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FEBRUARY 9, 2021
JUMADA AL AKHIRA 27, 1442

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Dubai Safari Park gets 290,000 visitors
Advance booking required as it operates at limited capacity

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Tesla buys $1.5b in bitcoin
Firm to take payment in digital currency which saw 10% surge yesterday

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How India can be the world's pharmacy
Country well suited to assume a premier role as vaccine supplier

HOPE PROBE: UAE'S DATE WITH HISTORY

Mohammad: We will prove nothing is impossible for UAE, Emiratis

DUBAI

BY ANGEL TESORERO
Senior Reporter

The UAE's Hope Probe arrives in the orbit of Mars at 7.42pm today for the most crucial part of the mission — the Mars Orbital Insertion. It simply means the probe will slip into Mar's gravity so that it can orbit the Red Planet.

"God willing, tomorrow, we will celebrate 50 years of our country's formation by reaching Mars as we celebrate the fruits of the work of the late Shaikh Zayed and the late Shaikh Rashid. Tomorrow, we begin preparation for the next 50 years. Tomorrow, we will prove to the world that nothing is impossible for the UAE and Emiratis. Tomorrow, we will take the Arabs to the farthest in the universe," His Highness Shaikh Mohammad Bin Rashid Al Maktoum, Vice-President and Prime Minister of the UAE and Ruler of Dubai, tweeted.

Biggest challenge

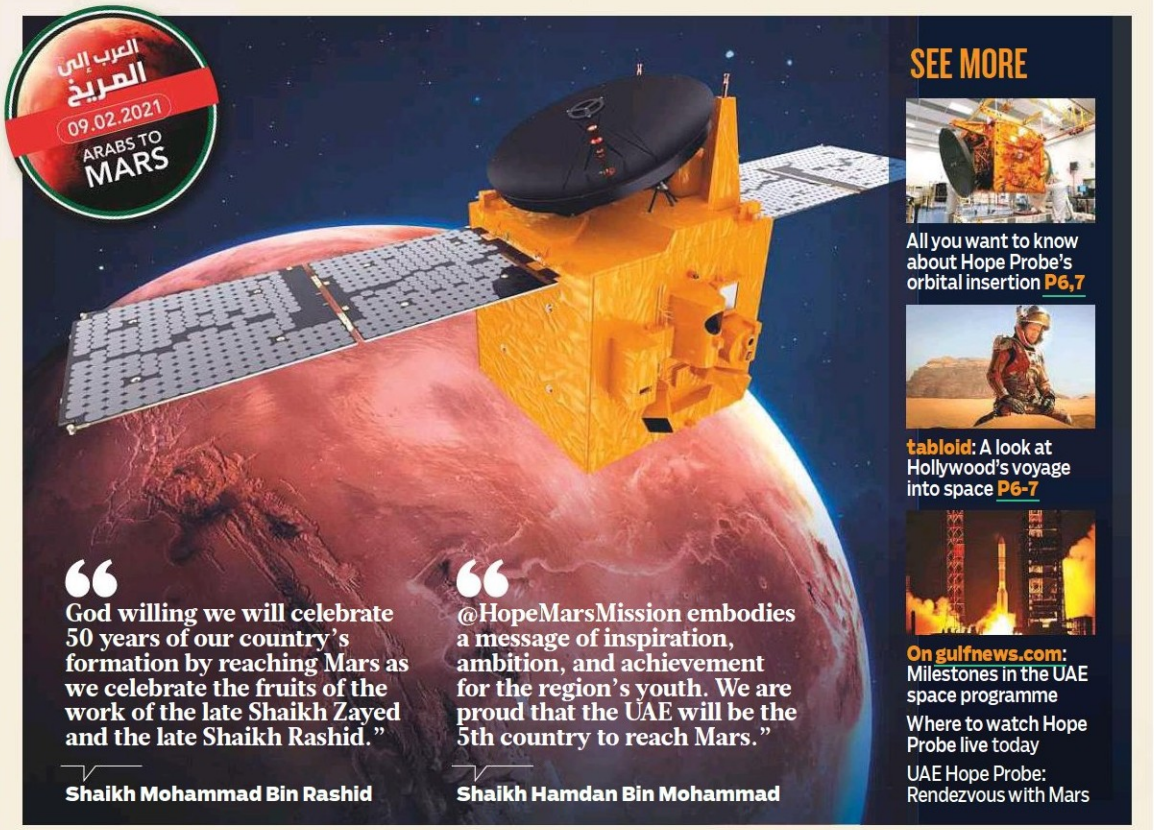
"In the coming hours, the Hope Probe will reach Mars... And the biggest challenge will be to enter the orbit of Mars. 50% of the human missions that tried before us could not enter the orbit. But I say, even if we do not enter the orbit, we have entered history," he added.

