



Catalog of Innovation Assets Supporting Aerospace and Advanced Manufacturers

Prepared for
Piedmont Triad Partnership

July 2014

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JOINT SCHOOL OF NANOSCIENCE AND NANOENGINEERING (JSNN)

Overview

Aerospace/Aviation Relation: Advanced Materials

Description: JSNN is a joint academic unit of NC A&T and UNCG and located at the Gateway University Research Park's South Campus in a 105,000 square foot facility. The school is dedicated to academic and industrial research in the growing field of nanotechnology. JSNN believes focused efforts in nanomanufacturing can help produce strong, longer lasting, and lighter planes and equipment for the aviation and aerospace industry.

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NanoBio Launchpad

Aerospace/Aviation Relation: Start-Up Assistance

Description: The NanoBio Launchpad operates as a co-working site for nanobio technology start-ups. The space includes a shared laboratory, 3 offices, and 8 workstations. Occupants can benefit from access to advanced equipment and research at the JSNN and the Nanomanufacturing Innovation Consortium (NIC).

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Gateway Materials Testing Center (GMTC)

Aerospace/Aviation Relation: Advanced Materials

Description: GMTC can provide extensive mechanical testing capabilities and a broad chemical analysis toolset that enables nanomaterials and nanochemistry research. The Materials Test Center specializes in testing of Polymer Matrix Fiber Reinforced Composites, which the aerospace industry requires for composite materials before they can be used in aircraft manufacturing. Other testing focus areas include advanced coating research, composite testing and certification, static and fatigue testing, designing/prototyping, and computational mechanics research.

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NanoManufacturing Innovation Consortium (NIC)

Aerospace/Aviation Relation: Advanced Materials

Description: The nano school has established a NanoManufacturing Innovation Consortium to link companies with university researchers and provide access to the school's advanced equipment. Member companies can work with PhD scientists to conduct R&D for their company. Member companies can range from small business and start-ups to major global corporations. The Consortium currently has 25 members with locations across North Carolina, Virginia, and California.

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NORTH CAROLINA A & T STATE UNIVERSITY

College of Engineering

Aerospace/Aviation Relation: Advanced Manufacturing Techniques

Description: North Carolina A & T University strengths for the aviation and aerospace industry are concentrated in the College of Engineering, with 23 academic programs ranging from the bachelors to the doctoral level and a wide range of R&D capabilities exist including microtomes and 3D manufacturing. Every year several undergraduate engineering students partner with companies to complete their capstone design projects. Supporting the local manufacturing community with R&D is a major pillar of the college.

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Center for Human Machine Studies

Aerospace/Aviation Relation: Advanced Manufacturing Techniques

Description: This center focuses its research on understanding human performance under interaction with complex machine systems. Research focuses on application in manufacturing, aviation and transportation human factors, IT, and interface sciences. These efforts are funded by the Army Research Laboratory.

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Center for Advanced Materials and Smart Structures

Aerospace/Aviation Relation: Advanced Materials

Description: The Center for Advanced Materials and Smart Structures (CAMSS) is focused on advanced ceramic materials and their composites. The major research thrust areas include 1) advanced ceramic, 2) advanced composites, 3) electronic ceramic devices, and 4) sensors and smart structures and III-V nitrides, and 5) ohmic contacts and devices. The center is a collaboration between academics, private industry, and the government to develop basic and applied research programs.

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Center for Composite Materials Research

Aerospace/Aviation Relation: Advanced Materials

Description: This center provides similar composite materials research for general applications, not just aerospace specific applications. The center includes separate laboratories for computation, mechanical testing, diagnostics, and composite processing and fabrication. Research focus areas include complex composite components, textile fiber architectures, materials testing and analysis, cost-effective studies, textile fabrics process techniques, and training of industry engineers in composites fabrication and composite usage.

