



**Biomedical
Engineering**

FLORIDA INTERNATIONAL UNIVERSITY

Annual Report

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Ranu Jung, PhD

Department Overview and Accolades

Success, Reward and Progress!—This is what defined 2013-2014 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 continued to flourish over the year. True to its mission of merging engineering with science and medicine the department extended collaborations in education, research, and outreach 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. From its inception, the Biomedical Engineering program has continued to grow and improve each year. In Spring 2012, the Department faculty and 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 BME plan lays out Vision Goals to enhance research excellence and productivity, develop educational excellence, establish medical and industrial engagement and create a sustainable model of growth. 2013-2014 saw action to address multiple strategic issues for fulfilling the Vision Goals and a banner year of recognition of the faculty. Faculty were awarded the University Graduate School Provost’s Award for Outstanding Director of Graduate Studies, the FIU Faculty Award for Excellence in Advising and Mentorship as well as the College of Engineering Outstanding Faculty Award for Research.

As the department propels itself into its second decade, it has become a major educator of a diverse engineering work force. As of the end of Spring 2014, the department had over 454 alumni. The department once again had an increase in undergraduate enrollment to an all time high and has an active enrollment of 497 students. 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. The department also awarded four doctoral degrees and significantly increased domestic graduate student applicants (240% increase for PhD and 200% increase in MS student applicants), and those enrolled (PhD, 150% increase, MS 140% increase). To achieve its research excellence vision, the department established three areas of excellence in research. Enhancement of research and discovery and growth of vibrant and stainable areas of excellence require success in securing research wards and establishing national and international collaborations in this fast growing knowledge economy. The department added nine new feathers to its grant revenues cap, including five grants from the National Institutes of Health, one from Burroughs Wellcome Fund, one from National Science Foundation, one from MedStar Health Research Institute, and one from Miami Children's Hospital. New international collaborations were fostered by Dr. Chenzhong Li through US-China-Japan research collaborations. Dr. Ranu Jung initiated a three-year US-France research collaboration including hosting faculty, postdoctoral fellows and students and a US-Denmark research collaboration hosting graduate students. She also visited Lovely University in Punjab, India, IIT-New Delhi, All India Institute of Medical Sciences and the Public Health Foundation of India to forge new links. A research partnership with Lovely University has begun and additional faculty invited to visit.

Capacity building in the department increased with the recruitment of Dr. Jessica Ramella-Roman (Associate Professor with tenure). We are excited to have her join us. Her expertise strengthens the biophotonics cluster of the department and is our first joint hire with the College of Medicine. With the retirement of our previous instructional laboratory manager, we were delighted to recruit an accomplished chemist, Dr. Yun Qian, previously at the National Oak Ridge Labs. She immediately took charge of helping implement the revised laboratory curriculum and develop new standard operating

procedures and laboratory manuals. She has helped revamp the organizational and physical structure of laboratories and is in-charge of all of the regulatory compliance. Additionally, another undergraduate advisor (Lynneah Brown) joined the department to assist students with the administrative aspects, such as official transfer to the program, registration for courses, application for degree, and to provide career guidance. With her Master's in Education from University of Illinois at Urbana Champaign, Lynneah brings new enthusiasm and ideas to enhance student success.

There was another "first" on the educational end. BME started offering online courses. Dr. Ramella-Roman moved "Medical Instrumentation" online making extensive use of digital media linked to hands-on design kits that each online participant received. The student feedback has been excellent. A second course is scheduled to go online in Fall 2014. The undergraduate student laboratory curriculum was extensively updated and revised further strengthening ties with the lecture curriculum and the research areas of excellence. One of the most successful aspect of the undergraduate curriculum is the Senior-Design Capstone Project. 100% of the projects were sponsored by local industry or area hospitals, giving students the opportunity to gain hands-on experience in finding practical solutions for real-world problems. The changes to the curriculum have been supported by students' high achievements and acceptance into highly ranked graduate programs and medical schools.

