

The Transformative
Power of Adaptive
Sports

Mode: Driverless

CU-ICAR designs autonomous
racecar

Robert H. Brooks Sports Science Institute

ANNUAL REPORT 2021

New fellows, graduate students,
seed grant awards
Scholarship recipient highlight

About Robert H. Brooks



Robert Howell Brooks was a man whose philanthropy and love of Clemson University inspired him to give generously to his alma mater.

Born in 1937, Robert Brooks grew up on a farm in Loris, South Carolina. He developed a strong work ethic as a result of his rural background and earned a degree in dairy science at Clemson in 1960. After an internship in Gastonia, North Carolina, Brooks moved on to a sales job at a dairy plant in Rock Hill, South Carolina.

As a child working on the family farm, he never envisioned that he would become a revolutionary in the food-service industry; however, he eventually founded Naturally Fresh, Inc. and became the chairman of Hooters of America, Inc., when he purchased the franchise rights to the restaurant chain. Both companies are highly successful Atlanta-based corporations well known for innovation.

In 1961, he joined a food processing company in Atlanta as a sales engineer before serving active duty in the U.S. Army. After his military service, Brooks joined a food formula company in Philadelphia and saved to pursue his dream of becoming an entrepreneur.

Brooks formed Eastern Foods in 1966 and combined his dairy background and entrepreneurial drive to develop the first non-dairy creamer in 1967, which primarily served the airline industry. Over time, Eastern Foods began to focus on a more diverse food business. Now known as Naturally Fresh, the company boasts such brands as Jackaroo Meat Sauces and Naturally Fresh dressings, sauces and dips.

In 1984, he began an association with Hooters, a nationwide restaurant chain. Brooks’ division of Hooters of America, Inc. controlled the developmental rights to the concept and quadrupled sales from 1990 through 1995. In April 2001, he consolidated the Hooters concept with the purchase of the trademark from its founders, enabling him to have full control over all business decisions. Today, there are more than 420 Hooters restaurants in 42 states and 29 countries.

Brooks was a man whose philanthropy and love of Clemson University inspired him to give generously to his alma mater. His \$2.5 million gift established the Brooks Center for the Performing Arts and has enabled hundreds of thousands of patrons to experience world-class performances and given countless students the opportunity to pursue their artistic passion.

Additionally, in the mid-1990s, Brooks gave Clemson University a gift to establish a sports science institute. The gift was given in memory of members of his racing team, including his son Mark Brooks ’91, NASCAR Champion Alan Kulwicki, and co-workers Dan Duncan and Charlie Campbell, who died in a plane crash on April 1, 1993.

In summary, Mr. Brooks has taken his place in a long line of Clemson philanthropists dating back to the original gift of Thomas Green Clemson to the state of South Carolina. Mr. Clemson gave so that the youth of South Carolina could receive a quality education, and W. B. Camp, a beneficiary of Mr. Clemson’s vision, also gave so that students like Robert Brooks could afford to attend Clemson University. Mr. Brooks made the most of the scholarship that Mr. Camp provided for him, and he honored this tradition of generosity with many contributions to the university. His legacy is intertwined with the generations that preceded him and stands to inspire those who follow.

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A Word from the Director

Dear Friends, Family and Associates of the Robert H. Brooks Sports Science Institute:

The past year brought lots of changes and adaptations to schedules, formats, office procedures and protocols, but the community of scholars that make up the Brooks Sports Science Institute has been resilient and dogged in its pursuit of mission. Sports, broadly defined, are integral to the Clemson experience, whether students are intercollegiate competitors, intramural participants, or avid fans. And, many faculty members and their students are engaged in sports-related inquiry.

This year, the Institute welcomed two new faculty fellows and awarded deserving faculty teams seed grants to assist in their research. Moreover, under the guise of One Clemson, the Institute engaged with the Department of Athletics, University Relations, and students from the Erwin Center for Brand Communications to develop public service announcements pertaining to public health and social equity. In addition, the Institute served as the liaison between academic programs and the Director of Strength and Conditioning for Olympic Sports and developed a successful program partnership to assess biometric data in an effort to improve athletic performance, reduce injuries and guide athlete rehabilitation and safe return to the field of play.

To say the least, it has been a rewarding year of activity and growth for the Institute as we continue to honor the legacy of the late Bob Brooks, Clemson Class of '60.

I hope you enjoy reading about our accomplishments and that you will continue to follow our progress.

Warmest regards and Go Tigers!



Brett A. Wright



Mission

The Robert H. Brooks Sports Science Institute at Clemson University serves as a multi-disciplinary platform for the academic study of sports sciences across the University. Through the foundation of four Legacy Professors in motorsports engineering, sports communication, sports management and sports marketing, the Institute will define, enhance and promote the role of sports in academia and society. The Institute provides experiential learning opportunities through academic programs, research, sports organizations, and support for service and outreach programs. Through all of its activities, the Institute seeks to prepare people to perform at the highest levels within sports industries, as well as provide an acute understanding of the significance of sport in modern society.

Vision

The Robert H. Brooks Sports Science Institute will be the nation’s preeminent academic institute regarding the comprehensive study of sports sciences. It will engage faculty, staff and students from disciplines across the University in the study of sport, including enhancing individual and organizational performance, promoting human development, and improving the general health and social well-being of our communities.

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History

Over the years, the Institute has partnered with various individuals and organizations in the sports industry for research, academic programs and student internships — with a focus on motorsports engineering, sports communication, sports management and sports marketing.

