This is a time of unprecedented growth and change at Rowan University, and our faculty's accomplishments in research, scholarship and securing external grants reflect the transformation that is underway. Despite a challenging funding environment, Rowan saw a 56-percent increase in grant funding, securing new awards exceeding $9 million in fiscal year 2012. Our faculty members have embraced the spirit of innovation and entrepreneurship, generating increasing numbers of invention disclosures that are being leveraged into patents. With the opening of Cooper Medical School of Rowan University in Camden, N.J., the opportunities for research, collaboration and outreach in our community grew significantly.

The South Jersey Technology Park on our West Campus has begun to expand its efforts to strengthen the research infrastructure of the University and fulfill its role to establish a technology-based entrepreneurial economy in this region. In the 45,000-square-foot, LEED*-certified, state-of-the-art Samuel H. Jones Innovation Center, faculty and students in 16 engineering research and development laboratories interact with 15 small businesses in the Rohrer College of Business Incubator. Together, the research and development labs secured more than $1 million in new research awards, and the small businesses generated more than $1 million in revenue.

Our faculty members have demonstrated national (and international) credibility in the following four areas: Sustainability & Community, Health Sciences & Biotechnology, Infrastructure & Materials, and Computation & Information. The breadth of our expertise and the multidisciplinary connections that we have made are remarkable. We have a firm commitment to the economic development of southern New Jersey. We are eager for collaboration—with other universities, industry, federal and state agencies, municipalities and local government, and entrepreneurs.

I invite you to visit our Glassboro campus, the South Jersey Technology Park and our Camden campus. Meet with our faculty and students as they share their enthusiasm and showcase their research work, and consider the opportunities for locating your business here.

Dr. Shreekanth Mandayam
Associate Provost for Research
Executive Director of the South Jersey Technology Park

I invite you to partner with us in transforming the future.
The world’s insatiable appetite for clean, viable energy sources continues to press researchers to seek better fuel alternatives. To encourage this search, the U.S. Department of Energy awarded a $750,000 grant to Rowan’s College of Engineering for research on algae-derived biofuels, which could lead to greener sources of energy and aid developing countries.

“The world is becoming more and more energy dependent,” said Dr. Kauser Jahan, professor of civil and environmental engineering, who is leading the Rowan investigation. “Not every country in the world has natural resources to produce energy, which is the primary reason many of these countries are poor.”

Algae offer a number of advantages over other energy sources because they are easy to find and simpler to grow than plants now used to produce biodiesel fuel. Furthermore, they are not a staple food source in high demand. And after oil is extracted from the algae, the remaining residue could be used as a nutraceutical that may be consumed by humans or animals. In addition, because algae consume carbon dioxide, a major byproduct of industrial gases, they could play a role in carbon neutrality.

Rowan researchers are collaborating with Algaedyne Corporation, in Preston, Minn., and Garden State Ethanol Inc., in Bordentown, N.J., to investigate the effect of membrane technology on the growth of algae. The investigation also includes energy and life-cycle analysis studies, which will determine the most efficient and environmentally friendly way to manufacture biodiesel fuel from algae.

Jahan explained, “If it could be done efficiently and in a cost-effective manner, it could change the world.”
Dr. Kauser Jahan
Civil & Environmental Engineering
As researchers scramble to develop innovative new drugs to treat infections triggered by antibiotic-resistant bacteria, the key to outwitting these crafty microbes may have been hidden inside the human body all along.

Through a $292,351 grant from the National Institutes of Health funded by the American Recovery and Reinvestment Act of 2009, a team of researchers led by Dr. Greg Caputo, assistant professor of chemistry and biochemistry, is examining host defense peptides, molecules in the body that naturally fight infection.

“We’ve taken several of these host defense peptides, and we’re trying to understand on a molecular level what makes them good killers of bacteria but inhibits their ability to damage host cells,” Caputo said. Researchers not only are studying what enables them to do that on a molecular level, but they also are altering the peptides to determine whether this change affects their ability to function as effective antibacterial agents.

“These peptides offer an interesting alternative because they’ve been part of our immune system throughout evolution,” Caputo said. “What this tells us is bacteria haven’t been able to evolve a resistance to this type of molecule. So if we can figure out all the beneficial properties of these molecules—what makes them good killers and what makes them selective—we can potentially develop a class of antibiotics that is more resistance-proof than some of the conventional antibiotics on the market right now.”
Innovative hydrogen storage research at Rowan University is paving the way for fully electric automobiles that may someday replace traditional gas-guzzling vehicles.