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NSF Engineering Research Center for Revolutionizing Metallic Biomaterials (ERC-RMB)

Aerospace/Aviation Relation: Advanced Materials

Description: The ERC-RMB is funded by NSF to develop new advanced materials for medical implant reconstruction and regeneration. The center has a strong focus in technology transfer. To achieve their biosensitive devices the center works with metallic biomaterials, biodegradable metals, sensors, and smart coatings.

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Transportation Institute

Aerospace/Aviation Relation: Business Process Innovation

Description: The Transportation Institute at NCA&T is a multidisciplinary group that draws from assets in the School of Business and Economics, the College of Engineering, and the entire University to develop research and technology transfer for transportation matters. The institute specializes in supply chain strategy, such as developing disaster management plans, as well as manufacturing logistics and warehousing and distribution. In addition to research, the center offers public lectures and seminars.

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Center for Autonomous Control and Information Technology

Aerospace/Aviation Relation: Computing & Control Systems

Description: The Center works to carry out research and education of autonomous control engineering. The areas of concentration are soft computing, multiagent systems, artificial intelligence in general, control theory, genetic algorithms, and energy conservation and power electronics. The center also deals with UAV control systems to allow missions to be delivered in a cooperative fashion.

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Center for Advanced Studies in Identity Sciences

Aerospace/Aviation Relation: Defense & Safety

Description: The Center for Advanced Studies in Identity Sciences advances research on biometrics and facial recognition technology (including ocular recognition) with a focus to provide solution to identity security issues. The center is a pilot initiative and funded by the Army Research Laboratory and is the only of its kind in the United States.

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Center for Aviation Safety

Aerospace/Aviation Relation: Defense & Safety

Description: Funded by NASA, the Center for Aviation is designed to develop understanding of the center's three objectives 1) advanced composite materials, 2) integrated vehicle health management, and 3) aeromechanics to support the safe operations of aircraft. The center serves the purpose of address NASA's Aeronautics Research Mission Directorate Fundamental Aeronautics and Aviation Safety Programs.

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Center for Cyber Defense

Aerospace/Aviation Relation: Defense & Safety

Description: The Center for Cyber Defense is designed to improve research and develop professional in the field of Information Assurance (IA). The Center features federally sponsored research to develop computer code that recognizing and mitigates cyber attacks. Other focus areas include biometric authentication, identity management, intrusion detection, health informatics privacy and security, mobile security, engineering secure software, and cloud computing.

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Waste Management Institute

Aerospace/Aviation Relation: Defense & Safety

Description: The Waste Management Institute is an interdisciplinary academic unit that conducts research to develop understanding regarding the environmental and health issues surrounding waste management activities. Under the institute, research has been conducted for NC State and NASA to help evaluate health monitoring and heat transfer issues for aerospace considerations.

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Center for Energy Research and Technology (CERT)

Aerospace/Aviation Relation: Fuels, Power Sources, & Efficiency

Description: CERT is a leader in energy research in the Triad area. The center's research focuses include energy management and modeling, sustainable building technologies, renewable fuels and technologies (including hydrogen, biodiesel, and biogas), and workplace energy-reduction measures. CERT offers services to the business community such as energy auditing, energy reduction strategies, and assistance with developing data reviews and planning documents.

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NSF CREST Bioenergy Center

Aerospace/Aviation Relation: Fuels, Power Sources, & Efficiency

Description: This center works to advance development in thermochemical biomass and make the technology a viable fuel option. The center also focuses on hydrogen production in industrial applications. The center is also tasked with assessing the economic profitability of these fuels compared to traditional energy sources.

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NOAA Interdisciplinary Scientific Environmental Technology Cooperative Science Center

Aerospace/Aviation Relation: Sensors

Description: A partnership with NOAA and universities with NCA&T at the helm, the center works to develop technologies in weather sensors, IT data management development, geospatial tools, and observing severe weather patterns. The ultimate goal of these research thrusts are to help better understand climate change. The centers work in sensor development includes tools with nanoscale, chemical, low-cost, and portable sensors.

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International Trade Center

Aerospace/Aviation Relation: Start-Up Assistance

Description: The International Trade Center provides outreach to small-to-medium business owners and small farmers develop through international trade. The center also conducts research on issues concerning globalization and trade and development. The center also provides training in operating skills and management.

