is her favorite part of her job.

CONTINUING THE SEARCH FOR COURAGE

3

by Piper Starnes

For more than two millennia, great thinkers have tried to define human psychological constructs and virtues. A psychological construct is a skill or attribute such as love, curiosity or fear, used to help explain human behavior. From the earliest philosophers to today's researchers and psychologists, there are still many unanswered questions surrounding lesser-studied constructs, such as acts of courage. Since 2003, Dr. Cynthia Pury in the Department of Psychology has been researching courage with undergraduate students. When Clemson's Creative Inquiry program was established in 2005, she established the Courage and Positive Psychology Research Creative Inquiry project. Over the last 18 years, the project has conducted research addressing the meaning of courage, resulting in an ever-changing definition of what it means to be courageous.

Today, the Creative Inquiry team defines courage as taking a worthwhile risk. "I think it is a nice, succinct definition that captures a lot of the stuff we've seen in all the data that we've collected over the years," Pury said. The team develops surveys to collect data on peoples' experiences while being courageous. Deciphering this type of data is difficult as each respondent's previous experiences and background affects their interpretation of risk. Taking a more individualized approach helps the team analyze the narratives and pinpoint key elements of courage that are present in all of the stories.

"When we look at what constitutes courageous actions, we think about what people can do to be more courageous…if that's the right thing to do," Pury said. Some of the narratives the Creative Inquiry team collected and read on the Internet originated from stories of people who attempted suicide and manifestos of mass shooters and terrorists. As courage can be for many purposes, good or bad, anyone can perceive themselves as courageous. "The question is always if the risk is worth it," Pury said.

Putting this into perspective with today's events, the COVID-19 pandemic has resulted in a wide range of courageous actions. "I think we've seen an awful lot of that. In terms of what people think of as risks and worthwhile goals, those differences can be heated," Pury said. Without a doubt, healthcare workers who have tirelessly treated the millions of patients infected with COVID-19 are celebrated for their courage. However, COVID-deniers might also be considered to display courage in their decision to resist safety precautions and continue normal living. As a result of their research, the Creative Inquiry team's personal views on courage have changed how they approach certain situations where they might need to act bravely or speak up. "I think I personally have a much bigger mouth and am more confrontational about things that I think are wrong since I've studied courage. If somebody is doing something that seems really foolish, I probably will have less patience for that," Pury said. Still, one must remember that courage is all dependent on what a person deems a worthwhile risk.

Throughout the years, this Creative Inquiry project has published their work in peer-reviewed journals and book chapters as well as presented their work at national conferences. Their work has also provided consulting support for projects involving historical acts of courage at organizations including The National Civil Rights Museum, the United States Department of State and currently the ARKIVET Peace and Human Rights Center in Norway.

Reflecting on nearly two decades of research on courage and positive psychology, these motivated students have put in countless hours of work towards this project and are hopeful for its future. Looking forward, the Creative Inquiry team intends to develop an improved system of evaluating courage by testing how individuals respond in public speaking contexts. While Clemson students are among the small group of people in the world studying this topic, their efforts will continue to lead the search for courage.

