North Carolina Agricultural and Technical State University

A Research Intensive Doctoral University

www.NCAT.edu/research
NCATResearch.org
336.334.7995
North Carolina Agricultural and Technical State University

Advancing knowledge and developing technologies that address society’s grand challenges and drive the economy of the state, nation and world.

Research and scholarship have always been core elements of life at N.C. A&T. Our rich and unique legacy and tradition in agriculture, engineering and technology makes us well-suited for solving today’s challenges in nanotechnology, bioengineering, health sciences, energy, the environment, cybersecurity and big data, in a way that positions us to address the unforeseen problems of the future.

N.C. A&T faculty and student work in laboratories and in communities, on farms and in cities, on campus, across the state and around the world. Our academic units and disciplines partner with other universities and with corporations and government researchers. We continue to distinguish ourselves as an institution with a rapidly-growing research enterprise fueled by external grants and contracts, producing scholarly projects and outstanding creative works and graduating civically-engaged citizens.

We invite you to learn more about how research at N.C. A&T advances education, fosters community engagement and catalyzes economic development.

Dr. Sanjiv Sarin
Interim Vice Chancellor for Research and Economic Development
Sarin@ncat.edu
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About North Carolina Agricultural and Technical State University

Established in 1891, N.C. A&T is the largest historically black college or university in the country. The university is located in the city of Greensboro in the Piedmont Triad region of central North Carolina. A constituent institution of the University of North Carolina system, N.C. A&T offers a range of undergraduate, masters and doctoral degree programs.

The main campus, located just east of downtown Greensboro, is accompanied by a 492-acre research farm and additional shared research sites. The 150-acre gateway University Research Park, divided roughly in half between the park’s North and South Campuses, is operated jointly by N.C. A&T and the University of North Carolina at Greensboro. The Center of Excellence in Post-Harvest Technologies is located at the North Carolina Research Campus in Kannapolis.

North Carolina Agricultural and Technical State University is a public, doctoral/research, 1890 land-grant university committed to exemplary teaching and learning, scholarly and creative research and effective engagement and public service.

Points of Pride

#1 producer of undergraduate engineering degrees to African Americans

#2 producer of degrees awarded to African Americans in agriculture and related sciences; engineering technologies and related fields; and mathematics and statistics

#3 in doctoral degrees awarded to African Americans in engineering

#3 largest research enterprise in the UNC system for more than a decade

First and only HBCU to lead an NSF Engineering Research Center

Lead Institution for the Center for Academic Studies in Identity Science (CASI/S), which is the first and only National Intelligence Science and Technology Center of Academic Excellence in the United States
N.C. A&T by the Numbers, FY 2018

Student Enrollment: 12,142
Full Time Faculty: 411
Sponsored Research, Millions: $64.3
Farm Size, Acres: 492
Centers & Institutes: 17
MS Degree Programs: 31
PhD Programs: 9

Classification:
Doctoral University - Higher Research Activity

R2
While maintaining our excellence in the traditional land-grant fields of engineering and agriculture, we have developed strengths in emerging areas of engineering and have extended our reach into fields such as biomedical research, leadership development and the social and behavioral sciences. Our researchers address fundamental and strategically important questions and deliver economic, social and cultural impact at regional, national and international levels. We tackle global sustainability challenges with research focused on solutions to critical world issues around environment, poverty, healthcare, food and clean water.

The foundation of N.C. A&T’s research program is strong relationships with major funding agencies, including the United States Department of Agriculture, Department of Education, National Science Foundation and National Institutes of Health.

The Division of Research and Economic Development (DORED) administers the university’s approximately $64.3M annual sponsored research portfolio, supports and nurtures our researchers and extends research outcomes into the community. DORED provides services to faculty, postdoctoral scholars, student researchers, current and potential research partners, funding agencies, economic development agencies and community engagement partners.

Where traditional disciplines overlap and where new ones arise, N.C. A&T researchers are working to turn the scientific promises of today into the technological realities of tomorrow.
From July 1, 2017 through June 30, 2018, N.C. A&T received $64.3 in direct and indirect federal funding, which represents 94% of the total sponsored projects awards.