Shaikh Hamdan Bin Mohammad Bin Rashid Al Maktoum, Crown Prince of Dubai, also tweeted about his visit at the Mohammad Bin Rashid Space Centre in Dubai to give his best wishes to the young Emirati engineers behind the Emirates Mars Mission. "The team is ready for all scenarios as the Hope Probe gears up for its Mars Orbit Insertion and the commencement of its scientific mission," Shaikh Hamdan said.

The success of the Arab world's first interplanetary mission will be a momentous occasion for the UAE and its fledgling space programme. The Hope Probe, built by Emirati engineers, was launched from Tanegashima, Japan, on July 20, 2020. The Hope Probe covered 493.5 million kilometres from the Earth to Mars in 7 months, travelling at a speed of 121,000km per hour.

Hope will orbit the planet for at least one Martian year, or 687 days. Launched on July 19, the Hope probe which is officially called the Emirates Mars Mission is designed to orbit Mars and study the dynamics in the Martian atmosphere on a global scale, and on both diurnal and seasonal timescales.

EDITORIAL COMMENT - P7



SEE MORE

All you want to know about Hope Probe's orbital insertion P6,7

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Milestones in the UAE space programme
Where to watch Hope Probe live today
UAE Hope Probe: Rendezvous with Mars

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FROM THE COVER
Astrazeneca doesn't work well against South African strain. Why? | P3

Rescuers in India digging for 37 trapped in glacier flood

New Delhi fears more deaths as UAE expresses solidarity with the victims

RUDRAPRAYAG, INDIA

Rescuers in northern India worked yesterday to rescue more than three dozen power plant workers trapped in a tunnel after part of a Himalayan glacier broke off and sent a wall of water and debris rushing down a mountain in a disaster that has left at least 26 people dead and 203 missing.

Following the tragedy, the UAE expressed its solidarity with India. The Ministry of Foreign Affairs and International Cooperation yesterday expressed UAE's heartfelt condolences and solace with the Indian Government and families of the victims of this great calamity and wished quick recovery for the injured.

Meanwhile, search-and-rescue operations continued in the northern state of Uttarakhand after Sunday's flood, which destroyed one dam, damaged another and washed homes downstream. Officials said the focus was on saving 37 workers who are stuck inside a tunnel at one of the affected hydropower plants. "The tunnel is filled with debris, which has come from the river. We are using machines to clear the way,'' said H. Gurung, a senior official of the paramilitary Indo Tibetan Border Police.

Authorities fear many more people are dead and were searching for bodies downstream using boats. They also walked along river banks and used binoculars to scan for bodies that might have been washed downstream.

A senior government official told The Associated Press that they don't know the total number of people who were working in the Dhauliganga project. "The number of missing people can go up or come down,'' S. A. Murugesan said.