Following on the heels of a self-study and Carnegie style review of it's doctoral program the department made major revisions to its graduate program that now offers students directed courses and greater opportunity for early engagement with research. A two-semester course sequence emphasizing physiology and associated engineering concepts was added. New elective courses were introduced for neural engineering. FIU BME strengthened its educational links to the Herbert Wertheim College of Medicine. New engagement of BME with the "Neighborhood Help" program has been established. Graduate students are now taking courses from the Department of Physical Therapy as electives. With increased growth and looking towards the future new research laboratory spaces are reaching completion at the Modesto Maidique Campus in close proximity to the Colleges of Medicine, Nursing and Health Sciences, Public Health and Arts & Sciences. Educational laboratory space for undergraduates is slated to be increased in the Engineering Center in Fall 2014.

Twenty-five lectures were presented over fall and spring by international and national experts, invited as part of the scientific WH Coulter Lecture Series, supported by the Coulter endowment to the department. The speakers were required to meet with all BME graduate students during a separate meeting, giving the students an opportunity to directly interact with them. The lectures included those from Dr. Mario Romero Ortega (Associate Professor of Bioengineering at UTA and UTSW, Research Partner at the University of Wollongong, Australia), Dr. Stephen Macknik (Barrow Neurological Institute, Arizona) and Dr. Jane Grande-Allen (Professor of Bioengineering, Rice University) amongst others.

Engagement with the Community

To engage with national, local, and international constituencies, BME embarked on several outreach programs.

FIU hosted and sponsored the inaugural BioFlorida Latin America & Caribbean Life Sciences Conference. The two-day event focused on best practices in life sciences, including research, development, commercialization, intellectual property law and financing. The conference served as an opportunity for industry professionals in the U.S. and Latin America to explore potential collaborations in established and emerging markets. Conference attendees which included investors, regulatory experts, government officials and research institutions from the U.S. and Latin America were also given tours of BME's research

and teaching facilities. Dr. Godavarty presented a webinar for “LifeSciences, South Florida”, an initiative to strengthen the university-industry-community partnership.

FIU had one of the largest exhibits at eMerge Americas Techweek where the Adaptive Neural Systems (ANS) Lab was one of the main attractions. eMerge Americas Techweek brought both industry and tech people together in South Florida to explore the possibilities of what most believe is the next developing tech community. Creating a lot of interest throughout the exhibit, the ANS Lab displayed a neural-enabled prosthetic hand, which uses wireless technology to stimulate nerves so the user can feel sensation. Pictures of the prosthetic hand were highlighted in both the Miami Herald and Sun-Sentinel newspapers. The exhibit was an excellent opportunity for FIU to showcase its amazing research projects.

BME faculty made presentations to the Wallace H. Coulter Foundation on their translational research effort. Visits were made to the Veteran’s Administration of Miami to make them aware of the several areas of FIU Biomedical research that could help address veteran’s health needs. Dr. Jung was also a member of a small contingent that traveled to DC to brief Florida congressional staffers and program officers at federal agencies about the biomedical engineering program and its research portfolio, and visit officials at the Telemedicine and Advanced Technology Research Center, a Department of Defense research facility at Fort Detrick.

As part of BME’s recruitment and marketing effort, the department exhibited a booth at the annual Biomedical Engineering Society meeting in Seattle, Washington and the department participated actively in the annual Engineering Expo.

Multiple faculty hosted students from high school during the year for short visits as well as summer research internships.

Faculty Highlights

2013-2014 saw new faculty appointments, promotions and professional and community recognition of the faculty. The faculty has been very active in research and establishing new international and national collaborations. Completing a banner year for the department, three faculty members received national and University honors. A few key highlights of individual faculty are:

Dr. Jessica Ramella-Roman joined the department as Associate Professor (with tenure). She is a world expert on optical imaging, who is working on ocular diseases associated with diabetes. A researcher in the areas of bio-optics, her areas of focus are the development of novel and non-invasive technologies for the diagnoses of disease, with particular emphasis on retinal disease and conditions caused by diabetes. Dr. Ramella-Roman has more than 30 peer-reviewed publications and has served as chair of many national and international conferences.

