

Learn skills ranging from coding to 3-D printing at maker spaces



Kellie Hwang, The Republic | azcentral.com 8:10 p.m. MST September 23, 2015

Mesa maker space HeatSync labs is about more than just learning how to build a robot, it's for developing all kinds of creative ideas. Ben Margiott/azcentral.com

Makers are garage tinkerers, engineers, artists, entrepreneurs, retirees, students and other curious people who meet up to create, learn and share.



(Photo: Ben Margiott/The Republic)

Jasper Nance grew up on a dairy farm in Idaho. There was little technology, but she developed a strong interest in electronics, fiddling with circuit boards on the school bus and receiving her first soldering gun in the sixth grade. Now the 32-year-old Mesa resident is an engineer with Orbital ATK, an aerospace manufacturer.

Joey Hudy, 18, of Anthem, made headlines when he was invited to the 2012 White House Science Fair to demonstrate his marshmallow gun for President Barack Obama.

Ryan Murray, 34, of Phoenix, has always enjoyed using his hands, whether it's to work on cars, build skate rails, design furniture or make sculptures.

Nance, Hudy and Murray are part of the so-called maker community that is growing steadily across the country.

Makers are garage tinkerers, engineers, artists, entrepreneurs, retirees, students and other curious people who meet up to create, learn and share.

The maker movement, still in its infancy, embraces technological change. It brings people together in community spaces to make things, and make them better.

Maker spaces, also called hacker spaces, offer tools and classes that promote learning, collaboration and entrepreneurship. Some spaces offer paid memberships to use their tools, others encourage donations and charge for storage space, and some are free. Makers just need to buy their own materials for their projects.

Nance drops by HeatSync Labs in Mesa regularly. She is building a scanning electron microscope out of donated and found materials.

Hudy, a freshman at Arizona State University's Polytechnic Campus, has full access to TechShop in Chandler, where Murray teaches classes in induction molding and various types of metalworking.

Create Grand Opening

When: 10 a.m.-4 p.m. Saturday, Sept. 26.

Where: Create at Arizona Science Center, 600 E. Washington St., Phoenix.

Admission: Included with Arizona Science Center admission. \$16.95; \$14.95 for age 62 and older; \$11.95 for ages 3-17; free for age 2 and younger and center members.

Details: 602-716-2000, azscience.org (azscience.org).

"I discovered HeatSync Labs by accident," Nance said. "I felt instantly at home, and had never before heard of a hacker space. I researched hacker spaces and the only thing I could think of was, 'Where have you been all my life?'"

The Valley has about 10 locations that fit the narrowest definition of a maker space, and several others that offer space for co-working or arts and crafts. The newest maker space, Create at the Arizona Science Center, will hold its grand opening Saturday.



High school shop classes may have disappeared, but the desire to learn to make things hasn't. Maker spaces such as Tech Shop give people that creative outlet. Ben Margiott/azcentral.com

What is the maker movement?

The maker movement is an offshoot of do-it-yourself culture with a technological focus.

Maker spaces in the United States were inspired by the rise of similarly focused hacker spaces in Germany in the 1990s. As 3-D printers, laser cutters and design software became more accessible and affordable, people bought the equipment and shared it with others.

Dale Dougherty of San Francisco is credited with coining the term "maker movement." He launched "Make" magazine in 2005 to tell the stories of makers and share their projects, and held the first Maker Faire in 2006. Now, his Maker Media company runs the fair and magazine along with an online store, an instructional site and a social network.