TANTRUMS AND STRESS

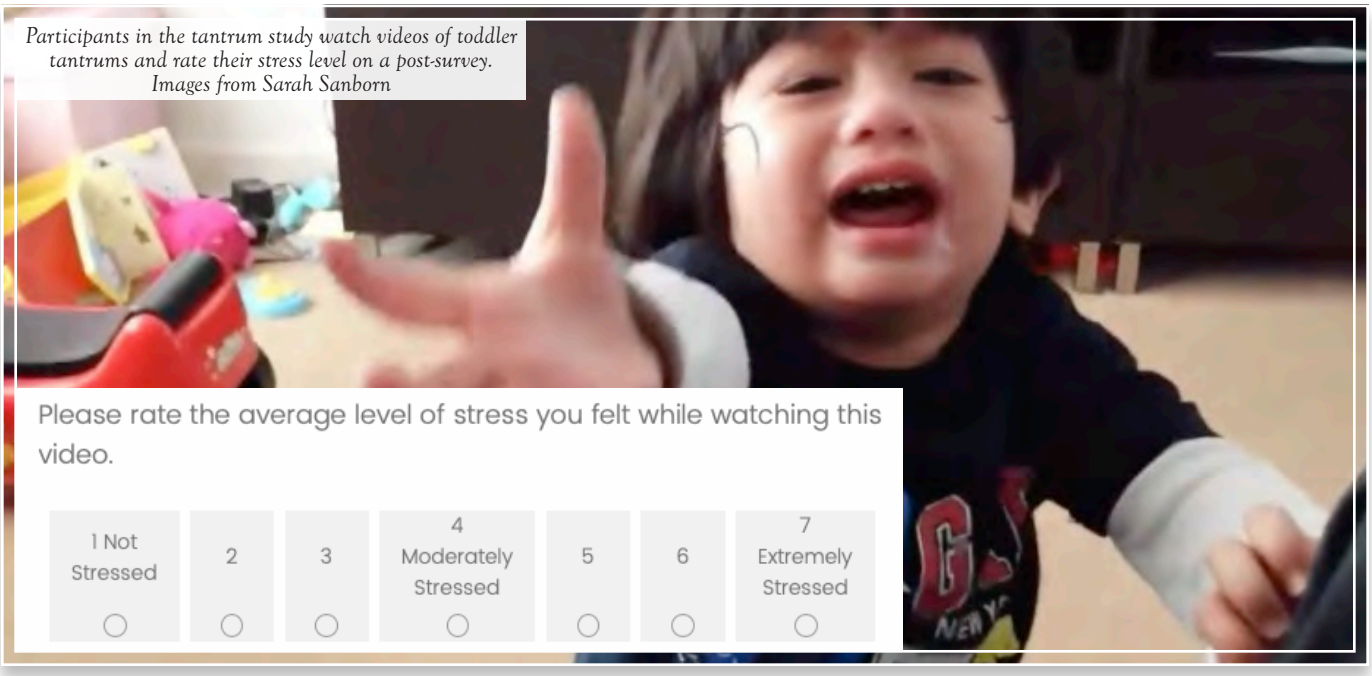
by Amy Maistros

During what was to be a simple grocery run, a parent exasperatedly drags a shrieking toddler out of the candy aisle, drives home to the wails of a tantrum from the backseat and realizes a fourth of their grocery list was forgotten. Though this is a common scenario, the Child Development Creative Inquiry project, mentored by Dr. Jennifer Bisson and Dr. Sarah Sanborn from the Department of Psychology, seeks to help parents navigate the stresses of parenthood.

The Child Development Creative Inquiry project works as three sub-teams: parental attachment; infant crying and tantrums; and effects of crying on infant cognition. These teams are very productive. Each team regularly submits their findings to professional conferences. This year, the infant crying and tantrums group addressed how infant crying triggers stress responses and they attracted international attention.

In this study, participants watched videos of crying and tantrums while wearing smart bracelets that measure electrodermal activity; after the video they rated their subjective stress level. The team found a significant difference between the physiological reaction of men and women. While all non-parents reported higher stress than parents, men had a higher rate of electrodermal activity, which is a measurement of body heat and sweat. When electrodermal activity goes up, a person is likely experiencing an intense emotional state. The team's abstract was accepted at the International Congress for Infant Studies. Due to COVID-19, the event was cancelled, but an invitation to such a well-regarded event is an achievement.

While the Creative Inquiry project's research benefits the discipline as a whole, team members benefit from their experiences too. "I want to be a child developmental psychologist and just to learn from these awesome professors and this experience will definitely help me in my future career," Bella Powell, a junior psychology major, said. Through these opportunities, students are developing their research skills while understanding the trials and tribulations of research in psychology. The Child Development Creative Inquiry project is not only expanding on the body of work in the field of child psychology but is supplying the students involved with valuable research tools for their future.



Participants in the tantrum study watch videos of toddler tantrums and rate their stress level on a post-survey. Images from Sarah Sanborn

PHIL-ANTHROPY

by Piper Starnes

For William P. "Phil" Bradley, actions speak louder than words. His philanthropy and community involvement have, for many years, supported Clemson students' curiosity and commitment to solving real-world problems and over the years, giving back to the university has become a family tradition.

