Among the NC State innovations patented in 2006, an all-natural insect repellent has been licensed to HOMS, a North Carolina-based biotech company. The tomato-based spray could be on the market this year. Such innovations create new jobs and markets and positively impact our quality of life and the environment.

NC State values “Innovation in Action” and demonstrates creativity and entrepreneurship in its 552 U.S. patents and 533 active license agreements with industry to commercialize academic research. Its commitment to “real people and real issues in real time” has meant that in the past 25 years, NC State, operating as a knowledge base for the state, has launched 63 companies, creating more than 13,000 jobs and generating more than $200 million in follow-on venture capital investments, most of this new capital into the state.

Within the past year alone, NC State has launched seven companies, received 49 patents, executed 81 industry agreements formalizing partnerships between the university and corporate partners, and generated $3.6M in royalties from commercialized products. In FY 2006, The Scientist magazine ranked NC State third in the nation for overall patent power. (www.ncsu.edu/ottl/)

Generating jobs and investment locally, regionally, and statewide with unique strategies
For the past three years, NC State and Wake County Economic Development have worked together in a unique partnership to transform high-tech research into well-paying jobs. The Economic Development Partnership (EDP) taps into the resources of NC State and researchers to glean leads about companies, matching the companies’ needs to the manufacturing, research, and development capabilities of NC State and the 13-county Research Triangle region. The partners then develop a customized approach to attract industry specific companies to the area. It is a long-term cycle of identifying companies,
The NCRC is the largest industry-university-state cooperative research center in the nation—a thriving example of cooperation between NC State and industry.

NC State Engagement Today...

creatively partnering them with the university, creating new products and encouraging them to manufacture those products here. And the process is working. Forbes magazine ranks the Raleigh-Cary area the #1 metropolitan area for jobs in the United States in its 2007 annual survey of the top 100 cities. (www.raleigh-wake.org/)

Targeting the nonwoven textiles industry
The first targeted companies were nonwoven textiles companies, which make products such as medical gowns, diapers and wipes. Since the partnership began in 2004, ten companies have moved operations to North Carolina and have invested more than $240 million in the state. Today, North Carolina has the largest concentration of nonwovens companies in the nation. Most recently, Vescom America is locating its vinyl wall coverings and upholstery operations from New York to Henderson in Vance County, creating 75 new jobs, investing $9 million over the next three years, and bringing a formerly abandoned textile facility back to life.

Inside NC State's Nonwovens Cooperative Research Center (NCRC) - home to the most comprehensive nonwoven textiles laboratory in the world - heavy machines roll out 300 meters of material a minute. That’s at least 1,000 times faster than the looms inside traditional textile mills. A fabric line inside NCRC turns out more material in one hour than 500 looms weave in four. Such a pace has led some industry insiders to dub NCRC the “Energizer bunny.” NCRC - a resource for product development, research and training for nonwovens companies - keeps going and going. Just as its engines turn out staggering volumes of fabric, the center proves to be an engine for continuing economic growth.

Even the United States military has taken notice of NC State’s contributions. In 2005, the NCRC created a nonwoven fabric for tents used by the military, which has since shown interest in making other products such as rope out of nonwoven fabric. Delegations from Italian textile machinery manufacturers and the Danish-American Business Forum have come to Raleigh to meet with members of the nonwovens industry and discover the NC State resources that fuel the industry’s growth. And NC State researchers continue to shape the future of the industry as they create interactive technology roadmaps that help align research, development, and the application of technology with business goals. With these remarkable successes and nearly 80 member companies worldwide, the NCRC is the largest industry-sponsored, university-based consortium in the nation and has garnered NC State University approval to transform into the Nonwovens Institute. (www.tx.ncsu.edu/ncrc/)

Executive Director of Wake County Economic Development, Ken Atkins, states, “We use NC State’s knowledge and expertise in our efforts to attract companies that create new jobs and new investments. They would not have come if not for NCRC and NC State.” The continuing collaborative successes of the Economic Development Partnership have paved the way for targeting and attracting other industry sectors, including medical devices, biomanufacturing, and biomedical research.
"The Kinston Waterfront—Now!" project to determine the fate of the town's waterfronts along North Carolina's Neuse River was prepared as a class project by the students enrolled in the graduate program of the Landscape Architecture Department at NC State. The project, which integrated Kinston's waterfronts with existing main streets and buildings, land-use and transportation, proved a desirable approach for the residents who are going forward with some of the proposed conceptual design ideas in 2007, with additional assistance from the university. It is orchestrated by the collaborative efforts of the College of Design, NC State University project team, the Lenoir County Center — North Carolina Cooperative Extension, as the Kinston Waterfront task force.