243 Total Sponsored Awards

- USDA: $16.5M
- NSF: $16.2M
- Dept. of Education: $12.2M
- Other Federal: $10.3M
- Other: $9.1M
Technology Transfer

Recent Spin-Off Company

The BioAdhesive Alliance

Produces a low-cost, durable adhesive that reduces the amount of petroleum needed in asphalt. It is a green product obtained from swine manure. Bioadhesive gives pavement greater water resistance and temperature tolerance. It also provides a use for one of the world’s most problematic waste materials.

From the research developed in our labs to the ideas generated in our classrooms, N.C. A&T nurtures ideas and helps commercialize them. Our Technology Transfer team identifies innovations from around the campus and facilitates their commercial development.

The team provides a university-wide service to help protect and exploit our intellectual property through licensing and spin-out company formation. We work closely with faculty to select high-value opportunities, and with business partners to develop and execute licensing agreement plans. The team provides a range of services including opportunity evaluation, IP protection, securing incubation funding, customer engagement, marketing, business planning and negotiation of commercial agreement terms.

The team also focuses on raising the profile of the university within the knowledge exchange arena, and forging long-term strategic partnerships with national and international organizations to realize the impact potential of the university’s research outcomes.

Wayne Szafranski
Assistant Vice Chancellor
Outreach and Economic Development
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Since 2001, **seven companies** have launched based on N.C. A&T innovations, with breakthrough inventions licensed by N.C. A&T spanning engineering, biotechnology and manufacturing.

In FY 2018 N.C. A&T received more than **$42,000** from licensed technologies.
Research Impact Areas

Advanced Materials
Creating a Healthier World
Educating the Next Generation
Engineering for Better Living
Entrepreneurship and Innovation
Food for a Growing Population
Harnessing and Protecting Big Data
Heritage, History and Cultures
Leadership and Community Development
Living With Our Planet
Moving People and Products
Securing Cyberspace
Tools and Technologies of Tomorrow
Transforming the Energy Landscape

Disciplinary boundaries are no barrier to Aggie researchers. Our faculty, researchers and students collaborate across the spectrum of science and engineering, creating new knowledge, spurring economic activity and improving the quality of life for our community and the world.
Developing breakthroughs in structural materials and characterizing new materials for use in emerging technologies by manipulating matter at an atomic or molecular level to build macro, micro and nanostructured materials with new and game-changing properties.

**Research Areas**
- Nanomaterials and regenerative engineering
- Composite and advanced smart materials
- Innovative construction materials
- Nanobioelectronics and nanoenergy
- Nanoengineered materials
- Nanotechnology and multiscale materials
- Surface engineered materials

**External Partnerships**
- NSF – Bioenergy Center
- NSF – Engineering Research Center for Revolutionizing Metallic Biomaterials
- DOD – Center for Nanoscience and Nanomaterials
- NSF – Nanoscale Science and Engineering Center
- NSF – Nanoscale Interdisciplinary Research Team
- NSF – Nanoscale Undergraduate Education
- NSF – USA-Euro for Perovskite and Coating
- Department of Energy, NASA, Boeing
- Air Force Research Laboratory
- Joint School of Nanoscience and Nanoengineering

**Selected Resources**
- Electron microscopy laboratory
- Bio-polymeric smart materials laboratory
- X-ray diffraction laboratory
- Mechanical testing laboratory
- Surface characterization and microscopy laboratory
- Materials processing and sample preparation laboratory
- Physical property measurement facility
Established as an academic collaboration between North Carolina Agricultural and Technical State University and The University of North Carolina at Greensboro, the Joint School of Nanoscience and Nanoengineering (JSNN) builds on the strengths of the two universities to offer an innovative, cross-disciplinary graduate program that trains scientists in various emerging areas of nanoscience and nanoengineering.

JSNN is housed in a 105,000-square-foot state-of-the-art science and engineering research building located at Gateway University Research Park South Campus with nanoelectronics and nanobio clean rooms, nanoengineering and nanoscience laboratories and extensive materials analysis facilities.

The facility includes partner labs, cleanrooms, wet lab space, fermentation lab, thermochemical lab, tissue culture and cell culture space, biophysics lab, bioscience open lab and a suite of microscopes from Carl Zeiss SMT®, including the only Orion Helium Ion microscope in the Southeast. A visualization center allows three-dimensional imaging for modeling of nanotechnology problems.

