MIT alums recount their Martian experiences

Massachusetts Institute of Technology

Since NASA's Curiosity rover made its extraordinary Aug. 6 touchdown on Mars, it has been roving the Martian landscape, returning startling images. So far, the rover has revealed rust-colored canyons and the remains of what appears to be an ancient riverbed — a sign that the Red Planet may have once supported water, or even life.

For Allen Chen '00, SM '02, "it's like Christmas every day," as the rover sends new images and information back to Earth. Chen, who studied aeronautics and astronautics at MIT, was the deputy chief of the rover's descent and landing team, and spent the last 10 years puzzling over how to safely land the car-sized rover on Mars. His team's ultimate game plan involved a heat shield, a parachute, several rocket engines and, most daringly, a bungee cord-style sky crane.

"I worked 10 years for seven minutes to go well," Chen says, adding as understatement, "It was a pretty good ride."

Chen returned to MIT on Wednesday to relive that ride, along with Curiosity team members Bobak Ferdowsi SM '03 and Steven Sell, a former member of MIT's Space Systems Laboratory. Speaking to a packed lecture hall in MIT's Media Lab, the team members recounted their paths from MIT to the Mars mission, and their rollercoaster of emotions leading up to the rover's "landing day."

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Sell, who oversaw the deployment of Curiosity's sky crane, recalled running through a mental checklist in the tense moments before the landing was confirmed.

"You start scrolling through every analysis you did, and thinking, 'Did I carry the two?'" Sell said.

In fact, in the hours prior to the rover's landing, there wasn't much for NASA engineers to do but wait. For 10 years, thousands of people worked to design, build and test the rover, its landing equipment, and its intricate suite of scientific instruments. Last November, the team armed the rover with its tools and commands, and launched it to Mars, an experience Ferdowsi likened to "sending your kid off to college."

The hours leading up to Curiosity's landing were, as Sell remembers, a time when "activities shut down, and we were mostly listening. It was the first time we could breathe."

It was during this period when members in the control room started getting texts from family and friends who were watching NASA's live feed of the landing. Ferdowsi remembers receiving images of crowds watching in New York's Times

Square. “I don’t think any of us knew how big this would be,” said Ferdowsi, who has since attracted widespread attention for his unique style: on landing day, a Mohawk dyed red, white and blue.

While the hours before the landing were relatively quiet, the last seven minutes — the time it took for the rover to descend from the top of the Martian atmosphere to the planet’s surface — was a hair-raising experience. The 14-minute lag in getting signals from the rover to Earth meant that the craft would sit on Mars, successfully or not, for an agonizing period before the scientists would know its fate.

The team had developed a simulation testbed to gauge the rover’s trajectory, and the engineers ran the simulation just ahead of the actual rover, in an attempt to predict a successful landing. In the one fluke of the night, the simulation delivered heart-stopping news: “Someone said that the testbed failed, and that we slammed into Mars,” Ferdowsi recalled.

Chen, who was monitoring the rover’s signals, confirmed otherwise, declaring a successful touchdown at 1:32 a.m. EDT — an announcement that set off whoops and cheers from the control room at NASA’s Jet Propulsion Laboratory (JPL). Remembering the moment, Chen joked, “Sometimes people say JPL stands for ‘Just Plain Lucky.’”

From MIT to Mars

Luck may have had a part in the landing, but Chen also credits his experience at MIT — particularly his years as an AeroAstro undergraduate. Like today’s AeroAstro students, Chen went through the department’s “Conceive, Design, Implement, Operate [1]” program, a hands-on learning experience in which students take a project from an idea to a working prototype, learning to adapt and adjust a design to make it work.

“We basically did the same at JPL,” Chen said, noting that when he first arrived there after graduating from MIT, Curiosity was in the very initial stages of design. “It had two arms, and no sky crane, and looked very different,” Chen said. In refining a design, he said, “you wandered the wilderness a lot.”

For students who may be considering a career in aerospace, and future Mars missions in particular, Sell has one piece of advice: “Keep in touch with your colleagues. Aerospace is a small world.”

Ferdowsi’s experience bolsters Sell’s advice. After graduation, he learned of a fellow MIT student who accepted a job at JPL. Shortly before leaving, the friend submitted Ferdowsi’s resume for review. JPL offered Ferdowsi a job, and put him to work on the then-fledgling Mars mission. “You did whatever needed doing,” Ferdowsi said.

Opportunities for Mars-related work may crop up in the near future, as Chen is just starting a new JPL project, drawing up a concept for a next-generation Mars rover. “I just got back on the merry-go-round again,” he said.

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