Among its accomplishments:

- The Institute has been a conduit for the comprehensive study of sports, emphasizing the physiological, psychological, technological, managerial, cultural and societal perspectives.
- The Institute has fostered sports-related research, outreach programs and initiatives that include internships for Clemson students at leading sports organizations such as the Philadelphia Phillies, Philadelphia 76ers, New York Yankees, Baltimore Orioles, Milwaukee Brewers, Seattle Seahawks, Dodge Rockwell’s motor sports and ESPN.
- Through the Institute and various academic departments across the entire Clemson landscape, researchers have developed and tested various grasses for use on golf courses and athletic fields, and worked to make golf accessible for Americans with disabilities. Others have examined the strength of football facemasks, and they have studied the inhibitors of high school athletes’ intent to report concussion symptomology. They have developed marketing campaigns for the Clemson Deep Orange 9 motorsports project and developed protocols for using Clemson sports memorabilia in the treatment of dementia patients.
- In the motorsports program, Clemson engineering students and faculty have engaged in highly technical research areas ranging from vehicle chassis software and computational fluid dynamics, to thermal engine controls and composite materials capabilities. These efforts have been widely viewed as instrumental in the creation of the Clemson University International Center for Automotive Research (CU-ICAR). The Institute is the proud sponsor of the Clemson Formula SAE team.
- Through the Markvan Bellamy Brooks Endowed Scholarship Fund, the Institute has provided undergraduate scholarships to students who major in one of the legacy programs: motorsports engineering, sports communication, sports management and sports marketing.

The Transformative Power of Adaptive Sports

By: Dr. Jasmine Townsend, CTRS, CARSS-I, Associate Professor, Clemson University

My introduction to adaptive sports occurred at the National Ability Center in Park City, Utah (www.discovernac.org). It is a community recreation organization that provides adaptive sports and recreation activities like mountain biking, sled hockey, river rafting, handcycling, and waterskiing, among others, to individuals with a variety of physical and cognitive disabilities. People come from all over the United States, at all times of the year, to participate in their programs. I spent my time helping kids and adults learn new skills, push the boundaries of their abilities, and generally just have a great time in the mountains, lakes, and deserts of the Mountain West. It was the best job ever. We had tons of fun, and I developed lasting friendships with many of my coworkers.

My work in adaptive sports over the last decade has continued through both direct service provision and research activities. In all my interactions with participants across these various experiences, I have heard statements like “Adaptive sports have changed my life”; or “My son/daughter has changed so much since they started playing wheelchair basketball”; or “I’m more confident in my abilities, and I have a sense of purpose now.” It was quite fulfilling as a health and recreation professional to know that what we were doing had such impact. I absolutely believe it changed lives, because I saw it happen. However, the researcher in me wanted to know more.

The Clemson Adaptive Sports and Recreation Lab aims to provide evidence that informs decisions about adaptive sport programming and enhance outcomes associated with involvement in those programs. This mission is perfectly geared to examine the transformative nature of adaptive sports for individuals with disabilities. Recent research (Duerden, et al., 2018) has provided definitions of a continuum of general experience types ranging from ordinary, to memorable, meaningful, and finally transformative. Other research has also identified adaptive sport participation as transformational to participants’ self-identity (Lundberg, Taniguchi, McCormick, & Tibbs, 2011).

In January 2021, and in collaboration with colleagues at Brigham Young University, my students and I embarked on a study to determine the impact of adaptive sport experiences using the Experience Impact Measure (EIM). This will be the first study to use this measure in an adaptive sport context and will contribute to validation of the instrument. We also explored a variety of program characteristics that may prove important for each type of experience (ordinary to transformative). Such information will be useful to various stakeholders in their efforts to understand the impact of adaptive sport programs but will also help in efforts to refine the design and implementation of these programs.

While anecdotal evidence from participants is meaningful in the moment and powerful as a testimonial, a systematic and data-driven understanding of the impact of adaptive sport participation is needed. This project provides that understanding, and we feel it perfectly complements the aims of the Robert H. Brooks Sport Science Institute.

**This article originally appeared on our [blog](#), Sports Insight, which is where you can find the references.*



Legacy Professors

Four Legacy Professors assist in the day-to-day operations of the Institute. The professors are responsible for building a more in-depth program of study within each of their disciplines by recruiting and encouraging other faculty and students to contribute to the Institute’s mission. These professorships were named for Brooks’ son and three colleagues who died in a plane crash in 1993.

MARK BROOKS PROFESSORSHIP IN SPORTS MANAGEMENT



DR. SHEILA BACKMAN
Professor, Department of Parks, Recreation and Tourism Management

Backman received her undergraduate degree and master’s degrees from Acadia University in Canada. She was awarded her Ph.D. from Texas A&M University in 1988. She began her academic career at the University of Illinois then joined the Department of Parks, Recreation and Tourism Management at Clemson University. She teaches recreation and tourism marketing to both undergraduate and graduate students. In addition, she has focused a line of research specific to the golf industry. Her research has explored turf preferences and also examined why golfers leave the game and why they continue to play. Although golf has been the primary focus, she has examined fan loyalty and the social media preferences and Twitter behavior of NCAA basketball fans. She has published in Tourism Management, Journal of Travel and Tourism Research, Event Management and the Journal of Park and Recreation Administration. Additionally, she is an active reviewer for other major journals.

ALAN KULWICKI PROFESSORSHIP OF MOTOR SPORTS ENGINEERING



DR. ROB PRUCKA
Associate Professor, Department of Automotive Engineering

Prucka is an associate professor in the Department of Automotive Engineering at the Clemson University International Center for Automotive Research (CU-ICAR). His first big project was guiding a team of graduate students and industry sponsors in building Deep Orange 9. The ninth installment of the celebrated program will be the first aimed at motorsports — constructing a next-generation Rallycross race car. Prucka has been a member of the automotive engineering faculty since 2008. His research and teaching interests include the design, performance, control, calibration and emissions of advanced internal combustion engines. Prior to joining Clemson, he worked for the Ford Motor Company and was an independent consultant for racing engine manufacturers.

