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INNOVATION THROUGH TRANSLATION
TRANSFORMING KNOWLEDGE THAT CREATES A HIGH IMPACT ON SOCIETY

We live in a world that is growing increasingly interconnected and complex. Adapting to change is the grand challenge of our time. Fundamental drivers such as globalization, growing economic interdependence, population growth and resource depletion mean that sustainability challenges are not only increasing, they are rapidly evolving to become more unpredictable and viral. What’s more, the rate of change is accelerating faster than our solutions, a phenomena occurring in all facets of life from health to economics. Like our challenges, our approaches must also evolve. Adaptation will require continual innovation, meaning the currency of the future will be ideas, and the framework will be one of shared partnership. Our problems are too complicated for any single entity to solve alone — be it government, industry or academia. We must develop not only innovative technologies and curricula, but also partnerships that support idea generation. We must create an organizational and leadership culture for innovation and collaboration.

As a land-grant university, we are uniquely positioned both strategically and geographically to take a leadership role to develop such innovative partnerships. Our problems are too complicated for any single discipline to solve alone.

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The College of Engineering and Science will transform lives and be recognized for research, education and scholarship that make or have a GLOBAL IMPACT. Through our integration of science, engineering and mathematics, and through the faculty, staff and students who execute that integration, we will cement our reputation as global game-changers in the fields of science and engineering, positively impacting economies and technologies everywhere.

To advance the college’s mission, the College of Engineering and Science has a vision and a strategic plan consisting of four goals that lay the foundation for an integrated and coordinated strategy for success.
LEADERSHIP IN INTEGRATED TRANSLATIONAL EDUCATION

OUR UNIQUE AND INTEGRATED ENGINEERING AND SCIENCE STRUCTURE and world-class STEM experiences attract top talent and provide Creative Inquiry undergraduate research integrated within the curriculum, global engagement programs and community- and service-learning programs.

- EMAGINE: A faculty-guided program for middle and high school students to test their creativity and technical skills in a series of engineering challenges.
- CREATIVE INQUIRY AND STUDY-ABROAD: Research experiences that prepare the next generation of global citizens to tackle society’s toughest problems.
- PROGRAMS FOR EDUCATIONAL ENRICHMENT AND RETENTION (PEER): A mentoring program that helps undergraduates from underrepresented groups carry out their plans for academic achievement and enrichment.
- RESIDENTS IN SCIENCE AND ENGINEERING (RISE) LIVING-LEARNING COMMUNITY: A unique residential community designed to ease freshmen’s transition to college.
- WOMEN IN SCIENCE AND ENGINEERING (WISE): An organization that supports females in engineering and science through mentoring, networking and other resources.
- ENGAGEMENT WITH INDUSTRY: A variety of programs and research in which the college partners with business to develop better products, help students find jobs and create the next-generation workforce.

Clemson senior Bria Dawson was awarded the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers Winifred Burks-Houck Women’s leadership award.
EXCELLENCE IN HIGH-IMPACT RESEARCH THROUGH THE CREATION AND TRANSLATION OF NEW KNOWLEDGE AND TECHNOLOGIES

GOAL TWO

BIG PROBLEMS can’t be solved by any one individual. Our convergent research cuts across disciplines to tap the brightest minds. We work together to shape the future in a rapidly changing world. The translational research we do with business partners serves as a prime example of our convergent research and how we stay on the cutting edge. Our students get world-class research experiences, while businesses get some of their best ideas from students. Examples of the college’s translational research include:

- **INTELLIGENT RIVER PROJECT**: A system that collects real-time water quality data from remote locations to monitor, analyze and report a river’s health, while showcasing our convergent research.
- **PILLS OF THE FUTURE**: Groundbreaking nanoparticle technology that could be especially useful in developing new treatments for conditions such as high cholesterol or arthritis.
- **CARBON NANOTUBES**: Technology that starts with building blocks about 10,000 times smaller than the diameter of a human hair and could power industrial tools, run consumer electronics and help reduce carbon emissions.
- **TISSUE REGENERATION**: Medical advances that could cure aneurysms, repair rotator cuffs and help build heart valves, developed in a cutting-edge lab equipped for sterile work with human stem cells and scaffolds.
- **ULTRASONIC STANDING WAVES**: Levitating water droplets long enough to intercept most of the dangerous particles from coal dust and diesel exhaust, potentially saving miners’ lives.