Research focus areas:
- Nanobiology
- Nanometrology
- Nanomaterials (emphasis on NanoComposite materials)
- Nanoelectronics
- Nanoenergy
- Computational Nanotechnology

JSNN is also part of National Science Foundation-funded collaboration to advance research, education and infrastructure in nanoscale science, engineering and technology. The NSF has selected the Southeastern Technology Infrastructure Corridor, a collaboration between Georgia Institute of Technology Institute of Electronics and Nanotechnology, N.C. A&T and the University of North Carolina at Greensboro as a site for the prestigious National Nanotechnology Coordinated Infrastructure.

http://jsnn.ncat.uncg.edu

Nanomanufacturing Innovation Consortium

The Nanomanufacturing Innovation Consortium (NIC) enables access to the JSNN’s state-of-the-art research and education facility located at Gateway University Research Park and provides access to unique capabilities for product development, analytical services and materials testing, analysis and evaluation to address the needs of consortium members. The diverse membership includes more than 30 institutions with the majority being local and national companies. Of particular benefit is the exposure of NIC members to the JSNN’s ongoing research in nanobiology, nanomaterials and cleanroom technologies.

www.gatewayurp.com
Creating a Healthier World

Strengthening the ability of science and society to strategically and effectively address complex public health issues and improve the well-being and quality of life for all people through next-generation technologies and evidence-based practices.

Research Areas
- Alzheimer’s disease
- Bioinformatics
- Cancer genes
- Drug-delivery systems
- Health disparities
- Medical devices
- Psychology and counseling
- Substance abuse

External Partnerships
- National Institutes of Health
- University of North Carolina at Chapel Hill – TraCS
- RTI International – TraCS
- Merck, GSK, AARP – COAACH
- NC Department of Health and Human Services
- Moses H. Cone Health System
- USDA – Cooperative State Research, Education and Extension Service
- Department of Health and Human Services – Centers for Medicare and Medicaid
- Hampton University – Minority Men’s Health initiative

Selected Resources
- Center for Outreach in Alzheimer’s, Aging and Community Health (COAACH)
- Center for Behavioral Health and Wellness
- Microbiology laboratory
- Bacterial physiology laboratory
- Molecular biology, biochemistry laboratory
- Biophysics laboratory
The North Carolina A&T State University Center for Outreach in Alzheimer’s, Aging and Community Health (COAACH) is a community resource that advances healthy aging. The COAACH team of experts and strategic partners are collectively committed to improving the health and well-being of communities by ensuring they have the capacity to provide individuals with the resources they need to live their best lives and age with good health, dignity and independence.

COAACH is determined to understand the needs of the communities it serves which is why COAACH staff and its partners conduct outreach activities and focus groups in targeted communities to gauge the state of healthy aging, and to determine key needs for fostering higher levels of health and quality of life. They also synthesize existing data and research related to a community and its health aging status.

Advocacy plays an important role in ensuring healthy aging takes place in all communities, particularly those underserved in access to key resources. Advocacy work involves sharing information and facts needed to make informed decisions related to local, state and federal policy in the areas of Alzheimer’s, aging and community health.

www.coaachhealth.org

Alzheimer’s and Aging Facts

- Approximately 92% of older adults have at least one chronic disease, and 77% have at least two
- One in three seniors dies with Alzheimer’s or another form of dementia
- The 65 and over population is projected to increase from 41.4 million in 2011 to 79.7 million by 2040
- Alzheimer’s disease is the sixth leading cause of death in the United States
The Center for Behavioral Health and Wellness (CBHW) provides community-focused, evidence-based and culturally-competent behavioral health services through the integration of best-practice research, training and technical assistance. In partnership with community-based agencies, CBHW conducts applied research and evaluation and provides training and technical assistance to service providers.

The Behavioral Health Clinic is a strong example of how the university is focusing on community engagement by bridging university-community partnerships while simultaneously providing hands-on opportunities for students to learn the latest techniques in behavioral health.

The clinic offers comprehensive clinical assessments, psychological testing, outpatient individual and group therapy as well as marriage counseling/couples therapy, medication management, support groups, peer support, advocacy programs and wellness experiences.

Staff members include licensed professional counselors, clinical psychologists, licensed clinical social workers, certified substance abuse counselors, psychiatrists and specialize advocates. These professionals focus on conditions such as depression, anxiety, anger management, substance abuse, addictions, bipolar disorder, post-traumatic stress disorder, domestic violence and eating disorders.

