
EXPERIMENTAL
PALETTE

UF scientists and artists are mixing their unique talents to mutual benefit

By Donna Hesterman

Elif Akcali sits at a sunny kitchen table absorbed in her work. She's an industrial engineer by training, but today she is busy folding colored squares of paper into hundreds of palm-sized origami cranes. This particular flock is destined for an art show at a local gallery, but others lie arranged in patterns of crimson and sage on a nearby triptych.

"I'm not sure what my colleagues would make of all this," Akcali laughs. She's an associate professor of industrial and systems engineering at UF. "I feel like I'm becoming this crazy crane lady, but I have all these stories to tell and this is a way to get them out."

The birds in the three-piece arrangement next to her convey a story from Greek mythology about how Hermes, inspired by the shapes and sounds of cranes in flight, created the alphabet. Another piece depicts a tragedy that unfolded in her native Turkey in 1994 when rebels tortured and killed a busload of unarmed soldiers returning home from boot camp.

The stories are complex and sometimes very emotional, but Akcali uses symbolism to help her distill them into clear, simple images. The process is not unlike what she does as an engineer when she uses numbers and algorithms to describe unwieldy problems that emerge in large-scale industrial systems.

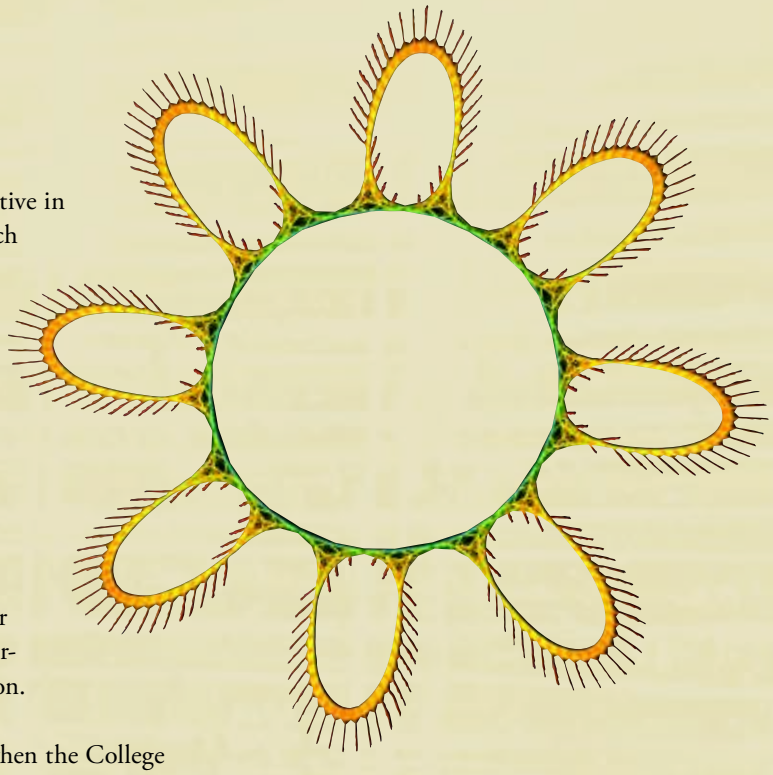
"But sometimes I feel a little too boxed in," she says of her work as an engineer. "Engineers have to be creative in that you have to be a problem solver, but I needed something more."

So she began taking art workshops off campus and eventually settled on collage and origami as her creative outlet. The art, she says, isn't just a distraction from her work. The training, along with exposure to other artists, is informing her work as a scientist and a teacher.

"It's not an immediate impact — no Aha! moments," she says. "It's more about learning to be open to possibilities that seem unorthodox, and knowing that creativity is a process that can be taught."

Akcali says that in the past, at work, she has felt alone in her need to create art, but that things are beginning to change. Scientists, engineers and artists from all over campus are organizing themselves into a committee called SEA Change that aims to break down some of the barriers that separate artists from scientists in academia.

"Most scientists who practice some form of art will tell you that it makes us better at our craft," says Angela Lindner, an associate professor of environmental engineering sciences at UF. "I'm not a neuroscientist, but there is plenty of research that suggests scientific genius and artistic talent are closely linked."



