

by Elizabeth Preston

ARACELY CHAVEZ

STUDENT INVENTOR

Growing up near Los Angeles, California, Aracely Chavez often saw homeless people. So when she and a group of her high-school classmates set out to invent something that would help others, they thought of a tent.

As participants in DIY Girls, an afterschool program, the 12 students designed and built a high-tech tent. It folds up into a backpack. It has solar panels that power a phone charger and lights. (The team imagined that if a homeless family had their tent, kids could use the lights to do their homework.) The team also planned to add a system for cleaning the inside of the tent with ultraviolet light. Their project won a \$10,000 grant from the Lemelson-MIT Program.

The girls sewed, soldered, and programmed a prototype. Then they traveled to Cambridge, Massachusetts, to present their invention at an event called EurekaFest. We talked to Aracely after her freshman year at Georgetown University in Washington, DC, about what she's learned from being an inventor.



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As part of an invention team, Aracely Chavez worked on solar panels. She also took charge of the team blog.

HOW WAS YOUR FIRST YEAR OF COLLEGE?

It was really tough, especially the first semester. I've never been away from home for that amount of time. So I was really homesick. It was a completely new environment. And obviously the classes were really rigorous. But I made it out alive! I took a computer science class my first semester, but it just wasn't my thing.

HAVE ANY OF THE SKILLS YOU DEVELOPED WITH THE INVENTION TEAM BEEN HELPFUL IN COLLEGE SO FAR?

Yes, even though the computer science didn't work out. I like that I tried it! DIY Girls gave me a lot of exposure to STEM that I otherwise wasn't getting and would probably never have gotten, at least in high school.

But it's not like I'm cutting STEM out of my life. I still do want to try out different subjects. I really have an interest in medicine and I would like to at least try it out.

WHAT ABOUT THE SKILL OF INVENTING SOMETHING TO ADDRESS A PROBLEM?

That's a huge thing. When I used to think of inventing, I always thought it was something I would never—or could never—do. I'd think, there's already cell phones and social media and everything. What else could I invent to improve someone else's life?

I guess subconsciously I thought it was something impossible. And something that especially me—a daughter of two immigrants and a first-generation college student from a low-income background, and a woman—I thought I would never be able to do it.

Even during the program, I remember someone asked all of us, do you consider yourself an inventor? I was like, no, not really! But now that I look back I'm like, yeah, I am! I brought this invention into this world. And even though it may not be something that's already out and about and being sold and distributed and everything, I still was a part of creating that. And it was a great experience.

IF YOU COULD INVENT SOMETHING TO IMPROVE THE LIVES OF COLLEGE STUDENTS, WHAT WOULD IT WOULD BE?

I could think of a few issues that I would address. The first would be sleep and mental health. At my college, the less you sleep, it's seen as a sign of how hard you're working. And how busy you are is kind of seen as something great—like if you're not busy, what are you doing with your life? So I think that would be something I would address.

WHAT WOULD YOU TELL OTHER HIGH SCHOOLERS WHO WANT TO INVENT THINGS TO HELP PEOPLE, BUT DON'T KNOW HOW TO GET STARTED?

You don't have to create something technological, like a gadget. There are so many other things you can invent. Technology is so big and prevalent nowadays in our life, but that's not the only medium you can use to invent and impact someone else's life. It can really be anything.

Another thing would be to think about what an inventor is, really think of that image, and just completely throw it out. Because an inventor, they could be anyone. And it could be you. You can be an inventor.

Elizabeth Preston is a freelance science journalist and former editor of *Muse*. She lives near Boston, where she's working on inventing a better organizational system for her sticky-note pads.



Learn more about Aracely's team and their invention on page 12!



BY JOHANNA ARNONE

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BEHIND THE SCENES

WITH DIY GIRLS INVENTEAM

Know the movies that start with heroes gathering a team? It's that scene. Twelve high schoolers. All from the San Fernando Valley region of Los Angeles. All Latinas. Together, they form the DIY Girls InventTeam. Here's a peek at their invention process.