Educating the Next Generation

Producing educational leaders and human services professionals with a lifelong passion for public service prepared to lead and engage in diverse contexts in local communities and on the global stage.

Research Areas
- Adapted physical education
- Culturally-responsive instruction
- Curriculum and instructional design
- Human development
- Childhood obesity
- STEM education
- Teacher education and leadership

External Partnerships
- Center for Creative Leadership
- Hugh Shelton Leadership Center
- Center for Health Equity Research at UNC-Chapel Hill
- Guilford Education Alliance
- United States Marine Corps at Camp Lejeune
- YMCA of Greensboro
- Moses Cone Hospital
- Carolina Panthers
- Charlotte Hornets

Selected Resources
- Center for Behavioral Health and Wellness
- DreamKeepers Living and Learning Community
- iLEAD Peer Mentoring Program
- 2+2 Transfer Program
- Louis Stokes Alliance for Minority Participation
- Minority Science and Engineering Improvement Program
Engineering for Better Living

Merging diverse engineering disciplines and the sciences to create and apply new knowledge for improved human health outcomes.

Research Areas
- Biodegradable medical implants and devices
- Bioinspired design
- Mechanical scaffolding for tissues
- Nanomedicine
- Biomaterials, biomechanics and biosensors

External Partnerships
- Carnegie Mellon University
- NC Biotechnology Center
- National Institutes of Health
- National Science Foundation
- University of Pittsburgh – ERC
- University of Cincinnati – ERC
- Hannover Medical School – ERC
- InCube – ERC
- Lockheed Martin Systems

Selected Resources
- NSF – Engineering Research Center for Revolutionizing Metallic Biomaterials
- Animal Biotechnology Laboratory
- Bioinformatics and Microarray Facilities
- Biochemical Engineering Laboratory
- Analytical Services Laboratory
Recent advances in engineering and the enabling sciences provide an unprecedented opportunity for revolutionary developments in biological interface materials and technologies.

The Engineering Research Center (ERC) for Revolutionizing Metallic Biomaterials transforms current medical and surgical treatments by creating smart implants to improve treatments for orthopedic, craniofacial, neural and cardiovascular ailments. These innovative solutions are made possible by revolutionizing metallic biomaterials and developing smart coatings with built-in responsive biosensory capabilities that can adapt to biological changes to create novel bio-functional engineered systems.

The ERC lead institution is North Carolina A&T State University with core partner institutions, the University of Pittsburgh and the University of Cincinnati, global research partner Hannover Medical School and other global and nation partners that include industry, innovators and state and local government-led entrepreneurial networks.

http://erc.ncat.edu

**Magnesium Alloys**

While magnesium alloys represent a promising next-generation option for cardiovascular stent materials, most recently the Engineering Research Center saw interest and great potential of magnesium-based systems in other non-medical opportunities such as lightweight applications. The center’s intellectual merits in alloying and processing techniques are expected to play an important role in the center’s sustainability.
Entrepreneurship and Innovation

Delivering unique insights into the latest thinking around innovation, entrepreneurship and business management.

Research Areas
- Business communication
- Business ethics
- Business management
- Economic feasibility and impact
- Entrepreneurship education
- Managerial communication
- New venture creation

External Partnerships
- HQ Greensboro
- North Carolina Small Business and Technology Development Center
- Piedmont Association of Information Technology Professionals

Selected Resources
- Aggie Venture Development Lab
- Business Communication Center
- Center for Entrepreneurship and Innovation
- Entrepreneur in Residence
- Entrepreneur Club
- Entrepreneurship Counseling Clinic
- Society for the Advancement of Management
Food for a Growing Population

Pioneering technologies and practices for improving agriculture to increase food volume and quality while also refining production and processing techniques to build a sustainable food supply.