— AP & WAM

SEE ALSO P12

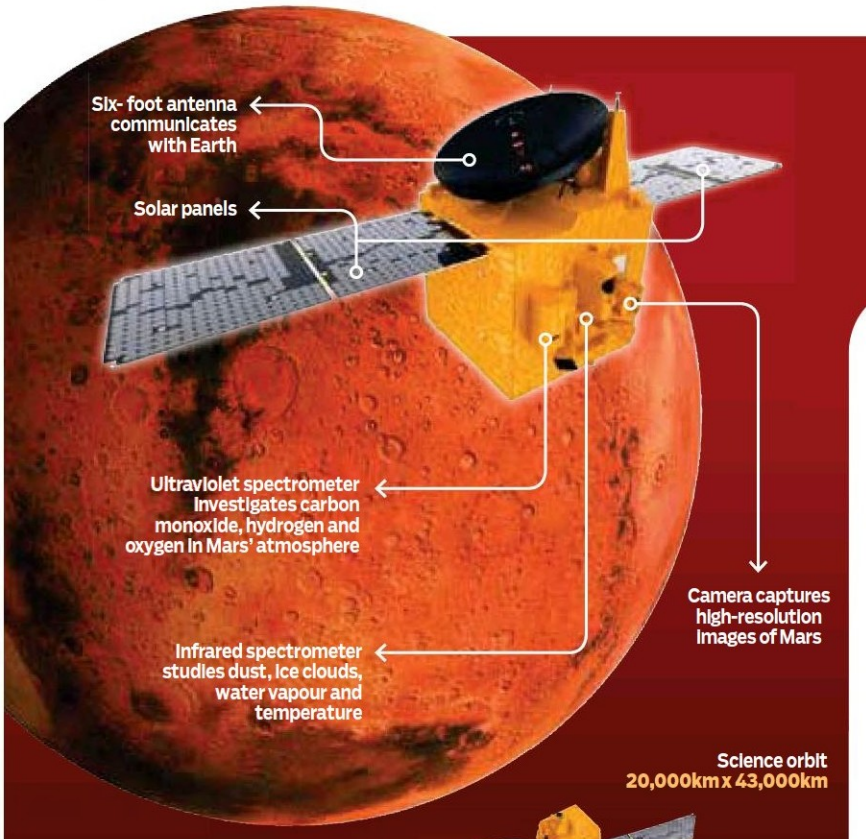
UTTARAKHAND GLACIER DISASTER

2,000
members of military, paramilitary groups and police involved in rescue operations

1 The focus is on saving 37 workers who are stuck inside the **2.5km Tapovan Tunnel** (left) at one of the affected hydropower plants.

2 The flood was caused when a portion of the Nanda Devi glacier snapped off on Sunday.

3 Experts said the disaster could be linked to global warming and a team of scientists was flown to the site yesterday to investigate what happened.



