

Technology

'Telerobotics'

Robots eyed to install 'telescopes' on moon

BOULDER, Colo., July 15. (RTRS): As the United States races to put humans back on the moon for the first time in 50 years, a NASA-funded lab in Colorado aims to send robots there to deploy telescopes that will look far into our galaxy, remotely operated by orbiting astronauts.

The radio telescopes, to be planted on the far side of the moon, are among a plethora of projects underway by the US space agency, private companies and other nations that will transform the moonscape in the coming decade.

"This is not your grandfather's Apollo program that we're looking at," said Jack Burns, director of the Network for Exploration and Space Science at the University of Colorado, which is working on the telescope project.

"This is really a very different kind of program and very importantly it's going to involve machines and humans working together," Burns said in an interview at his lab on the Boulder campus.

Sometime in the coming decade, Burns' team will send a rover aboard a lunar lander spacecraft to the far side of the moon. The rover will rumble across the craggy and rough surface - featuring a mountain taller than any on earth - to set up a network of radio telescopes with little help from humans.

Astronauts will be able to control the rover's single robotic arm from an orbital lunar outpost called Gateway, which is an international consortium of space agencies is building. The platform will provide access to and from the moon's surface and serve as a refueling station for deep space missions.

The goal is to give astronauts control of the rover "in a quicker fashion and more like doing some sort of video game," said Ben Mellinkoff, a graduate student at the university. His project is telerobotics, or using artificial intelligence to give users better control over robotic movements from afar.

"It has a lot of potential, especially applied toward space exploration," he says.

Plant

The rover, being built at NASA's Jet Propulsion Laboratory in Pasadena, Calif., will plant the shoebox-sized telescopes on the moon's regolith - the dust, soil and broken rock that covers its surface. Unfettered by the noisy radio interference and light that hinders Earth-bound space observations, the telescopes will peer into the cosmic void, looking back in time to the early formation of our solar system, Burns says.

Working out of a small lab on the Boulder campus, Mellinkoff and two fellow graduate students have built a prototype of the robot named Armstrong (named for the first man on the moon, Neil Armstrong). It is made from computer parts and powered by two modified portable cell phone chargers.

On a recent visit, Mellinkoff controlled the robotic arm using an X-box gaming controller, driving it toward an assortment of shoe-sized objects created with 3-D printing and resembling the radio telescopes to be planted on the moon.

"It's really going to be a platform for us to start different science studies that we couldn't do from the surface of Earth," said Keith Tauscher, a physics graduate student.

Tauscher is working on a lunar orbiter designed to take advantage of the radio silence of the far side of the moon to discover when the first stars and black-holes formed during the formation of the universe. The lab has dubbed this mission "the Dark Ages Polarimeter Pathfinder, or "DAPPER".

The work in Boulder and elsewhere underscores NASA's plan to build a lasting presence on the moon, unlike the fleeting Apollo missions in the 1960s and '70s.

