NATIONAL

# Women of color still lag behind in STEM jobs, despite efforts to change

APRIL 20, 2024 · 9:24 AM ET

Marisa Peñaloza



A mural at the first National STEM Festival held in Washington, D.C., this month shows the purpose of the gathering. High school students from around the country were celebrated for winning a science challenge.

*Dee Dwyer for NPR*

On a recent Spring weekend 126 high school students from around the country gathered at the

first National STEM Festival in Washington, D.C. They are winners of a science challenge organized by EXPLR, an organization that produces and distributes educational materials, including videos and curriculum, for high school students in the U.S.

The winners were here to showcase their projects in science, technology, engineering and mathematics (STEM) to government and industry leaders.



At the National STEM Festival, 12th-grader Treyonna Sullivan talks with visitors about her "Project Poop," created to encourage pet owners in her community to dispose of their pet's waste.
*Dee Dwyer for NPR*

There were students like Treyonna Sullivan. She's 17 and a senior at Renaissance High School for Musical Theater in the Arts in the South Bronx, New York.

"My project is called Project Poop," she says, with a big smile. It's a smart trash can that counts the poop dumps put in it. It's a metal, ruby red bucket — when you press the handle the lid opens up and the computer counts the dump.

"We have a huge poop problem in my community," Sullivan says, and she believes that if people could see the daily number of dumps collected, perhaps people would start changing habits and clean up after their pets.



Treyonna Sullivan, 17, is a winner in a national science challenge. She created "Project Poop," a smart trash can that counts the poop dumps put in it. She's from the South Bronx in New York.
*Dee Dwyer for NPR*

"It's like playing hopscotch to get everywhere, and it sucks because when you step on it, you carry it everywhere. It's just a mess," she says, adding that it's also bad for the environment. "It's not sanitary. And the more that we leave it out there, the more that it pollutes the air." It can also contaminate water when it rains and parasite and pathogen transmission can cause disease, she says.

Sullivan, dressed in a soft pink work suit, shows visitors her prototype of the can.

"It's coded in Python and it has a Raspberry Pi," she says.

Seventh-graders attended the National STEM Festival in D.C. They are, left to right, Makayla Warren, Morgan Locke, Maleah Johnson, Taryn Ward and Jordan Krull. They are part of an after-school STEM program in North Carolina.

*Dee Dwyer for NPR*

Python is a computer programming language and a Raspberry Pi is a computer the size of a credit card, but with the features of a full computer, she says.

Her plan is to place the trash cans all over the South Bronx, she says. But first Sullivan needs to fundraise to be able to mass produce the smart can.

The South Bronx is known as the birthplace of hip-hop and graffiti. But Congressional district 15 is also the poorest in the country with a 27.7% poverty rate while the national rate is 11.5%, according to the U.S. Census.

Sullivan attends after-school classes at the Renaissance Youth Center, where she learned to code about three years ago, "and I fell in love with it even though it was frustrating at first and it was hard for me to understand everything."

Encouraged by the youth center's director, Sullivan entered the science challenge and she's still pinching herself to be a winner.

"It's incredible!" she says.



Attendees at the festival in Washington, D.C., checked out the science challenge's winning projects.
*Dee Dwyer for NPR*

She looked up some of her competitors' backgrounds and she thought she didn't have a chance, she says.

"I feel like being able to have Black mentors and see more Black youth like me doing things that aren't really in our comfort zone — that really inspired me."

Sullivan has applied to college, and has already been accepted to several, she says, but she's waiting to hear about financial aid. She plans to study interior design with some aspects of STEM incorporated in design and construction, she says.



Science challenge-winner Nikita Prabhakar from Madison, Alabama, developed a non-invasive integrated sensor to monitor menorrhagia, a type of abnormal bleeding in a menstrual cycle.
*Dee Dwyer for NPR*

## It's hard to break stereotypes

Amid longstanding efforts to increase diversity in these fields, and as STEM jobs are expected to rise in the coming years, women of color remain underrepresented and underpaid in the STEM workforce, according to a Pew Research Center study.

Kuheli Dutt is Assistant Dean for Diversity, Equity and Inclusion at the Massachusetts Institute of Technology School of Science in Cambridge, MA.

"In STEM fields, research shows that women of color face the most challenges and harassment, both explicit and implicit," Dutt says.

She's the lead author in a 2016 study that looked at gender disparity in recommendation letters and found that regardless of the gender of the letter writer, male applicants were more likely to receive outstanding letters compared to female applicants.