Extending NC State University's resources and reach
At NC State, the concept of the "engaged university" extends across the state to individual communities. The College of Agriculture and Life Sciences has extension offices in each of North Carolina's 100 counties and on the Cherokee reservation; the Industrial Extension Service in 21 locations, and the Small Business Technology and Development Center at 16 UNC campuses. Now, the Gateway Counties pilot project is working in 12 counties to make the university's resources more readily available to more North Carolinians. College of Design faculty, for example, study traffic and develop planning strategies for communities on the Outer Banks; and the College of Agriculture and Life Sciences is opening a food product incubator in Orange County. (www.ncsu.edu/research/results/vol9/3.html)

Engineering military parts
The military's interest in NC State's resources has not stopped with nonwoven textiles. In 2005, the College of Engineering and its partners received a $5.4 million grant to support research on aging aircraft at the Fleet Readiness Center, Marine Corps Air Station at Cherry Point. The college's Institute for Maintenance Science and Technology (IMST) also develops "agile manufacturing" technologies—ways for suppliers to quickly produce parts for older aircrafts—and nurtures the creation of firms to become suppliers of military parts. IMST signed a $1 million contract with the military to fulfill task orders through 2009.

Office of Extension, Engagement, and Economic Development
NC State Engagement Today...

Bringing more research opportunities in next generation electronics
NC State remains on the forefront of other emerging industries as well. The two-year-old Center for Efficient, Secure and Reliable Computing (CESR)—one of only a handful of university research centers focused on embedded systems—is creating the next generation of electronics. Red Hat, a world leader in open-source software with headquarters on Centennial Campus, has partnered with CESR to bring more research opportunities and jobs to North Carolina. Cell-phone maker Qualcomm and semiconductor manufacturer Renesas Technology have established design operations in North Carolina, in part, for the chance to work with CESR researchers. (www.cesr.ncsu.edu/)

Collaborating on Centennial Campus to solve contemporary problems
Centennial Campus adds to the university’s national visibility. This environmentally sensitive, mixed-use, academic village responds to the professional, educational and recreational needs of the University’s faculty, staff and student body, as well as those of corporate and government affiliates whose presence on Centennial Campus adds to its vigor and effectiveness. Home to NCRC and a national model for partnerships among business, government, and the university, more than 130 companies, government agencies, and NC State research and academic units have resided on Centennial Campus. Twenty-three start-up companies are located in the NC State Technology Incubator, and during the past year, twelve new partners joined the campus while major partners continue to expand. Ericsson IPI, for instance, moved its research and development operations to Centennial Campus and hired 45 additional employees, and MeadWestvaco—a global packaging company that is a member of NCRC—has opened its Packaging Innovation Center and eventually will bring with it 200 jobs and $14 million in investments to the state. (www.centennial.ncsu.edu/)

The American Home Project on Centennial Campus has the vision to be the premier research, education, and extension facility for housing in the country. With five demonstration homes and an academic building, it will be a welcoming neighborhood for discovery and learning to advance and demonstrate innovation in the industry. (www.ces.ncsu.edu/americanhome)
The Next Big Things

Providing an entrepreneurial edge

Entrepreneurship is critical to the state's and country's economic health and growth in the 21st century. NC State is committed to entrepreneurial education in a number of ways: a new minor and major, an experiential learning activity for undergraduates, and an introduction to social entrepreneurship. Increasingly, the university environment must nurture entrepreneurs for the private, non-profit, and public sectors. Through its Entrepreneurship Education Initiative (mgt.ncsu.edu/eei/index.php) in the College of Management and the Engineering Entrepreneurs Program (www.engr.ncsu.edu/cep/), students go from creative idea or innovation to business plan and start-up. And in Management, Design, Engineering, Textiles and other colleges a variety of courses focus on design of new products and discovery of new markets, technology transfer and commercializing new innovations. With its statewide entrepreneurship and cluster-based economic development agenda, NC State will support microenterprises with high growth potential, with a focus on rural areas and Tier 1 counties. In the coming year, much of the Extension and Engagement seed grant program will support entrepreneurship-related activities.