CHARLIE CAMPBELL PROFESSORSHIP IN SPORTS COMMUNICATION



DR. BRYAN DENHAM, PROFESSOR
Professor, Department of Communication

Denham is a professor in the Department of Communication, where he studies media, policy and health issues related to performance-enhancing substance use in amateur and professional sports. His research has appeared in top-tier journals such as Communication Theory, the Journal of Communication, Journalism & Mass Communication Quarterly, and the Journal of Health and Social Behavior. Also working in the area of research methods, he is the author of Categorical Statistics for Communication Research. Denham is a member of five editorial boards and has served as a manuscript referee for more than 50 academic journals in the behavioral, social and health sciences. He has been a faculty member at Clemson since 1999.

DAN DUNCAN PROFESSORSHIP IN SPORTS MARKETING



DR. ANGELINE CLOSE SCHEINBAUM
Associate Professor, Department of Marketing

Scheinbaum is an associate professor in the Department of Marketing. She received her doctorate in marketing from the University of Georgia, and she comes to Clemson from the University of Texas at Austin. There, she served as the Associate Director for Research, Center for Sports Communication and Media. Dr. Scheinbaum has published or edited seven books on marketing, consumer behavior, and digital media and published numerous articles in major scholarly journals. Her research focus has been on sport and social/digital media.

Brooks Faculty Fellows

Faculty who excel at conducting research, teach sports-related courses, or provide administration/service to the sports industry are formally invited to affiliate with the Institute as Brooks Faculty Fellows. Along with the Legacy Professors, these faculty members constitute the Institute’s Board of Faculty. Fellows are appointed for three-year terms, renewable if faculty members remain actively engaged in the mission of the Institute.

SKYE ARTHUR-BANNING

Associate Professor, Parks, Recreation and Tourism Management

Arthur-Banning’s primary research interests involve amateur sport and, specifically, sport development. Lately, he has focused his work on adaptive sport and rehabilitation as well as sportsmanship, ethical behavior, and military sport programming. He is co-author of the textbook *Recreational Sport: Program Design, Delivery and Management* and has edited two more books on youth sport and the global influence of sports.

JOHNELL BROOKS

Associate Professor, Automotive Engineering

Brooks works with an interdisciplinary team that uses driving simulators to study the impact of concussions on the driving capabilities of high school and college athletes. She also uses driving simulators and instrumented vehicles to develop rehabilitation tools for clinical settings.

DEBORAH CADORETTE

Lecture and Coordinator, Athletic Leadership

Athletic Leadership is an emerging new discipline in the area of sport science and educational athletics. Study and research are based on the National Standards for Sport Coaches (NASPE 2006). Cadorette’s current interest is supporting positive environments for student-athletes, and professional development of interscholastic athletic coaches throughout the U.S. Cadorette currently collaborates with the National Federation of High Schools to provide Clemson students an opportunity to become Certified Interscholastic Athletic Coaches.

GREGORY CRANMER

Assistant Professor, Sports Communication

Cranmer’s research focuses on creating beneficial and stimulating experiences for high school and collegiate student-athletes through investigating effective coaching practices, student athletes’ socialization into collegiate athletics, and health and developmental outcomes through sport.

JOHN DESJARDINS

Professor, BioEngineering

He is currently the Robert B. and Susan B. Hambright Leadership Professor of BioEngineering at Clemson University. He has co-authored over 300 peer-reviewed conference or journal publications in the areas of biomechanics, sports biomechanics, and rehabilitation, among other topics. Most recently, he has collaborated in Brooks Sport Science Institute funding four times, and is most recently studying wheelchair tennis match simulation techniques and swing consistency and balance among golfers. This study collaborates with Clemson Athletics and other academic units. Dr. DesJardins has also been working to develop a comprehensive sport science program at Clemson to address the needs of a high profile varsity athletics program.

AMANDA FINE

Senior Lecturer, Marketing

Fine teaches courses on sports marketing, and her students implement the annual Tiger Paw Classic golf tournament benefiting a nonprofit started by former Clemson Basketball player Tanner Smith. She previously worked in marketing for Clemson Tiger

Sports Properties, the Atlanta Braves, and Atlanta Spirit, parent company of the Atlanta Thrashers and Atlanta Hawks.

MICHAEL GODFREY

Senior Lecturer, Education and Organization Leadership Development

Michael Godfrey’s research explores athletic experience and performance; student athlete development; and leadership development in intercollegiate athletics with a focus on the impact of ethics and diversity on team culture and performance. He is the graduate program coordinator of the Master of Science degree in Athletic Leadership.

GREG RAMSHAW

Professor, Parks, Recreation and Touris Management.

Ramshaw’s research explores the social construction and cultural production of heritage, with an interest in sports-based heritage and tourism. His book, *Heritage and Sport: An Introduction*, will be published by Channel View Publications in 2020.

SARAH STOKOWSKI

Assistant Professor, Athletic Leadership

Stokowski works in the Department of Educational and Organizational Leadership Development at Clemson University. She is the Editor-in-Chief of the *Journal of Athlete Development and Experience*. Stokowski received her doctorate in Kinesiology and Sport Studies from the University of Tennessee. Before joining the Athletic Leadership program at Clemson, Stokowski spent six years as an Assistant Professor in the Department of Health, Human Performance and Recreation at the University of Arkansas. During her time at Arkansas, Stokowski received teaching awards at both the departmental and college levels and secured more than \$40,000 in research grants and gifts, including the NCAA CHOICES grant. Dr. Stokowski studies college athlete development specializing in the personal development literacies and has authored or coauthored more than 55 referred publications. Sarah is also a College Sport Research Institute (CSRI) Research Fellow.