1 Identify the Problem

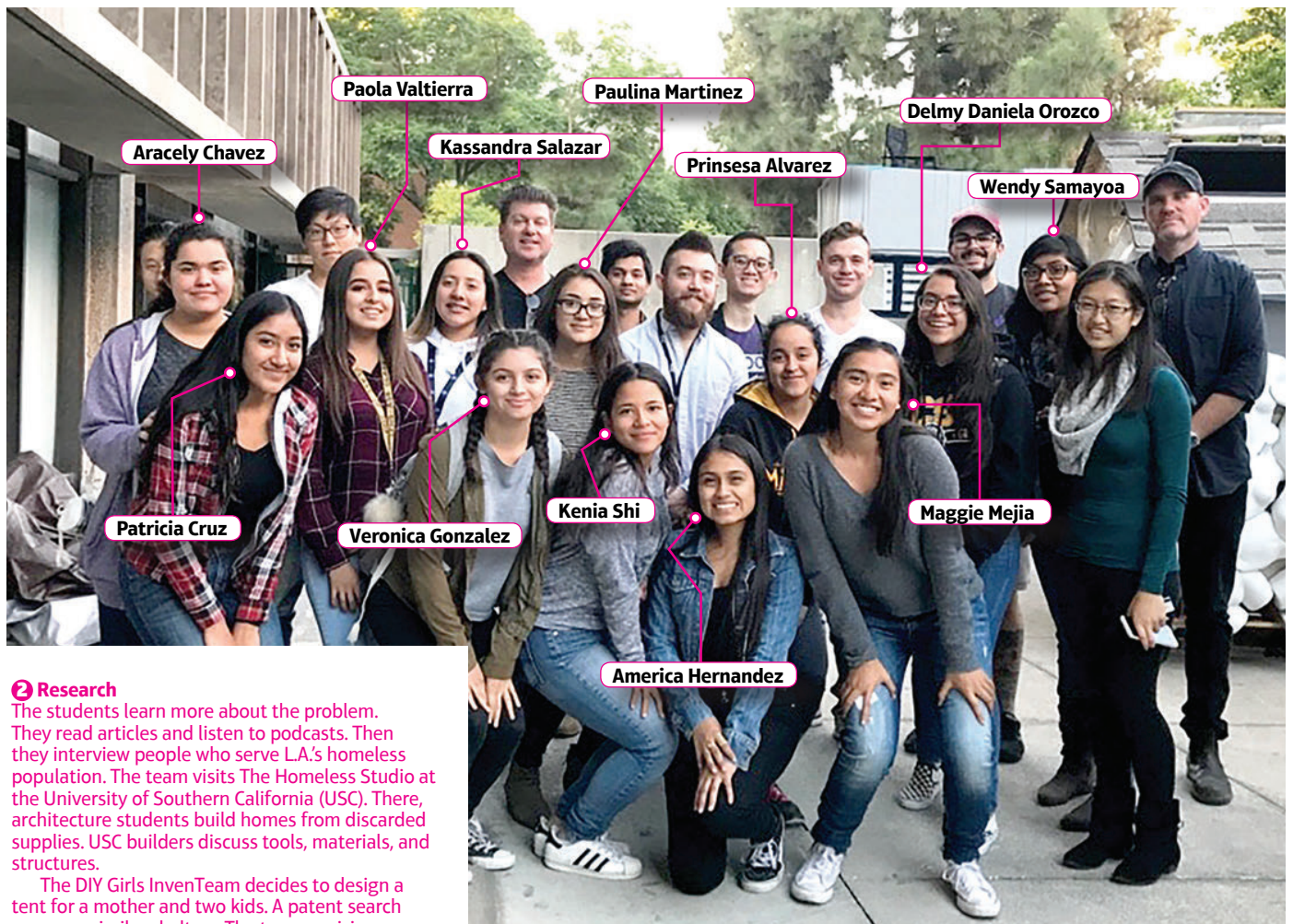
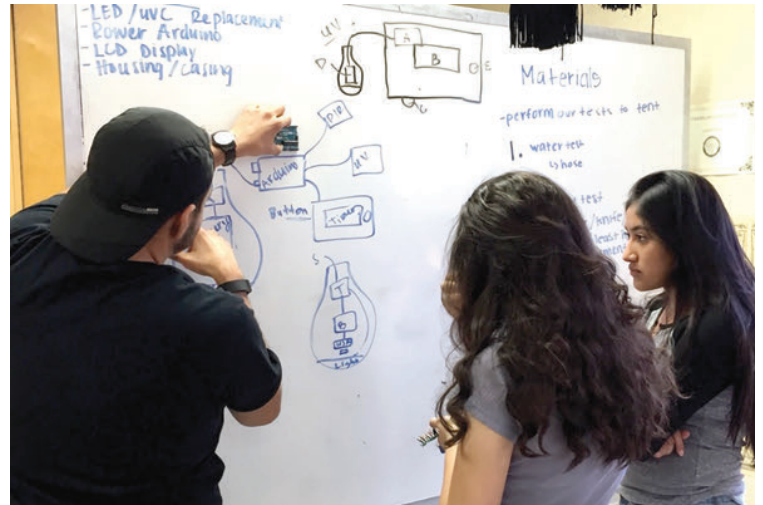
Team members list concerns in their community. They spend weeks reflecting. With time, they narrow it to one. Homelessness is a major problem, and it's on the rise. "We see homeless people in our community—at church, on the streets, and in our family," the team blogs. But can they really make a difference? The DIY Girls InventTeam digs in deeper.





