A New Point of View

Story by Whitney Dreier

The iLab allows Architectural Studies students to design more efficiently.

RENDERING BY MARK HALLETT
The mission of the ilab is to advance immersive visualization techniques to enhance design thinking, design collaboration and construction planning through thoughtful integration and evaluation of state-of-the-art digital media tools.
UNTIL MAY 2010, room 233 in Stanley Hall was a combination design studio and resource library. “It was heavily used for students taking multiple beginning classes in drafting and visual design,” explains Ruth Tofle, chair of the Architectural Studies department. Both studio space and the library, however, were trimmed down and relocated, which opened up 750 square feet for the Immersive Visualization Lab (iLab).

“We literally had to do physical labor,” remembers assistant professor Bimal Balakrishnan, who was a driving force behind the creation of the facility. “We had to move four dumpsters of out-of-date materials.”

The result is a large-screen, multi-projector virtual reality facility to support 3-dimensional visualization and tele-collaboration using a desktop-Virtual Reality approach. Three projectors backlight an 18-by-6-foot screen, which is the focus of the room. The panoramic screen allows for stereoscopic visualization and immersive experience, similar to 3D movies.

“It started with a simple idea: in the early stages of design, students have a hard time visualizing space and how an experience might be in that space,” says Balakrishnan, who was involved with development and usability testing of the Immersive Environments Lab at Penn State University prior to joining the University of Missouri five years ago. “We take their work and let them navigate it – they take a walk around, look around, get a feel for the space, get close to objects and examine them.”

After a series of designs and visualization sketches, students design a 3D space in programs such as SketchUP and 3D Studio Max. When their work is projected onto the high-definition screen, they put on 3D glasses and use a controller to “walk” through the space – they actually feel as if they are in the room they created. “On a computer, they are always outside the building; on a big screen, they are inside,” Balakrishnan explains. The screen is wide enough to cover the viewer’s peripheral vision, which enhances the experience.

“It’s awesome to see your work up there,” says junior Benjamin Schrimpf. “If you do a 3D model on the computer, you don’t experience it; with the screens, you experience it.”

Schrimpf’s description aligns perfectly with the department’s mission and goals for its students. “Strategies we embrace are learning-by-doing with hands on experiences, digital learning, and providing our students with the latest tools in professional practice,” Tofle explains. “This is how our program adds value to learning, and students become even more competitive in the marketplace.”

The iLab is primarily used to showcase designs for design reviews and critiques. “It’s much better than a PowerPoint – just having one or two images,” says Balakrishnan, noting that you can fit a lot of images on an 18-foot-wide screen – and look at many of them at different angles. “You can cross-reference and mix 2D and 3D images. We’re working to integrate 2D drawings and interactive 3D models.”

The iLab is also increasingly being used to explore movement within a space. Architectural Studies instructors and students are gradually compiling a library of movements – they capture people doing basic tasks such as stirring a pot on the stove or washing their hair. These virtual people are then placed in computer generated 3D environments, and students can see if their spaces are appropriately sized for such actions. “If you’re trying to build a new environment, and you want to see if you can function in that environment, this can help,” Balakrishnan
says. “Now we can test with behavior.”

Currently, average size people – a 5-foot-11 male and a 5-foot-6 female – are being used as models, but other shapes, sizes and abilities of people will be added in the future. Eventually the movement library will include movements by people in wheelchairs. “We’re interested in collecting data on the elderly and disabled,” Schrimpf says. “So you could do anything – put a wheelchair in a kitchen space to see if it’s functional; we’re also interested in bathroom space. The research is allowing us to design more efficiently.”

Research will also be done by faculty and graduate students on large scale visualizations, stereoscopic displays and psychological experiences in virtual environments. For the latter, electroencephalogram (EEG) caps are worn by users to determine which parts of the brain are active during virtual navigation. Eventually, the iLab will be used for collaborative projects with organizations such as the School of Nursing and the MU Fire and Rescue Training Institute to develop simulations with an eye toward training.

And professors, of course, will incorporate the iLab into their curriculum. Balakrishnan, for example, is teaching an advanced visualization class in the spring. “What we’re trying to do is build a community so faculty can step back and students can take the initiative,” he says. “It’s already happening.” Some students, such as Schrimpf, have applied for grants that allow them to work in the lab as many as 10 hours a week. Others simply volunteer their time. “It’s a big team effort,” Balakrishnan says.

Tofle agrees, but gives Balakrishnan due credit. “While our work is a team effort as faculty and students work together to advance our program,” she says, “I appreciate the tremendous leadership Dr. Balakrishnan has displayed in spearheading the iLab.”

The iLab was built by Architectural Studies faculty and students with help from the college technology support staff. The whole facility cost a fraction of a standard commercial VR system which was not only a bargain, according to Balakrishnan, but also a smart decision. “We are not at the mercy of anybody – if technology changes, we can adapt,” he says. “This whole thing can come apart. If someone were to donate $20 million for a new building, we could still move our lab.”

There is one problem, however: “We would like to watch the Super Bowl,” Balakrishnan says. “But we don’t have cable.”

“The iLab is a new way to present your ideas,” says senior Nicole Wagy. “It’s another medium to explore.”

LEFT: Bimal Balakrishnan, along with HES IT Staff and Campus Facilities, unload and install the large screen stereoscopic display for the iLab in spring 2010.
RIGHT TOP & BOTTOM: Wearing special “active shutter” glasses, students are able to view designs on the screen in 3-D. The immersive effect of the large screen gives students the sensation of standing inside the buildings they are designing.