JASMINE TOWNSEND

Associate Professor, Parks, Recreation and Tourism Management.

Townsend is a Certified Recreational Therapy Specialist and Certified Adaptive Recreation and Sport Specialist with 10 years of practice in these fields. She has worked primarily with individuals with physical disabilities during this time, helping them to reach their full potential and quality of life through participation in sport and recreation. Her primary research area is focused on examining the outcomes of participation in recreation and sport for individuals with various disabilities, with her most recent work exploring attitudes towards individuals with disabilities, as well as understanding the transformative power of adaptive sport.

ERICA WALKER

Assistant Professor, Graphic Communications

Walker is working with members of Clemson Athletics’ New and Creative Media Team to develop courses taught by industry-expert adjuncts that give students the opportunity to take courses taught by members of the top sports content creation team in the country. In these courses, students learn relevant industry skills and 21st Century Skills such as perseverance, teamwork, and communication. She is also working with the Clemson marketing team to develop a system to manage the consistent display of Clemson’s brand colors on the jumbotrons in Death Valley and Littlejohn Coliseum during live sporting events.

QILUN ZHU

Research Assistant Professor, Department of Automotive Engineering

Zhu serves as a control system specialist for Deep Orange 12, an initiative that gives graduate students the opportunity construct a next-generation Rallycross race car. He advises students on modeling, simulation, control and design.



Deep Orange 12

HIGH-SPEED DRIVERLESS RACECAR

Drivers, start your engines!

Wait a minute. There are no drivers in this race.

This is the Indy Autonomous Car Challenge. It is the first high-speed, head-to-head race of its kind and featuring 30 teams representing 39 universities across the world. And Clemson University's squad of automotive engineering students — known as Deep Orange 12— is among them.

The clue to what makes this so special is in its name. Indy refers to where it's taking place: the famed Indianapolis Motor Speedway, the Mecca of car racing in the United States and one of the most legendary racetracks in the world. And autonomous? That's because instead of a driver, each vehicle is operated by a complex series of sensors, computers, lidars, radars, cameras and GPS systems.

Deep Orange 12 is part of Clemson University's long-running Deep Orange rapid prototype vehicle program housed at the Clemson University International Center for Automotive Research (CU-ICAR). Now in its 12th year, the program addresses technology challenges facing the mobility industry with an innovative concept vehicle. Deep Orange develops the next generation of engineering leaders through an immersive

educational experience within the Department of Automotive Engineering.

Because of the Indy Autonomous Car Challenge, Clemson's students are putting their education and skills to the ultimate test.

After all, high-speed racing requires lightning-fast reflexes and advanced driver training to both optimize vehicle performance and maneuver around other drivers at similarly high speeds. These extreme — or edge-case — scenarios offer a rare testbed to develop and validate automated driving technology.

And that's where Deep Orange, one of Clemson's flagship programs, comes in. For the Indy Autonomous Car Challenge, its automotive engineering students will develop the high-speed, self-driving, open-wheel racecar as part of their two-year graduate studies. Undergraduate and graduate teams from other universities will develop the driverless car software, which will then be imported and run on the Clemson-designed vehicle. The project aims to advance driverless technology for passenger cars and equip Clemson automotive engineering students with direct experience in the field.

“The extreme engineering behind motorsports has often been used as a testbed to push the boundaries of consumer vehicle technology,” says Robert Prucka, Deep Orange 12 faculty lead and Kulwicki Endowed Professor in Motorsports Engineering with the Robert H. Brooks Sports Science Institute. “This is an incredible opportunity for students to not only work with advanced racing technologies but have a hand in driving solutions for one of the most pressing engineering challenges facing the mobility industry today.”





Rob Prucka, the Alan Kulwicki Professorship of Motor Sports Engineering, works with members of the Deep Orange 12 design team. *File photo provided by CU-ICAR.*

Millions of fans watch motorsports events every year, and an undeniable part of the appeal are the skills and personalities of the drivers themselves, Prucka said. With more advanced sensors, software and connectivity, the results of Deep Orange 12 could produce additional driver safety and crash-prevention benefits for today's racing series.

Announced in late 2019 at the SEMA Show in Las Vegas, the Indy Autonomous Challenge is a \$1.5 million university prize competition organized by Energy Systems Network and IMS to win the world's first head-to-head, high-speed autonomous race on October 23, 2021. IMS hosts the annual Indianapolis 500, the largest single-day sporting event in the world.

The competition has attracted university teams from around the world, all of which are developing their own driverless vehicle algorithms. After extensive simulation testing and validation, each team's code will be used to control a vehicle for the race at IMS's 2.5-mile oval track. The vehicle used by these race teams will be based



The finished Deep Orange 12 racecar features logos for Clemson University and CU-ICAR and of sponsors Ernst and Young, Energy Systems Network, Adlink, Ansys, ApexAI, Aptiv, AutonomousStuff, The Autware Foundation and the Clemson University Robert H. Brooks Sports Science Institute. Other supporters of this project include Cisco, ClutchMasters, Dailey Engineering, Eclipse iot, OpenADx, Hexagon, Indianapolis Motor Speedway, Indy Wiring, Juncos, Luminar, Microsoft, New Eagle, PWR Advanced Cooling Technology, ROS, Specialty Equipment Market Association, TierIV, Valvoline, rti, and ZF. *File photo provided by CU-ICAR.*



