North Carolina State University’s 125th anniversary encourages the campus community, alumni and partners to take a proud look at the past — and imagine discoveries ahead.

NC State was founded in 1887 to fulfill the land-grant university mission: to open the doors of higher education to all of North Carolina, and to transform the state, initially by developing and teaching agricultural and mechanical sciences.

From the first class of 72 students that enrolled in 1889, and through a few name changes over the years, NC State has grown into one of the nation’s top research institutions, and an engine for educational innovation and economic growth.

Throughout 125 years of groundbreaking work in fields ranging from engineering to economics, genetics to graphic design, soil science to social work, NC State has changed lives here and around the globe. NC State always has focused on real-world solutions, with research discoveries that have led to new techniques, companies and products.

The anniversary celebrations began in the spring and continue through March 2013 — providing a wide range of campus and community events, including a block party on Hillsborough Street called Packapalooza that opened the fall semester.

“We can set our goals a little higher, reach a little further than we have in the past, and have some fun doing it,” says Vice Chancellor Nevin Kessler, co-chair of the 125th planning committee.

In September, NC State hosted a symposium focusing on its strong military connections. The event included many alumni in leadership positions representing all the service branches, and a video welcome from retired Gen. H. Hugh Shelton, former chairman of the Joint Chiefs of Staff. Over the years, NC State has graduated more students who went on to achieve general or flag officer rank than any other institution of higher learning, other than the military academies. More than 40 of them are still living.

• GETTING THEM STARTED

Another strong tradition is NC State’s tally of more than 90 startup companies, representing more than $1.5 billion in venture capital investment and 3,250 jobs in North Carolina, from industry giants such as Cree to promising new startups listed on page 24.

The university is particularly proud that the rate of new companies is increasing, with 10 new startup companies spun out of NC State research in the 2011-12 fiscal year.
“We met our goal of more than doubling the annual number of startups,” says Vice Chancellor Terri Lomax, who leads the Office of Research, Innovation and Economic Development. “We have a strong network to nurture these young businesses.”

The network includes not only the Office of Technology Transfer but also a broad range of programs that support entrepreneurial efforts. The new businesses have many models of success — others that started with NC State research. Here are just a few examples of current industry leaders:

- **LIPOSCIENCE**

Heart disease is cited as the leading killer of Americans, and half of those who have heart attacks report having “normal” cholesterol numbers.

More than 20 years ago, NC State researcher James D. Otvos wanted to find a way to provide patients and physicians with a more complete picture of heart health. He filed an invention disclosure with the university in 1991, based on research funded by the National Institutes of Health. By 1994, he had a federal patent on his test that uses nuclear magnetic resonance to measure cholesterol and lipoproteins — LDL particles — in blood samples. LDL particles are linked to heart disease because they carry and deposit cholesterol, which turns into plaque, into arteries. This condition is also known as hardening of the arteries.

By 1997, Otvos had worked with NC State’s HI-TEC program to develop a business plan. LipoMed, later to become LipoScience, was founded that same year. Just four years later, the company already had 100 employees.

The NMR LipoProfile — which directly measures the number of LDL and other lipoprotein particles for a more complete picture of cardiovascular risk — received clearance as a diagnostic test from the federal Food and Drug Administration in 2008. LipoScience performed its eight millionth NMR LipoProfile test earlier this year.

In September, LipoScience’s automated clinical analyzer, Vantera, was cleared by the FDA and will be placed with national and regional clinical laboratories.

“LipoScience is pioneering a new field of personalized diagnostics based on NMR technology,” says Rick Brajer, president and CEO. “We value our relationship with NC State. With the 501(k) clearance of the Vantera Clinical Analyzer, we can build upon technology that had its roots in Raleigh, and dream of serving the world.”

Otvos is chief scientific officer for the Raleigh company that completed 2011 with $46 million in revenues. LipoScience has 200 employees, including NC State alumni in a range of disciplines and degrees.

- **CREE**

From the Bird’s Nest Stadium in Beijing to the Shimmer Wall here in Raleigh, Cree, Inc., has made its mark on the world. While its lighting has inspired beauty and imagination, it has also created technologies that are energy-efficient and economically beneficial.
The founders developed innovative materials technologies at NC State with a silicon carbide platform material that has been perfected over 25 years to create a lighting revolution.

Invention disclosures were filed with NC State in 1987, based on work by Robert Davis’ materials science and engineering team, funded by the Office of Naval Research. Cree was founded that year.

The company operates its main factory with almost one million square feet in Durham, and an additional 230,000-square-foot engineering and production facility in Research Triangle Park that opened in 2006. Cree has more than 5,500 employees worldwide, half of whom are in North Carolina.

“We are very gratified that the early work we did at NCSU, and that the subsequent licensing we did with the Office of Technology Transfer has led to such a vibrant and growing business for the State of North Carolina,” states John Palmour, a Cree co-founder along with Calvin Carter, Jr., John Edmond, Eric Hunter, Neal Hunter and Thomas Coleman.

LEDs are now used in radar, indoor and outdoor lighting, video and decorative displays. Cree also manufactures semiconductors for power conversion and wireless communications, and products to improve reliability/efficiency in power switching.

**SMARTFRESH**

We all know that fruits and vegetables are good for us. But who wants to buy apples that are mushy, tomatoes that are bruised, or avocados that are spoiled? Research from NC State has resulted in technology that literally preserves produce and reduces food waste: SmartFresh.

In fact, in 2009, the United Nations’ Food and Agriculture Organization cited SmartFresh technology as the global standard for product quality and safety. It works by managing ethylene, a chemical that occurs naturally and triggers ripening in many fruits and vegetables. The SmartFresh system simply and safely puts the ripening process on hold while produce is packed and shipped, extending its life on supermarket shelves.

SmartFresh has received approval by the U.S. Environmental Protection Agency and the European Union and earned numerous global awards. It improves quality management practices, enhances marketing flexibility, minimizes losses and delivers a superior product to consumers.

It can be traced to 1993, when NC State researchers — biochemist Edward Sisler and horticulturalist Sylvia Blankenship — filed their first disclosure related to the compound identified officially as 1-MCP. Original research was funded by the U.S. Department of Agriculture.

By 1996, the federal patent had been approved and NC State had reached a license agreement with the company Biotechnologies for Horticulture, which later became AgroFresh, a subsidiary of Rohm and Haas. AgroFresh was acquired by Dow Chemical Company, which has developed and marketed new applications for 1-MCP.

NC State researchers continue to look at new ways SmartFresh can benefit small growers.

**CLOCKWISE FROM TOP LEFT:**
LipoScience provided this image of its North Carolina facility that conducts detailed, state-of-the-art, and blood testing. • Apples and other produce sold in stories worldwide use the SmartFresh technology developed at NC State.
• The News & Observer shared this image of Cree’s Shimmer Wall at the Raleigh Convention Center.

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