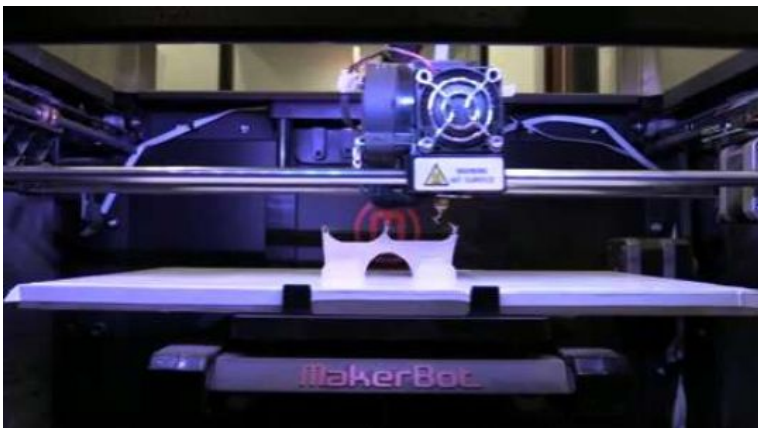
"I used the term 'makers' because it was sort of an available word that people could apply to themselves whether they were into robotics, electronics or wearables," Dougherty said.

"The definition of a maker is someone who creates things and shares them, and the movement has really become inclusive of all forms of making. The movement has been growing slowly, and is very much self-organized and widely distributed. People get together to create a maker space, and they don't necessarily need permission to do that."

Micah Lande, assistant professor of engineering at ASU Polytechnic, said the Maker Faire ignited a community.

"Access to some of these tools became democratized, and people started making stuff much more sophisticated and refined," Lande said. "People hacking away in the garage and tinkering with technology has always been there, but now there's a stake in the ground."

Maker culture has expanded to include many disciplines, including woodworking, sewing, metalworking and blacksmithing.



Chad Stearns, lab manager of Local Motors, didn't have a technical background, but he wanted to learn how to make something. So he did. He encourages others to do the same. Ben Margiott/azcentral.com

"It goes back to the crafts movement, with people using their hands," Murray said. "I was in one of the last classes in high school to have wood shop. It's an important part of learning that gets missed out on. You are learning and exploring by making something, and it's gratifying."

Even the president has noticed.

The White House hosted its first Maker Faire in June 2014, and this past June launched the National Week of Making, reaching out to schools, libraries, museums and maker spaces to encourage people to take part.

President Barack Obama put a call out to mayors for the "Mayors Maker Challenge," and the mayors of Phoenix and Chandler have joined the effort to expand their cities' maker communities.

The Valley's maker community

The community is relatively small and quite spread out, but tight-knit: Most makers know one another. Many of the spaces are in the East Valley, near technology and engineering firms and ASU Polytechnic.

The 2,200-square-foot HeatSync Labs in Mesa calls itself a hacker space and has an underground, DIY vibe. The grass-roots co-op has no staff, and anyone can come work for free. Members can make a monthly donation that entitles them to perks such as voting rights and storage space. Some of the equipment was purchased by members; some has been donated or borrowed.

There was a lot happening on a recent Wednesday evening.

A group met at the conference table for Arduino Hacknight. Arduino is a company that makes open-source microcontroller kits. Group members were discussing their projects and how to use the microcontrollers to make them better.

Paul Hickey, 31, of Chandler, was in the back, using the laser cutter to make an acrylic plaque. He said it's not difficult to use the machine.

"The hard part is the design part, so you need to learn the software, and then the laser cutter does all the work," he said. "I love that you can spend a couple bucks on supplies to make something with the laser cutter, where it would cost hundreds of dollars to buy something similar at the store."

Roderek Soest, 20, of Mesa, worked on several projects and chatted with fellow makers in the casual environment. He joined HeatSync to learn how to make things better.

"If you want to change something, you need to understand it," he said. "Once you understand it, you know how to make it. Here you can burn something, break something, because if you don't make mistakes, you don't learn. It's not like your typical classroom."

Eric Ose, board secretary and "Robot Ambassador" for HeatSync, showed off a cardboard pinball machine that lights up.

"Both of my grandfathers were inventors, and my father did computer repair, but he didn't show us how to make anything because there were six of us," Ose said. "I always like drawing and making things, and when I came here, all of the people around me taught me so much more than I would learn elsewhere. My job now is hands-on and I get to teach kids about making at schools and libraries."