1 Brainstorm and Sketch

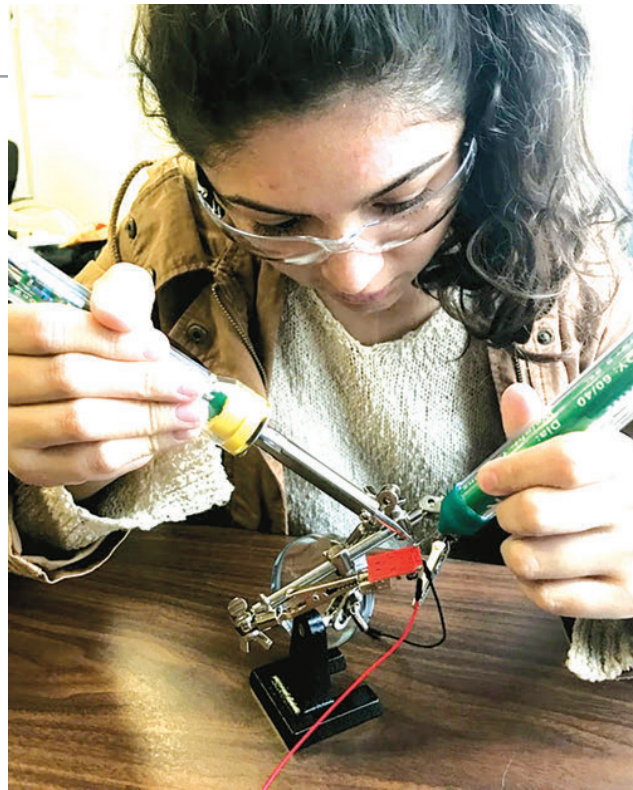
Time to brainstorm invention requirements. L.A. bans temporary shelters from streets during the day, so the team plans a tent that collapses into a backpack. It must be easy to use. It must be safe. They plan two unique features. It will self-clean and include a renewable energy source. Solar power will run fans and lights and charge devices. They break into three technical teams: structures, materials, and solar power. Each group weighs pros and cons. They sketch plans.



