



Community Case Study

HOW INVENTION UPLIFTED AND CHANGED THE COURSE OF STUDENTS AND THEIR COMMUNITY

It was the end of the school year at Garey High School, one of four high schools in California's Pomona Unified School District, when Science Department Chair Antonio Gamboa received an email about the Lemelson-MIT InvenTeam initiative. He read the message aloud to the three students hanging out in his classroom and was about to hit "delete" when Evelyn Casas one student said, "I want to invent something."

Gamboa had received the email invitation the prior year as well but felt he didn't have the time to mentor an InvenTeam. He asked Evelyn to look over the email and figure out what was needed. By the end of the day, he received a video from her to submit to the grants initiative. "She was really motivated," Gamboa says.

Students' initial idea, an automatic nail cutter for diabetics, won a 2017 Excite Award that paid for Gamboa's trip to MIT for EurekaFest in June to experience InvenTeams first-hand. Gamboa worried about going further – applying for the \$10,000 Lemelson-MIT InvenTeam grant – as his summer was packed with a two-month out-of-state seminar. Evelyn, who was committed to

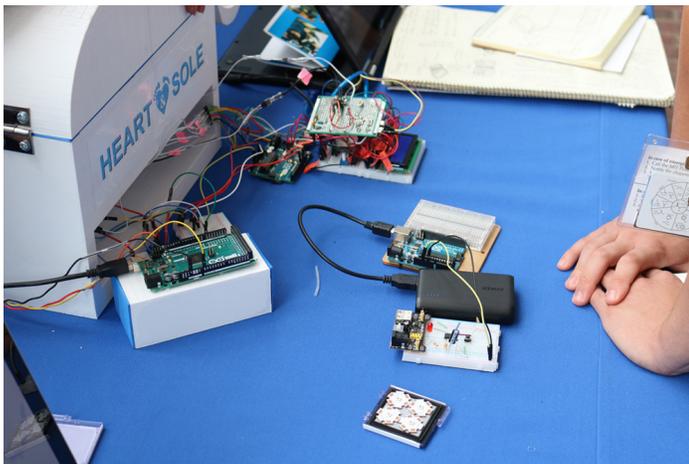
creating an InvenTeam, designed an application for potential participants. Evelyn and her best friend Diana Valencia interviewed 15 students, and chose six more to be team members. "I came back in August and told them, 'You are the inventors and I am the mentor,'" Gamboa says.

In September 2017, the Garey students found out they were one of 15 grant winners, but they felt their idea was too simplistic. Gamboa's fellow teacher Alexander Ruper, who had joined as a co-mentor, suggested developing a more complex health system device for diabetics.



Over the next few months, the students worked to improve upon their idea. Jia Bragado and Diana talked to their relatives, and the team conducted video chats with physicians, nurses, and diabetes specialists. As they neared the mid-year review in December, they were behind schedule and Anh Thu Tran kept reminding Gamboa that the team hadn't spent any of the grant money yet. They turned their attention on identifying the technologies that could help – a set of LEDs and a sensor that could measure blood flow in a foot and oxygen content. "They read up on new technology that could send out light and measure the reflections – oxygen devices can't do that because they have to penetrate the bone," Gamboa says.

The team, now at seven students (one student left the team), comprised of six girls and one boy, Sushil Bohara. The girls on the Garey InvenTeam led the hard-core development, making circuit boards and programming the sensors, while Jia and Sushil led the structural design. "We created a device that could measure for neuropathy and help determine the health of the nerves," he says. Called "Heart & Sole," the device aimed to prevent amputations, a common outcome for diabetics.



While most of the students were heads down creating the device, Melody Sanchez focused on two of the most critical parts of invention, awareness and fundraising. Under her direction, the team gained visibility from the senator for the 20th district in California, city officials including the city mayor who presented them with recognition awards; district officials, including the

superintendent; the regional Rotary chapter; and a host of area businesses. She rallied support for the team early on, even helping the regional newspaper, "La Nueva Voz," publish multiple articles about the team and their invention. The newspaper also hosted a fundraiser that raised nearly \$10,000 for the team's trip to Lemelson-MIT's EurekaFest event in June 2018 where they presented their invention.

"The student had very, very strong communications skills and that piece was so essential. Our device would not have been possible without public support, people's interest, and reaching out to share the invention with those who need it." – Antonio Gamboa

It wasn't until after EurekaFest, though, Gamboa says that Melody, who wanted to quit the team because she didn't think she added any technical value, realized what an important role she played in developing a strong presence and a deep connection with the community.

Changing the Future

"Our school is one of the lowest performing academically and 99% of our students are low income," Gamboa says. "Before the Lemelson-MIT InvenTeam grant, district administrators said they didn't have money to support science. Once they saw what these students could do, that turned around – not just in our school, but across the district."

The whole community got to witness the potential in these students. "They now see them as having a purpose," he says, adding other students now want to come to Garey High School for the opportunity of invention. "These students motivated everyone in the community," which is only fair, he says, since the community motivated them. At the end of the year, the students created a "thank you" video for their supporters and donors. "It's not about money – it's about realizing that without your community, you can't be successful at invention," he says.

For Gamboa, though, the most impactful part of the InvenTeam experience has been “the transformative effect on his own students.” The team plans to pursue a patent for their device through a program at Microsoft. That’s a long way from not even knowing what STEM was, Gamboa says of his students. Two team members are now determined to become engineers in STEM fields and have their sights set on MIT and another aims to attend Stanford. “Before the InvenTeam, they had never interacted at that level with electronic devices, much less programmed them,” Gamboa says.

Gamboa has continued an invention curriculum, and even has had the InvenTeam students mentor younger students. “I used to work at a school where students were hand-picked to attend,” he says. “I moved back to this area because I wanted to work with students who didn’t have these opportunities. I wanted to show them they have what it takes to be successful in everything. The InvenTeam experience provided that personal accomplishment for me and changed my teaching forever.”

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