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Interdisciplinary Center for Entrepreneurship and E-Business (ICEEB)

Aerospace/Aviation Relation: Start-Up Assistance

Description: In addition to promoting and fostering entrepreneurship to current NC A&T students, the Center also can provide help with management and expansion to local entrepreneurs. The center focuses on networking between local practicing entrepreneurs and current students. The center also support strengthening and collaboration with minority owned businesses. The ICEEB also hosts an annual entrepreneurial conference.

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FAA Center for Excellence for General Aviation

Aerospace/Aviation Relation: Defense & Safety

Description: N.C. A&T is an affiliate member of the research partnership between universities, private industry, and the federal government. The Center of Excellence's research and development efforts will focus on general aviation safety issues, including airport technology, propulsion and structures, airworthiness, flight safety, fire safety, human factors, system safety management, and weather. The center is part of the FAA's efforts to reduce general aviation fatalities 10 percent by 2018.

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NATIONAL INSTITUTE OF AEROSPACE (NIA)

Aerospace/Aviation Relation: Defense & Safety

Description: Located in Hampton, VA just outside the gates of NASA Langley the NIA is a non-profit research and graduate level education institute. The center is supported by 14 member universities, including North Carolina A&T and NC State Universities. Research centers focus on aerospace engineering, flight sciences, satellite systems, sensor and solar energy, and aerospace acoustics. NCAT and NCSU have Langley professors who work at NIA on research efforts for small satellites and advanced smart materials.

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UNIVERSITY OF NORTH CAROLINA AT GREENSBORO

Department of Geography

Aerospace/Aviation Relation: Economic Impact

Description: Within the geography department, a few professors have specific aviation research interests. Dr. Debbage in particular researches the impacts of airline routes on regional economies and the economic geography of tourism. The professor's research has led him to believe that the Triad has potential to develop as an aerotropolis, where aviation and its related businesses can drive economic growth. Currently, he serves on the International Editorial Board of the Journal of Air Transport Management.

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Center for Geographic Information Science (CGISc)

Aerospace/Aviation Relation: GIS Mapping

Description: The CGISc collaborates with public and private entities to utilize mapping and develop applications to address geographic considerations. Recent work has focused on transportation and cellular communications. For each project the center is conducted by at least one graduate student and one faculty member operating as the lead consultant. The goal of these partnership is to develop new and creative applications.

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Information Systems and Supply Chain Management

Aerospace/Aviation Relation: Business Process Innovation

Description: Researchers involved in this school can provide research and insights to supply chain operation strategies, including impacts of implementing technology innovations. Faculty and students have a variety of research being conducted for the private sector, including work with B/E Aerospace. The UNCG Center for Business and Economic Research can also provide research on manufacturing trends and the economic impacts of R&D spending and investment.

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North Carolina Entrepreneurship Center

Aerospace/Aviation Relation: Start-Up Assistance

Description: The mission of the center is to catalyze globally competitive companies in the Piedmont Triad. To its goal of support and grow new businesses the center aims to develop new types of entrepreneurial learning and build capacity of local institutions, economic developers, and organizations to better collaborate. The center's target areas include international entrepreneurship, social entrepreneurship, creative industries, health care, family business, franchising, and technology entrepreneurship.

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International Programs Center

Description: The International Programs Center (IPC) coordinates extensive study abroad programs in over 100 locations in over 40 countries. It also hosts international students and scholars from 75 countries. The IPC can connect companies to resources to help with research into new global opportunities, better understand cultural issues and provide access to a growing talent pool of students and faculty with deep connections and experiences all over the globe.

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Center for Business and Economic Research

Aerospace/Aviation Relation: Economic Impact

Description: The Center utilizes the expansive expertise of the Bryan School of Business and Economics to perform applied research on business practices and economic policies for the Triad community and economic developers. This research includes the Dixon Hughes Goodman Triad Business Index that tracks economic forecasts and trends for the Triad economy, which is available for subscription on the center's website. Other research includes cluster mapping, exports, and bioscience.