Lindner leads the SEA Change committee at UF and is active in a national organization called the Alliance for Arts in Research Universities. The two groups share a common mindset that science and engineering cannot thrive separate from the arts.

"The University of Florida is leading in this initiative," Lindner says. "We aren't just philosophizing about the benefits of providing opportunities for scientists and artists to collaborate — we are actually doing it."

For example, Lindner and her SEA Change colleagues are currently working on a plan to allow engineering students to minor in art subjects.

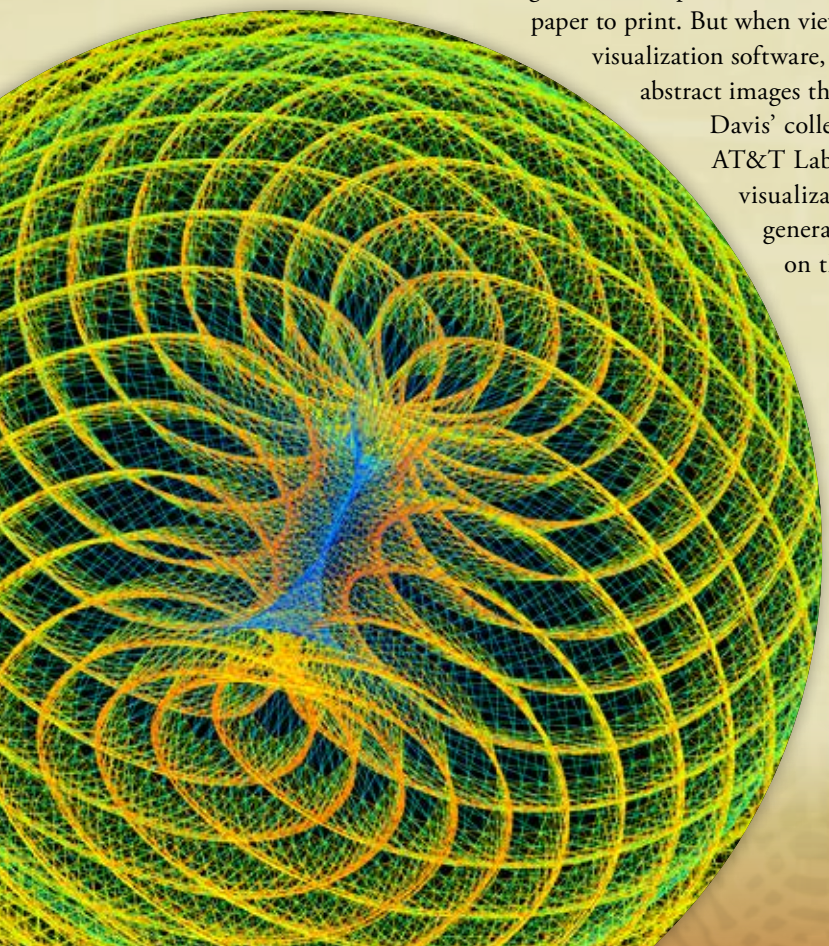
The idea is to recreate an academic environment where a new generation of DaVincis and Galileos can emerge. Lindner says that in many ways, engineers have been stripped of important training and inspiration that comes with an arts education. "We want that back," she says.

"There is a real hunger for this," Lindner says. Last year when the College of Engineering showcased artwork created by faculty and students at the Samuel P. Harn Museum of Art, it was one of the best-attended events of the year.

"Over 900 people showed up that night," she says. "We took over the place with musicians, dancers, paintings and sculpture."

Tim Davis, a professor in UF's Department of Computer and Information Science and Engineering, shared some of his work at the 2011 show. Davis writes "solver" software that calculates answers for huge, complex matrix problems used in programming everything from Google Maps street view software to nuclear power plant control systems.

The matrix problems in their raw form are not much to look at. Davis describes them as giant Sudoku puzzles that would take reams of paper to print. But when viewed through special visualization software, they become colorful abstract images that look like string art.



Davis' colleague, Yifan Hu at AT&T Laboratories, writes the visualization software that generates the art, based on the mathematical structure of a particular matrix problem. Managers at AT&T use the digital imagery to help them visualize expansive data networks. Davis uses them to find the best mathematical strategy when he's writing code for a solver.