Brought up as a Tiger by his mother and father, William F. Bradley (Class of 1952), Phil Bradley became a man for whom Clemson spirit is second nature. Bradley received his bachelor's degree in industrial management in 1965. After serving in the military, he and Mary, his wife, moved to Charleston, SC, where they raised their two children Renee and Philip. Bradley's humanitarian spirit extended to his clients through his successful career in the insurance industry. Philip (Class of 1992) followed in his father's footsteps and also became an insurance agent. "[My father's] compassion toward people and customers was contagious. He taught me to put myself in other people's shoes and understand their story," Philip wrote.

Phil and Mary Bradley were the first supporters of the Creative Inquiry program. They helped Dr. Doris R. Helms, the previous Provost, launch the program in 2005 with their first gift of $100,000. Since that time, they have continued to support Creative Inquiry by endowing annual awards to faculty and graduate student mentors. The Phil and Mary Bradley Award for Mentoring in Creative Inquiry award celebrates recipients for their outstanding work with undergraduate students participating in engaged learning and research through the Creative Inquiry program. Each spring, students nominate mentors that have significantly impacted their professional development inside and outside of the classroom. The Bradleys' generous gift allows each recipient to receive a plaque and salary supplement. For each of the past 15 years, we have presented one faculty member with the Phil and Mary Bradley Award for Mentoring in Creative Inquiry. Graduate students have been eligible for awards since 2016.

Mary and Phil Bradley

Inside and outside the Creative Inquiry program, the Bradleys continue to demonstrate their support for the Clemson community. They have contributed to other Clemson University efforts, including the Jim and Marcia Barker Scholarship Endowment, the Class of 1965 Scholarship Endowment, the Grace Catherine Clements CU LIFE Endowment and Clemson athletics.

Bradley has also served Clemson as a volunteer, dedicating his time and talents as a member and then chair of the Board of Visitors and member of the Regional Advisory Board for Clemson PSA. He also serves as an ambassador for the Clemson University Foundation's Order of the Oak. Under the direction of Development and Alumni Relations, the order advocates for Clemson and engages in philanthropic efforts to identify and gain support for the university's long-term goals.

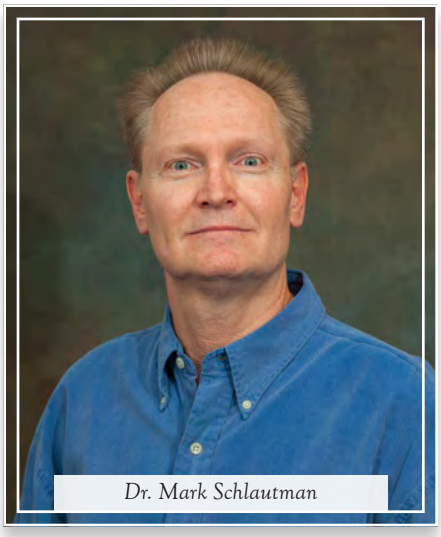
In every phase of his philanthropy, Bradley has been supported and encouraged by his wife, Mary. She was awarded Honorary Alumnus status in 2015 to recognize her lifelong devotion and demonstrated loyalty to Clemson. Phil and Mary frequently host events in Charleston for alumni and to welcome incoming first-year students into the Clemson family.

In 2021, Phil Bradley received the Clemson University's Alumni Association's Distinguished Service Award. A fitting tribute to an ardent and effective Clemson supporter. With all that he has done and continues to do for Clemson University, Bradley is truly the epitome of leaving a place better than he found it.