Dr. Anthony McGoron was promoted to Professor of Biomedical Engineering. In recognition of his mentorship efforts, Dr. McGoron received the FIU 2013 Faculty Award for Excellence in Advising and Mentorship.

Dr. Wei-Chiang Lin received the University Graduate School Provost’s Award for Outstanding Graduate Program Director at FIU. The contributions made by Dr. Lin to Biomedical Engineering at FIU are extensive, and the nominators wrote enthusiastic letters of support on his behalf. As Director of Graduate Studies for the department, he has impacted the overall program in all areas of growth: curricular program development, student engagement, and student recruitment

Dr. Chenzhong Li was promoted to Associate Professor with tenure. Chenzhong has established very extensive international collaborations in Asia in the development of novel nanosensing devices with partnerships in Japan, India, Kazakhstan, China and Turkey. In December 2013, Dr. Li won the Outstanding Faculty Award in Research for the College of Engineering and Computing at FIU. Dr. Li also received a visiting professor award from the Japanese Society for the Promotion of Science for a six-month sabbatical at Tohoku University.

Highly recognized for his innovative technologies, Dr. Shuliang Jiao was awarded a United States Patent for “Spectral Contrast for Glaucoma Imaging”. Dr. Jiao developed a method for imaging the earliest signs of glaucoma by applying both visible and NIR light to a retina, where early detection may allow treatment to save vision.

Health Care Hero, distinguished lecturer, author and now inventor, Dr. Anuradha Godavarty received her first United States Patent with the design of “Hand-held optical probe based imaging system with 3-D tracking facilities.”

Dr. Sharan Ramaswamy continued to actively serve as a peer reviewer for the American Heart Association’s Bioengineering Peer Review panel and works as part of the Education and Cell & Tissue committees. He also worked closely with Miami-Dade public schools, particularly, MAST-Homestead and TERRA, through the ACCESS Leadership Group/Office of Engagement at FIU.

Dr. Ranu Jung, professor and chair of FIU’s Department of Biomedical Engineering served as Chair for a National Institute of Biomedical Imaging and Bioengineering, Special Emphasis Panel/Scientific Review Group for P41 Centers of Excellence. She was also invited to participate in the NSF workshop, “Mapping and Engineering the Brain” in Washington, D.C., and served as an external examiner for the Doctoral Dissertation of a student at Aalborg University, Denmark.

Student Highlights

Enrollment in BME increased to an all-time high with 497 students. The student headcount has risen steadily and last year the department had an 8% increase in BS enrollment from the previous record high. BME undergraduates and graduates had much to celebrate.

Rupak Dua served as National Student President for Alpha Eta Mu Beta, the National Biomedical Engineering Honor Society. He was awarded the Dean’s Leadership and Service Scholarship Award from FIU’s College of Engineering and Computing. Dua also received the Dissertation Year Fellowship from FIU’s University Graduate School in November 2013.

Vinay Bhardwaj received the Young Scientist Award 2014 in Biomedical Engineering from the Photon Foundation in the global student competition for novel and original ideas, which has global significance.

Yinchen Song was the winner of the 3rd Annual Graduate Research Day for Poster Presentation at FIU-BME held in September 2013, and the Engineering Oral Presentations at the 2014 Graduate Scholarly Forum at FIU. He also received the Trainee Abstract Travel Award for the 2014 Organization for Human Brain Mapping Annual Meeting in Hamburg, Germany.

Sasmita Rath received 2nd place at the Graduate Research Day for the Best Poster Award and won a Dissertation Year Fellowship.

Juan Pham, a sophomore in biomedical engineering, was selected for an internship this summer with the Office of Congresswoman Ros-Lehtinen. The internship was awarded through the Congressional Hispanic Caucus Institute.

Student placement for higher education was excellent. Several undergraduate students got summer research internships including one at Harvard University. Graduating undergraduates got admission into medical school, graduate schools or gained employment within the industry. Of the four doctoral graduates, one joined the MD program at FIU, two obtained postdoctoral fellowships (Northeastern University and UT- Southwestern) and one in Germany.