On the same evening, the TechShop in Chandler also was buzzing. At 17,000 square feet, it's a big maker space. It's staffed 24 hours a day, seven days a week, and there are classes for all levels. Everyone must take a safety class before using the shop. Classes cost \$55 to \$115, with discounts for members. Right now, individual memberships are \$95 to \$150 a month. ASU students can join for free.

Memberships help pay for the state-of-the-art equipment, some of which is rented, like the \$350,000 water-jet cutter.

Ryan Murray comes to teach, but also to learn, even though he holds three collegiate degrees in design and the arts.

"You look around here and see all the tools are really valuable, but really it's the community that's valuable," Murray said. "On any given day, you have a shop full of experts."

Jason Black, senior account manager for TechShop, oversees corporate sales and partnerships. He said many companies buy memberships so they can prototype quickly and affordably. He learned about TechShop when he wanted to make something for his son.

"I wanted to build a pirate-ship bed for my son, and it took me two months to do it on my own," he said. "I came here with the idea for a car bed, and it took only seven days to build."

TechShop's partnership with ASU is the only one of its kind in the country. Audrey Iffert-Saleem, with ASU's Office of the Vice President for Entrepreneurship and Innovation, said it's "all about 21st century skills ... and we wanted to figure out how we could enhance project-based learning."

"There's a misconception that making only fits certain majors, but there are concepts learned that can fit anywhere from health care to journalism to space to arts," she said.

Local Motors, a Chandler manufacturing company that plans to produce the world's first fleet of 3-D-printed cars, has a hacker space called LM Labs, open for Local Motors community members to use. It recently hosted a 3-D printing day, and was open to anyone who wanted to learn about the technology.

Lynn Ellsworth, 72, of Phoenix, brought a magazine article about 3-D-printed prosthetics.

"It's fantastic what people can do today," he said. "I just wanted to learn about how to make these prosthetics so maybe I can build some."

Matthew Elgert, 38, of Phoenix, runs the Phoenix 3D Printing Meetup group. A hardware and software programmer for many years, he became a maker out of necessity two years ago. He wanted to build a lock for his dog door to prevent coyotes from getting in, so he bought a couple of 3-D printers but didn't like them.

"It took so much time to troubleshoot them, and I figured I could build a better and faster one myself, because 3-D printers are not one-size-fits-all," he said. "Anyone can learn how to 3-D print. It's really just a glue gun with a mechanical hand."

In 2014, the first Southwest Maker Fest showcased Valley makers in downtown Mesa. This year, 5,500 attended and there were nearly 150 vendors. Cindy Ornstein, executive director of the center and a member of the festival's steering committee, hopes the festival continues to grow not only in terms of quantity, but quality too.

"There are smaller maker fairs and events in Arizona, but this is the only one with the goal of becoming a larger regional event," Ornstein said.

Libraries are getting in on the act, too. The fourth floor of Burton Barr Library in Phoenix contains MACH1.

"We've been responsive and reflective of the community's needs," said Kelly Pearson, manager of MACH1. "Libraries aren't just super quiet with rows and rows of dusty books anymore. We are looking to the future."

The 5,000-square-foot space features a computer lab with programs including SketchUp and Blender, 3-D printers, a tool wall and fiber crafts. Programs include Coderistas, a weekly coding workshop for girls ages 8 to 18; JavaScript Meetup; Hacker Haven; and Paper Engineering.

A big goal is getting young people interested in STEM (science, technology, engineering and mathematics) subjects. Another is to help inventors and entrepreneurs: They can develop ideas at MACH1 and create a business plan at the Hive@Central.

Mesa's ThinkSpot at Red Mountain Library opened in late 2013 after a suggestion from a resident, and coordinator Sarah Prosory is seeing a wide variety of visitors.