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WAKE FOREST UNIVERSITY

Center for Nanotechnology and Molecular Materials

Aerospace/Aviation Relation: Advanced Materials

Description: The three major focuses of the Nanocenter at Wake are alternative energy power, biomedical technologies, and advanced materials physics. The advanced materials program focused on developing new materials particularly conjugated polymer design and synthesis and carbon-based nano-particles. The center collaborates with companies by establishing sponsored research programs, IP licensing, and access to testing and facilities.

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Center for Energy, Environment and Sustainability (CEES)

Aerospace/Aviation Relation: Fuels, Power Sources, & Efficiency

Description: The Center provides a variety of research on several environmental topics including biofuels, lithium-ion rechargeable batteries, and solar fuel. The center also has a focus area on unmanned aircraft and how unmanned aircraft can be utilized for data collection. For the business community the center provides a Sustainability Clinic that helps business address challenges in navigating the sustainability field.

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Center for Injury Biomechanics

Aerospace/Aviation Relation: Product Testing

Description: Drawing from Wake Forest's strong medical assets, this partnership with Virginia Tech brings together 40 biomedical engineering faculty to conduct simulations to evaluate impacts and test safety equipment. Current research has focused on automobile safety, military research, and sport biomechanics. The center has advanced facilities for experimental research and computer modeling.

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HIGH POINT UNIVERSITY

School of Art and Design

Aerospace/Aviation Relation: Fabrics & Design

Description: Given the aerospace and aviation sector in Triad has a focus on supplying furniture and seating to aircraft, the School of Art and Design may be able to help provide innovation to this specific regional focus. The school has assets in product design, furnishing manufacturing, graphic design, furnishing product development and design. The university has many resources for design including a 3D printer, laser cutter, CAD labs, and a CNC Router.

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Department of Physical Therapy

Aerospace/Aviation Relation: Product Testing

Description: This department houses the Human Biomechanics and Physiology Laboratory which features advanced equipment such as 24 advanced motion capture cameras to track and analyze detailed movement, an environmental chamber for performance testing under extreme conditions including altitude, a metabolic cart for VO₂ max and lactate threshold testing, a wet lab for blood and tissue sampling and processing and a DEXA scanner that produces body fat and bone density results in 6 minutes. Using this technology the lab is now home to the Institute for Human Health and Sports Science Research. Given the ability for biomechanics and physiology testing, this facility and staff could provide testing designed to prevent injury and improve performance. Also, given the expertise and international renown of the faculty and partnerships through the Institute, the Department of Physical Therapy is positioned to conduct research for the aerospace and aviation industry.

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CENTER FOR DESIGN INNOVATION

Aerospace/Aviation Relation: Fabrics & Design

Description: CDI is a multi-campus research center, including Winston-Salem State University, UNC School of the Arts, and Forsyth Tech, that works to develop the Piedmont's advanced digital technologies. CDI has research capabilities in techniques in motion capture and analysis, data visualization and modeling, and rapid prototyping support creative activity to generate designs for animations, video games, interactive narratives, medical devices, and responsive objects and environments.

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NORTH CAROLINA STATE UNIVERSITY

Precision Engineering Center

Aerospace/Aviation Relation: Advanced Manufacturing Techniques

Description: The Precision Engineering Center (PEC) develops technology for high precision measurement and production, and works with innovative industries that apply that technology to make new and better products.

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Center for Robotics and Intelligent Machines

Aerospace/Aviation Relation: Advanced Manufacturing Techniques

Description: The Center for Robotics and Intelligent Machines (CRIM) was established in 1992 with the mission of fostering increased interaction in the interdisciplinary technologies of advanced robotics and intelligent machines research. Research is being achieved through various programs of evolution, integration, and collaboration. The changing face of the state's hi-tech industries motivates the CRIM to broaden its research base to include biotechnology and information technology themes, since these industries are expanding quickly within the state and the nation.