ALL YOU NEED TO KNOW ABOUT MARS ORBITAL INSERTION

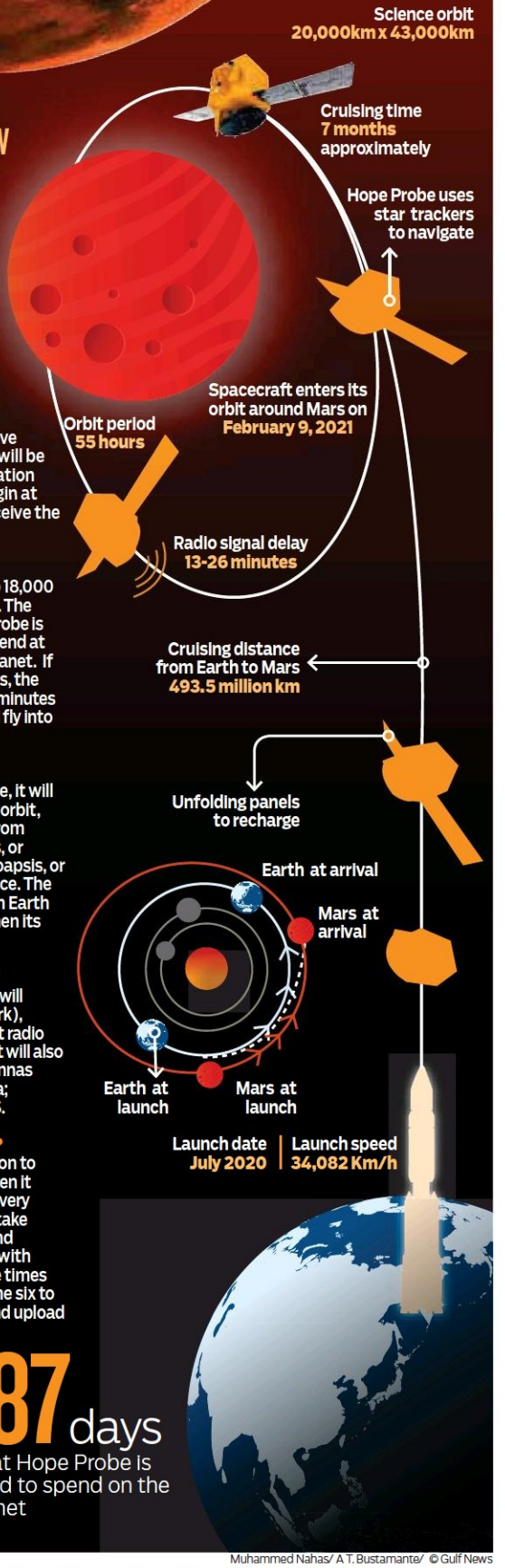
This complex manoeuvre is all about the Hope Probe being captured by Mars' gravity and thereby entering its orbit. If the probe comes in too fast, it will crash on Mars and it is too slow, it will miss Mars' orbit and get lost in space. The probe will operate in auto mode, using star trackers to position itself. All commands have been pre-programmed as there will be a 22-minute delay in communication during the manoeuvre. It will begin at 7.30pm, but MBRSC will only receive the signal at 7.42pm.

HOW WILL IT BE DONE?
The probe will reduce its speed to 18,000 km/h over a period of 27 minutes. The firing will commence when the probe is 2,363km from Mars' surface and end at a distance of 1,441km from the planet. If one pair of thrusters malfunctions, the other two will engage. Around 10 minutes after the MOI burn, the probe will fly into the dark side of Mars.

WHAT HAPPENS NEXT?
After Mars' gravity captures Hope, it will enter a phase called the capture orbit, which will take the probe from from a distance of 1,000km (periapsis, or nearest point) to 49,380km (apoapsis, or farthest point) from Mars' surface. The probe will be in daily contact with Earth during this two-month phase when its instrumentation will be tested.

HOW WILL IT BE MONITORED?
The Emirates Mars Mission team will use the DSN (Deep Space Network), Nasa's international array of giant radio antennas, to monitor the probe. It will also be monitored through three antennas spread across Canberra, Australia; Madrid, Spain; and Goldstone, US.

WHAT IS THE SCIENCE ORBIT?
The probe is expected to transition to its science orbit by April 2021 when it will complete one orbit of Mars every 55 hours. The elliptical orbit will take the probe between 20,000km and 43,000km from Mars. Contacts with Earth will take place two to three times a week with each pass being some six to eight hours to download data and upload instructions. The probe will capture a full planetary sample every nine days using its three instruments.



687 days
time that Hope Probe is expected to spend on the Red Planet

Source: MBRSC

Muhammed Nahas/ A T. Bustamante/ © Gulf News

> "The Emirates Mars Mission's success in reaching this crucial phase sends a message of hope and pride to the Arab world's youth that we can accomplish great things and succeed in implementing such unique projects."
>
> **Hamdan Bin Mohammad Bin Rashid Al Maktoum |** Crown Prince of Dubai

55 hours
Hope Probe will take to complete one orbit around Mars

MILLIONS OF PRAYERS AS HOPE PROBE FACES ITS BIGGEST CHALLENGE

IF HOPE PROBE IS TOO FAST OR TOO SLOW, IT WILL EITHER CRASH ON MARS OR MISS ITS ORBIT AND GET LOST IN SPACE

ORBITAL INSERTION

DUBAI
BY SHYAM A. KRISHNA
Senior Associate Editor
ANGEL TESORERO
Senior Reporter

At 7.42pm today, around 9.9 million people in the UAE, and many more in the Arab world, will hold their collective breath and say a prayer. For the next 27 minutes will decide the fate of the Emirates Mars Mission.