"Ideally, a maker space gives you access to tools and knowledge you might have a hard time finding or purchasing, and it gives you a community of like-minded individuals," Prosory said.

"We don't just have families, kids and working adults coming into the space, but senior citizens are surprisingly drawn to us. They have a lot of time and they enjoy coming to ThinkSpot to learn."

How to get involved

Lindsay Kinkade owns Design RePublic Studio on Grand Avenue in Phoenix, teaches at ASU and runs a mobile pop-up maker studio. She moved here from Providence, R.I., which has a strong maker scene.

"There's a lot of creative people in Phoenix who are working in their houses, garages and studios, and don't usually bump into each other," she said. "There's no central hub, while other big cities have many maker spaces."

So she and Will Bradley, a founding board member of HeatSync Labs, created a user-generated website called arizonacollab.com that tracks collaborative organizations across the state, including maker spaces.

Given the maker movement was built on openness and collaboration, the best thing to do is to find a maker space that interests you, drop in during business hours and ask for a tour, attend an event or sign up for a class.

HeatSync Labs has a laid-back vibe and no receptionist, so just walk in and chat with one of the makers, and someone will show you around. TechShop is staffed 24 hours a day, and you can ask for a tour.

Some spaces, such as the Collaboratory in Mesa, focus on traditional skills such as welding, painting and sewing in a cozy home run by Ceri Jones. The Phoenix Center for the Arts also is a great place to learn traditional skills, with classes year-round.

Library maker spaces are another option, with many youth programs. Best of all, they're free. Then, there are co-working and incubator spaces such as the successful Co+Hoots in Phoenix that offer work spaces for a monthly fee, conference rooms and networking opportunities.

Other spaces, like Gangplank in Chandler, Avondale and Queen Creek, are more business-focused with the goal of helping entrepreneurs prosper. Gangplank locations feature a co-working space and Gangplank Labs, the maker-space component.

“Maker spaces tend to be really good at allowing people to tinker and hack, but not as good at helping what they are working on get to market,” said Gangplank co-founder Derek Neighbors. “We help you get connected to the community, help you monetize your work, help with billing, your website and marketing.”

MeetUp groups connect makers and offer workshops, as well.

The newest maker spaces

Create opens this weekend at the Arizona Science Center, in the former Phoenix Museum of History, which closed in 2009. The 6,500-square-foot space features collaboration areas, three Create Challenge areas and three Resource Centers, which are the Woodshop, Artistry Hub and Electronics Zone.

After paying for admission to the Science Center, visitors can observe, take tours and work in the collaboration areas. The Create Challenge areas are geared to specific age groups. One is free with general admission, and two will have an additional \$9 to \$14 fee.

The Resource Centers are for age 13 and older. Participants must take an introduction and safety class to sign up for intermediate and advanced workshops. Resource Center pass holders can schedule specific times to use the equipment. The cost is \$35 per month or \$395 for an annual membership.

“We want to see different generations come in, and to keep coming back again,” said Steven Weiner, director of programming. “In the long run, Create will become a community that propels itself. People come in with an idea, to learn how to make something, start simple and go as high as they can.”

And in 2016, Chicanos Por La Causa plans to open Pickle House Makerspace Business Incubator in the former Arnold Pickle House at Van Buren and 14th streets in Phoenix. The group received a \$3 million grant last year to transform the space, and in August received \$50,000 from the U.S. Small Business Administration’s Growth Accelerator Fund Competition.

Pickle House will be one part maker space with equipment, one part co-working space and one part incubator space to help small businesses get off the ground.

Derek Neighbors said it’s human nature to want to make.

“There’s something deeply empowering about being able to create something out of nothing,” he said. “It’s something inside all of us, whether you’re an artist, musician, mechanic, hardware or software engineer. We are wired to create, and it gives us a depth of purpose. I enjoy being around maker spaces and seeing the lights go on in people: ‘I made something, look at this!’ It’s energizing.”

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