



**Biomedical
Engineering**

FLORIDA INTERNATIONAL UNIVERSITY

Annual Report

July 2011-June 2012

Ranu Jung, PhD

Department Overview and Accolades

Growth! Growth! Growth!—This is what defined 2011-2012 for the Department of Biomedical Engineering (BME). The only department in the nation at a public Minority and Hispanic serving institution that offers a full slate of programs (BS (accredited), MS, BS/MS and PhD), BME at FIU was bullish in its growth over the year. True to its mission of merging engineering with science and medicine the department is now included under the umbrella of the Academic Health Center at FIU, in partnership with the colleges of Medicine, Nursing & Health Science, Arts & Sciences and Public Health. The department has risen to the challenge of developing a *Worlds Ahead* program of research and education. A \$5M endowment from the Coulter Foundation matched by \$5M from the State of Florida helped launch the department in 2003. As the department propels itself to the end of the first decade of existence it has already become a major educator of a diverse engineering work force with over 330 alumni and a 400+ enrollment. A recently released report from the Florida Education and Training Placement Information Program ranks the department first in the entire State University System of Florida for providing BS, MS and PhD engineers for in-state employment. At the same time, as FIU is striving to move from a High Research Classification to a Very High Research Classification, the department has accepted the mandate to enhance its research portfolio. With research awards at approximately \$474K/per faculty member last fiscal year, the Department now leads the College.

The Department faculty and the Chair, Ranu Jung, merged the vision she had laid out in her paper, “Rising to New Challenges”, with those laid out in the Strategic Plans of the University and College of Engineering and Computing to develop a five-year departmental strategic plan. The plan sets specific goals to enhance research excellence and productivity, develop educational excellence, establish local and industrial engagement and create a sustainable model of growth. An external academic Advisory Board was established. To achieve its vision the department has established three areas of excellence in research. Towards this end, two senior faculty were successfully recruited at the Associate Professor level. Each of them brings a world-class reputation, a passion to develop innovative technology to cure ophthalmic or neurological diseases, and extensive publication and funding records. They strengthen the “Diagnostic Imaging and Sensor Systems” research cluster.

Further strengthening the Diagnostic Imaging and Sensor Systems area were a new National Institutes of Health (NIH) grant to Dr. Anuradha Godavarty for developing a hand-held optical imager for breast cancer imaging, and another for development of biosensing devices for cytotoxic and genotoxic assessment of Nanomaterial’s to Dr. Chenzhong Li. In the Neurotechnology area, Dr. Jung, who arrived in 2011, received funding from DARPA(MTO) to develop effective and reliable neural interfaces for peripheral nerve recordings for prosthetic control in human amputees and transferred her NIH Bioengineering Research Partnership grant for development of neural interfaces for sensory stimulation in amputees. She also transferred a National Science Foundation grant for knowledge dissemination in computational neuroscience. A new patent and a new invention disclosure were filed, and faculty publications received high recognition.

The year also saw establishment of about 3000 sq. ft of extensively upgraded laboratories for research studies in people with neurological disabilities and chronic rodent models of neurological disorders. For the first time some of the laboratory space is on the Modesto

Maidique campus, giving the department close proximity to the Colleges of Medicine, Nursing and Health Sciences and Arts & Sciences.

Twenty lectures were presented over Fall and Spring by international and national invited experts as part of the scientific WH Coulter Lecture Series supported by the Coulter endowment to the department.

Accompanying the heightened research was a significant boost in student enrollment and curriculum advancements. Reflecting nationwide trends, our department saw the highest rate of increase in undergraduate enrollment in the College of Engineering. We re-organized the undergraduate curriculum into concentrations and developed four-year maps of the course sequences. Most importantly, we are now offering an “Introduction to Biomedical Engineering” course for our freshmen. Our Senior-design capstone projects were 100% sponsored by local industry or area hospitals. We hosted a post-final presentation reception for an industry mixer with the students and developed a portfolio booklet for mass distribution. We are also proud of placing our undergraduates in highly ranked graduate programs and medical schools. We have reinvigorated our BS/MS five-year program and we are completing a ‘Self-Study’ as part of a Doctoral Program Carnegie review. We have re-organized our graduate electives so that they provide a strong foundation for our research cluster areas of excellence. We have also strengthened our educational links to other Colleges. BME courses are included in a newly launched Graduate PhD program in Basic Medical Sciences in the College of Medicine. They are also included in a Cognitive Neuroscience certificate program offered through the College of Arts and Sciences. We have started a pilot initiative through which we are offering an MS in BME to highly qualified medical students in a gap year during their medical education.