Hope Probe faces its most crucial stage of its mission today — the Mars Orbital Insertion. It simply means that the probe will slip into Mars's gravity so that it can orbit the Red Planet, making make the UAE the fifth country to reach the Martian orbit, after successful missions by the US, Russia, the EU and India.

The Mars Orbital Insertion (MOI) is the most critical and challenging part of the mission. If Hope Probe is too fast or too slow, it will either crash on Mars or miss its orbit and get lost in deep space.

All about precision

Suhail Butti Al Dhafri, Deputy Project Manager, said Hope Probe would deploy its six Delta V thrusters to rapidly reduce the speed of the spacecraft from 121,000km/h to 18,000km/h before entering Mars' orbit.

The MOI manoeuvre involves a 27-minute deceleration. "If one pair malfunctions, two pairs will fire up and increase burning fuel to achieve the required deceleration," he added.

No live commands can be sent to the probe as there is a 22-minute delay in communicating with the spacecraft. It requires 11 minutes to send and another 11 minutes to receive radio signals.

Emirati engineers are cautious but confident

The young Emirati engineers, programmers and data analysts at MBRSC are confident of a successful Mars Orbita; Insertion. The anxiety and excitement were evident at the MBRSC command centre in Dubai when *Gulf News* visit ed last week, but the Emirati engineers, scientists and analysts exuded a quiet confidence.

Ali Juma Al Suwaidi, FlatSat engineer, said: "It is actually hard to measure the exact level of confidence in the MOI as our project director (Omran Sharaf) had said, around 50 per cent of Mars missions have failed — some have failed at launch while others during the cruise and at arrival. But we are confident as we have been running thousands of tests and simulations and we have been closely monitoring the spacecraft cruising in deep space for almost seven months now."

Al Suwaidi is in-charge of the FlatSat, a large motherboard at MBRSC, where modules similar to a real satellite were installed. It was used to test the instruments, telemetry database and properties of Hope Probe. "Throughout the seven-month cruise in deep space, we have also simulated the capabilities of Hope Probe prior to its Mars approach. We need the right timing and speed to avoid crashing into Mars or be lost in space," he said.

'Success within our grasp'

Omar Abdul Rahman Hussain, lead mission design and navigation engineer, said:

He said: "Several missions have failed and we took lessons from them to innovate and mitigate any failures for our mission. We have done our Monte Carlo Simulation, a highly precise computer-based quantitative risk analyses. We also have safe margins as there will be an 11-minute communication delay with Hope Probe. There is no do-over. We are very excited; we did rehearsals to get them right. We are confident, and we just need to trust our design."

Why study the Red Planet?

Apart from Earth, Mars is the most explored planet in our solar system. Several missions have been sent to Mars, and humans have been looking for answers to these fundamental questions: Did Mars once have life on it? What is the climate history of Mars? How did Mars evolve from its original state? Should Mars be the next destination for humans?

By studying the connection between current Martian weather and the ancient climate of the Red Planet, scientists will have deeper insights into the past and future of the Earth as well as the potential for human settlement on Mars and other planetary objects.

Inspiring Arab youth

For the Emirati engineers, scientists and analysts on the Emirates Mars Mission, reaching Mars is about inspiring youth. Omran Sharaf, EMM Project Director, said Hope Probe's success will create a massive change and a positive impact at home that will inspire Arab youth.

Sharaf said Hope Probe would not only make history as the first Arab interplanetary mission to reach Mars, but will also be a showcase of the growing UAE space programme and Emirati design and engineering.

