At UH, one of the world’s top computer scientists takes a cue from ‘Star Trek’

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The computer scientist behind two of the world’s most advanced virtual reality environments is at it again — this time at the University of Hawaii, where he expects to best his past work for the benefit of researchers across the UH system and beyond.

Visualization expert Jason Leigh, who joined UH-Manoa two years ago as an information and computer sciences professor, recently secured a multiyear federal grant to build a data visualization system that will be able to take volumes of research data and display it in three dimensions across light-emitting displays.

Think of the holodeck on “Star Trek,” the fictional holographic technology that simulated recreational entertainment and training for crew members. Leigh’s technology would be used for real-world applications, simulating replicas of environments in outer space, inside the human body or historical sites, for example.

“Researchers working with disciplines from art to energy to medicine to oceanography to astronomy all have the same problem, what we call ‘big data.’ We’re collecting so much data that no one can really make sense of it,” Leigh said in an interview at his lab, where he and his students walk around barefoot on the carpet.

“Humans are really good at seeing things in patterns,” he said, “so when it’s presented visually we can make better sense of it and we can make better decisions.”

Larry Smarr, a physicist and leader in scientific computing, supercomputer applications and Internet infrastructure at the University of California, San Diego, said Leigh’s work is critical for modern research.

“We’re living in a historically unprecedented time of data explosion in all fields — financial, medical, astronomy, doesn’t matter. When you go from a data-poor to a data-rich world, the methods that you use to gain insight into the patterns that are in the data radically change,” Smarr, founding director of the California Institute for Telecommunications and Information Technology, said in an interview.

“Jason understood early that we had to completely change the paradigm by which we visually interact with data,” Smarr said, describing Leigh as a research colleague for several decades.
Leigh is renowned in the tech world for creating what's known as immersive virtual reality environments with his former colleagues at the University of Illinois at Chicago, where he led the school's Electronic Visualization Lab.

In 1992 the Chicago lab invented the CAVE, a small cube-shaped room covered in display screens that revolutionized virtual reality by shifting away from bulky helmets to lightweight 3-D glasses. Twenty years later he completed the CAVE2, an 8-foot-tall cylinder, 26 feet in diameter, covered from floor to ceiling with screens that create a 320-degree view.

“There wasn’t a better technology until I invented CAVE2. What we’re working on now has to be better than CAVE2. We’re building a whole new system,” Leigh said.

He doesn’t yet know what shape or form the new system will take, but it does have a new name: CyberCANOE — Cyber-enabled Collaboration Analysis Navigation and Observation Environment. “If you try to unroll the CyberCANOE, it sounds very technical,” Smarr said. “But if you’ve seen the holodeck on ‘Star Trek,’ it’s sort of that idea, where you can just walk into a room and see other people and you can both examine visually in 3-D and stereo very large amounts of data from any kind of discipline.”

He says the technology will not only help researchers make sense of their work, but allow for long-distance virtual collaboration.

“His new grant is linking both the visualization capabilities with a super-collaboration capability to essentially eliminate distance,” Smarr said. “What they’ll be able to do is to bring live, in high definition, experts from anywhere in the world to Hawaii. And since the global economy is about how many brains you have, the idea that you can get a bunch of top-notch brains virtually sitting on Hawaii — it’s got to be good for the economy and great for research.”

UH added $257,000 to Leigh’s $600,000 federal grant from the National Science Foundation for the project, which is expected to take about three years to complete.

“This comes at the best time for Hawaii as the number of students interested in information and computer science is skyrocketing,” Leigh said, noting that freshman computer science students entering the program this year increased by 100 students to 270.