BRADLEY AWARD RECIPIENTS

Faculty Award Recipients

2021 **Dr. Mark Schlautman,** *Environmental Engineering & Earth Sciences*
2020 **Dr. Jessica Larsen,** *Chemical & Biomolecular Engineering*
2019 **Dr. Anastasia Thyroff,** *Marketing*
2018 **Dr. Arelis Moore de Peralta,** *Languages; Youth, Family & Community Studies*
2017 **Dr. Vladimir Reukov,** *Bioengineering*
2016 **Dr. Michael Sehorn,** *Genetics & Biochemistry*
2015 **Dr. Michael Childress,** *Biological Sciences*
2014 **Dr. Heather Dunn,** *Animal & Veterinary Sciences*
2013 **Dr. Marian Kennedy,** *Materials Science & Engineering*
2012 **Dr. John DesJardins,** *Bioengineering*
2011 **Dr. Delphine Dean,** *Bioengineering*
2010 **Dr. June Pilcher,** *Psychology*
2009 **Dr. Karen Kemper,** *Public Health Services*
2008 **Dr. Susanna Ashton,** *English*
2007 **Dr. Mark Charney,** *Performing Arts*


Dr. Mark Schlautman

Graduate Student Award Recipients

2021 **Kea Payton,** *Biological Sciences*
2020 **John Cannaday,** *Wildlife & Fisheries Biology*
2019 **Kylie Smith,** *Biological Sciences*
2018 **Christopher Mayerl,** *Biological Sciences*
2018 **Drew Morris,** *Psychology*
2017 **Dotan Shvorin,** *Industrial Engineering*
2016 **Alice Brawley,** *Psychology*

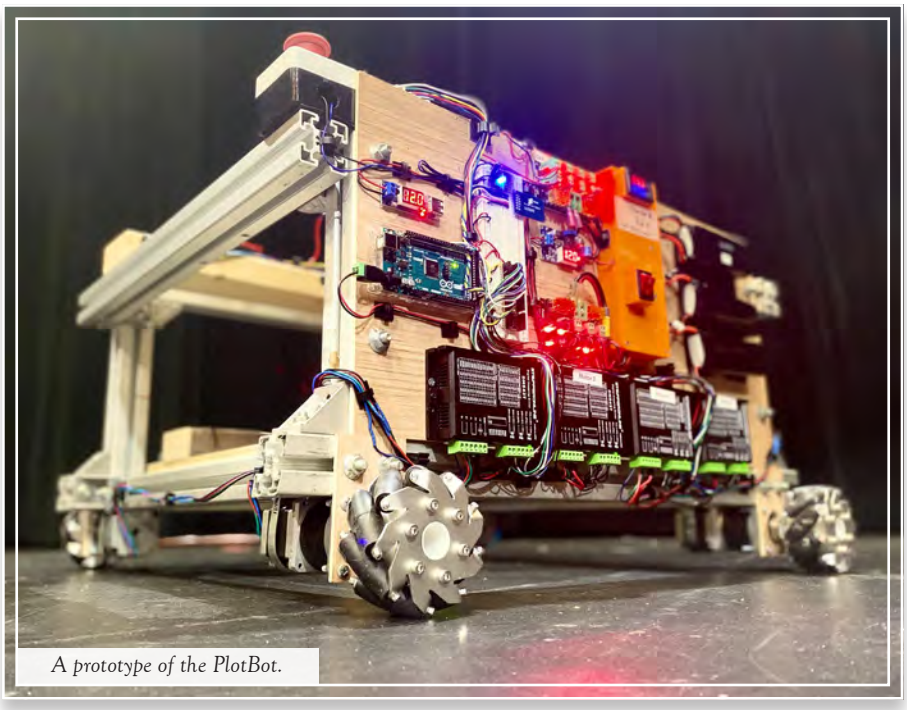

Kea Payton

UP AND COMING

Innovation in Theatre

When preparing for touring theatre productions, many set-up tasks must be completed by hand to ensure accuracy, time efficiency and that all safety precautions are being followed. To assist performing arts and entertainment professionals in their work, the Affordable Automation for Entertainment Industry Creative Inquiry project is developing a programmable robot called PlotBot. The project is led by Matthew Leckenbusch and Shannon Robert from the Department of Performing Arts in collaboration with Dr. Bradley Putman, in the Department of Civil Engineering.

The PlotBot is designed to move, follow commands and draw on the floor with chalk. It will be responsible for marking the locations of stage elements, including scenery, rigged overhead equipment, seating and space parameters.