Research Areas
- Agribusiness and food industry management
- Animal science
- Bioagriculture and food microbiology
- Global food security
- Food science, safety and processing
- Crop and pasture production
- Future food systems

External Partnerships
- Carnegie Mellon University
- NC Biotechnology Center
- National Science Foundation
- USDA- National Institute of Food and Agriculture
- USAID
- NCRC - DHMRI

Selected Resources
- Animal Biotechnology Laboratory
- Animal Nutrition Laboratory
- Center for Excellence in Post-Harvest Technologies
- Food Research Laboratory
- Microarrays Facility
- Mushroom Biotechnology Laboratory
- Plant Biotechnology Laboratory
- Reid Greenhouse
- Soil Microbiology and Fertility Laboratory
- University Farm (492 acres)
N.C. A&T’s Center for Excellence in Post-Harvest Technologies (CEPHT) conducts cutting edge research in post-harvest technologies and food science in a 6,000-square-foot wet lab and office located in the UNC Nutrition Research Institute building.

Post-harvest technologies focus on improving the quality and safety of food after it has left the farm. CEPHT’s goal is the development of multidisciplinary programs focused on post-harvest technologies including research pertaining to processing, preservation, consumer research, recovery of health promoting food components, food safety issues, storage stability and quality and value-added product development for food and non-food uses. The program creates new jobs and enhances the economic opportunities for the agriculture sector in North Carolina along all components of the supply line from producers to consumers.

https://transforming-science.com/nc-at-university

**Research focus areas:**

- Health-promoting food components, including isolation and characterization of bioactive compounds, and the development of functional foods and nutraceuticals.
- The development of rapid and effective methods to control spoilage and pathogenic growth, and safe, minimal processing to inactivate food-borne pathogens and eliminate other food contaminants.
- New technologies for predicting and extending shelf-life and quality, and evaluation/minimization of the effect of storage and processing conditions on nutrients and bioactive compounds.
- Value-added product development for food and non-food products, and evaluation of product quality and consumer acceptability.

**Nutrition Discoveries**

The Center for Excellence in Post-Harvest Technologies is a key partner at the North Carolina Research campus – a $1.5 billion world-class biopolis dedicated to making breakthrough discoveries in nutrition and human health. CEPHT is administered by the College of Agriculture and Environmental Sciences.
Unlocking the big data opportunities leads to new insights into everything from health and business to science and education. With big data opportunities come big data challenges and responsibilities. Researchers are working to mitigate the big data challenges of storage and protection to prevent them from becoming liabilities.

**Research Areas**
- Computational modeling
- Data center operations and efficiency
- Data science/data engineering
- Data mining and visualization
- Genetic evolutionary computing
- Software engineering

**External Partnerships**
- DOD High Performance Computing Modernization Office
- Department of Defense
- National Science Foundation
- National Consortium for Data Science
- National Security Agency

**Selected Resources**
- 18 Node 36 Processor IBM Linux Cluster
- 40 Processor SGI3900 Shared Memory System
- 8 Processor Itanium 2 Altix 3300
- 32 processor Compaq Alpha GS 320
- Virtual and Immersive Scientific Visualization Laboratory
- Visualization and Computation Advancing Research Center
- Computational Structure Biochemistry Cluster
- Modeling and Simulation Analysis Software
Heritage, History and Cultures

Discovering and studying historical events, movements, people and ideas that structure and frame the rich, textured and diverse world in which we live.

Research Areas
- African American history and literature
- Native Americans
- Cultural studies
- Digital humanities
- Gender equity
- Race, crime and social injustice

Selected Resources
- NCAT Upward Bound Program
- NCAT Middle College
- University Galleries
- University Library and archives
- Lyceum Series
- Community Performances

External Partnerships
- American Historical Association
- National Humanities Alliance
- Department of Education
- National Endowment for the Humanities
- Department of the Interior
- Bureau of Indian Affairs
- The International Civil Rights Museum and Center
- Greensboro Historical Museum
- North Carolina Association of Historians
- The Melungeon Heritage Association
- Historic Hope Plantation
- Six Nations Polytechnic
Leadership and Community Development

Pursuing breakthroughs that strengthen communities and build leadership capacity.

**Research Areas**
- Advancing the well-being of the global community
- Defending and extending human rights
- Economic empowerment
- Housing and infrastructure
- Leadership development
- Promoting share economic prosperity

**External Partnerships**
- US Department of Housing and Urban Development
- NC Coalition of Farms and Rural Families
- NC Institute of Minority Economic Development of Guilford County, NC
- City of Greensboro
- Center for Creative Leadership

**Selected Resources**
- Interdisciplinary Center for Entrepreneurship and E-Business
- Department of Construction Management and Safety
- PhD Leadership Studies Program
- Community Outreach Resource Center
Living With Our Planet

Advancing our understanding of the complex physical forces shaping our world.

