



**Biomedical  
Engineering**

FLORIDA INTERNATIONAL UNIVERSITY

**Annual Report**

**July 2012-June 2013**

**Ranu Jung, PhD**

## Department Overview and Accolades

Milestones, Growth & Achievements!—This is what defined 2012-2013 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 be 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 2002. In Spring 2013, the department had a trifecta celebration. ‘Dream, Discover, Inspire, Innovate’ was the theme for the celebration which included the 100th Anniversary of Wallace H. Coulter’s birth, the 10th Anniversary of the establishment of the Department, and the 3rd Annual Undergraduate Research Day. The event also celebrated the opening of a new research building that will host BME laboratories. The keynote was given by Dr. Peter Katona, Former President & Chief Executive Officer, The Whitaker Foundation and Professor, Electrical and Computer Engineering, George Mason University. Ms. Susan Racher, Vice President of Finance from the Wallace Coulter Foundation reflected on the legacy of Wallace H. Coulter and shared with all a video presentation. She also moderated a venture capital panel. Well over 200 guests - alumni, industry partners and University members were welcomed by Dr. Andres Gil, VP for Research and the Dean of the College of Engineering & Computing. President Rosenberg and Congressman Garcia attended the undergraduate research day. The event brought together a large swath of the university community; Provost Wartzok and Past-President Modesto Maidique spoke, the current chair reflected on the achievements of the past decade, the founding Chair, and the deans of the Colleges of Medicine, Nursing & Health Sciences, Arts & Sciences and Business attended the event, as did staff and faculty from multiple departments. The Coulter Foundation gifted a commemorative plaque to BME and the Department unveiled a commemorative painting “FIU Girl” by a local Cuban artist.

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 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. 2012-2013 saw action on multiple items of this plan. 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 2013 we had over 393 alumni and an active enrollment of 473 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.

To achieve its vision the department has established three areas of excellence in research. Diagnostic imaging with emphasis in bio photonics has now become a cluster with outstanding faculty. Dr. Shuliang Jiao, a world expert on ophthalmic multimodal imaging, who is working on ocular diseases, joined the department Fall 2012 as Associate Professor. We also finalized appointment of Dr. Jessica Ramella-Roman as Associate Professor of Biomedical Engineering at

FIU. Dr. Ramella-Roman, also an expert on optical imaging, will join the department Fall 2013 with a joint appointment with the Department of Ophthalmology in the College of Medicine. Thereby we will have enhanced the faculty by three new members in the past two years. They bring with them a world-class reputation, extensive publication and funding records, and most importantly a passion to develop innovative technology and educate the next -generation. Faculty received new funding from DARPA, NIH, and the Everglades Foundation and filed 12 new invention disclosures and 9 provisional/full patents.

Accompanying the enhancement in faculty numbers was a significant boost to the graduate program. The department increased PhD Degrees awarded (Total 9; 300% increase from previous year; and highest number per year to date) 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). The department completed a Carnegie Review style graduate self-study. A thorough report that included a SWOT (Strength, Weaknesses, Opportunities, Threat) analysis was prepared. Faculty had multiple discussions and the director for graduate studies and Chair met with the graduate students. An expert external reviewer evaluated the graduate program. The program received multiple accolades and some suggestions for change, all of which had already been identified in the SWOT analysis, thereby giving the department a head-start on reforms. As highlighted below multiple graduate students received awards and recognition.

We 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 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.

Reflecting nationwide trends, the department also saw the highest rate of increase to date in undergraduate enrollment. We have 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.

All of this growth has engendered the need for new laboratory spaces. Architectural renderings of laboratories were executed and construction initiated for laboratories in the new buildings on the Modesto Maidique Campus (MMC). These new laboratory spaces in MMC will give the department close proximity to the Colleges of Medicine, Nursing and Health Sciences, Public Health and Arts & Sciences.

Twenty-seven 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. 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. One of the

feature lectures “Créative Sans Frontières” was by Sir Harold Kroto, a British chemist who in 1996 shared the Nobel Prize in Chemistry on the discovery of fullerenes.

