University of Houston Cullen College of Engineering
Cluster Project Overview
Biomedical Engineering

Research Expenditures

Biomedical engineering research accounts for more than 15% of the college's FY10 research expenditures. Nearly $2.9 million fund research projects in the areas of biosensing and imaging, neuroengineering, bioanalytics and drug delivery. Core biomedical-related research projects include:

- BME
- Sustainability
- Education
- Energy
- Materials
- Other
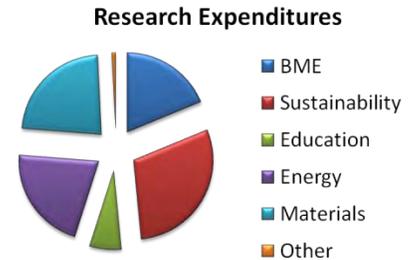
Biosensing/Imaging
Kirill Larin (BME), Biomedical Optics Laboratory
Funded by the National Science Foundation, Wallace Coulter Foundation, Institute for Biomedical Imaging Sciences, National Institutes of Health

Research conducted in the Biomedical Optics Laboratory is focused on disease detection and advanced diagnostics via the development of novel bioimaging and biosensing instrumentation. Specifically, Larin is using a method known as Optical Coherence Tomography to detect vascular abnormalities that lead to cardiovascular disease as well as embryonic heart defects. OCT will also be utilized in a project to build an implantable nanodevice to monitor glucose levels in diabetics.

Molecular Recognition
Richard Willson (ChBE) and Dmitri Litvinov (ECE)
Funded by the National Institutes of Health, Alliance for NanoHealth

Interdisciplinary research is being conducted on a project to construct an ultra-sensitive nanomagnetic sensor array that is capable of screening large quantities of drug candidates to detail virus/cell associations. By binding virus receptors to cell proteins, researchers can evaluate whether a drug candidate is capable of blocking the interaction. The instrument being developed by Litvinov and Willson enables the detection of these associations on the molecular level. In addition, it can be adapted to provide advance diagnostics on biopsy specimens to detect the presence of cancer biomarkers in tissue and even be harnessed to detect bioterrorism agents.

Neuroengineering
Ji Chen, Ben Jansen and Bhavin Sheth (ECE), Center for Neuroengineering and Cognitive Science (CNECS)
Funded by the National Institutes of Health

CNECS researchers are working on a variety of projects focused on neuroengineering. Chen, Jansen and Sheth are working to construct a prototype transcranial magnetic stimulation (TMS) device that is capable of demonstrating in-depth interactivity and connectivity among the various brain regions.

Drug Delivery
Michael Nikolaou (ChBE) and Vincent Tam, UH College of Pharmacy
Funded by National Science Foundation

Working in collaboration with the UH College of Pharmacy, Nikolaou is developing a computer-based modeling system to predict how bacteria respond to antibiotics in the body. The system will have the capability of proposing dosing regimens to further determine how much and how frequently of a drug is needed to ward of an infection. It might, quite possibly, aid in accelerating the process of bringing antibiotics to the market.