John R. Saylor, a professor of mechanical engineering in the College of Engineering and Sciences, uses ultrasonic sound waves to levitate water droplets — technology that could combat lung cancer for coal miners in the future.
ECONOMIC DEVELOPMENT IMPACT THROUGH TRANSLATIONAL RESEARCH, INNOVATION AND EDUCATION BY INTEGRATING INNOVATION CAMPUSES

IDEAS ARE THE CURRENCY in America’s knowledge-based economy — and our four innovation campuses serve as idea factories. The engineers and scientists at our innovation campuses are doing translational research that creates new knowledge. Our work drives economic development, sustainability and competitiveness, while making our curriculum highly relevant. The campuses are dispersed throughout the state to best serve industries and communities that need them. Each innovation campus is focused on a different area of research and education. They are: energy and sustainable environment; transportation and manufacturing; advanced materials; and health and biotechnology.

• CLEMSON UNIVERSITY RESTORATION INSTITUTE (CURI): A North Charleston economic-development model that is home to the world’s most advanced wind-turbine drivetrain testing facility and energy-grid simulator.

• CLEMSON UNIVERSITY INTERNATIONAL CENTER FOR AUTOMOTIVE RESEARCH (CU-ICAR): A public-private partnership in Greenville on its way to becoming the world’s premier facility for automotive, transportation and manufacturing research.

• CLEMSON UNIVERSITY ADVANCED MATERIALS RESEARCH LAB (AMRL): A Anderson research hub for advanced materials that offer huge opportunities to improve lives and contribute to an industry growing across the Southeast. It is an internationally recognized state-of-the-art facility focusing on research programs in optoelectronics, chemistry and materials science. It also houses one of the nation’s most outstanding electron microscopy facilities and a professional staff that provides services to private industry and academic clients.

• CLEMSON UNIVERSITY BIOMEDICAL ENGINEERING INNOVATION CAMPUS (CUBEInc): A lab complex at Greenville Health System’s Patewood Campus that is lighting the fuse for a boom in the health and biotechnology industries. Researchers at the campus develop high-impact medical technology and devices for disease management and technology transfer from bench to bedside.
COLLABORATIVE TRANSLATION THROUGH INNOVATIVE LEADERSHIP, PARTNERSHIPS, ENGAGEMENT AND EXPERIENCES

As a land-grant university, we are uniquely positioned both strategically and geographically to take a leadership role to develop innovative partnerships. We welcome and value working with a broad-based group of constituents and stakeholders to create impact not only in our community and state, but across the nation and the world for the greater public good.

The college is engaging in projects with a range of organizations, including nonprofits, businesses, technical colleges, federal agencies and the K-12 system. Working together, we build on each other’s strengths to develop world-changing innovations while creating a better academic experience for faculty and students. The college is uniquely positioned in an area with a high density of multinational companies. Our location creates the opportunity for us to have a global impact.

- CLEMSON ENGINEERS FOR DEVELOPING COUNTRIES (CEDC): A service-learning course that is supported through the Creative Inquiry program at Clemson University. CEDC was started by seven civil engineering students in 2009 wanting to use their knowledge to make a difference in the world. Their mission is to work with local communities in the Central Plateau of Haiti to develop sustainable solutions that improve the quality of life.

- DEEP ORANGE: A project in which graduate students develop an automotive prototype each year. The Deep Orange experience includes system analysis and integration, product development, software analysis, architecture and design to create innovative automotive prototypes in partnership with industry.

- MEETING GRAND CHALLENGES IN DEVELOPING COUNTRIES: Designing and developing systems to keep premature newborns at just the temperature to save their lives when traditional incubators aren’t available, a common problem in Tanzania and other developing countries.

To cement this global leadership role, we need to go beyond imagining a better future and begin to create it. To ensure that we turn our vision into reality, we have defined four specific priorities.

WORLD-CLASS FACILITIES
We will create cutting-edge facilities that include space for collaboration and state-of-the-art research and technological capabilities. These spaces will create an ecosystem that will foster creative thinking and innovation.

VIRTUOSO TALENT
We will attract and retain diverse faculty and students who are recognized for their outstanding abilities and scholarship. The synergy created by their intellectual interaction and collaboration will lead to transformative innovations, having an impact on lives everywhere.

EXEMPLARY EDUCATIONAL EXPERIENCES
As the traditional view of higher education changes, the focus is becoming more interdisciplinary and experiential. To address this change, we will develop cutting-edge pedagogies, integrating classroom, research and real-world experiences.

IMPACTFUL RESEARCH AND SCHOLARSHIP
In our role as global game-changers, we will exemplify Peter Drucker’s vision that “knowledge has to be improved, challenged and increased constantly.” We will be our generation’s leaders as we disseminate the knowledge needed to address the complex issues of the 21st century global society.

A Ph.D. student at CU-ICAR pioneered a scientific approach to the design of structural origami in folded sheet metal technology that is expected to improve automobile efficiency and functionality.
We will be one of the nation’s top-20 public colleges in engineering and science.