BOISE STATE PROFESSORS REPLICATE BONES

Anatomy by committe

Interdisciplinary collaboration has been a hallmark of research at Boise State. In recent months, two projects with major implications have brought engineering professors together with colleagues from various fields.

The unlikely collaboration of a Boise orthopaedic surgeon and two engineering professors at Boise State has provided a much clearer definition of the term "anatomically correct."

While it would seem that Dr. Kevin Shea's medical practice and the rapid prototype technology employed by mechanical engineering professors Steve Tennyson and Joe Guarino would not have much in common, the trio, along with other colleagues from the university, has developed a cutting-edge process to provide surgeons such as Shea with anatomically precise solid models of knees, hips, spines and other body parts on which they are to operate.

Using specialized imaging software to create virtual graphic models from CT (computerized tomography) and MRI (magnetic resonance imaging) scans electronically transmitted from Intermountain Medical Imaging, Guarino and Tennyson are able to take those images and program them into the university's rapid prototyping machine, which was installed in the College of Engineering a year and a half ago, and build exact physical and virtual models of bones and joints.

Unlike conventional prototype processes that would take considerably longer to make exact models, the technology used by Tennyson and Guarino can produce the models in a matter of hours. Assisted by kinesiology professor Ron Pfeiffer and radiologic sciences professor Lorrie Kelley, who provide anatomical and imaging expertise, Guarino and Tennyson can quickly and efficiently furnish Shea with a prototype that replicates the body part right down to the most minute detail.

"That way," says Pfeiffer, "surgeons like Kevin can 'rehearse' the surgery using the model before they actually go in. It helps the surgeons prepare, which can improve the outcome for the patient."

Given the precision needed in the operating room — especially during surgeries to correct spinal deformities such as Shea performs — the availability of a three-dimensional model that so closely resembles the real thing is an invaluable tool.

"There are certain risks associated with spinal surgery," says Shea, who specializes in pediatric surgery. "Having a model of the spine allows us to plan the surgery more completely and do it more safely."

Shea, an adjunct professor in Boise State's kinesiology department, says the union of high-speed image transmission and rapid prototyping to assist surgeons is a fairly new process that has

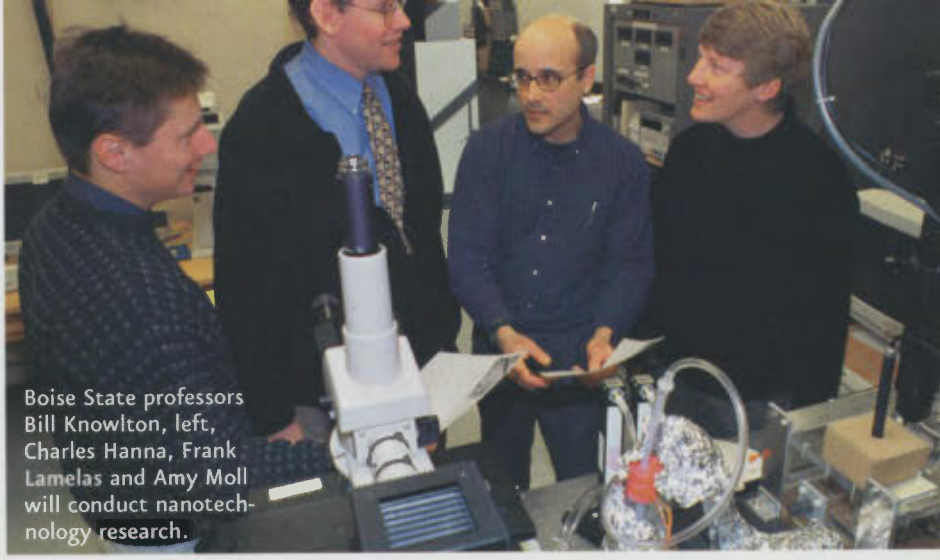
e

Student Holly Staffan, engineering professor Steve Tennyson, and physicians Kevin Shea and Howard King examine an anatomically precise bone model created in Boise State's rapid prototype laboratory.

yet to receive widespread notice in the medical community. "I've used the process to prepare for about six patients since last year," he says, "and the Shriners Hospital for Children in Salt Lake City has contacted us about making models."

Shea and his Boise State colleagues have applied for funding to continue their efforts. Given the advantages the models provide, there's a good chance it will only be a matter of time before the practice becomes commonplace.

—Bob Evancho



Boise State professors Bill Knowlton, left, Charles Hanna, Frank Lamelas and Amy Moll will conduct nanotechnology research.

Boise State receives funding for nanotechnology research

An interdisciplinary team of Boise State scientists will be part of a statewide project to study and develop nanoscale materials, the ultra-miniaturized systems that are formed by manipulating individual atoms and molecules to create tiny but complex electronic devices.

Nanoscale materials are regarded as essential to the future of the computing, optical, aerospace, electronics and biomedical industries.

The Boise State phase of the project is financed by nearly $2 million in federal and matching state funds awarded to the university through the National Science Foundation's Experimental Program to Stimulate Competitive Research (EPSCoR) that supports competitive research in Idaho.

Boise State physics professors Charles Hanna and Frank Lamelas, along with Amy Moll in mechanical engineering and Bill Knowlton in electrical engineering, will join researchers at the University of Idaho and Idaho State University on the project. Hanna, a theoretical physicist, will model how electrons behave in two, one, and even zero dimensions, by working with students to carry out computer-based quantum-physics calculations. Lamelas and his students will conduct experiments involving the growth of crystals in solution under unusual conditions, while Moll and Knowlton will study the reliability of nanoscale oxides used in integrated circuits.

The three-year grant also funds a new faculty position in applied physics at Boise State.

The nanotechnology project is one of three statewide programs supported by the EPSCoR program in a recent round of funding. A total of $9 million in federal funds, plus $4.5 million in institutional matching funds, were allocated. A second project, which involves studying the interaction of microbial communities and their geologic settings in hydrothermal springs, includes Boise State geosciences professors Mitch Lyle, Bill Clement and John Bradford on the statewide research team.

The EPSCoR program promotes the development of the state's science and technology partnerships by involving state universities, industry and federal research and development enterprises in collaborative projects.

—Janelle Brown