"These matrices are webs of values and expressions that are related," Davis says. "But you can't see these relationships by just looking at a massive table of numbers."

The visualizations are a tool for Davis, but they are also art, he says. They are appealing on a superficial level. "You don't necessarily have to understand the math behind them to appreciate their beauty," he says.

Kevin Dana, a senior majoring in chemical engineering at UF, expresses a similar sentiment when he talks about his passion for music.

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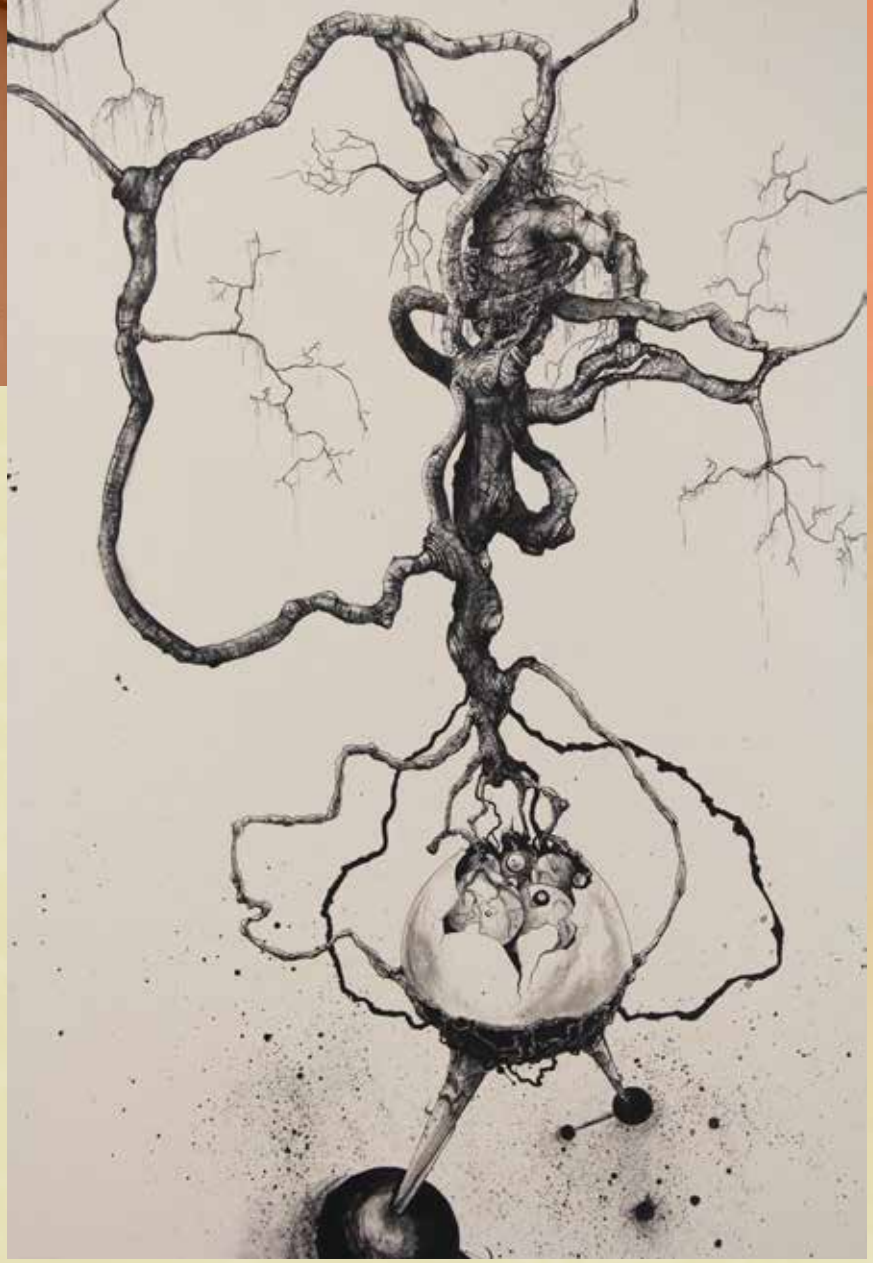
CODIFIED II
ART + GENETICS



Artwork featured in Codified II. This juried exhibition that was held during the Florida Genetics 2012 Symposium, featured selected artworks by UF School of Art + Art History students and alumni, many created specifically for this exhibition, that explore themes surrounding genetics and art. The artists compete for material and fabrication grants as well as exhibition awards.