Research Areas
- Weather/climate ecology
- Environmental systems and engineering
- Sustainable land management
- Natural resources management
- Civil and architectural engineering
- Agro-forestry research

External Partnerships
- National Science Foundation
- National Oceanic and Atmospheric Administration
- Department of Energy
- EPA Air Pollution Laboratory
- USDA – Center for Waste Management Partnership
- USDA – Rescue Laboratory

Selected Resources
- Environmental Laboratory
- Wetland Research Facility
- Applied Geophysical Modeling Laboratory
- Geophysical Field Laboratory
- Reid Greenhouse
Mastering time and distance to meet human needs and business demands.

**Research Areas**
- Logistics
- Transportation systems
- Economics
- Manufacturing logistics
- Disaster relief
- Resource scheduling
- Supply chain strategy

**External Partnerships**
- UNC- Chapel Hill – Center of Excellence in Logistics and Technology
- UNC- Chapel Hill – Institute for Defense and Business
- Georgia Tech Supply Chain and Logistics Institute
- Massachusetts Institute of Technology
- North Carolina Department of Transportation
- University of Illinois
- University of Maryland – Institute for Systems Research
- UNC-Charlotte
- Virginia Polytechnic Institute and State University
- Stanford University

**Selected Resources**
- The Transportation Institute
- Interdisciplinary Center for Remanufacturing Supply Chains
- Center for Human-Centric Command and Control Decision Making
- Piedmont Region Logistics – FedEx Hub
- The Southeastern Transportation Center
Established in 1970, the Transportation Institute has been a leader in transportation-related research, education and technology transfer. The mission of the Transportation Institute is to serve as a national, regional and local clearing house for transportation education, research and outreach. It offers seminars, workshops, lectures, publications and other information for public and private transportation practitioners, decision makers and the general public.

The Institute educates students and workers from diverse populations to provide qualified professionals for the transportation workforce. The programs and activities conducted by the Institute are designed to provide ongoing initiatives in the areas of education, research and workforce development.

The Institute leads the Summer High School Transportation Institute, which is sponsored by the U.S. Department of Transportation, the Federal Highway Administration, the North Carolina Department of Transportation, the N.C. A&T Transportation Institute and the Southeastern Transportation Center.


N.C. A&T is a Member of the Southeastern Transportation Center

The Southeastern Transportation Center (STC) is a consortium of nine universities in the Southeastern U.S. that have formed a partnership to serve the region as the designated U.S. Department of Transportation Region IV University Transportation Center. With a theme of transportation safety, the STC is dedicated to the mission of training professionals to address the transportation needs of the region and nation in the 21st century. STC has an aggressive program of supporting students pursuing transportation degrees. With the goal of attracting future leaders into transportation careers, the STC recruits top undergraduate and high school students.
Securing Cyberspace

Employing creative thinking and technical prowess to help build secure computing capabilities in a world increasingly dependent on modern technology.

**Research Areas**
- Artificial intelligence
- Autonomous agents
- Biometrics
- Cyber security, identity protection
- Information assurance
- Secure software engineering
- Trustworthy cloud computing

**External Partnerships**
- National Aeronautics and Space Administration
- U.S. Air Force
- National Security Agency
- Naval Oceanographic Office
- National Science Foundation
- National Security Agency
- Department of Homeland Security

**Selected Resources**
- Center for Cyber Defense
- BEACON (Bio/computational Evolution in Action CONsortium) – A National Science Foundation Science & Technology Center for the Study of Evolution in Action
- Center for Academic Studies in Identity Sciences
- Alliance for the Advancement of African-American Researchers in Computing
- Center for Cyber Defense
N.C. A&T’s center for Advanced Studies in Identity Sciences (CASIS), in collaboration with Carnegie Mellon, Clemson and the University of North Carolina at Wilmington, is the first and only National Intelligence Science and Technology Center of Academic Excellence in the United States. The center received an $8.93 million, five-year grant from the Army Research Laboratory which led to its establishment. A&T is the lead university in the center.