Hannah Coley, an 11th-grader from Stockbridge, Georgia, shows off her project, "The Effect of Fabric in Soil."
*Dee Dwyer for NPR*

"There is a perception that men are smarter and therefore better at science. Unconscious biases can play out like that," Dutt says. "It starts really early on, and these messages keep getting reinforced over time."

Dutt mentions a 2018 study of children who were asked who was smarter, girls or boys? She says that 5-year-old kids were more likely to respond that their own group was smarter, but at 6, already both girls and boys were more likely to say that boys are smarter.

According to the latest National Science Foundation report, Diversity and STEM: Women, Minorities, and Persons with Disabilities, the workforce in STEM careers is made up of 61% white, 21% Asian, 8% Black, 8% Latino.



Naya Ellis, a 9th-grader, is a native of New Orleans. She developed a stroke detector.
*Dee Dwyer for NPR*

Now, says Dutt, it's even more important to address equity in STEM early on because of the current backlash against DEI (diversity, equity and inclusion) efforts — policies and practices that many schools and companies have adopted to make these spaces more equal for all.

For example, she says, students who come from under-resourced schools don't have the access to opportunities and resources that students from well-resourced schools do, "regardless of their race/ethnicity, there is an equity issue here that needs to be addressed."



Kara Branch, a chemical engineer by training, is the founder and CEO of Black Girls Do Engineer, an organization that empowers and inspires Black girls to go into STEM fields.
*Dee Dwyer for NPR*

## Struck by impostor syndrome: Do I belong here?

Kara Branch is trained as a chemical engineer in Houston. Branch worked in the oil and gas

industry as well as in the space industry for several years. She quit because she couldn't shake imposter syndrome.

"I felt like I wasn't wanted. I didn't feel comfortable," says the 34-year-old mother of three daughters. "I went to work every day just feeling like, 'Do I belong here?'"

Branch was raised by a single mother in Port Arthur, Texas, a predominantly disadvantaged Black community that's home to some of the world's largest refineries.

She says that she loved working as a chemical engineer, but she found the industry wasn't very welcoming to her.
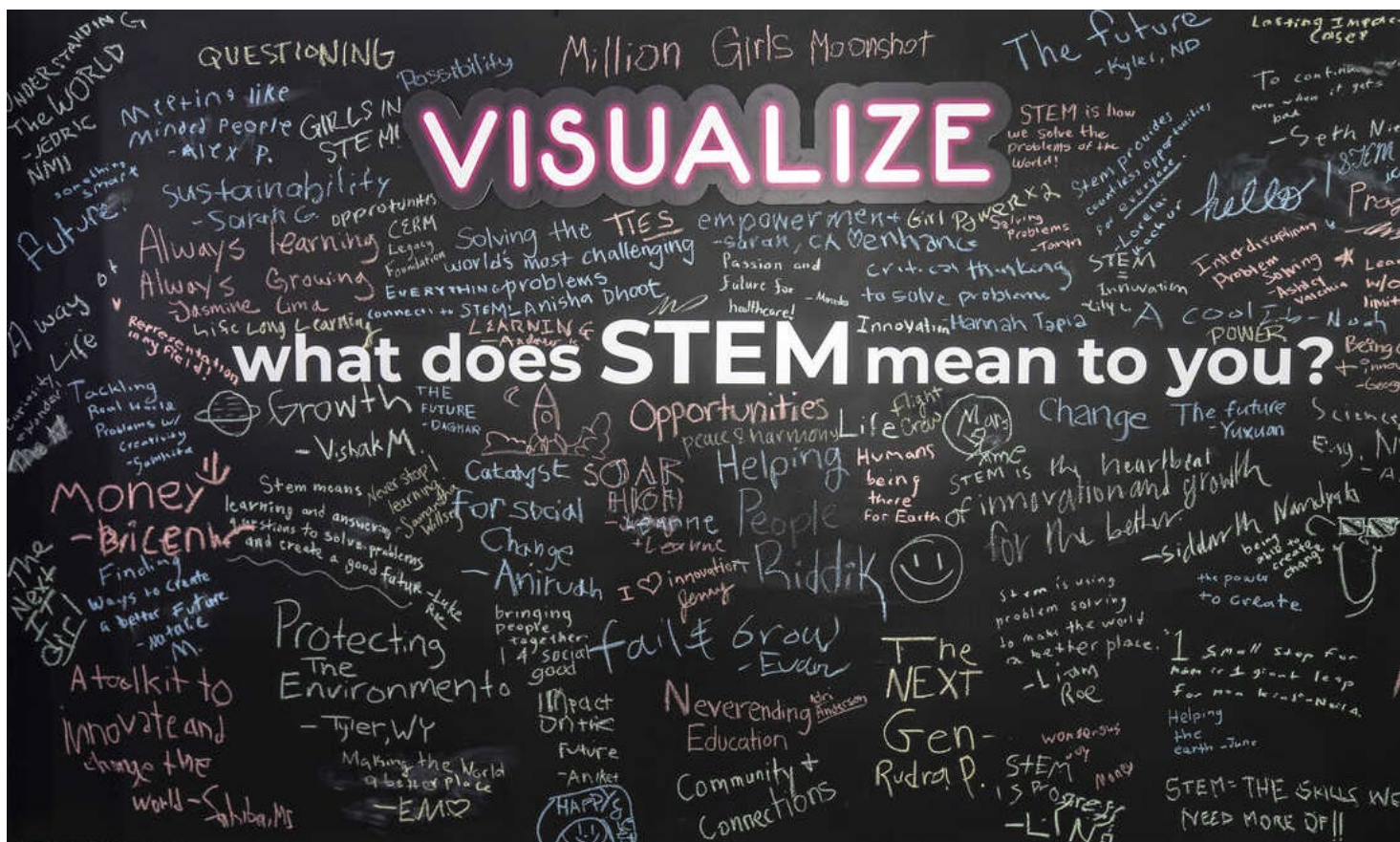