WATCH LIVE BROADCAST FROM 6.30PM

Cinemas across the UAE will beam free live broadcast of the historic entry of Hope Probe into Mars Orbit today, beginning at 6.30pm.

The UAE Ministry of Culture and Youth tweeted: "The eyes of the world are turning to Mars ... Those wishing to watch the live broadcast can pre-book through the cinemas' website. Seats are limited."

Cinemas offering free showing include **Vox Cinemas** in Dubai, Sharjah and Ras Al Khaimah: **Novo Cinema** in Dubai, Sharjah and RAK; and **Reel Cinemas** at Dubai Mall.

Those who prefer to stay at home, can also watch the live streaming of Hope Probe's rendezvous with the Red Planet on Emirates Mars Mission website **(https://www.emiratesmarsmission.ae/)**.

Local television channels will also broadcast the Hope Probe's historic moments live.

— A.T

ON GULFNEWS.COM

Complete coverage

When Dubai saw two Martian moons
Arab Space Pioneers participants named
Students chat with American astronaut

SCAN ME
All you need to know about the Mars mission

UAE is the fifth country to send a probe to Mars after the US, Russia, EU and India. If successful, it will be the third country to do so in its first attempt. Around 50 per cent of Mars missions launched mostly by the US and erstwhile Soviet Union have failed — some have failed at launch while others during the cruise and at arrival

18,000 km/h
speed Hope Probe needs to maintain to enter Mars orbit. This involves firing its six Delta-V thrusters to reduce its speed from 121,000 km/h

"The simulations were done at least a million times, and we are still iterating the same design we had five years ago. It has been a long process and a very tedious process, but the design is very robust."

Omar Abdul Rahman Hussain | Lead, mission design

The Emirates Mars Mission team will use Nasa's International array of giant radio antennas, to monitor the probe. It will also be monitored through three antennas in Canberra, Madrid and US.

Hope Probe will operate in auto mode during Mars Orbital Insertion, using star trackers to position itself. All commands have been pre-programmed as there will be no live commands

Why Hope mission is different from others

Study will give a clear picture of Martian conditions in a Martian year

DUBAI
BY ANGEL TESORERO
Senior Reporter

There have been plenty of Mars missions, so what makes the Hope Probe special? It's ability to map the Martian atmosphere, said Dr Nidhal Guessom, professor of Physics and Astronomy at the American University of Sharjah.

"Hope Probe is an orbiter that will study Mars from high above its surface to give it a large field of view and the ability to observe and measure conditions everywhere on the ground and in the atmosphere, hour by hour, and day by day, throughout the Martian year (equivalent to almost two Earth years). This has not been done before," he said.

Dr Nidhal Guessom is a professor of Physics and Astronomy at the American University of Sharjah.

Three instruments

Hope carries a high-resolution digital colour camera, complemented by spectroscopes in infrared and ultraviolet. All this will give us a complete picture of the evolution (in time and space) of the surface conditions (e.g., dust storms) and the atmospheric processes (interaction of the layers of the atmosphere and escape of various chemical elements). After a Martian year of measurements, Hope will have provided great additions to our scientific knowledge of the Red Planet, Dr Guessom told *Gulf News*.

"There are two key factors that will determine the success of this mission: a) successful orbital insertion around Mars; b) perfect operation of the instruments during the orbital manoeuvre and later during the scientific study/observations period. We are all confident that everything will work well. Still, contingency plans have been made in case one instrument or another does not function properly," he said.

What is next for UAE?

The UAE has already announced two more space projects: the second phase of the astronaut programme (to send Emirati astronauts to the International Space Station to conduct various experiments) and the Lunar Rover to be send to the moon in 2024.

Another avenue to consider is the construction of a space rocket launch facility.

A MILESTONE IN UAE'S LIST OF ACHIEVEMENTS

"The Mars mission turns the UAE into a knowledge-exporting country instead of an importer, sharing with the world for the first time, unprecedented data that will be captured by Hope Probe."