The research in this interdisciplinary center (Computer Science, Electrical and Computer Engineering and Visual Computing) focuses on advanced biometrics. The center’s overarching goals include providing the intelligence community with a pool of talented researchers in biometrics and developing a wide variety of innovative solutions to critical identity security issues.

http://casis.ncat.edu

Biometrics

Biometrics is the science of using human behavioral and physical traits to identify individuals, often for security purposes. Researchers at N.C. A&T currently focus on biometrics from the neck up. Facial features are photographed, broken into individual data segments and those unique points are used to match for identity.
Tools and Technologies of Tomorrow

Applying knowledge of people, machines, processes, materials, mathematics and economics to solve complex problems in a wide variety of settings.

Research Areas
- Systems engineering
- Autonomy and robotics
- Earth-space technologies and remote-sensing (small satellites)
- Motorsports technology and mechanical engineering
- Human-machine interaction

External Partnerships
- DOD Air Force Research Laboratory
- National Oceanic and Atmospheric Administration
- National Center for Atmospheric Research
- National Institute of Aeronautics
- The University of Texas at San Antonio
- Southwestern Indian Polytechnic Institute

Selected Resources
- Center for Testing, Evaluation and Control of Heterogeneous Large-Scale Systems of Autonomous Vehicles
- Institute for Autonomous Control and Information Technology
The Testing, Evaluation and Control of Heterogeneous Large-Scale Systems of Autonomous Vehicles (TECHLAV) Center was initially funded by the DOD Air Force Research Laboratory as a Center of Excellence in Autonomy in 2015.

The TECHLAV Center comprises a strong multi-disciplinary team and synergizes expertise in control, communication and human cognition from N.C. A&T and its collaborator The University of Texas at San Antonio. The Center is also partnering with Southwest Indian Polytechnic Institute to provide and promote education, outreach activities and curriculum development to the larger Native American community.

The TECHLAV Center addresses fundamental problems in modeling, analysis, control, coordination, testing and evaluation of autonomous systems. It also serves as a national resource in education and research in autonomy and provides outreach services in autonomy-related areas.

http://techlav.ncat.edu

Making Things that Independently React and Reason

Devices with autonomous control have the ability to self-govern with minimal human input. Autonomous system technology is of increasing interest throughout scientific and even consumer circles. These systems allow operators to observe, record, make decisions and even take actions in locations where physical human presence is either impossible or undesirable. Autonomous systems are separate entities from the people who operate them, so the more aligned an operator is with a system’s state, the more effective it will be. Creating this alignment through technology and research is TECHLAV’s primary mission.
Transforming the Energy Landscape

Researching alternative energy and environmental sustainability that leads to improved human health by reducing environment pollution, improving air and water quality and developing clean, renewable energy.

Research Areas
- Energy innovation
- Alternative/renewable energy (wind, solar, geothermal, biofuels)
- Accelerator-based nuclear physics

External Partnerships
- Biofuels Center of North Carolina
- Department of Energy
- EPA Air Pollution Laboratory

Selected Resources
- Bioenergy and Bio-Processing Laboratory
- Center for Energy Research and Technology
- Environmental Laboratory
- Fuel Cell Laboratory
Founded in 1984 and grounded in the engineering and building sciences, the Center of Energy Research and Technology (CERT) is a multi-disciplinary research, teaching and outreach institution that pursues the reduction of energy and water consumption and promotes sustainable design practices.

CERT has evolved and transformed into a resource fitting the times. As the nation’s energy agenda has changed over the past three decades, CERT has responded by producing students, modernizing curricula and securing facility and staff that enable CERT to continue its mission. Global politics, economics and diplomacy dictate a solution that will do more than save a few dollars on utility bills. Our nation will need to remedy, for the long term, its current energy predicament while addressing larger themes such as carbon emissions reduction and climate change, energy independence and national securities, net-zero energy and sustainable design practices.

CERT’s history of effective, cooperative research with federal, state and local government and utility suppliers has allowed it to gain functional insight into energy delivery from the production plant to the end user.

http://www.ncat.edu/research/dored-research-centers/cert

**CERT’s services include:**
- Preliminary and secondary energy audits
- Energy reduction recommendations
- Commercial and residential plan reviews
- Measurement and verification plans
- Data synchronization and review

**Applying Research to the Built Environment**

CERT’s faculty, staff and students provide a variety of services to the community. Businesses, local governments and school systems have called on CERT for services ranging from basic to complex.