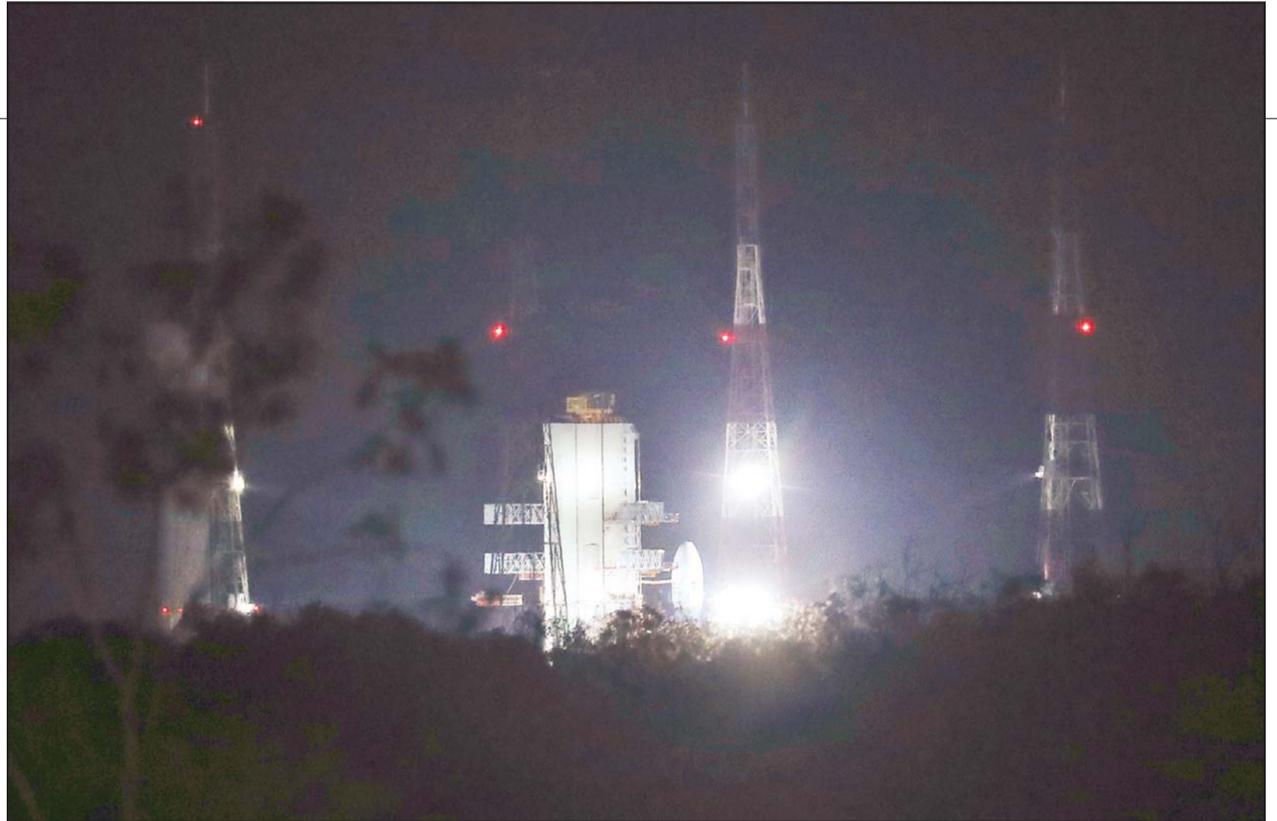
Vice-President Mike Pence in March announced an accelerated timeline to put humans on the moon in 2024 "by any means necessary," cutting the agency's previous 2028 goal in half and putting researchers and companies into overdrive in the new space race.

The Americans are not alone in their latest moon quest, unlike a half-century ago. In January, the China National Space Administration landed a spacecraft on the far side of the moon, with a long-term aim of building a base on the moon. India was scheduled to send a rover to the moon this month.

Another key difference between the Apollo program and the Artemis program, as NASA chief Jim Bridenstine named the new lunar initiative in May, is bringing in help from commercial partners such as Elon Musk's SpaceX and Jeff Bezos' Blue Origin. Those companies are working to slash the cost of rocket launches with a longer-term ambition of doing their own projects on the moon and eventually Mars.



Armstrong



Indian Space Research Organization's (ISRO), Geosynchronous Satellite launch Vehicle (GSLV) MkIII carrying Chandrayaan-2 stands at Satish Dhawan Space Center after the mission was aborted at Sriharikota in southern India on July 15. (AP)



A telescope is shown at the summit of Hawaii's Mauna Kea on July 14. Hundreds of demonstrators are gathered at the base of Hawaii's tallest mountain to protest the construction of a giant telescope on land that some Native Hawaiians consider sacred. (AP)

Discovery

Hawaii activists prep for protests: Hundreds of demonstrators are gathered at the base of Hawaii's tallest mountain to protest the construction of a giant telescope on land that some Native Hawaiians consider sacred.

State and local officials will try to close the road to the summit of Mauna Kea on Monday morning to allow trucks carrying construction equipment to make their way to the top.

Officials say anyone breaking the law will be prosecuted. Protesters who blocked the roadway during previous attempts to begin construction have been arrested.

Scientists hope the massive telescope they planned for the site - a world-renowned location for astronomy - will help them peer back to the time just after the Big Bang and answer fundamental questions about the universe.

But some Native Hawaiians consider the land holy, as a realm of gods and a place of worship.

Groups of activists sang and prayed at the base of the mountain on Sunday afternoon. They declared the area, which is well off the highway at the intersection of the mountain's access road, a place of refuge and safety.

