



Rover Curiosity on the surface of Mars in a 'Buckskin' selfie

SPECIAL REPORT

MARS

'Dare to do mighty things'

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launched the first American satellite in 1958 and continued to send missions to the moon that were robotic with the goal to find out what was the moon like, map it and learn about it before man could make the journey.

She explained to the audience that both robotic and human exploration adheres to the same theme, 'follow the water'. "Water is necessary for life as we know it, we require water and so what we are looking for is — was there water elsewhere in the solar system, is there water now, what about outside our solar system, should we send astronauts who will need water?"

Cox has worked on multiple missions, but focused her talk on Mars, which the nearest planetary neighbor held a special interest for exploration. She revealed that every 26 months a window opens up, where Mars and the Earth are at the closest point together in their orbit. That is when it takes less energy, less time to send a space craft. "We try to send missions to Mars every 26 months."

She pointed out that space exploration has become much more global in recent years with many agencies and countries involved, such as Japan, China, the US, Russia, India, and even the UAE with its plan to send a mission called Hope in 2020. As such, the launch opportunities are getting very crowded, she stated.

She explained that while orbiters going around Mars provide images and communication relays, after you have been going around a planet long enough, you really want to find out what it is like up close. For this, there have been four rovers that successfully landed on Mars of which Cox has worked on three. The very first, Pathfinder, landed in 1997, to learn just how to send a rover to another planet, what deployment and control would entail.

The next two, Spirit and Opportunity, was followed by Curiosity.

She shared that the missions take about 5 years at the inception, and another 5 to 7 years to build and test the spacecraft. JPL is currently working on the Mars 2020 rover that will start test and launch operations in ten days.

She shared details of the journey of Curiosity, which was launched in 2011. In the 7 to 9 months that it takes for a mission to fly to Mars, she shared that the engineers are busy getting ready to land, changing trajectories to get there, picking a landing site, and much more.

While Spirit and Opportunity aimed to find out if there



Jubilant over a perfect landing.

had ever been liquid water on Mars in the past at the surface, Curiosity was sent to ascertain if the water had been there long enough to have created an environment for life.

She described to the audience what was it like to be in the room during the landing sequence. "It takes 6 minutes or so to get from the top of the Martian atmosphere down to the surface. We entered the atmosphere at 18,000 km/hr, 4 minutes bleeding off atmosphere and slowing down before parachuting to slow down enough to get to the surface, deploy the rover, land it and then send the descend stage off to a different part of Mars. This had never been done before."

She talked about the difficulties and risks attached to such an undertaking stressing that one successful landing doesn't guarantee the same result on subsequent attempts,

landings are extremely risky.

The rover, being the size of a small SUV, made the team unsure of if it would work. As it takes between 5 to 20 minutes to get a signal from Earth to Mars and Mars to Earth, the team watched as a spectator as the landing process was autonomous. Fortunately, everything worked and she described the immense joy and excitement of a group of people who had been putting 70-80 hours per week and working over a decade to make this happen. She shared that the first thing the team did was take a selfie with the camera on rover's arm before getting down to the business of working on Mars and towards their objective.

She touched upon many aspects of the mission, such as the chemistry instruments that helps determine the composition of samples and what the planet is like, and the chal-

lenge of working the night shift on Martian time where a day is 24 hours and 40 minutes long. "We went to find out if Mars was habitable, was the water there long enough to have created an environment for life and the answer is yes", she said describing a picture taken by Curiosity at a site believed to have been a rushing river long ago.

She added that the exploration of Mars since 2012 has not been without hiccups, "We have not drilled on Mars for a year. The drill wouldn't retract and so we had to figure out another way. Things go wrong and there are no astronauts to fix them. We have to find other ways to fix things from here."

Speaking about the 2020 Rover, she informed that Mars 2020 is a life detection mission specifically looking for signatures. The mission will use new landing techniques to land more precisely and go to different parts of Mars, along with MOXIE (Mars OXYgen In situ resource utilization Experiment), a prototype designed to take the carbon dioxide in the Martian atmosphere and pull it apart into oxygen and carbon monoxide. The mission will also bring back samples which is a highly difficult task.

She shared that NASA expects human explorations of Mars to commence near 2040 but SpaceX is hoping to send humans sooner. She shared that the biggest obstacle to getting human presence into space is having the ability to send payload and rockets into space which is something that SpaceX is working on.

She stated that a human mission to Mars would be an international mission with a crew of 2-6 people in the manner of a science and research base in Antarctica.

"These missions are about science and learning about the universe but also about teams of people doing a job. I have been at JPL for 25 years, as a kid I wanted to work on missions that mattered. What I didn't know was that there was this other component of teams of people that work together to do things that are hard", she expressed.

Cox challenged the students by stating that space exploration is just one example of problems that we have to solve, "As you look out to what you want to do with your career, think about what it means to work with a group of people to do something hard. Sometimes it takes long hours, it involves failures, but look around at you at what Kuwait needs, what the region needs, what the world needs."

"After 25 years, the thrill does not go away when you work with a group of people to do something that matters", she concluded.

research

UAE Space Agency showcases impact of partnerships at ISEF2 in Japan

ABU DHABI, UAE, March 6: Leaders of the UAE Space Agency showcased the positive impact of partnerships and the strategic importance of developing the UAE space industry at the 2nd International Space Exploration Forum (ISEF2) held in Tokyo, Japan.

A delegation from the UAE Space Agency was led by His Excellency Dr Ahmad Bin Abdullah Humaid Belhoul Al Falasi, Minister of State for Higher Education and Advanced Skills and Chairman of the UAE Space Agency and His Excellency Dr Eng Mohammed

Nasser Al Ahabbi, Director General of the Agency and other senior officials and executives from the UAE space sector.

Sponsored by Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT), the event was a gathering of distinguished governmental ministers and representatives from more than 60 countries, where panellists discussed the significance of international cooperation and collaboration for further advancing space exploration.

HE Dr Al Falasi participated in a

panel discussion focused on the importance and benefits of space exploration. He highlighted the significance of the UAE's investments in space and the scientific, economic and social benefits such investments provide to humankind. HE Dr Al Falasi also spoke of how education and human capital development form a key part of the UAE Space Agency's mission and objectives, in line with UAE Vision 2021. He stressed the importance of innovation in the development of enhanced educational systems that in-

spire the next generation to positively contribute to the advancement of humanity and give them the skills necessary to become future leaders.

Commenting on the ISEF2 forum, HE Dr Al Falasi said, "Our participation in the International Space Exploration Forum falls in line with our strategic objectives to support and strengthen the UAE's space sector. This is also part of our commitment to observing best practices and relevant international developments and integrating them into our own sector with a view to further enhancing

our own capabilities."

"The UAE space sector is an essential part of our country's ambitious long-term strategic plans to develop a knowledge-based economy. We are dedicated to developing our capabilities and we recognise the importance of building partnerships with leaders in the global space industry to maximise international cooperation in the space sector, resulting in valuable international contributions to the fields of space technology. It is crucial that we develop the necessary skills needed

for our engineers and professionals to lead the space industry in the UAE for years to come" added HE Dr Al Falasi.

Along with the ISEF2, the Japanese Cabinet Office, the Japan Aerospace Exploration Agency (JAXA), MEXT and the Ministry of Economy, Trade and Industry (METI) also organised the Industry International Space Exploration Forum (I-ISEF) on the 2nd March 2018, which encouraged discussions on the advancement of space-related business opportunities as well as space exploration.