A mural at the National STEM Festival in D.C. earlier this month is meant to inspire young people to think how science, technology, engineering and math can create a better world.
*Dee Dwyer for NPR*

"I feel like I could not be myself," Branch says. "I had to change everything about me to fit in the environment."

"I was used to being myself, being free, being who I was," says Branch, who attended Prairie View A&M University, an HBCU. "But being myself in a corporate environment wasn't really

always accepted. And so it was always very hard."

Branch says she's still passionate about the possibilities STEM careers can offer to women of color, but she felt a jolt when one of her daughters expressed interest in these fields.

"When my oldest daughter told me she wanted to come into this space, I wanted to be able to create a space not just for her, but for girls who look like her."

In 2019, Branch left her industry job and created Black Girls Do Engineer. It's a membership-based nonprofit that promotes STEM education and careers for girls.

It's important for Black girls to see professional Black women in the STEM workforce as well as to seek out mentors and allies to succeed, says Branch.

"When you're working on projects, you need to have everybody's perspective, everybody's ideas," she says. "And that comes from diversity."

"How are we going to make technology good for all?" she asks.
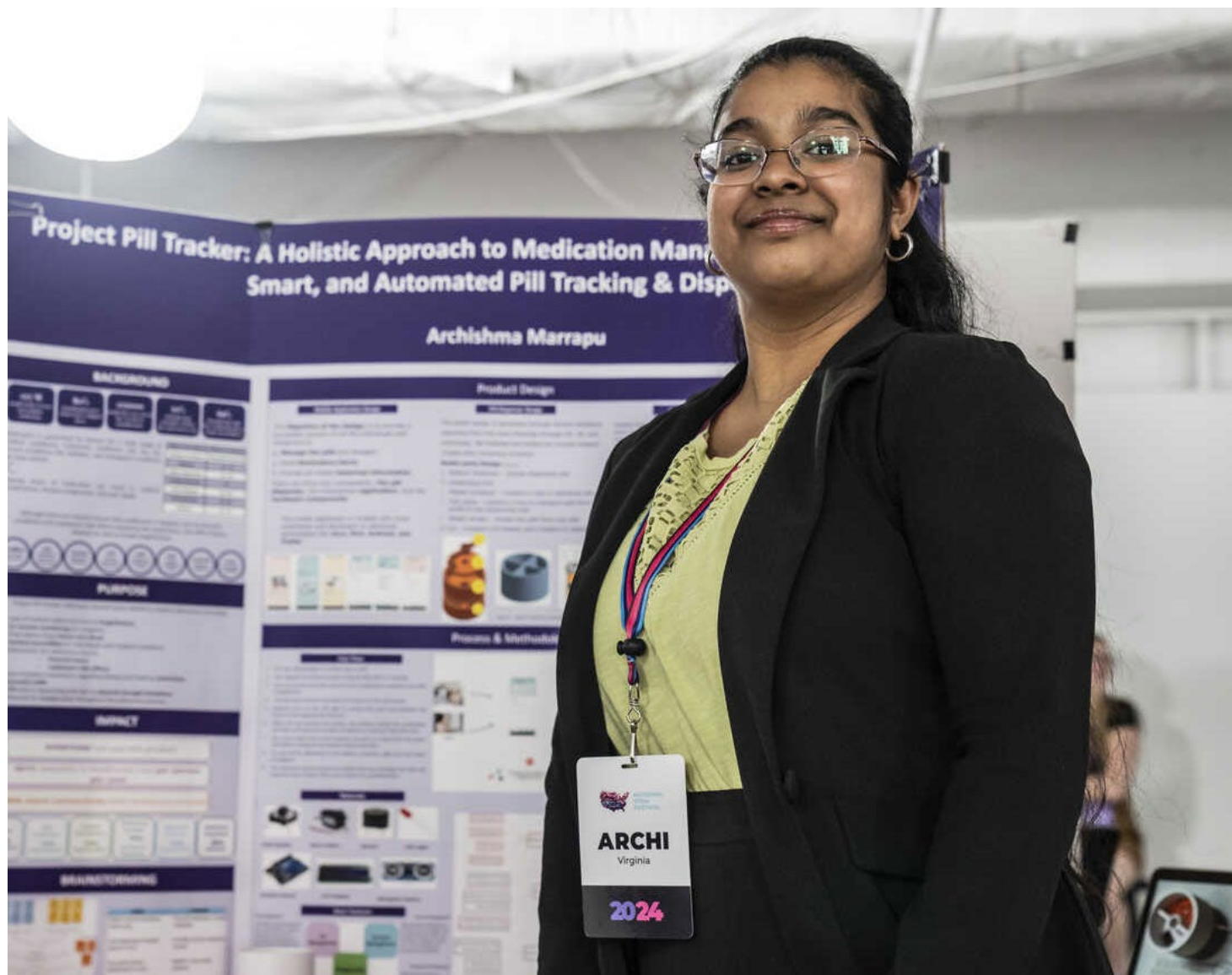
Archi Marrapu, 17, excitedly tells visitors about her project. "I usually get ideas based on problems that my family faces," says Marrapu, a junior at Thomas Jefferson High School for Science and Technology, a magnet school in Alexandria, VA.