Members of the Deep Orange 12 design team include Abhishek Bhagwat, Adithya Suresh, Aditya Navin Jain, Akash Shinde, Akshay Maajan, Akshay Palakkal, Amit Deshpande, Andrew Barnett, Anish Pandey, Ankit Verma, Anshuman Sharma, Arthur Robinson, Deep Shah, Gayathry Krishnan, Harpreet Singh Walia, Harsh Patel, Jaideep Vaidya, Janam Sanghavi, Kartik Goppalakrishnan, Kunal Kshirsagar, Manav Patel, Manikanda Balaji Venkatesan, Narahari Rahul Malayanur, Pranav Gadamsetty, Raja Manas Macherla, Rakshitaa Geetha Mohan, Rohan Mathur, Sabarish Selvakumar, Sagar Virk, Satya Rahul Jaladi, Shreyas Pingle, Shristy Sagar, Shubham Shaurya, Shyam Sunder Manivannan, Siddhesh Bagkar, Sunir Majilya, Thomas Havemann, Unmesh Patil and Utkarsha Mukund Chaudhari. *File photos provided by CU-ICAR*

on the prototype developed in the Deep Orange 12 program at CU-ICAR.

While engineering students drive each Deep Orange project, they benefit from Clemson's world-class cabinet of cross-disciplinary researchers within the Department of Automotive Engineering. Students also utilize the University's state-of-the-art automotive facilities and testing equipment for the project, operating out of the 9,000-square-foot AVX Mobility Systems Innovation Lab on the CU-ICAR campus. There are 15 international universities -- from Austria to India and South Korea to Switzerland -- and 23 U.S. universities participating in this competition.

The U.S. competitors include: Massachusetts, Auburn Univ.; Univ. of Alabama, UC Berkeley; UCLA, California Polytechnic State Univ. Colorado State Univ., Embry Riddle Aeronautical Univ., Univ. of Florida, Kennesaw State Univ., Univ. of Hawaii, Indiana Univ.-Purdue Univ. (IUPUI), Purdue Univ., Massachusetts Institute of Technology, Michigan State Univ., Western Michigan Univ., Univ. of Michigan-Dearborn, Rochester Institute of Technology, U.S. Military Academy, Univ. of North Carolina at Chapel Hill, Univ. of Pittsburgh and Texas A&M Univ.



Brooks Student Scholars

One of the traditions at Clemson is to engage students in the mission of the University, and the Robert H. Brooks Sports Science Institute is no exception. Students who are interested in the study of sport will be invited to formally participate in the activities of the Institute as Brooks Student Scholars.

These students will include, but not be limited to, those students awarded Markvan Bellamy Brooks Endowed Scholarships, graduate students funded as teaching and/or research assistants in the Institute’s legacy programs (motorsports engineering, sports communication, sports management and sports marketing), or other students actively engaged in the study of sport.

MARKVAN BELLAMY BROOKS ENDOWED SCHOLARSHIP

Endowed in memory of Robert H. Brooks’ son, Mark Brooks ’91, this fund provides scholarships to undergraduate students who major in one of the four legacy programs.

In the 2021-2022 academic year, the Institute provided scholarships to:

- **Delaney O’Tuel**, marketing
- **Margaret Hope Wilson**, mechanical engineering
- **Nicole Entrup**, parks, recreation and tourism management
- **Nadia Salameh**, sports communication

In the 2020-2021 academic year, the following students received scholarships:

- **Samantha Moody**, marketing
- **Kyle M. Bonin**, mechanical engineering
- **Kamryn Walker**, sports communication
- **Scarlett Lawhorne**, parks, recreation and tourism management



For the 2019-2020 academic year, the following students received scholarships:

- **Elisa A. Aldrich**, marketing
- **Elaina (Laney) Edwards**, parks, recreation and tourism management
- **Meredith Priest**, sports communication

For the 2018-2019 academic year, the following students received scholarships:

- **Maggy H. Powers**, marketing
- **Alexander G. Krolicki**, mechanical engineering
- **Caitlin R. Cannon**, parks, recreation and tourism management
- **Julee S. Williams**, sports communication

For the 2017-2018 academic year, the following students received scholarships:

- **Erin Andrews**, marketing
- **Luke Bittenbinder**, mechanical engineering
- **Paige Timberlake**, parks, recreation and tourism management
- **Ashley Hodge**, sports communication

To date, 56 undergraduate students have received support from the Robert H. Brooks Sports Science Institute.

Student Highlight



DELANEY O’TUEL

Hometown:
Mooresville, N.C.

Double Major:
Marketing
& Sports Communication

Post-graduation plans: It is my dream to work for a professional sports team in their Marketing/Event Operations/Communication/Corporate Partnerships or something in that area! I just know that I want to be on the business side of sports! I applied for internships this summer but am waiting to hear back. Once I know my plans this summer, I could let y’all know if you would like! (It should be this week fingers crossed!)

Interest in sports: Growing up, I have always been surrounded by sports. Being the youngest of three, I was always dragged along to my older brothers’ games. I played several sports myself and was a double four-year varsity letterman in volleyball and track and field. I was a three-year varsity captain for volleyball and the varsity captain of track my senior year. I also played volleyball competitively at the travel level for seven years. I began working in sports in high school managing the varsity basketball team. I was also in charge of the ‘school spirit’ my senior year at Lake Norman High School. I created the “Wildcat Minute” which was a sports segment on the announcements. I wrote, edited, and anchored this announcement daily. I fell in love with the environment that surrounds sports, and I can’t see myself working elsewhere after graduation.