Sara Al Amiri
| Minister of State for Advanced Technology

"Hope Probe's success will create a disruptive change and a positive impact at home that will inspire not just the Emirati, but the entire Arab youth. It will also be a showcase of Emirati design and engineering."

Omran Sharaf
| Project Director, Emirates Mars Mission

"The Hope Mission to Mars testifies the capability of UAE to transcend the frontiers of space technology. Congratulations to the visionary rulers of UAE who decided to embark on this bold initiative and the astute scientists of UAE who made it a reality."

Dr Azad Moopen
| Founder Chairman and Managing Director, Aster DM Healthcare

The 30x40-metre sand art on the beachfront of Rixos Premium Dubai JBR.

Sand artist pays tribute to Hope

Filipino artist uses beach umbrellas, sunloungers to embellish artwork

DUBAI
ANGEL TESORERO
Senior Reporter

While famous landmarks across the UAE — from Burj Khalifa to Burj Al Arab, Emirates Palace, House of Wisdom, National Museum of Ras Al Khaimah, and more — have lit up in red, a Filipino artist has created a massive sand art to celebrate the historic arrival of Hope Probe on Mars today.

Using only a garden rake, Nathaniel Alapide, 43, turned the beachfront of Rixos Premium Dubai JBR as his canvas to create a 30x40-metre sand art. He sketched Hope Probe with its outstretched solar panels orbiting Mars and utilised the beach umbrellas and burgundy-coloured tables to accentuate the artwork with miniature satellites. He also used the sunloungers to spell out in massive letters the word 'Hope'.

Three hours of work

Talking to *Gulf News*, Alapide said: "It took me three hours — I started at 3am and finished by around 6am — to create the entire drawing of Hope Probe and planet Mars etched on the sand. I did it to celebrate the UAE Hope Probe's mission reaching Mars orbit."

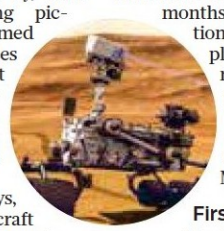
"I used a garden rake to draw on the sand while the word Hope was created using the sunbeds. The beach umbrellas were also opened to resemble several mini-satellites. I like using materials found around me and make them part of my art. I like creating a sustainable way of producing artworks, whether I'm creating something in the middle of the desert or on the beach and even at empty spaces in the city," he added.

Close encounters with the Red Planet over the years

US leads expeditions with rovers, landers

DUBAI
BY ALEX ABRAHAM
Senior Associate Editor

Dozens of spacecraft have been sent to study Mars over the past six decades. Early missions were fly-by, with spacecraft taking pictures as they zoomed past. Later, probes entered the orbit of Mars and recently landers and rovers have touched down on the surface.



In the early days, launch and spacecraft failures plagued the missions. Of the many spacecraft to be launched, more than 60 per cent landing attempts have failed as the thin Martian atmosphere makes descent tricky. So far, four space agencies — Nasa, Russia's Roscosmos, the European Space Agency (ESA) and the Indian Space Research Organisation (Isro) — have put spacecraft in the Martian orbit. The US has made eight successful landings and is the only country to operate a craft on the planet's surface.

Nasa's Mariner 4 spacecraft swung by Mars in July 1965 and captured the planet's first close-up images. In 1971, the Soviet space programme sent its first spacecraft into Martian orbit which returned eight months of observations about the planet's topography, atmosphere and weather. It also sent the first lander on Mars.

First successes

Nasa's Viking 1 and 2, the first spacecraft to successfully operate on Mars in 1976, sent photos until 1982. In 1996, Nasa's Mars Pathfinder mission put the first free-moving rover called Sojourner on the planet.

Later, the rovers Spirit and Opportunity explored the planet and sent more than 100,000 images.

India's space odyssey to Mars succeeded on its first attempt at a staggeringly cheap budget ($73 million).