

Meet the young students who designed an ocean-cleaning robot

ASU workshop helps Arizona educators integrate ocean science into their classrooms

By Dolores Tropiano, ASU News
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A classroom in the middle of the Sonoran Desert might be the last place you'd expect to find ocean research — but that's exactly what's happening at Harvest Preparatory Academy in Yuma, Arizona.

Two eighth grade students designed a robot capable of removing microplastics from waterways, and recently presented it to nearly 100 people, including students, teachers and an Arizona State University scientist.

MP Guard, as the robot is called, is compact — about the size of a notebook. But it has a mighty mission: saving the world from dangerous plastics in waterways that can be mistaken for food, and harm marine life or humans who eat seafood.

On March 13, the students, Adriel Magana and Brandon Miranda, both 14, tested the robot in front of the crowd in the school's auditorium. They placed it in a small, round, plastic pool and slowly the skimmer began to move. The cylinders turned and the sharp-toothed ratchet started to collect particles, which were then trapped by a filter made from sustainable coconut husk fibers. The bot is designed to trap microplastics that are even invisible to the human eye.

The crowd applauded their achievement — a machine with the potential to be both scalable and patented.

"It feels like something that is revolutionary," Miranda said. "It's very exciting."

Magana, who had no idea they would be presenting their prototype to so many people, was pleased by the results.

“I was very happy, very satisfied that this actually worked because at the start it was only an idea and it seemed impossible,” Magana said. “But then after a few winning trials, we were able to do it. We will actually be able to finish it completely and test it in the ocean. That will be a very enjoyable moment.”

(Video: <https://youtu.be/-dP-UCN6cUM>)

The source of the solution

The idea for a surface skimmer came when Magana and Miranda, both members of the school’s robotics club, were participating in the FIRST LEGO League Innovation Project. The league is a global STEM program for students, and the 2025 challenge was to discover ways to improve the planet’s ocean problems.

The young scientists worked for six months on the design, which began as a drone that would move across the water’s surface, but the lack of funds forced a pivot. Their stationary version started with the idea of using a common oil filter to collect the particles. They used a 3D printer, duct tape, pool noodles and LEGO pieces to build it. The project went through multiple iterations — at times requiring up to 12 hours to reprint the 3D ratchet.

When they became stumped by the design, the students were introduced to [Vernon Morris](#), an environmental scientist at ASU, by Karen Maninang, a science specialist at the preparatory academy.

She knew Morris from an oceanography workshop he had offered K–12 teachers throughout Arizona in October, which helps elementary and secondary school educators in the state integrate ocean science into their classrooms and share what they learn with their peers. It was organized by ASU in collaboration with the [National Oceanic and Atmospheric Administration](#), APS Foundation and the Arizona Science Center.

“The workshop was inspired by a conversation with NOAA about the launch of ASU’s [School of Ocean Futures](#) and the fact that [ASU West campus](#) is the center of expertise in this area,” said Morris, ASU Foundation Professor and associate dean for [Knowledge Enterprise and Strategic Outcomes](#) in the [New College of Interdisciplinary Arts and Sciences](#). “And recognizing a need for a deeper knowledge of ocean literacy — especially in places like Yuma where they are not next to the ocean.

“We wanted to share that knowledge beyond the university classrooms.”

Bringing ocean science to Yuma

Morris had guided the students as they worked through the kinks of the bot's design. On March 13, he came to the school to see the prototype work.

"The purpose of Thursday's presentation was to have ASU visit and showcase the prototype robot that Morris and his colleagues provided feedback on, which helped students identify a real-world problem related to the ocean," Maninang said. "They were then able to develop a solution and build prototypes to bring their ideas to life."

Morris spoke passionately to the students about his path to becoming a scientist. As a young boy, he didn't like school, but an assignment requiring him to collect and categorize bugs got him hooked on science. He later chose science over boxing for his future.

He encouraged students to consider a career in science — especially earth, climate, deep ocean or atmospheric science.

"What do you think about a scientist?" Morris asked the students. "Close your eyes and think about a scientist. What would that person look like? Probably wouldn't look like me, right? And I get that, and that's OK. And if you close your eyes and think of a scientist, for most people, it doesn't look like you either.

"But if you were to go into many scientific labs, scientists do look like us. Very much so. And as the world continues to move forward, more and more scientists will look like all of us in this room. And so it's important for you to see yourself as a scientist."

This story originally appeared on [ASU News](#).

Main image



Brandon Miranda (left) and Adriel Magana, eighth grade students at Harvest Preparatory Academy in Yuma, Arizona, demonstrate the prototype of a robot they made that removes microplastics from the water. It was created with some help from ASU Professor Vernon Morris. Photo by Richard Holland/ASU West Valley campus

Text image(s)



ASU Professor Vernon Morris speaks to students at Harvest Preparatory Academy in Yuma, Arizona, about becoming a scientist. Photo by Richard Holland/ASU West Valley campus