Positioning North Carolina as an aerospace industry state

The Kenan Institute for Engineering, Technology & Science, with seed support from the Office of Extension, Engagement, and Economic Development, conducted a study of space-related research and commercial activities in North Carolina. The study found the state has a modest presence in the narrowly prescribed core aerospace industry but a more significant presence, and potential for growth, in the broadly inclusive aerospace-related cluster. The National Aerospace Development Center (NADC) selected North Carolina as one of five states to support in its National Aerospace Solutions Initiative, a first step toward developing a national strategic plan to develop and maintain a highly skilled and thriving aerospace workforce. NC State and state and regional economic development entities are collaborating to support and grow aerospace, automotive, and marine parts manufacturing as one of the state’s strong industry clusters. (www.ncsu.edu/kenan)

Expanding impact on small and medium-sized enterprises in high growth sectors

The Small Business and Technology Development Center (SBTDC) is well-recognized within the economic development and business communities as an important educational and technical assistance resource for entrepreneurs, the expansion of existing businesses, and technology development and commercialization. Acknowledged for its high-quality, in-depth business counseling and management education services to small and medium-sized businesses, its professional staff serves nearly 13,000 individuals. The SBTDC plans to strengthen levels of outreach and services to Tier 1 counties in each of its regions and expand the capacity of the Cooperative Extension Service by training and support through the SBTDC offices. (www.sbtdc.org)
Supporting advanced medical care
The economic development partnership between Wake County Economic Development and NC State is expanding its efforts beyond the College of Textiles to the College of Veterinary Medicine. Next up are biotechnology partnerships developed in collaboration with the College of Veterinary Medicine—home to the Centennial Biomedical Campus, an extension of the Centennial Campus concept that will include 1.6-million-square-feet of building space dedicated to biomedical applications for animals and humans. At the Center for Comparative Medicine and Translational Research (CCMTR) interactions between different laboratories as well as interactions with private groups enhance collaborative, translational, interdisciplinary approaches for the comparative study of animal/human diseases. An additional facility will engage partners on the new Centennial Biomedical Campus. A proposal to develop a Flexible Laboratory Building for use by partners in the biomedical field envisions a 44,500 gross square feet facility. The preliminary schedule indicates construction in the fall of 2007 and completion in the fall of 2008. (www.cvm.ncsu.edu)

Supporting these efforts, the Biomedical Textiles and Device Innovation Consortium will focus on coalescing multi-college resources such as those from the colleges of engineering, management, design, and textiles to assist new product development, testing, and commercialization efforts within the regional medical device and advanced medical care industry clusters. (www.centennia1.ncsu.edu/cbc/)

Improving performance in health services sector
NC State enters the workplace with the Industrial Extension Service (IES) to help organizations continuously improve and become more productive and efficient while emphasizing quality. Duke University Hospital in Durham received the North Carolina Awards for Excellence (NCAfE) Advancement Level Award for having demonstrated its commitment and practice of performance management principles according to the Baldrige Criteria for Performance Excellence. Evolving as the state does, IES applies its expertise in a variety of traditional and innovative industry clusters. Indeed, in 2007 IES will begin administering the Research Triangle Regional Partnership’s industry cluster leadership teams to bring together concentrations of companies and their vendors, suppliers, and organizations that support their growth and development. (www.ies.ncsu.edu/)

Harvesting for biofuels and bioproducts
Biomass energy is derived from three distinct energy sources: wood, waste, and alcohol fuels. Unlike other renewable energy sources, biomass can be converted directly into liquid fuels—biofuels—for our transportation needs. Because of the cost of processing and converting biomass, biofuels account for less than two percent of U.S. energy consumption. NC State researchers study biomass materials as possible biofuel sources and test ways to transform crops, wood chips, and agricultural wastes into feedstocks for biofuel refineries and fine-tune production processes, reduce the costs, and create consumer and industrial products from biomass. NC State has partnered with North Carolina A&T and the University of Tennessee to develop a curriculum that address the growing need to teach people how to grow crops for biofuels and bioproducts. (www.ncsc.ncsu.edu)
NC State Engagement Tomorrow...