"Music is applied physics, which is applied math," he says. "It's all just pressure waves and vibrations that stimulate sensory organs in your ears. But unlike math, music elicits an emotional response in almost everyone. You don't have to be a mathematician to appreciate it."

Dana sings in a barbershop quartet, plays saxophone in the university marching band and dabbles in several other instruments. His quartet played at the Art and Engineering show and he's currently working with Lindner's SEA Change committee to help bridge the gap between the arts and sciences at UF.

"This is a no-brainer for the kids," Lindner says. Many students want to go back and forth between the arts and science as part of their education, but hard science degree programs aren't structured to allow for that, she says.

Eric McLamore, an assistant professor of agricultural and biological engineering at UF, was once one of those kids. He played in a band and wrote poetry as an engineering undergraduate, but had to give up his affair with the arts while finishing his graduate work at Purdue University. Now a faculty member at UF, he invites artists into his laboratory.

The classroom blend provides a novel source of inspiration for the artists, while giving engineers important skills that help them as researchers. Five artists will be working in McLamore's lab in 2013 as part of a new university-funded program called SARP, or the Student Artists in Residence Program.

McLamore's lab builds tiny tools and sensors for observing the physiological processes plants and organisms undergo when stressed by disease, drought or pollution.

"Artists who have joined us in the lab in the past have been better welders than the engineering students, and they have drawing and communication skills that are extremely useful in the kind of work we do," he says.

"We can't actually see some of the things we are dealing with, like how a certain protein binds with another to trigger a physiological response," McLamore says. Yet

their research demands that they be able to communicate to one another what they think may be happening. "Trying to describe these processes in words is crazy," he says. "Drawing a picture makes much more sense."

Jamie Gillooly, an associate professor of biology at UF, says arts training is an imperative for educating scientists. He believes it so strongly that he left his teaching and research duties in the biology department to spend a year in UF's School of Art and Art History in 2011.

