

Tucson Citizen Morgue, Part 1 (2006-2009)

UA in cutting-edge solar home show

by [Alan Fischer](#) on Feb. 08, 2008, under [Edge](#), [Local](#)

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Students building house that has innovative ideas



Federico Peralta and Marina Copado, both fourth-year University of Arizona School of Architecture students, work on a small model of the energy-efficient home.

The University of Arizona Solar Decathlon team is trying to inject fresh air into home design.

High-tech materials, new devices and novel designs are being combined to produce a solar home integrating healthful environmental features that will compete in the fourth annual U.S. Department of Energy Solar Decathlon in Washington, D.C.

[Innovative](#) solar devices, a greenhouse to modulate temperature and air quality, and modular panels made of evolving materials will make the project home environmentally friendly and a good place to live, said Jason Vollen, assistant professor in the UA School of

Architecture.

Such advances could soon be available in new homes here or trickle down to products that can make existing homes more energy [efficient](#), he said.

“We’re trying to invent new products as part of our challenge,” Vollen said.

Eddie Hall, a fourth-year UA architecture student, is developing a simple nonmechanical device to make thin-film solar panels follow the sun across the sky, similar to the way some flowers’ petals move during the day to better absorb solar energy.

He demonstrated a prototype hinged activator that uses Nitinol, a combination of nickel and titanium that contracts when heated by the sun. The device moves the solar panel so it follows the sun during the day and returns the panel to its east-facing “sunrise” position during the [cool](#) of night.

Nitinol is an emerging material invented by the U.S. Naval Ordnance Laboratory, he said.

The team is moving away from current home design. Instead of airtight boxes that sequester occupants from the environment, houses should embrace the outdoors and offer a cleaner, healthier and more energy-efficient place to live, team members said.

“Builders now are depending on high insulation and caulking in their homes,” said Dale Clifford, assistant professor in the School of Architecture. “We are not doing that. We are bringing in more of the outside in.

“The design is wide open and you do not feel enclosed. We want to open the house up, and bring in the outdoors – the air, the light.”

UA’s team consists of students and faculty advisers in architecture, civil engineering, systems engineering, materials science and biosystems engineering.

UA landed a spot in the contest on its first try.

The event features 20 universities selected from around the world.

The teams build fully solar-powered, energy-efficient, environmentally friendly homes that will be displayed and judged on the National Mall in Washington, D.C., in fall 2009, said Tom Welch, a DOE spokesman.

UA’s team will design and build an 800-square-foot home here that will be transported back and forth across the nation, Vollen said.

“It seems like we are building the potential for responsible building,” said Sherwood Wang, a fourth-year architecture student.

“It’s about making better places to live; it’s not about the competition,” Hall said. “This is an interesting opportunity to go from concept to design to actually building something.”

The project will show the public the feasibility and benefits of green, healthy housing.

“This is an in-depth educational process,” said Larry Medlin, director of the School of Architecture. “We are looking at an alternative way to do heating and cooling.”

The UA project is based on using high-tech emerging materials to solve problems, Vollen said.

In addition to Nitinol, another emerging material being considered is Aerogel, a silica-based, transparent material made of 97 percent air, said Clifford.

Aerogel, which boasts good insulating [efficiency](#), can be used for walls or roofs, he said.

Modular Aerogel panels could be moved around as needed based on temperature, season and sun position, he said.

A greenhouse is an integral component in the UA team’s design, Vollen said.

Greenhouse control systems oversee and regulate the temperature, humidity, air quality and other factors needed in such structures to

grow healthy crops, he said.

This control technology can use the project home's greenhouse to keep the inside of the structure comfortable, as well as growing plants and vegetables, he said.

"The greenhouse really becomes the air conditioning, and not just for agriculture," Vollen said.

The building's modular design, centered on a core containing plumbing and wiring, allows simple design changes and expansions if needed, Clifford said.

Components such as rooftop solar panels and walls can be moved to better take advantage of the season, he said.

Each of the 20 teams selected to participate received \$100,000 from DOE, but the cost of the projects in the past contests have often far exceeded that, Welch said.

The UA team received a matching \$100,000 from the Arizona Research Institute for Solar Energy at UA, and is seeking additional [funds](#) to support the project, Clifford said.

Following the weeklong exhibition and judging on the National Mall, plans call for the UA home to be returned to Tucson.

The project's long-term goal is to educate people about energy-efficient, healthy housing, Vollen said.

"This is a demonstration of healthy building," Vollen said. "It really is supposed to be the beginning of something. We hope it propagates."

The team's design could be built in quantity here, or the technologies and designs could be implemented in homes being built, he said.

"We would really like to see the people who do the building in the state take on the responsibility of trying to build more responsibly," he said.

TIPS FOR HOMEOWNERS

Even if you are not in the market for a new energy-efficient home, there are plenty of things you can do to your existing home to make it more friendly for the environment.

"There are some add-ons you can do," said UA assistant professor Jason Vollen. "Retrofitting is very important since many people are not in a position to buy a new home."

SOLAR: Installing solar devices is a great start, Vollen said.

Covering the roof with photovoltaic panels will offer "free" electricity and give homeowners the opportunity to sell excess power back to electric utilities at times of excess generation, Vollen said.

Growing credits and rebates are bringing down the cost of solar systems, reducing the amount of time needed to pay off the [investment](#), he said.

Solar water heaters are also a good investment, he said.

GRAY WATER: Reusing gray water from washing machines and other sources is something all homeowners should do, Vollen said.

"We have a water crisis on our hands," he said. "It should be in the (building) code you have to recycle gray water."

INSULATION: Insulating sun-facing walls can save energy by keeping a home cooler in summer, said Dale Clifford.

If solar panels are used for insulation they offer the benefit of generating electricity or hot water, Clifford said.

And if the panels are modular they can be moved to allow the sun to warm the building during winter while still producing electricity

and hot water, he said.

COSTS: How much is all this going to cost?

That will vary widely based on your home, how extensive the environmental modifications are, and what economic incentives are available for your specific project, Vollen said.

Local solar technicians and installers can offer estimates, he said.

UA Solar Decathlon team

Lead faculty advisers Dale Clifford, Jason Vollen, Larry Medlin, Joe Simmons

Faculty advisers Álvaro Malo, Ignacio San Martin, Beth Weinstein, Gene Giacomelli, Muni Budhu, Jeff Goldberg

Students Matt Gindlesparger, Eddie Hall, Brendan Nirudin, Kelly Winn, Federico Peralta, Marina Copado, Anton Toth, Sherwood Wang, Mike Face, Tim Lambson, Eric White, Ari Goldberg, Lara LaFontain

U.S. Department of Energy Solar Decathlon site: www.solardecathlon.org

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