Recipient of the prestigious five-year $400,000 National Science Foundation Faculty Early Career Development (Career) grant, Dr. Tabetha Dobbins, assistant professor of physics and astronomy, is investigating stable onboard storage of hydrogen for fuel cells to power electric vehicle motors. “The question was, if this technology was going to go onboard vehicles, how could we carry hydrogen gas safely?” she said. To this end, she is investigating how to convert hydrogen gas to a solid powder, heat the powder and release the hydrogen gas, while also examining the rate and temperature of release.

If successful, the research could lead to greener automotive options. “With this application, you get clean technology to run automobile engines because you don’t emit harmful byproducts like carbon dioxide,” she said.

A number of features drew Dobbins to Rowan, including its proximity to major neutron and X-ray facilities in Maryland and New York. “It helps me enormously,” she said.

Furthermore, future opportunities also attracted Dobbins. “Rowan is on a growth trajectory, enabling researchers to perform world-class research at an undergraduate institution, which is very exciting,” she said. In addition, the launch of Cooper Medical School of Rowan University is a huge advantage for the biomedical projects she is planning. “I knew the medical school would bring a lot of useful input and collaboration to these projects,” she said.
Research at Rowan University may help rapidly advancing technology keep pace with shifting data patterns in today’s complex world.

Backed by a $164,923 National Science Foundation research grant funded by the American Recovery and Reinvestment Act of 2009, Dr. Robi Polikar, professor and chair of Electrical and Computer Engineering, and his team are studying new ways to help computers learn incrementally from unbalanced data in a nonstationary environment. In other words, one type of data far outweighs others in these situations while the characteristics of the data continually change.

The research team is creating an automated algorithm allowing machines to track changing patterns when data are unbalanced, enabling machines to monitor data, adjust their analysis based on changes they recognize and make decisions based on large quantities of data.

Such applications offer a number of opportunities, such as financial fraud detection and climate data and energy demand analysis. “Predicting our future energy need—and hence the cost of that energy—and detecting different types of financial fraud and even detecting spam email are examples of nonstationary problems,” Polikar said.

“In such cases, similar circumstances in the future may lead to different outcomes, and hence the nonstationarity.”

Their investigation is ongoing, but research team members already have presented their preliminary findings internationally.

“There are increasing numbers of real-world applications that generate nonstationary data,” Polikar said. “There are very few approaches out there that can address this problem. It’s a very new field.”

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TOTAL TECH PARK
AWARDS FY12:
$1,033,443
While faculty and students at Rowan University are heavily invested in research in numerous disciplines, entrepreneurs and firms at the South Jersey Technology Park are at the cutting edge in their fields (see pgs. 14-17).

The South Jersey Technology Park offers those entrepreneurs and firms a fertile environment, a place where startup and established technology companies take root and thrive.

With its extensive support network and state-of-the-art facilities, the South Jersey Technology Park presents a wealth of resources in a prime setting located on a major highway, with easy access to Philadelphia, New York City and Washington, D.C.

Technology firms tap into the expertise of Rowan faculty with research competencies in biotechnology, sustainability, infrastructure, materials, information technology and many other areas.

The Samuel H. Jones Innovation Center at the South Jersey Technology Park houses 16 research and development labs and more than 15 small businesses.

Visit our campuses to learn more about the opportunities to partner with Rowan University and the South Jersey Technology Park.

Let us work together to transform the future.
Vital technology produced at the South Jersey Technology Park could someday reduce the risk of death and disability after heart attack or stroke.

The CoolGuide Catheter, designed to rapidly cool the blood during emergency angioplasty, was invented by Dr. Thomas Merrill, assistant professor of mechanical engineering and CEO and co-founder of FocalCool LLC, a medical device startup located in the South Jersey Technology Park. This intervention would reduce cell death and tissue damage after a heart attack.

Based on this technology, Merrill and his team also developed a new device for stroke patients, which pumps cooled blood through a carotid artery to minimize brain damage.