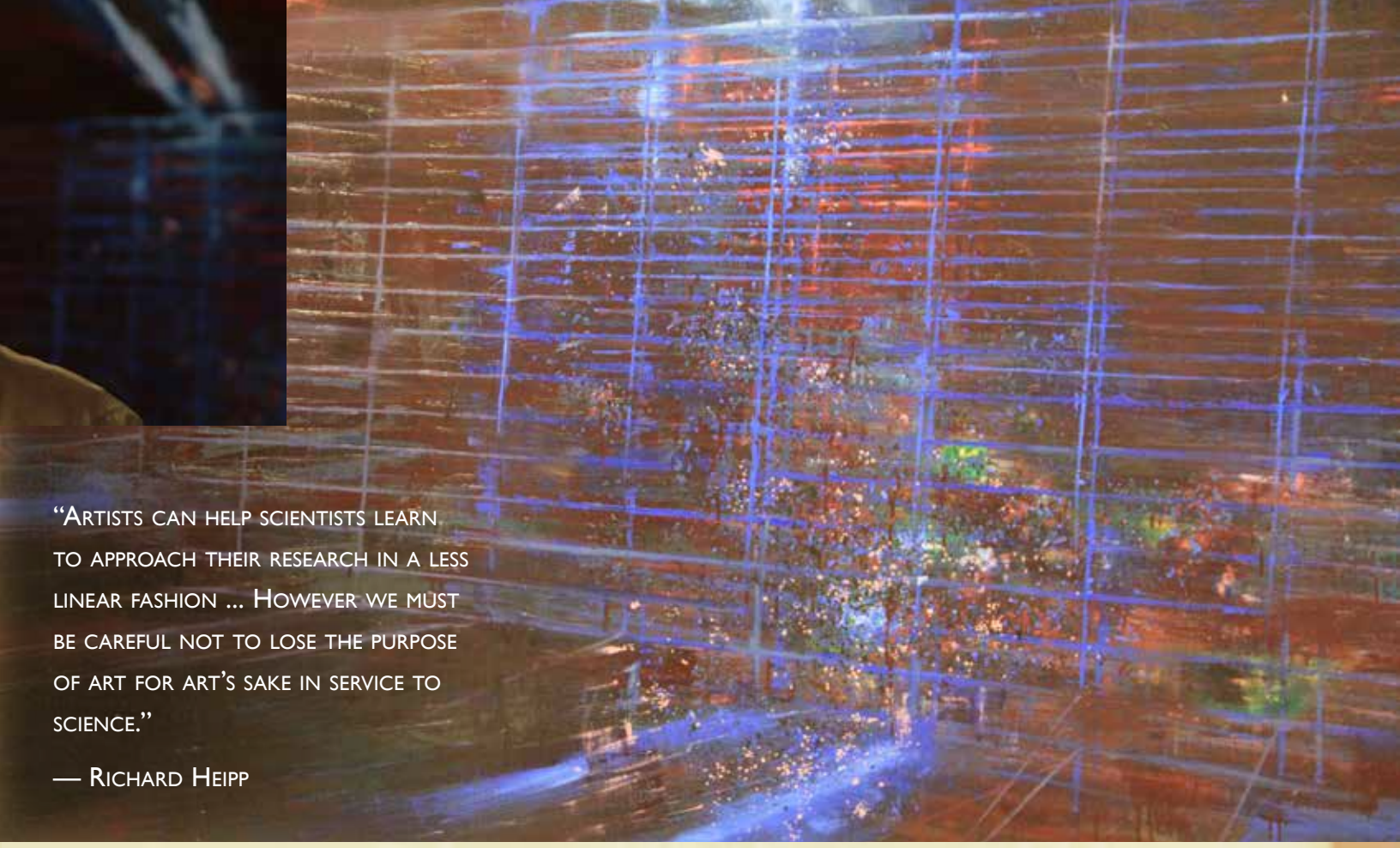
"Some of my colleagues didn't get it," he says. "I'm sure they thought I was just over there finger painting or something."

But he wasn't.

Gillooly spent his year co-teaching courses with art school faculty and creating venues for artists and scientists to work together.

"Studio artists get just the sort of training that researchers need to be successful," Gillooly says. "The arts have these well-developed models and practices for teaching the creative process, and students are expected from day one to wrestle with open ended questions. They also learn how to deal with setbacks and failures early on."

Gillooly says that young scientists get no such training, and that can be a problem when they reach graduate school.



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— Richard Heipp

Painting and sculpture featured in the 2012 juried exhibition, Codified II.

"The hardest day for a new Ph.D. student in science is the one when he or she is given the keys to their cubicle and told go come up with a research project," he says. "The last time they did something that self-directed or creative was probably in the sixth grade science fair."

Artists can help scientists learn to approach their research in a less linear fashion, says Richard Heipp, director of UF's School of Art and Art History. And artists can learn a lot from scientists too, he says. Sculptures use engineering principles to make their structures sound, chemistry can be used to engineer new paints and pigments and digital technology is an increasingly important tool for artists to master.

"However we must be careful not to lose the purpose of art for art's sake in service to science," Heipp says. The line between art and science is easily blurred, but it's all about the intention of the person who is creating the piece, he says. If the purpose is to make something that causes people to reflect on the human condition or ponder themes like man's inhumanity to man, then it is art. If the purpose is to do science and the result is a beautiful image of some sort, then it probably isn't art, Heipp says.

"It's a fine line — but one we would like to keep," he says. "Science has very practical intentions, but art does not. It won't cure cancer, but it can heal your soul."

The faculty leading SEA Change at UF would no doubt agree with Heipp as to the soul-healing attributes of art; however, they also see a practical angle to re-incorporating arts training into research universities' science programs.

"I can teach a student the facts about ecology or genetics," Gillooly says, "but I can't hand them a deep-seated sense of curiosity or confidence that leads them to ask their own questions about the natural world. Arts training, however, can give them that."

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