Engagement with the Community

To engage with our national and local constituencies, BME embarked on several outreach programs. Dr. Jung was a member of a small contingent that traveled to DC to brief Florida congressional staffers about the biomedical engineering programs and our research portfolio. We hosted a booth at the annual Biomedical Engineering Society meeting. Our department hosted “EDC Biotech” in Miami, an annual life science conference of EDC, a nonprofit South Florida organization. With over 200 attendees, it provided a networking and partnership venue for companies and South Florida universities. Dr. Jung also presented the first webinar for “LifeSciences, South Florida” an initiative to strengthen the university-industry-community partnership. Drs. Chenzhong Li and Anthony McGoron hosted and organized the 2011 NanoFlorida conference and we also hosted PAHCE 2012-the Pan American Health Care Exchange conference. Finally, multiple faculty hosted students from elementary through high-school throughout the year for short visits as well as research internships. Several faculty traveled abroad and met with University leaders in China and Taiwan. The department was also host to three international Biomedical Engineering faculty, one on a government of India fellowship, another on a Taiwanese Govt. fellowship, and one on a sabbatical from Tohoku University, Japan.

Faculty Highlights

2010-2011 saw new faculty appointments, and professional and community recognition of the faculty. Jorge Riera, PhD a world expert on brain multimodal imaging, who is working on neurodegenerative diseases, was recruited from Tohoku University in Japan. His research is focused on developing strategies to integrate different modalities of brain imaging for the understanding of multicellular signaling in the neocortex. He joins the department June 2012 as Associate Professor. Shuliang Jiao, a world expert on ophthalmic multimodal imaging, who is working on ocular diseases, was recruited from the University of Southern California. Jiao's research is focused on developing high-resolution multimodal anatomical and functional imaging technologies for the diagnosis and research of diseases that cause blindness. He will join the department October 2012 as Associate Professor.

Anuradha Godavarty, Associate Professor was named a Health Care Hero at the Greater Miami Chamber of Commerce's 15th Annual Health Care Heroes® award celebration. She and her research team of students and postdocs has generated multiple inventions of portable, hand-held imaging devices that show early promise in improving the diagnosis of breast cancer and in aiding the pre-screening of sports injuries and other on-site body imaging applications. Sharan Ramaswamy, Assistant Professor was elected Fellow of the American Heart Association and the Council on Basic Cardiovascular Sciences.

Several faculty members were recognized for excellence by FIU. Michael Brown, MD, PhD won the FIU Excellence in Teaching Award for 2011-2012 as well as the Excellence in Teaching Award for the College of Engineering and Computing. Ranu Jung, PhD was recognized as a "Top Scholar 2012" by the University. She is the third faculty from the department to receive the accolade, an Honor bestowed to only a very select group. Anthony McGoron, PhD, received the Outstanding Service award for the College of Engineering and Computing for 2011.

Faculty also received high recognition for their publications. One of Dr. Chenzhong Li's papers was recognized in the "Top-50 most cited articles" as published in *Biosensors & Bioelectronics*, while an article by Dr. Wei-Chiang Lin was selected to be part of the *Physics in Medicine and Biology* journal's Highlights collection of 2011. Dr. Ranu Jung published an edited book "Biohybrid Systems: Nerves Interfaces and Machines".

Student Highlights

Enrollment in BME increased to an all-time high with 400+ students. The student headcount has risen steadily and last year the department had a 14% increase in BS enrollment. BME undergraduates and graduates had much to celebrate. The department held the First Graduate Research Day and the Second Annual Undergraduate Research Day at which keynotes were given by the national President-Elect of the Biomedical Engineering Society, Dr. Gilda Barabino and VP and Chief Financial Officer of the Wallace H. Coulter Foundation, Ms. Susan Racher.

BME graduates were recognized for their achievements all year around. At the national Biomedical Engineering Society meeting, Rupak Dua (PhD Candidate) was chosen the 2011

Outstanding Officer for the Alpha Eta Mu Beta honor society and Sridevi Nagaraja as Outstanding Chapter Member. At the Summer 2011 commencement at FIU, Shradha Prabhulkar was identified as the “Outstanding” doctoral graduate from the College of Engineering and Computing. In Fall 2011, Manuel Salinas was chosen as the “Outstanding” MS graduate by the College and in Spring 2012, BME swept the “Outstanding graduate” category, with Mohamed Goryawala at the PhD level, Jean Gonzalez at the MS level and Kamau Pierre at the BS level! Doctoral graduates won prestigious Postdoctoral fellowships (Sarah Erickson, American Cancer Society & Canary Foundation); Shradha Prabhulkar (Bascom Palmer Eye Institute) and Sridevi Nagarajan (Biotechnology HPC Software Application Institute (TATRC)). Several students won Dissertation Year Fellowships from the graduate school.

Student placement for higher education was excellent. Of special note were four graduate placements in medical schools, one as an MD/PhD at Ohio State University and a 2010 BS graduate as MD/PhD at NYU. Others had multiple offers for graduate school from some of the highest ranked BME programs (Duke, Northwestern, Cornell, Rutgers). Several undergraduates got employment in industry and one student went to Washington DC as a US Patent Examiner.