## Engagement with the Community

To engage with our national and local constituencies, BME embarked on several outreach programs. The department hosted the BioFlorida Saturday Exchange to reach out to local biomedical industry (Key speaker- Maurice Ferre, CEO of MAKO, Inc. besides faculty from BME). Dr. Godavarty presented a webinar for “LifeSciences, South Florida” an initiative to strengthen the university-industry-community partnership. We enhanced our engagement with area High Schools through school visits and seminars and active participation the Engineering EXPO. 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 India, 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 from Kazakhstan as well as a visit from faculty from Columbia. We established new international links for Graduate students from France, Germany and Denmark to complete part of their educational curriculum through coursework or research internships in BME in the next academic year.

Dr. Jung was 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 our research portfolio and we also hosted them for reverse visits at FIU. We exhibited a Booth at the annual Biomedical Engineering Society meeting in Atlanta, GA.

## Faculty Highlights

2012-2013 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. They have received national and University honors. A few key highlights are:

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. One of his manuscripts, “Membraneless enzymatic biofuel cells based on graphene nanosheets”, was recognized as a “Top-50 most cited article” by Biosensors & Bioelectronics and he published several manuscripts in very high impact journals such as SMALL.

Ranu Jung, professor and chair of FIU’s Department of Biomedical Engineering, was named a fellow of the American Institute for Medical and Biological Engineering (AIMBE). The AIMBE citation recognized Jung “for her outstanding contributions to developing novel physiology-based orthopedic devices, and for fostering academic and industrial interactions to advance neuro-engineering.”

Dr. Sharan Ramaswamy was elected Fellow of the American Heart Association. He was also recognized as a *2013 Top Scholar* by FIU for his research service to the Council on Basic Cardiovascular Sciences. Dr. Ramaswamy's research interests are investigating the mechanical regulation of stem cells in cardiovascular regenerative medicine, heart valve tissue engineering and experimental/computational studies of flow dynamics in vascular/valve implants.

Dr. Anuradha Godavarty, Associate Professor was recognized as a *2013 Top Scholar* by FIU.

## Student Highlights

Enrollment in BME increased to an all-time high with 473 students. The student headcount has risen steadily and last year the department had an 18% increase in BS enrollment. BME undergraduates and graduates had much to celebrate.

The student chapter of Alpha Et Mu Beta (AEMB), the National Biomedical Engineering Honor Society, was recognized as the Outstanding Honor Society Organization 2012 and Most Active Student Organization Spring 2012 by the FIU Council of Student Organizations. Graduate student Rupak Dua was awarded the 'Outstanding Officer' award, Pratikumar Shah the Outstanding Chapter member.

Rupak Dua won the UGS Provost Award for Graduate Student Engagement, a prestigious award given to one graduate student once a year. The award recognizes nominees who have, in conjunction with graduate faculty, demonstrated significant local, regional, or global community engagement initiative(s) with a community partner that has led to demonstrable community impact. Recognizing his leadership and service, he was also elected the National Student President of AEMB. In addition, Rupak won the Outstanding Paper award in the graduate student paper competition at the 2013 ASME Global Congress on Nano Engineering for Medicine and Biology.

Shabnam Namin was highlighted by the University Graduate school. Her doctoral dissertation, "An Experimental and Theoretical Analysis of Nitric Oxide Availability in the Microcirculation", was focused on research on engineered tissue model systems.

Ujwal Chaudhary and Jared Leichner were awarded the Doctoral Student Kaufmann Awards at FIU. given for pursuing the development of an innovative technology.

Dharam Persaud a Ph.D. Candidate in Biomedical Engineering was accepted to the Herbert Wertheim College of Medicine (Class of 2017). Not too long ago, Dharam became the first student in the history of the College of Engineering to receive a grant to support his Doctoral Project he conceived from the National Brain Aneurysm Foundation.

Student placement for higher education was excellent. Many of our students either pursuing graduate work or have gained employment. Of special note are one student admitted to an MD/PhD program at Ohio State University and two undergraduates to PhD programs at Northwestern and Boston University. Several students gained employment from employers including Baptist Hospitals, NASA and Lifenet Inc. Others had multiple offers for graduate

school from some of the highest ranked BME programs (University of North-Carolina, Chapel Hill, University of Southern California, University of Miami and Florida Atlantic University). Several undergraduates got employment in industry.