2 Research

The students learn more about the problem. They read articles and listen to podcasts. Then they interview people who serve L.A.'s homeless population. The team visits The Homeless Studio at the University of Southern California (USC). There, architecture students build homes from discarded supplies. USC builders discuss tools, materials, and structures.

The DIY Girls InvenTeam decides to design a tent for a mother and two kids. A patent search uncovers similar shelters. The team envisions a better version.



4 Create a Prototype

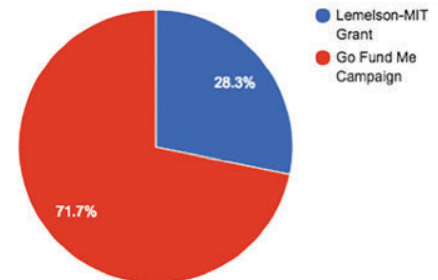
The structure, materials, and solar groups have big jobs. They evaluate every detail. They learn new skills. They change their minds. Over many hours, the groups assemble the first model, or prototype, of their invention.

5 Test and Improve

Testing comes next. The DIY Girls InvenTeam also presents the first tent to fellow students, engineers, teachers, family, and officials. They gather feedback. The team makes technical tweaks. They upgrade their presentation too. There's no end to an invention's possible improvements.

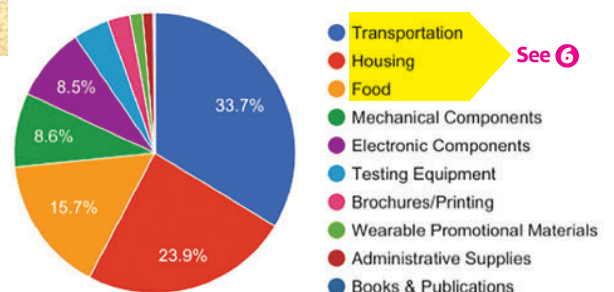
TEAM INCOME

DIY Girls Income

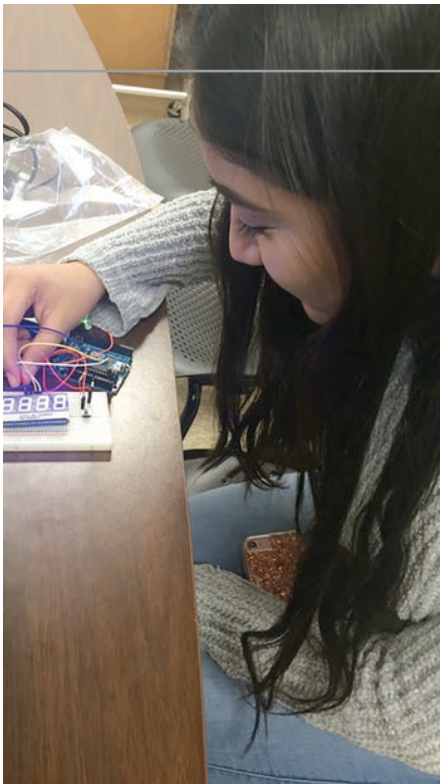


Amount	Percentage	Source
\$7,000	28.3%	Lemelson-MIT Grant
\$17,760	71.7%	Go Fund Me Travel Campaign
\$24,760	100%	Total

BREAKDOWN OF FUNDS SPENT



See 6



This invention isn't just important for our school but also our community! We are thrilled to go to MIT in June!"

— DIY Girls InvenTeam blog



6 Spread the Word

In June 2018, the DIY Girls InvenTeam travels to Cambridge, Massachusetts. They present a working prototype to fellow inventors at an event sponsored by the Lemelson-MIT Program.

The tent is made of insulating, breathable material. It has solar-powered lights, a phone charger, and sanitation features. This design meets technical goals. It also meets the team's larger goal: to create a convenient place for a homeless family to rest.

What are the next steps? Further testing. Filing for a patent. Distributing the invention to people in need.

No doubt about it. These heroes put in the work.