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Center for Dielectrics and Piezoelectrics

Aerospace/Aviation Relation: Advanced Materials

Description: The CDP aims to develop an international leadership position in the fundamental material science and engineering that underpins dielectric and piezoelectric materials. Innovations in these areas often arise from research advances in materials chemistry, synthesis, and processing that enable new materials and device functionality.

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Center for High Performance Simulation

Aerospace/Aviation Relation: Advanced Materials

Description: The Center for High Performance Simulation (CHiPS) brings together expertise present in the Colleges of Engineering and Physical and Mathematical Sciences at North Carolina State University in electronic, atomic, meso-scale and macroscopic simulation methods and offers advanced training and research to graduate students. Among the aims of the Center are the promotion of interdisciplinary interactions in these areas, including multi-scale approaches to complex systems, and advanced education in these areas. The Center is organized along three multi-disciplinary thrust areas: (a) materials and biomaterials; (b) computational fluid dynamics, including meteorological and astrophysics applications; and (c) applied mathematics and computer science.

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Center for the Integration of Composites into Infrastructure

Aerospace/Aviation Relation: Advanced Materials

Description: The Center for the Integration of Composites into Infrastructure is a National Science Foundation (NSF) Industry/University Cooperative Research Center which began operations in July 2009. The primary objective of the center is to usher applications of composites in civil and military infrastructures to the next level through collaborative efforts between West Virginia University, Rutgers, the State University of New Jersey, North Carolina State University and the University of Miami, Florida. The focus areas will synergize different fibers and polymers to create new application areas; thus expanding market potential.

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Institute for Transportation Research and Education

Aerospace/Aviation Relation: Business Process Innovation

Description: At the core of ITRE's mission is transportation research. Staff and graduate students conduct a variety of surface and air transportation studies that address today's—and tomorrow's—complex issues, many of which are best management practices.

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Integrated Manufacturing Systems Engineering Institute

Aerospace/Aviation Relation: Business Process Innovation

Description: The Mission of the Integrated Manufacturing Systems Engineering Institute (IMSEI) is to provide an environment in which faculty and students from different relevant disciplines can interact with each other and with industry in common areas of manufacturing systems education and research interests.

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Kenan Institute for Engineering, Technology & Science

Aerospace/Aviation Relation: Business Process Innovation

Description: The Kenan Institute for Engineering, Technology & Science (KIETS) develops partnerships in basic research, education, commercialization and public outreach with individuals and organizations dedicated to the advancement of science, engineering and technology as a force in improving the economic and social well-being of the nation and the world.

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Institute for Advanced Analytics

Aerospace/Aviation Relation: Business Process Innovation

Description: The mission is to produce the world's finest practitioners of analytics—individuals who have mastered complex methods and tools for large-scale data modeling, who have a passion for solving challenging problems through teamwork, who are guided by intellectual curiosity, honesty and integrity, and who strive to attain the highest level of professionalism through continuous self-improvement.

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Center for Transportation and the Environment

Aerospace/Aviation Relation: Business Process Innovation

Description: The Center for Transportation and the Environment conducts innovative programs of research, education, and technology transfer that seek to mitigate the impacts of transportation on the environment.

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Industrial Extension Service

Aerospace/Aviation Relation: Business Process Innovation

Description: The Industrial Extension Service (IES), the first of its kind in the United States, was established in 1955 to help North Carolina industries grow and prosper. More than 50 years later, our mission remains the same. As an outreach and extension organization affiliated with the NC State College of Engineering, we support industry and business in the workplace—whether that’s in the office, on the factory floor, at a hospital, inside a government facility, or on the job site.

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Center for Research in Scientific Computation

Aerospace/Aviation Relation: Computing & Control Systems

Description: The Center for Research in Scientific Computation (CRSC) is a formally recognized, multidisciplinary center administered by North Carolina State University. Its purpose is to foster research in scientific computing and provide a focal point for research in computational science, engineering and applied mathematics.