Our best-known business customer may be the Proximity Hotel of Greensboro. The Proximity engaged CERT for an energy measurement and verification plan that helped it become the first LEED Platinum-certified hotel in the United States.
Centers & Institutes
Bioenergy Center
Center for Advanced Materials and Smart Structures
Center for Advanced Studies in Identity Sciences
Center for Aviation Safety
Center for Behavioral Health and Wellness
Center for Composite Materials Research
Center for Cyber Defense
Center for Energy Research and Technology
Center for Entrepreneurship and Innovation
Center for Excellence in Post-Harvest Technologies
Center for Outreach in Alzheimer’s, Aging and Community Health
Engineering Research Center for Revolutionizing Metallic Biomaterials
Institute for Autonomous Control and Information Technology
International Trade Center
Interdisciplinary Scientific Environmental Technology
Visualization and Computation Advancing Research Center
Waste Management Institute

Facilities and Labs
Analytical Services Lab
Autonomous Control Lab
Bioinformatics Lab
Plant Tissue Culture Biotechnology Lab
Computational Science and Engineering Cluster
Joint School of Nanoscience and Nanoengineering
Reid Greenhouse
Food and Nutrition Lab
Food Research Lab
Plant Biotechnology Lab
Research Farm
At N.C. A&T, the student body is surrounded by highly-motivated faculty, postdoctoral scholars, graduate students and research administrators who have tremendous resources, expertise and professional networks at their disposal. This sophisticated research enterprise provides a vast array of opportunities for students in all disciplines.

The Office of Undergraduate Research (OUR) encourages, facilitates, supports and promotes all types of undergraduate research and scholarly inquiry. OUR broadens and strengthens N.C. A&T’s undergraduate research program by increasing opportunities, lowering barriers and promoting scholarly inquiry.

The number of students who engage in undergraduate research and other scholarly activity continues to increase each year.
N.C. A&T offers 9 doctoral degree programs (11 concentrations), 31 master’s programs (46 concentrations) one post-master’s certificate program and 8 post-baccalaureate certificate programs in collaboration with eight colleges, with cutting-edge research opportunities within interdisciplinary research centers. The academic programs are offered through colleges in agriculture and environmental sciences, arts, humanities, and social sciences, business and economics, education, engineering, health and human services, joint school of nanoscience and nanoengineering, science and technology.

Master’s Degree Programs

MBA Business Administration
  Accounting
  Human Resource Management
  Supply Chain Systems
MA English and African American Literature
MAEd Elementary Education
MAEd Reading Education
MAT Biology Education
MAT Business Education
MAT Chemistry Education
MAT Child Development: Early Education & Family Studies Birth-K
MAT Elementary Education
MAT English Education
MAT Family and Consumer Sciences Education
MAT History Education
MAT Math Education
MAT Physical Education and Health
MAT Special Education
MAT Technology Education
MS Adult Education
MS Agricultural Education
  Professional Licensure
  Professional Service
MS Agricultural and Environmental Systems
  Integrated Animal Health Systems
  Agribusiness & Food Industry Management
  Natural Resources and Environmental Systems
MS Applied Mathematics
MS Bioengineering
MS Biology
  Professional Science Masters in Biology
MS Chemical Engineering
MS Chemistry
  Professional Science Masters in Chemistry
MS Civil Engineering
MS Computational Science and Engineering
MS Computer Science
MS Electrical Engineering
MS Food and Nutritional Science
MS Industrial and Systems Engineering
MS Information Technology
MS Instructional Technology
MS Mechanical Engineering
MS Mental Health Counseling
  Clinical Rehabilitation Counseling
MS Nanoengineering
MS Health and Physical Education – Sports Administration
MS Physics
MS School Counseling
MS Technology Management
  Professional Science Masters in Technology Management - Construction Science and Management
MSA School Administration
MSW Social Work (Joint program with UNCG)

Doctoral Programs

PhD Computational Science and Engineering
PhD Computer Science
PhD Electrical Engineering
PhD Energy and Environmental Systems
PhD Industrial and Systems Engineering
PhD Leadership Studies
PhD Mechanical Engineering
PhD Nanoengineering
PhD Rehabilitation Counseling & Rehabilitation Counselor Education
North Carolina Agricultural and Technical State University
Division of Research and Economic Development
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