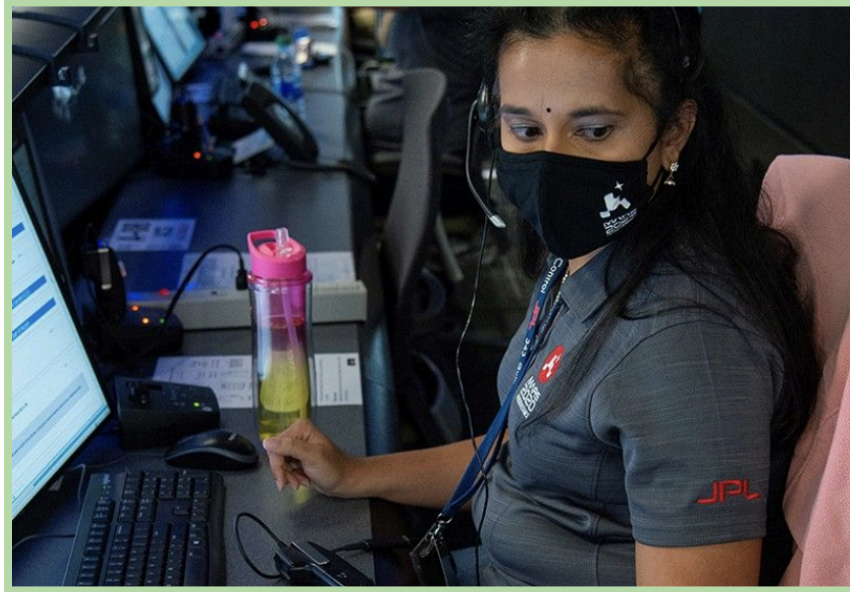


Dr. Swati Mohan: Guiding Perseverance to Mars

Written by Shunyu Yu for Spacetime Archives



Credit: Casey Dreier/The Planetary Society

Landing a Rover on Mars

On February 18, 2021, millions of people around the world held their breath as NASA aerospace engineer Dr. Swati Mohan calmly narrated the Mars 2020 Perseverance rover landing in real time. As the Guidance, Navigation, and Controls (GNC) Operations Lead for the mission, Mohan was responsible for the rover’s “eyes and ears,” ensuring the spacecraft’s orientation and trajectory were spot-on during its harrowing descent. In those famous “seven minutes of terror,” the entry capsule streaked into Mars’ thin atmosphere at 12,000 mph, becoming a fiery blur before deploying a supersonic parachute to slow down. Next, Perseverance shed its heat shield and fired retrorockets, and a hovering sky crane lowered the one-ton rover safely to the ground at a gentle 1.7 mph. “Touchdown confirmed,” Mohan announced

from mission control at 3:55 p.m. EST, to an eruption of cheers and relief, as Perseverance arrived intact and “ready to begin seeking the signs of past life” on Mars’ Jezero Crater.

Navigating Challenges and What’s at Stake

Landing on Mars is notoriously difficult – more than half of all Mars missions have failed. For Perseverance, everything had to work autonomously, since a communication delay meant engineers like Mohan could only watch from Earth. The stakes were enormous: success would open a new chapter in Mars exploration. The rover’s mission is to search for ancient microbial life and collect samples for eventual return to Earth, while also studying Martian climate and

geology to pave the way for future human missions. Mohan and her team spent eight years developing and testing the rover's navigation and control systems to meet this challenge. They implemented innovative technologies like *Terrain Relative Navigation* – a system that let Perseverance “eye” the Martian surface and pick a safe landing site on its own. This technological leap was crucial to landing in Jezero Crater, a rugged former lakebed that could hold clues to past life but was filled with hazardous boulders and cliffs. *“It was a huge team effort... We had envisioned being there together, but could support only half the team for the final step, due to COVID protocol,”* Mohan noted, reflecting on the unusual pandemic-era operations. Despite masks and distanced work, the team's precise coordination paid off in a flawless landing, protecting years of work and billions of dollars of equipment on the Martian surface.

A Moment of Triumph and Teamwork

When that first image from Perseverance flashed on screen after landing – a dusty Martian horizon – the room at NASA's Jet Propulsion Laboratory erupted. Mohan's steady voice and calm focus during the landing turned her into an unexpected public face of the mission. Media outlets around the world celebrated the moment, with CNN calling her the “face of the Perseverance landing” and *USA Today* praising the feat as “truly America at its best,” a salute to the diverse team behind the rover. For Mohan herself, the achievement was deeply personal. *“I have to say that I was so focused on what I had to do... it took a few minutes to sink in after I made the touchdown call,”* she recounted, describing how the reality of the successful landing slowly dawned on her amid the cheers. In that instant, years of preparation and worry melted into joy. It was a triumph not just for one engineer but for an entire community of

scientists and engineers working together across the globe.

From Star Trek Dreams to NASA Missions

Swati Mohan's journey to Mars began long before she joined NASA. Born in India and raised in the United States from age one, Mohan grew up fascinated by the night sky and science fiction. *“I remember watching my first episode of Star Trek at the age of 9... I remember thinking, ‘I want to do that. I want to find new and beautiful places in the universe,’”* she said, recalling how seeing starships explore unknown worlds ignited her passion for space. Encouraged by her parents' emphasis on education and hard work, she pursued aerospace engineering, earning her BS from Cornell University and a PhD from MIT. Mohan interned at NASA as a teenager and later worked on projects like the Cassini mission to Saturn. These experiences paved the way for her role on Perseverance. By the time of the Mars 2020 mission, she had become an expert in spacecraft guidance systems – and was poised to help make history on Mars.



Image Credit: NASA/Bill

Ingalls: <https://www.nasa.gov/image-article/perseverance-mars-rover-mission-guidance-navigation-controls-operations-lead-swati-mohan/>

Embracing Heritage and Inspiring the Future

During the landing broadcast, many noticed the small bindi (a traditional dot) on Dr. Mohan's forehead – a reflection of her Indian heritage that she chose to wear for the big day. *"It was an appropriate moment to dress up for,"* she explained, noting that it symbolized pride in her culture while looking professional for the world's cameras. Mohan's presence highlighted the growing diversity at NASA. She was one of several women and engineers of color in key roles on Perseverance, something unheard of in the Apollo era. NASA today is a multicultural organization, and the Mars 2020 team included people of many backgrounds collaborating toward a common goal. Mohan herself often celebrates this diversity – she even hosts an annual Diwali party for her colleagues, sharing Indian culture with teammates. By excelling in a high-profile

mission, she has become a role model for countless students, showing that space exploration is for everyone.

Her story demonstrates that with passion, education, and perseverance (a fitting theme), one can literally reach for the stars. The next generation of scientists and engineers can take inspiration from Dr. Swati Mohan's journey – from a little girl dreaming in front of a TV screen to a leader guiding a rover on Mars. Each milestone, from internship to landing day, was fueled by determination and curiosity. *"The vastness of space holds so much knowledge that we have only begun to learn,"* Mohan observed, embodying the spirit of exploration that drives missions like Perseverance. As NASA and its partners prepare to return samples from Mars and aim for human footprints on the Red Planet, pioneers like Swati Mohan are lighting the way, proving that science and engineering are as inclusive and inspiring as the cosmos they explore.