What it means to receive this scholarship: Being an out-of-state student, all financial aid helps. I worked hard in high school applying for scholarships, both nationally and locally. I received some merit scholarships but had to apply for loans to compensate for the difference in tuition. This scholarship not only means a lot to me because of what it stands for but also because of the financial pressure it reduces.

Graduate Students

JOSEPH BOBER has completed his first year in the Master of Arts in Communication, Technology and Society (MACTS) program. Supported through the RHBSSI, Joseph has had the opportunity to work on exciting sports communication research with Department of Communication faculty. During the Fall 2020 semester, he assisted Dr. Gregory Cranmer and Dr. Darren Linvill on a project concerning the intersection of sports, social media, and politics. During the Spring 2021 semester, he assisted Dr. Virginia Harrison on multiple projects. While one project is still ongoing, the other — a manuscript with Dr. Brandon Boatwright entitled “‘A manifestation of their city as a god’: Gritty memes, the 2020 U.S. presidential election, and online representations of home” — was accepted for presentation at the AEJMC 2021 Virtual Conference.

JUNGAH CHOI is a third-year doctoral student in the Department of Parks, Recreation and Tourism Management. Her dissertation research examines the lifecycle of post-event sports museums, including museums founded as part of Olympic and World Cup-hosting legacies.

JIYUN HUANG is a Ph.D. student in the School of Mathematical and Statistical Sciences at Clemson University. As a doctoral student supported through the Robert H. Brooks Sports Science Institute, Jiyun has been working closely with Dr. Angeline Close Scheinbaum on how the corporate social responsibility of a sponsor impacts consumer use of sponsoring products. She has also assisted a class of undergraduates with Dr. Scheinbaum that focuses on the essentials of effective sports marketing and careers in the business of sports. As a graduate student majoring in statistics, Jiyun is appreciative for the opportunity to work with Dr. Scheinbaum to apply theoretical and statistical methods to real life data of sport marketing.

YOUNG SUK OH is a Ph.D. Candidate in Parks, Recreation and Tourism Management at Clemson University. His research interest lies within the areas of addressing inequality in sport, community

reintegration via sport, sport development via corporate social responsibility, and sport consumer behavior. He is currently one of the leading team members of the Veterans Adaptive Sport Camp. Young Suk has assisted in implementing a multi-institutional, short-term study abroad program with students from nine different universities to the PyeongChang 2018 Paralympic Games. He was also involved in facilitating the first-ever 5-a-side/Blind Soccer Development Think Tank Session as a researcher with experts from different organizations across the United States. Young Suk had 3 peer reviewed publications accepted this year and has been providing support on a \$385,000 grant from the US Department of Veteran Affairs.

DENNIS ROBERTSON completed his PhD degree in the Department of Automotive Engineering in December of 2020. His research pertained to advanced combustion strategies for internal combustion engines with high power density. Dennis has accepted a position as Senior Research Scientist at the Perduco Group near Dayton, OH. His work focuses on machine learning and other advanced techniques for the United States Air Force. He and his wife Sarah are enjoying their first summer in Dayton.

WILL SEATON is a first year MACTS student and is pursuing a career in higher education in either collegiate athletics or as a professor. He graduated from Blackburn College where he was the Athletics Department Manager for a year while he was an undergraduate student.

DEREK WHALEY has completed his first year in the PRTM Ph.D. program. His concentration is in Recreational Therapy with a focus in Adaptive Sports. He has been involved in two research studies in his first year, collecting data on the transformational nature of adaptive sports involvement, and contributing to a manuscript exploring the attitudes of Clemson University students towards students with disabilities. He is also working for the Clemson Adaptive Sports and Recreation Lab by running a veterans’ air rifle program on Clemson’s campus this summer, as well as working at the Outdoor Lab for Team Ventures.

United As Tigers: Using peer-to-peer messaging to influeece healthy choices

In addition to the annual seed grants, the Institute funded a special project during the 20-21 academic year. This two-fold project consisted of undergraduate students from Cadency, the student-run public relations firm on Clemson’s campus, and the senior marketing capstone course working with Katie Hildebrand, Executive Director of the Erwin Center for Brand Communications, to develop peer-to-peer messaging around the University’s “United as Tigers” and “Healthy Clemson” campaigns.

Cadency students worked on this project throughout the Spring 2021 semester, creating several final products to be featured on various university social media channels.



Anna Shaw, Cadency Managing Director, a Marketing major, and Erwin Center student , and Tanner Hall, Cadency Videographer, a Marketing major and Erwin Center student, interview Ann Lyons, an Academic Success Center Tutor and Psychology major, for a “Healthy Clemson” video. Lyons described how she and her friends perserved during the pandemic.
File photo provided by cadency

“Our mission at the Erwin Center for Brand Communications is to provide access to experiential learning through strategic projects where students directly execute the work that can help make an impact for partners and the Clemson community,” Hildebrand said. “The Healthy Clemson project allowed us to deliver on this mission during a challenging year on campus in regard to health and safety.”

To view the student-created videos, visit The Erwin Center for Brand Communciations [YouTube](#) channel.

In addition to this work, the Institute funded research projects of three Communication professors – Dr. Brandon Boatwright, Assistant Professor and Director of the Social Media Listening Center (SMLC); Dr. Jordan Morehouse, Assistant Professor of Strategic Communication; and Dr. Virginia Harrison, Assistant Professor of Sports Communication.

The three are working on three interrelated research projects about perceptions of student social justice initiatives and COVID healthy behavior campaigns at

Clemson. First, Dr. Morehouse and Dr. Harrison collected over 400 survey responses from Clemson students in spring 2021 and are currently cleaning and analyzing the data. Dr. Morehouse is investigating the impact of relationships on certain behaviors and attitudes around COVID. For example, her study measures the degree to which relationships with other COVID-aware students impacts a student’s willingness to practice preventative measures COVID using egocentric network analysis.