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Center for Efficient, Scalable and Reliable Computing (CESR)

Aerospace/Aviation Relation: Computing & Control Systems

Description: The Mission of CESR is to research, design, and build computer systems that are Efficient, Scalable and Reliable. Increasingly, these are the key requirements for a wide range of computing systems—from ASICs to cell phones to corporate servers: efficient in their use of energy, space, and memory; scalable in performance and cost; and reliable in the face of high transaction rates and adverse environments. We address these challenges through research in VLSI design, processor architecture, compilers, memory systems, system architecture, and application software.

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Institute for Next Generation IT Systems

Aerospace/Aviation Relation: Computing & Control Systems

Description: The Institute for Next Generation IT Systems (ITng) is a joint university/government industry research organization located within NC State University's College of Engineering. Its mission—to provide a forum for collaboration between partners, faculty and students to research solutions that address current IT challenges. Working at the intersection of research, practice and policy to address IT needs, ITng focuses on four key areas: Health & Well Being, Educational Innovation, Energy and Environment.

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NextGen Air Transportation

Aerospace/Aviation Relation: Defense & Safety

Description: The NextGen Air Transportation (NGAT) Center at the Institute for Transportation Research and Education (ITRE) at North Carolina State University is a non-profit partnership with academia, industry, and the government focused on developing and evaluating improvements to existing and anticipated air traffic control, airspace management, airport and airspace system capacity, surface traffic management, and flight safety.

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Center for Research on Textile Protection and Comfort

Aerospace/Aviation Relation: Fabrics & Design

Description: The Center for Research on Textile Protection and Comfort (TPACC) provides faculty and students with a coordinated environment where interdisciplinary problems related to textile comfort and protection performance can be studied and solved.

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Nonwovens Institute

Aerospace/Aviation Relation: Fabrics & Design

Description: The Nonwovens Institute (NWI) is the world's first accredited academic program for the interdisciplinary study of engineered fabrics through an innovative partnership of industry, government, and academia. Operating on an "open" platform, NWI enables industry and university experts to develop the next generation of nonwoven applications while educating and training future industry leaders.

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NCSU Nanofabrication Facility

Aerospace/Aviation Relation: Fabrics & Design

Description: The facility has a full range of micro and nano-fabrication capabilities including: photolithography, reactive ion etching (RIE), deep RIE, low pressure chemical vapor deposition (LPCVD), plasma-enhanced CVD, rapid thermal anneal, thermal oxidation, solid source diffusion, thermal and e-beam evaporation, sputtering, chemical mechanical polishing, various wet etching and cleaning processes, along with various characterization tools. Many of the tools are capable of processing on a broad range of substrates such as semiconductor glass, ceramics, and plastics with sizes ranging from small pieces to 6" wafers.

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Next Generation Power Electronics National Manufacturing Innovation Institute

Aerospace/Aviation Relation: Fuels, Power Sources, & Efficiency

Description: NC State is leading the institute because of its success in developing energy innovations and in working with partners to deploy them. NC State faculty in electrical engineering, computer engineering, and materials sciences are on the leading edge of efforts to advance the use of WBG semiconductors.

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Power Semiconductor Research Center

Aerospace/Aviation Relation: Fuels, Power Sources, & Efficiency

Description: With the widespread use of power devices in consumer electronics, for transportation, and air-conditioning, this technology plays an important role for improving the comfort and well being of people around the world. They are also key enabling devices for reduction of wasted power leading to reduction of usage of fossil fuels and the concomitant reduction in environmental pollution.

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Center for Earth Observation

Aerospace/Aviation Relation: GIS Mapping

Description: The mission of Center for Earth Observation (CEO) is to perform a premier academic, research and teaching program in the study and expansion of geospatial science and technology focused on remote sensing, geographic information systems, image processing, and global navigation systems.

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Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST)

Aerospace/Aviation Relation: Sensors

Description: The NSF Nanosystems Engineering Research Center (NERC) for Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST) develops and employs nano-enabled energy harvesting, energy storage, nanodevices and sensors to create innovative battery-free, body-powered, and wearable health monitoring systems.

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