“In the event of a heart attack or stroke, if blood flow is reduced, tissue damage occurs. Our goal is to reduce that tissue damage so that you stay alive and decrease the risk of disability after that event,” said Merrill, whose work has been funded by the National Institutes of Health and Dr. Jay Yadav, founder and CEO of CardioMEMS Inc. in Atlanta.

The Technology Park provides Merrill with many resources. Merrill’s Rowan research team includes full-time engineers and student interns, including pre-med and mechanical engineering students. The site also offers state-of-the-art facilities. “We have an amazing lab that can afford us the opportunities to do whatever testing is necessary,” he said.

Such advances are critical. “Stroke is a leading cause of serious disability and the fourth-leading cause of death. And heart disease is the leading cause of death in the United States,” he said. Unfortunately, approximately 20 percent of first-time heart attack victims die within one year after a heart attack.

“These are massive health-care problems, so even small improvements will impact many lives and save a lot of money,” he said.
Dr. Thomas Merrill
Mechanical Engineering
FocalCool LLC
Cancer and diabetes are leading causes of death and disability. Dr. Catherine Yang, professor of chemistry and biochemistry, hopes research conducted by her drug discovery company, DNJ Pharma Inc., will lead to more effective treatments for these diseases.

Located in the Rohrer College of Business Incubator in the South Jersey Technology Park, the biopharmaceutical company is dedicated to discovering and inventing effective therapeutics for a range of medical needs through innovative and translational research.

The company already has identified lead compounds that may become potential drugs to slow the progression of prostate and liver cancer. It also is developing a novel compound for diabetes that has demonstrated promising results in regulating the growth of beta cells, which may increase insulin secretion, decrease gastric emptying and reduce blood glucose levels. “We have completed the discovery stage and would like to move on to preclinical trials if further funding is secured,” Yang said.

Yang is encouraged by the company’s early results. “I believe we will discover and develop effective and safe therapeutic drugs for the medical field at our innovation site,” she said. “We’re very committed to combatting these diseases to improve the quality of human health.”

On this mission, the startup’s location provides a wealth of opportunities. “We are surrounded by numerous pharmaceutical companies and other leading universities, so we can access many resources,” she said. “In addition, the South Jersey business community promotes entrepreneurship, and the South Jersey Technology Park plays a very active role in connecting Rohrer College of Business Incubator companies.”
FY12 Federal funding

Health Resources and Services Administration

U.S. Department of Education

N.J. Space Grant Consortium (funded by NASA)

Naval Air Warfare Center

National Science Foundation

Federal Aviation Administration

U.S. Army

FY12 Awards by University unit

39.2% College of Liberal Arts & Sciences

22.8% Camden Campus

13.7% College of Engineering

11.3% South Jersey Technology Park

5.7% Cooper Medical School of Rowan University

5.3% College of Education

1.9% Administration (1.7%) and College of Graduate & Continuing Education (0.2%)
FY12 SPONSORS (partial listing)
- National Science Foundation
- Federal Aviation Administration
- Naval Air Warfare Center
- U.S. Department of Education
- U.S. Army
- N.J. Department of Law and Public Safety
- N.J. Department of Environmental Protection
- Health Resources and Services Administration
- N.J. Space Grant Consortium (NASA)
- N.J. Department of Transportation
- Research Foundation of the City University of New York
- N.J. Department of Military and Veteran Affairs

FY10 FY11 FY12

$8.5M $5.8M $9.1M

Three-year award trends

FY12 Funders over $1M
- N.J. Higher Education $3,017,949
- N.J. Department of Education $1,702,400
- National Science Foundation $1,261,351

TOTAL FY12 RESEARCH AWARDS: $9,118,454

FY12
Percentage of all funding sources
- 56% CONTRACTS/SUBCONTRACTS
- 23% STATE
- 22% FEDERAL

TECH PARK BUSINESSES
- Aquaproof
- BRADM Technologies
- DNJ Pharma
- Financial Engineering Institute
- Fitly
- FocalCool
- French & Parrello
- Grammy Boy
- Healthy Tans
- Higher Hospitality
- I-Stream Live
- Motivator Fitness
- Ol Inc.
- Provonix
- Strategic Billing Enterprise

CONTRACTS/SUBCONTRACTS
STATE
FEDERAL

FY10 FY11 FY12

$8.5M $5.8M $9.1M

MILLIONS

$10

$0

$1

$2

$3

$4

$5

$6

$7

$8

$9

$10