Dr. Harrison is examining how students perceive the university’s corporate social responsibility toward the two causes, specifically how transparency, authenticity, and skepticism of the campaigns impact university reputation and supportive intentions. Second, Dr. Boatwright is analyzing social media conversations around student-athletes’ social justice demonstrations from fall 2020 to evaluate various public responses to activist messaging. Currently, we are on schedule to submit Dr. Morehouse and Dr. Boatwright’s findings to the National Communication Association’s 2022 Annual Convening and Dr. Harrison’s findings to the International Communication Association’s 2022 Annual Conference.

“The Brooks Signature Research Projects are off to a great start. We have gathered quality survey and social media data to support our three main research goals. We look forward to reporting some initial results to the board in fall 2022. The support of the Brooks Institute has been a key factor in our ability to make such progress,” Harrison said.



Research

RESEARCH SEED GRANTS

Competitive seed grants are awarded each academic year to Clemson University faculty and researchers to engage in multidisciplinary sports research.

The purpose of these seed grants is to stimulate and expand faculty and graduate student research in the academic study of sport. The following grants were funded through the Institute:

2021

- Greg Batt (PI) Food, Nutrition and Packaging Science
John DesJardins (Co-PI) Bioengineering
Topic: “Efficacy of bullriders’ helmets to prevent head trauma”
- Kristen Okamoto (PI) Communication
Brandon Boatwright (Co-PI) Sports Communication
Topic: “Understanding the role of instructor in online group fitness programs”
- Erica Walker (PI) Graphic Communications
Hudson Smith (Co-PI) Watt Center research data scientist
Topic: “ColorNet: Developing artificial intelligence-based color correction tools for sports media applications”
- Joel Williams (PI) Public Health Sciences
Chris Hopkins (Co-PI) Furman University Applied Health Research Evaluation
Jim Stoker, (Co-PI) Interim Exec. Director of PlaySafe
Christopher Clemow, M.D.(Co-PI) AnMed Health +BlueRidge Orthopedics Physician and PlaySafe Medical Director
Topic: “Improving injury surveillance to promote adolescent athlete health and safety: A university/non-profit collaboration”

2020

- Andrew Duchowski (PI) School of Computing
Paige Rodeghero (Co-PI), School of Computing
Dr. Tenley Murphy, M.D. (Co-PI), a Clemson team physician
Dr. Chris Troup, M.D. (Co-PI), neurosurgeon from Prisma Health
Topic: “Sideline Concussion Screening in Eye-Tracked Augmented Reality”
 - Casey Hopkins (PI) School of Nursing
Christopher Hopkins, Ph.D. Candidate, DPT, PT
Topic: “A Mixed Methods Study of Adolescent Girls’ Experiences with Sport Participation and Their Intentions for Future Physical Activity”
 - Jeremy Mercuri (PI) Bio-Engineering
Steven Martin, M.D. (Co-PI) Sports Medicine
Topic: “Comparing the Regenerative and Anti-Fibrotic Effects of Biologic Therapies for Muscle Injuries”
 - Jasmine Townsend (PI) Parks, Recreation and Tourism Management
John DesJardins, (Co-PI) Department of Bioengineering
Chuck McCuen, (Co-PI), Director of Wheelchair Tennis Operations at Clemson University
Topic: “3D Modeling and Kinematics of Wheelchair Tennis Within Novel Match Simulation Techniques”
- ### 2019
- John Desjardins (PI) Department of Bioengineering; Jordan Byrd (co-PI) Assistant Golf Coach
Topic: “The effect of balance on internal swing consistency: An athletic/academic partnership in movement science”
 - Pingshan Wang (PI) Electrical and Computer Engineering; William R. Harrell (Co-PI) Electrical and Computer Engineering; David M. Feliciano

(Co-PI) Biology; M. F. Casanova (Senior personnel) from the University of South Carolina School of Medicine; Danny Poole Head Athletic Trainer;
Topic: “Cellular rectification of electrical stimulation fields”

2018

- Ryan Gagnon (PI) Parks, Recreation and Tourism Management; Mariela Fernandez (co-PI), Parks, Recreation and Tourism Management;
Topic: “Promoting Positive and Healthy Development in African American Youth Through the Sport of Climbing”
- Jeremy Mercuri (PI) Bio-Engineering Tong Ye (co-PI), Bio-Engineering;
Topic: “Early Detection and Prophylactic Treatment for Post Traumatic Osteoarthritis”
- Thompson Mefford (PI) Materials Science and Engineering; Mark Bolding (co-PI), Chemistry; Irfan Asif (co-PI), a family medicine doctor with GHS; Danny Poole (co-PI), Head Athletic Trainer; Len Reeves (co-PI), Materials Science and Engineering
Topic: “Advanced imaging agents to diagnose the state of confused brain”
- Heidi Zinzow (PI) Psychology;Jennifer Goree (co-PI), Student Health Center; Lauren Pollard (co-PI), Student Health Center; Natalie Honnen (co-PI), Athletic Administration; Dr. J.B. Kingree (co-PI), Public Health Sciences
Topic: “Sexual violence prevention program”

2017

- Gregory Batt (PI), Department of Food, Nutrition and Packaging Sciences; John Desjardins (Co-PI) Department of Bioengineering;
Topic: “Quantifying the impact performance of football helmet facemasks”

