

# WEAVING the Future

By Nestor Vences

**Karen Abarca** never expected her path from Hollywood costume design to engineering would lead her to work on the James Webb Space Telescope (Webb). But today, as an engineer at Northrop Grumman, she applies her design and problem-solving skills to protect critical space mission components.

When she started at the company, Karen entered the multi-layer insulation room — where spacecraft insulation is cut and assembled — and was struck by something familiar: sewing machines, cutting tables and rolls of Kapton, a high-performance polymer film used on Webb.

"I remember thinking, 'This is a sewing room for space stuff!'" Karen said. "Never in a million years did I think that my background in costume design would fit so seamlessly into engineering, but elements of design are everywhere."

## CHARTING A NEW PATH

Karen's path into engineering was anything but traditional. Growing up in a Los Angeles suburb, she loved school and participated in STEM programs. However, the daughter of a seamstress, she initially pursued a career in fashion design. In 2009, Karen opened a shop on Etsy, selling handmade items to help her family and pay for college.

Encouraged by a friend, she applied to the Fashion Institute of Design and Merchandising in Los Angeles, where she won a scholarship and honed her skills. She earned her associate's degree

in 2014, becoming the first person in her family to graduate from college. After graduating she found consistent work designing costumes for shows on Disney and "Germany's Next TopModel."

"I love costume design because it tells a story through clothing," she said. But even with her success, something felt missing.

## REDESIGNING HER DREAM

On New Year's Eve in 2014, while stargazing at Death Valley National Park, Karen reflected on her childhood passion for helping others. Surrounded by the vast desert and clear sky full of stars, she realized she wanted to return to school to pursue a new path.

"It was intimidating to give up on a successful career, but I had to do it for me," she said. "As I looked up into the stars, I knew I had to go back to school." Karen embarked on a multi-year journey that would see her earn two degrees, breathe life into a second career to help others through STEM. She enrolled in community college, earning six associate degrees by 2018, and then transferred to California State University, Long Beach, where she earned a bachelor's degree in chemical engineering in 2020.

During her studies, she attended a Society of Women Engineers (SWE) conference, where she learned about a job opening at Northrop Grumman. Six months before graduation, she accepted a systems engineer role on an Independent Research and Development project. And within a year, she joined the contamination engineers working on Webb.

"I was beyond excited," she said. "It was unbelievable."

## BRINGING DESIGN TO ENGINEERING

At Northrop Grumman, Karen found that her experience in costume design gave her a unique perspective in her engineering. On Webb, her work required the same precision and problem-solving she used when designing intricate costumes.

In the multi-layer insulation room, the contamination engineers were responsible for ensuring Webb was free of foreign contaminants prior to delivery and launch.

"I realized the precision I used in fashion I now use in engineering," she said. "It's just a different material and goal."

Today, Karen continues to work as a freelance costume designer on independent film and television projects and advocates for underrepresented groups in STEM through leadership positions in her local SWE and SHPE chapters.

When she looks at new images from Webb, she can't help but think back to that starry night that changed her life forever.

"I'm exactly where I wanted to be, doing what I wanted to do," she said. "I'm helping people every day, folding in the skills I learned from my mom and from my fashion career to build engineering projects that are changing the world." **n**

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—**KAREN ABARCA**  
Engineer



**n** Karen's passion for costume design led her to an engineering career at Northrop Grumman, including work on NASA's James Webb Space Telescope.

Photo by Patrick McIntyre and Daniel Perales