

NASA, Salinas Valley Memorial join to advance medical imaging

Two major Bay area science facilities are now going to work together to develop highly advanced medical imaging technologies that could potentially revolutionize patients' diagnostics and treatment.

In July, NASA Ames' BioVIS Technology Center and Salinas Valley Memorial Hospital (SVMH) announced an exciting new agreement to collaborate on enhancing the quality, accuracy and utility of medical imaging in animal and human models.

"Developing new, accurate medical knowledge will enable us to create revolutionary, non-invasive ways to analyze animals and humans," said NASA Ames Center Director G. Scott Hubbard.

BioVIS' researchers will use their expertise in the development of image processing and 3-D modeling to develop high-fidelity digital models of the anatomy and physiological functions of animals.

The standard medical scanning techniques used today to image internal organs, bones, blood flow and neural function are magnetic resonance imaging (MRI) and computed tomography (CT) scans. MRI is an imaging technique used to produce high-quality images of the inside of the human body. CT is the process of generating a composite image of internal body structures from x-rays taken from different angles. By combining the data from CT, MRI and ultrasound, the newly developed Advanced Digital Animal Physiology Testbed (ADAPT) will help scientists acquire knowledge of cardiovascular anatomy and function without harming an animal.

"Once we're able to fuse the different modalities into one image set, the next logical step is to take that information and apply it to human health. That will be a huge breakthrough in the field of diagnostic imaging," said Thomas Burnsides, director of diagnostic imaging at the Salinas Valley Memorial Healthcare System.

The hospital will provide NASA scientists with existing medical data and assist in evaluating the new imaging and segmentation process.

"We take two-dimensional images from MRIs and CT scans and combine them into a three-dimensional model of the heart, for example," said NASA Ames' Xander Twombly, the technical lead for ADAPT. "The ADAPT system also will model 3-D structures as they deform over time, allowing MRI and CT data to be combined with 4-D cardiac ultrasound. This will allow NASA to generate a continuous time-step model of the heart through a full beat cycle

based on a series of data provided by the SVMH."

All images provided by Salinas Valley Memorial to NASA will be from patients who have consented to participate in the research. The hospital then will remove the names from each image sent to the BioVIS center, so patient privacy is further protected.

"Developing a safer method to study animal and human anatomy without subjecting them to dangerous levels of radiation or magnetic fields may benefit scientific research and add important knowledge to help NASA ensure the health of astronauts traveling in space to other planets," said Director of BioVIS Technology Center Dr. Richard Boyle.

"The biomedical modeling research funded through the Human Research Initiative is aimed at addressing the bioastronautics critical path roadmap that defines questions that must be addressed for humans to execute the new Vision for Space Exploration," said Viktor Stolz, chief of the Gravitational Research Branch in the Life Sciences Division.

"This mutually beneficial collaboration will accelerate technology development for our own exploration initiative, while allowing the medical community to provide better health care on Earth," said Lisa Lockyer, chief of the Ames Technology Partnerships Division.



NASA Ames Center Director G. Scott Hubbard (left) shakes hands with the president and CEO of the Salinas Valley Memorial Hospital, Sam W. Downing.

NASA photo by Victoria Steiner

This agreement will be a valuable addition to already established collaborations between NASA Ames and hospitals across the country including Stanford, John Hopkins, Beth Israel Medical Center and the University of California, San Francisco hospital.

BY VICTORIA STEINER