- Gregory Cranmer (PI) Department of Communication;
Topic: “Factors affecting high school football players’ intent to report concussion symptomology: An application of the health disclosure decision-making model”
- Sabarish Babu (PI), School of Computing; Eileen Kraemer (Co-PI), School of Computing, and Christopher Pagano (Co-PI), Department of Psychology;
Topic: “Investigating perceptual-motor synchrony and coordination on cybersickness, skills training, and spatial perception in a VR rowing simulator”
- Adam Hoover (PI), Department of Electrical and Computer Engineering; Elliot Jesch (Co-PI) Department of Electrical and Computer Engineering ;
Topic: “Pedometer evaluation during structured, semi-structured and unstructured gaits”
- Greg Ramshaw (PI), Department of Parks, Recreation and Tourism Management; Brent Hawkins (Co-PI) Department of Parks, Recreation and Tourism Management
Topic: “Reminiscing Howard’s Rock: Harnessing the power of Clemson Football memories to improve cognitive functioning of South Carolinians with dementia”
- Mary Anne Raymond (PI), Department of Marketing; Delancy Bennett, (Co-PI), Department of Marketing; Robert Prucka (Co-PI), Campbell Engineering Graduate Program, and Jennifer Siemens (Co-PI) Department of Marketing
Topic: “Collaborative marketing and vehicle engineering for the Deep Orange 9 motorsports project”
- Travers Scott (PI) Department of Communication;
Topic: “What comes after coming out? Effective integration strategies for LGBTQ persons and college athletics.”

Seed Grant Highlight

Mocap technology aids study of wheelchair tennis athletes’ performance

The slightest tilt of the racket or an error in timing can be the difference between a missed or poor tennis shot and a good one. Analyzing athletes’ movements, speed and positions isn’t new to the sports field. However, it is relatively new to the adaptive sport world.

Two Clemson University professors have collaborated on research to bring technology often used in sports to help wheelchair tennis players improve their game. This research project is funded by the Robert H. Brooks Sports Science Institute (RHBSSI) through our seed grant program and is being completed in conjunction with Clemson Athletics and the United States Tennis Association.



Dr. Jasmine Townsend, associate professor of Parks, Recreation and Tourism Management and a RHBSSI Fellow, partnered with Dr. John DesJardins, a new Brooks Fellow and the Robert B. and Susan B. Hambright Leadership Professor in Clemson University Department of Bioengineering, to lead this research team. They are joined by Anne Marie Severyn, the lead graduate student conducting the study as part of her Ph.D. work in bioengineering.

The research team is using motion capture technology (mocap) to analyze the movement of the athletes’ chairs, rackets and bodies. Mocap is the process of recording the movement of objects or people. The technology was developed for gain analysis in the life science market, but has been applied to a variety of other fields.

Participants in the study include players from Clemson’s wheelchair tennis team as well as recreational and elite athletes outside the university. Test subjects of different ability levels and experience levels in the sport wore the mocap suits to run common wheelchair tennis drills while the researched captured the data on their movements on the court.

“We have had to develop an entirely new measurement model in order to study this, so it’s a first,” DesJardins said. “We hope to be able to answer questions that ultimately result in better performance from athletes, but in a more general sense we’re seeing how a person is working in concert with—or struggling against—an object such as a wheelchair in a sports setting. Maximizing what works and minimizing what doesn’t is the goal.”

Townsend, who also serves as the director of Clemson University Adaptive Sports and Recreation Lab, said wheelchair tennis athletes must approach the game differently than able-bodied athletes due to differences in their functional ability and the need to use a sport wheelchair. A major difference is the wheelchair tennis athlete remains in constant motion; otherwise, they lose momentum and it requires more energy to get moving again.



Clemson Fellow Jasmine Townsend (front row, second from right) collaborated with John DesJardins back row, right) in Bioengineering to improve wheelchair athletes’ performances. (Clemson file photo)

“Right now, we’re just developing the model, but we keep coming up with questions that this study could address from the player development perspective,” Townsend said. “It will be immensely helpful to see where athlete strengths and weaknesses are so that they can be improved immediately and over several training sessions.”

Endowment Financials

Endowments 80191 and 90038 provide operating funds for the Robert H. Brooks Sports Science Institute, which was created by Mr. Brooks in October 1994.

80191	2018	2019	2020	2021
Corpus	\$5,555,463	\$5,555,463	\$5,555,463	\$5,555,463
Appreciation	\$2,028,351	\$2,161,947	\$1,950,743	\$4,141,194
Market Value	\$7,583,814	\$7,717,410	\$7,506,206	\$9,696,657
Carryover Balance	\$612,320	\$591,653	\$554,733	\$564,587
Endowment Value	\$8,196,134	\$8,309,063	\$8,060,939	\$10,261,243

90038	2018	2019	2020	2021
Corpus	\$2,231,375	\$2,235,773	\$2,235,773	\$2,235,773
Appreciation	\$717,610	\$802,515	\$715,921	\$1,526,165
Market Value	\$2,948,986	\$3,038,288	\$2,951,694	\$3,761,938
Carryover Balance	\$138,421	\$31,755	\$38,093	\$-2,239
Endowment Value	\$3,087,406	\$3,070,043	\$2,989,787	\$3,759,699

Endowment 90037 provides scholarships to undergraduate students majoring in curricula related to the Robert H. Brooks Institute for Sports Science.

90037	2018	2019	2020	2021
Corpus	\$41,764	\$41,764	\$41,764	\$41,764
Appreciation	\$30,550	\$32,184	\$29,719	\$ 49,070
Market Value	\$72,314	\$73,948	\$71,483	\$90,834
Carryover Balance	\$14,808	\$3,439	\$0	\$0
Endowment Value	\$87,122	\$77,387	\$71,483	\$90,834

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