Five new hot spots where medicine and technology will converge

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NJIT Distinguished Professor Atam Dhawan, an electrical engineer and associate dean of the NJIT Albert Dorman Honors College, chair of the the IEEE emerging technology committee, and workshop chair for the upcoming 33rd IEEE Engineering in Medicine and Biology Society (EMBS) Annual International Conference Credit: New Jersey Institute of Technology

Medicine and technology are converging in patient care at a faster pace than most people realize. Space age advancements from point-of-care health technologies like telemedicine to medical robots performing surgery are fast becoming commonplace in many hospitals. What's next?

Ask NJIT Distinguished Professor Atam Dhawan, an electrical engineer and associate dean of the NJIT Albert Dorman Honors College, chair of the the IEEE emerging technology committee, and workshop chair for the upcoming 33rd IEEE Engineering in Medicine and Biology Society

(EMBS) Annual International Conference. Set for late August in Boston, the event, considered by many to be the world's largest meeting of bioengineers, will showcase an insider's look at medicine's future. For more information about the conference, please visit http://embc2011.embs.org/.

"Our goal is to investigate which biological and biomedical engineering technologies are likely to become important within the next decade," Dhawan said. "For many people, a healthier tomorrow lies in advancements ranging from biomarkers for early diagnosis and monitoring to neural system engineering."

Five hot new bioengineering areas follow. According to Dhawan, here is where medicine and electronics come together to have the greatest impact on lives.

"Point of care health care technologies is the way medicine can be delivered in individual situations ranging from health monitoring to telemedicine. All point of health care solutions depend on patients connecting with healthcare professionals via computers. Treating people this way can be beneficial both as a great cost savings but also from a quality standpoint. Within this mindset, nursing engineering is fast becoming a career of the future. So too are health monitoring, e-health, health care information management for disaster situations and more. In this world of point of care technologies, the US will need to find a way to link to better efforts in Europe and the Far East. All these solutions will also depend on computer hardware and software improvements.

Optical imaging technologies will be in greater use for diagnosing and staging of cancer, cardiovascular diseases and other fibrotic diseases. Current molecular imaging/therapy agent research focuses on the discovery and exploration of naturally existing molecular targets of diseases. It also focuses on novel approaches to the best way to exploit

differences associated with the molecular targets between normal and diseased states, diagnosis and treatment.

Fast-emerging technological advances in bioelectronics, bio-nano-sensor technology and neural engineering have created exciting advancements in several areas of neuroscience. Advanced technological developments are critical for addressing the challenges of improving basic knowledge of the nervous system, neurophysiology and neurological disorders and to develop devices to interface with neural tissues.

For many people, tissue engineering and regenerative medicine is the wave of the future. The advent of stem cell-based therapies has brought regenerative medicine into an increased focus as part of the modern medicine practice. Gene therapy will also play a greater role in this new world.

Lastly, patients will see more medical or bio-robots becoming an important part of their care. "These robots will develop novel nano micro and macro devices to assist in diagnosis, surgery, prosthetics, rehabilitation and personal assistance," said Dhawan. "Clinical, therapeutic and surgical applications of medical robots with advanced instrumentation, sensors, actuators and real-time systems could make a revolutionary impact in medicine and health care."

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