A prototype of the PlotBot.

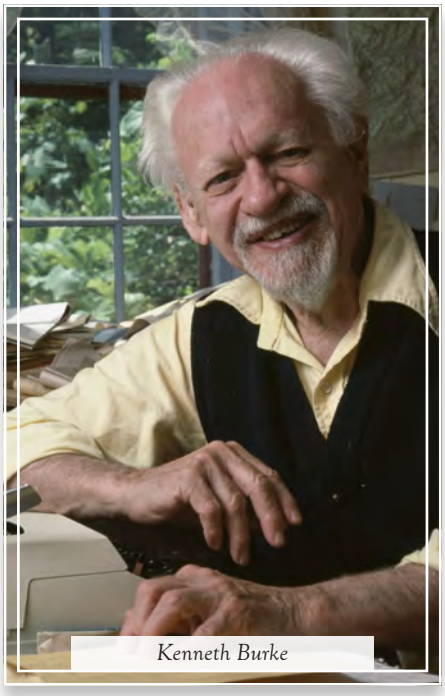
The Creative Inquiry is scheduled to complete the PlotBot in three phases over the course of four semesters: 1) planning and design; 2) fabrication and testing; and 3) improvement. Still in the early stages, the team interviews theatre professionals and researches technological concepts to develop a plan for creating a cost-effective robot prototype. When completed, the Creative Inquiry team will present the PlotBot at the United States Institute for Theatre Technology Conference and other trade shows. Until then, look forward to Affordable Automation for the Entertainment Industry Creative Inquiry and the PlotBot!

Setting the Stage

In the Documentary Film Production—Production, Technology and Marketing Creative Inquiry project, led by Michael Collins, a graduate student, and Dr. David Blakesley, both from the Department of English, team members work to create a professional studio environment in an effort to prepare Clemson's future film-makers for their upcoming careers.

This Creative Inquiry project is affiliated with The Open Studio Club, a student organization, which is currently focused on producing a new and upcoming film titled *The Wordman*. The documentary addresses the life of Kenneth Burke and illustrates how his works explained cultural and political life at the time, as well as how he grew to have a large impact on the humanities.

By supplying students with the opportunity to learn the skills needed to become filmmakers, this project offers a unique opportunity for students to experience what it is like to be a part of the professional film industry. "We're now in the phase of collecting assets and working on site filming. We hope to film at several locations in fall 2021," Blakesley said. Currently, the team has a loose script and a nearly finished trailer that they hope to complete in the coming months.



Kenneth Burke

Transitional Textbooks

The transition into college can be a difficult adjustment for many first year and transfer students. To help with these challenges, the Creating a Textbook for the College and Career Professional Development Course Creative Inquiry project is working to support Clemson students' success. Rise' Sheriff from the Department of Physics and Astronomy, leads this project with her small but mighty team. They are writing a book for a professional development course with a focus on physics and astronomy majors.

The class teaches students the skills to excel as self-sufficient students and professionals. In the fall, new students focus on strategies that will help them get good grades and become more proficient students. The spring section is geared towards upperclassmen's readiness to enter the job force.

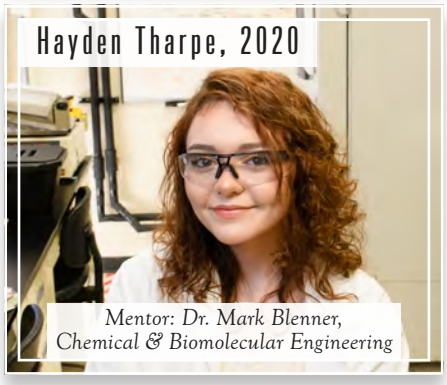
The team began compiling the resources for the book in January 2021. By partnering with Top Hat, a learning platform and publisher, the team is able to make the book more affordable with an approximate cost of $30. The book will be electronic and interactive. To ensure that students are reading and understanding the material, Michael Rutland, a junior physics major, is writing short quizzes for the end of each chapter. Taking inspiration from other physics textbooks, "[the questions] should help students take the content present in the book and actually apply it, not just plug and chug," Rutland said. After asking for his opinion on how the book should be organized, Sheriff said, "Michael took the course outline and came up with a flow idea that was fantastic. I agreed with his thought process 100%, and I am designing the textbook pretty much around his suggestions."