*Dee Dwyer for NPR*

### Finding inspiration in solving family problems

Back at the National STEM Festival in D.C., organized by the U.S. Department of Education and EXPLR, 17-year-old Archi Marrapu excitedly tells visitors about her project.

It's an artificial intelligence, or AI-based, system to help people track their daily medicine intake, especially people who take a large amount of pills a day, she says. The focus is on people with a condition like arthritis who may not be able to open a bottle or who have cognitive problems and may forget to take medications, she says.

"I usually get ideas based on problems that my family faces," says Marrapu, a junior at Thomas Jefferson High School for Science and Technology, a magnet school in Alexandria, VA.

Marrapu's parents emigrated from Hyderabad in South India in the early 2000's, she says. She got interested in robotics and technology in elementary school, where she joined science clubs and competitions.

But it was on a trip to India in 2022 to visit family that Marrapu got the pill tracker idea.

"I was inspired by my grandfather who suffered from a series of heart and brain strokes," she says. "He had so many pills that he couldn't manage it. My grandmother couldn't manage it. It was like a small pharmacy. And I just thought about how important it was for him to make sure he was taking each of those pills."



Archie Marrapu, from Northern Virginia, created a "pill tracker". It's a plastic bottle fitted with ultrasonic sensors and an AI engine that tracks when/if a patient has taken his/her medication, among other things.
*Dee Dwyer for NPR*

Marrapu's father takes medication to keep his diabetes in check. The pill tracker is designed to include an information section that was inspired by him.

"He really didn't know what other pills he could take with that medication, or if he had any dietary restrictions," she says.

Marrapu says there was a lot of confusion during the first weeks after her dad was put on the medication. The family relied on Google and multiple doctor visits, she says.

"I created a system that would send the user notifications, like, 'you've just taken your pill, please don't consume antacid until 2 hours have passed.' It's a guidance system so that people avoid compromising their medications," she says.

Marrapu knows she wants to study biomedical engineering with a minor in entrepreneurship when she goes to college, and her dream is to work in healthcare, she says.

"To make it more equitable, affordable and accurate as a whole," she says. "Healthcare is something that everyone deserves equally regardless of ethnicity or socioeconomic status."

She exudes self-assuredness and says she is aware of the disadvantages women of color face in STEM, but she's confident her generation will push for change.

"Whether it's talking to industries about hiring more women, giving women more opportunities with more pay, I think that's something women can change. I think women need to believe that they are enough," Marrapu says, emphasizing the word *enough*. "They can do whatever men can do, and they deserve whatever men do too."

*Susie Comings contributed research to this story.*

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