Meeting changing realities
As a part of Cooperative Extension, the College of Natural Resources extension programs for over fifty years have remained dedicated to core values in conservation, environment, lifestyle, landscape use, and water quality. Its evolving extension mission addresses the future changing demographic and environmental realities in North Carolina, the nation, and the world with programs such as The American Home, Forestry Educational Outreach, Forest Industry Cooperatives, Recreation Resource Service, Center for Earth Observation, and Distance Education in Paper Science. (www.natural-resources.ncsu.edu/outreach/)

Nurturing coastal ecologies
Researchers and extension agents at NC State’s Center for Marine Sciences and Technology (CMAST) serve all who care about the coast and its natural resources researchers. They confront the urgent questions arising from the fusion of coastal ecologies, environments, economics and management policies. Also within CMAST, the NC Seafood Laboratory offers a wide range of programs that encompass seafood safety, quality, processing, value-added products, regulatory compliance, utilization and health and nutrition. (www.cmast.ncsu.edu/)

Growing the North Carolina food industry
As a partner in the scientific community centered on biotechnology at the North Carolina Research Campus in Kannapolis, NC State will locate four extension agents from the Cooperative Extension Service and the SBTDC to deliver research-based information through extension educational programs at a Center for Youth and Education Research. Those programs will educate potential food growers and will provide small business and management training.

Planning for and responding to future professional development needs
Planning for and responding to future professional development and lifelong learning needs of diverse constituents are of primary importance to the McKimmon Center for Extension and Continuing Education (MCE&CE). MCE&CE will emphasize offering more noncredit diploma/certificate courses and addressing the expected demand for NC State developed noncredit distance education courses and will provide the essential technical infrastructure, course development funds, coordination and registration services. (www.mckimmon.ncsu.edu)

Becoming the site for a new Department of Homeland Security facility
A consortium of North Carolina universities, government agencies, and private-sector partners led by NC State has advanced to the next phase in a competitive process held by the Department of Homeland Security (DHS) to select the National Bio and Agro Defense Facility (NBAF) site for a new research facility that would address national agricultural and biological defense interests. With expertise in agro-security, infectious diseases, public health, and vaccine development, its strong infrastructure, top university system, highly trained biotech workforce, business resources and related industries, North Carolina offers potential cooperation and collaborative links for the NBAF found in few places in the world. DHS expects to name the final site in early 2008 to build a 500,000 square foot facility. It will bring an estimated 20-year economic impact of $2 billion in wages/salaries and $3.5 to $6 billion in total economic impact for the host state. (www.ncc-nbaf.org/)
Teaching science, technology, engineering, and mathematics (STEM) through educational innovations

In 2005, the William and Ida Friday Institute for Educational Innovation opened, giving researchers a new home for developing solutions to educational challenges such as attracting more students to math and science fields. As a part of its 21st Century Teaching and Learning Initiative, The Friday Institute collaborates with educators from northeastern North Carolina school districts to create innovative classroom practices—a technology infrastructure to support them—in rural public schools. Using a means to an end, the project uses technology-based learning tools to enable interactive, collaborative and engaging learning experiences that boost creativity and self-directed learning skills in rural area students.

The new Biomanufacturing Training and Education Center (BTEC), opening on Centennial Campus in Fall 2007, also supports innovative education in the sciences and engineering. BTEC will be the largest university-based worker-training center for the biomanufacturing industry in the nation. At 85,000 square feet, it will contain a simulated biomanufacturing facility capable of producing and packaging product in an aseptic environment. Students receiving a BTEC education will emerge as professionals with technical competence and hands-on experience to obtain jobs and contribute immediately to the biomanufacturing and pharmaceutical industries. (www.engr.ncsu.edu/btec/)

Today and tomorrow, NC State Engagement brings the University to its citizens, delivers discovery, and provides innovation to real people to solve real issues in real time. Fulfilling our mission brings learning, growth, and opportunity to our state, our nation, and our world.

For more information about NC State University Extension, Engagement, and Economic Development, visit our website: www.ncsu.edu/extension/