The the book will be complete and available for the fall 2021. With the guidance of the team's new textbook, incoming physics students will learn how to invest more time in college and career preparation, sending them on the right path to achievement and success.

BECKMAN SCHOLARS

In 2019, Clemson University was selected to participate in the prestigious Beckman Scholars Program, a recognition of Clemson's commitment to undergraduate research. The program, funded by the Arnold and Mabel Beckman Foundation and administered through Clemson's Creative Inquiry office, supports six undergraduate researchers over three years in projects centered in chemistry, biochemistry, biology and the medical sciences. Each of Clemson's six Beckman Scholars completes 15 months of intense laboratory research under the direction of a Beckman Mentor drawn from the faculties of the College of Science and the College of Engineering, Computing and Applied Sciences. This year marks Clemson University's third year in the program.

"The recognition and funding provided by the Arnold and Mabel Beckman Foundation speaks to the demonstrated excellence in undergraduate research at Clemson University," said Robert Jones, Clemson's executive vice president for academic affairs and provost. "This award highlights not only the outstanding undergraduate students we have but also the commitment of our outstanding faculty in engaging undergraduates in meaningful research."



BECKMAN
SCHOLARS
PROGRAM
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CLEMSON COVID CHALLENGE

The Clemson COVID Challenge is a summer virtual research and design opportunity for teams of undergraduates to work on problems related to COVID-19 and potential future pandemics. During the summer of 2020 more than 400 students worked from home with mentors to identify problems and then propose ideas for high impact solutions in the Clemson COVID Challenge. Projects addressed issues relating to a variety of fields including healthcare delivery, public policy, social factors and economics.

This year students were invited to participate in the Clemson COVID Challenge: IMPACTS program. This six week research and design opportunity engaged teams of students in addressing IMPACTS in relation to the COVID-19 pandemic. These teams worked under the guidance of a mentor to develop their projects and solutions.

Clemson COVID Challenge - IMPACTS Winners

First Place

qPCR for Detection of SARS-CoV-2 Variants

Keegan Sell, Laura Mitten, Emily Plumb, Anna Robinson
Mentor: Jerry Che

Second Place

Buoyant and magnetic (BAM) diagnostic assays for COVID-19

Wilkins Taylor, Jakob Jackson, Eve Gilreath, Bailey Gibson, Connor Bates, Emma Harrington
Mentors: Jeffrey Anker, Chuanlei Wang, Meenakshi Ranasi Ranasinghe Arachchila, Philip Moschella, Carolina Livi

Third Place

Quadruplex qPCR Detection for SARS-CoV-2 and Influenza A and B

Tyler Bowie, Erika Teetsel, Isaac Lee
Mentor: Kylie King

Fourth Place

Combating Distrust of COVID Vaccination

Aimey Jimm, Aaron Moore, Adrianna Mosher, Heny Patel, Brianna Pendergraft, LeeAnne Stokes, Victoria Young
Mentor: Pam Mack

THE CARR FAMILY ENDOWMENT

Chalmers Carr III and Lori Anne Carr established an endowment to support Creative Inquiry teams working in fruit and vegetable crop production, rural economic development or community and business development. Each year applications are accepted for the Carr Family Endowed Creative Inquiry Project to conduct research in rural economic development, rural community/business development, fruit and vegetable crop production or production agriculture industry. New or existing CI projects are eligible to apply. The Creative Inquiry recipients of this award receive a financial supplement to further enhance their project activities.

CLEMSON CREATIVE INQUIRY
CARR FAMILY ENDOWMENT

Recipients:

Dr. Kirby Player, *Rural Health Hubs*

Dr. Douglas Bielenberg, *Breaking bud: environmental control of bloom time in peaches*

Dr. Feng Chen, *Characterization of aromas and health benefiting chemicals of SC peaches*

Dr. John McGregor, *Shelf-life extension of fresh peach slices by surface crust freezing*

The Carr Family

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