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—Evan Variano
Assistant Professor of Civil and Environmental Engineering
University of California, Berkeley

Design research with a purpose.

Autodesk® IDEA Studio residents push the boundaries of design technology to help create a better world.



Photograph by David Wakely.

Featuring more than 20 exhibits revealing the creative processes behind groundbreaking designs, the Autodesk® Gallery in San Francisco provides an interactive, eye-opening experience for visitors. The space's newest addition, the Autodesk® IDEA Studio, celebrates the role that research plays within design innovation and injects even more interactivity into the Gallery experience.

Launched in 2009, the IDEA Studio residency program supports designers, engineers, architects and scholars who use design technology in unique ways to solve real-life problems. Thus far, most IDEA Studio residents have been university professors and students, but Autodesk also invites professional designers, engineers, and architects to apply. The common thread: all projects must use design technology in inventive ways and have a real-world application. Kimberly Whinna, who manages the IDEA Studio program, explains: "We choose residents with projects that can make a lasting impact on our world. Projects that push the latest design technology in new ways to create innovative, purposeful designs are a great fit for the IDEA Studio."

Innovative Wetland Design

Recent IDEA Studio residents worked on designing a "chaotic mixer" to help man-made wetlands remove pollutants. Wetlands are among the earth's most highly energetic ecosystems, and whether natural or constructed, are sensitive to water flow patterns due to natural landscape evolution and the abundance of underwater flora. As a result, wetland designers do not currently enjoy the same set of established engineering principles as designers of other water treatment methods.

"Whenever possible, we'd like to approach wetland design from a more informed position than trial-and-error," explains Evan Variano, the team's leader and assistant professor of civil and environmental engineering at the University of California, Berkeley. He says his team hoped to complement time-consuming and expensive field research by taking advantage of the resources provided in the IDEA Studio.

"We used Autodesk software to virtually simulate stirring water through a wetland in an irregular pattern to understand the impact of chaotic mixing on water flow," says Variano. "Our goal was to test the effectiveness of chaotic mixing before doing costly field studies."

IDEA Studio residents use Autodesk software in completely innovative ways to solve real-world problems.

Cross-Pollination

All IDEA Studio residents have wide access to Autodesk technical specialists, product managers, researchers, and executives—and Variano's team was no exception. "One of the most valuable resources residents have is collaborative interaction with Autodesk employees," says Whinna. "This cross-pollination helps residents use our software in innovative ways to solve project challenges."

For example, Autodesk employees helped Variano's team put Autodesk® Algor® Simulation software and Autodesk® Maya® software to unprecedented use. While Autodesk Algor Simulation software is typically used in the manufacturing industry, Variano's team took advantage of its computational fluid dynamics (CFD) tools to simulate flow in an environmental engineering context. "The support we got from Autodesk let us do things with Algor software we'd never have done on our own," says Variano. "We completed fluid simulations that gave us a very good idea of the type of time scales we needed for chaotic mixing."

After an inspirational meeting with Autodesk researchers, Variano and his students decided to leverage the advanced physics embedded in the Nucleus simulation framework of Academy Award®-winning animation software, Autodesk Maya. "The Maya experts made a small wetland model to show us how the software could simulate fluid movement," says Variano. "Animation software is not typically used in engineering research, but it turns out Maya is very good at telling a qualitative story. Now, I use Maya in my classes to illustrate different fluid processes for my students and to help guide the early stages of laboratory research."

Team Space

Collaboration with Autodesk employees is not the only source of cross-pollination for IDEA Studio



residents. New ideas can percolate just by hanging around the Autodesk Gallery and interacting with its visitors. "Our informal 'hallway chats' and firsthand exposure to Autodesk customer projects made our time in the Autodesk Gallery even more valuable—and inspirational," explains Variano. "For instance, after I learned about 3D scanning from the projects on display, it got me thinking about environmental applications for the technology."

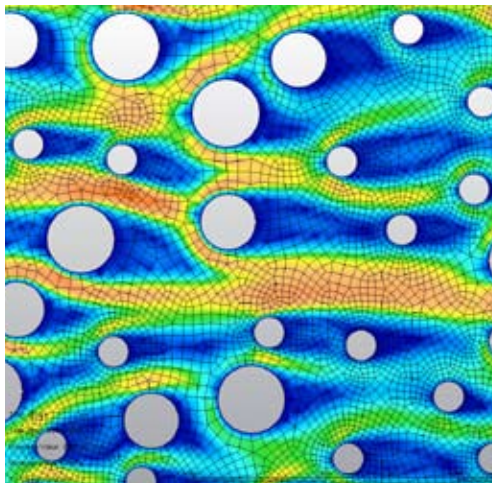
In addition, Variano and his teammates worked side by side in the IDEA Studio space, instead of independently in individual offices. This engendered an entirely new mode of collaboration, according to Variano. "Learning together not only built our professional relationship, it also encouraged a creative atmosphere," he explains. "We had ideas that might not have emerged or been shared if we were working in isolation. That's the joy of working as a team in a space that fosters collaboration."

Lasting Impact

Thanks to their experience working at the IDEA Studio, Variano's team members now have a sense of ideal time scales for chaotic mixing in the unpredictable wetlands environment. Next up: measuring how different vegetation impacts flow, building design blueprints, and demonstrating the chaotic mixer's magic on a real wetland. "Our time at the IDEA Studio was instrumental in moving our project forward," says Variano. "And working in the Autodesk Gallery space was incredibly cool. It already has me thinking about possibilities for new projects."

For More Information

To learn more about the IDEA Studio, visit www.autodesk.com/ideastudio. If you're interested in becoming a resident, **submit a proposal to the IDEA Studio.**



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