"This is Hawaiian homelands," said Kealoha Pisciotta, one of the protest leaders. "We're clearly out of their way, we're not obstructing anything, everyone is in ceremony."

The project already has been delayed by years of legal battles and demonstrations, drawing attention from the likes of "Aquaman" actor Jason Momoa, who has Native Hawaiian ancestry and has voiced opposition to the telescope.

Scientists selected Mauna Kea in 2009 after a five-year, worldwide search for the ideal site.

Protests disrupted a groundbreaking

Space

India aborts moon mission launch citing technical glitch

Earth's beginning under the moonscape?

WASHINGTON, July 15. (Agencies): As countries and companies rush to build infrastructure on the moon, some researchers are planning to dig under its rocky soil to unlock mysteries about Earth that have eluded scientists since astronauts first stepped foot on its surface a half century ago.

Scientists theorize that the moon, a quarter the size of Earth and weighing about 80 times less, was formed some 4.5 billion years ago from the remnants of a collision between early Earth and another planetary body, possibly as big as Mars. The pieces of the planetary body orbited the earth before eventually coalescing into the moon we know today.

But the oldest rocks found on Earth date back just 4 billion years ago, leaving scientists with a 500 million-year blind spot during the most crucial periods of our world's formation.

"A lot of that half billion years that we're missing probably exists on the moon in some form," says Bill Botke, at the Department of Space Studies in Boulder's Southwest Research Institute.

Botke says fragments of ancient Earth or meteorites that bombarded the lunar surface from other planetary bodies can serve as time capsules of information on how our planet, as well

as others in the solar neighborhood, were formed.

"This gives us the opportunity, by understanding the moon, to understand all these other worlds as well," Botke said. "This bombardment that's happening to the early moon ... it's happening to all the planets."

A team at Carnegie Mellon University in Pittsburgh plans to survey a network of underground tunnels carved out by lava that once flowed beneath the moon's surface. Those could hold untainted materials from the earliest ages of the formation of the moon - and thus the Earth.

"It is the lava tubes that are likely to hold the only pristine materials on the moon," said William Whittaker, a researcher at Carnegie Mellon. It was too early to say what secrets the materials might divulge as to the moon's origins, he added.

His team is working on autonomous rovers capable of peering into the tunnels through gaping, football field-sized lunar pits similar to sinkholes found on Earth that caved in from lava flow.

One of Whittaker's rovers will make it to the moon as early as July 2021 under NASA's Commercial Lunar Payload Services. The program will seed the development of an even-

tual moon base by funding a variety of robotic lunar landers to explore the moon's surface to prepare for humans to arrive.

US Vice-President Mike Pence announced on March 26 a goal of putting Americans back on the moon within five years. NASA had previously aimed to return astronauts to the lunar surface by the year 2028, after first putting a "Gateway" station in orbit around the

Also:

SRIHARIKOTA, India: India aborted the launch on Monday of a spacecraft intended to land on the far side of the moon less than an hour before liftoff.

The Chandrayaan-2 mission was called off when a "technical snag" was observed in the 640-ton, 14-story rocket launcher, Indian Space Research Organization spokesman B.R. Guruprasad said.

The countdown abruptly stopped at T-56 minutes, 24 seconds, and Guruprasad said that the agency would announce a revised launch date soon.

Chandrayaan, the word for "moon craft" in Sanskrit, is designed for a soft landing on the lunar south pole and to send a rover to explore water deposits confirmed by a previous Indian space mission.

and Hawaiian blessing ceremony at the site in 2014. After that, the demonstrations intensified.

Construction stopped in April 2015 after protesters were arrested for blocking the work. A second attempt to restart construction a few months later ended with more arrests and crews pulling back.

But Hawaii's Supreme Court has ruled the construction is legal, permits are in place, and the state has given the company behind the telescope a green light to resume its efforts. The company is made up of a group of universities in California and Canada, with partners from China, India and Japan.

According to the University of Hawaii, ancient Hawaiians considered the location kapu, or forbidden. Only the highest-ranking chiefs and priests were allowed to make the long trek to Mauna Kea's summit above the clouds.

Today, the university leases the land at

the summit from the state for existing telescopes and observatories on the summit. A road built for telescope access decades ago is used by thousands of tourists and locals each year, including Native Hawaiians who go there to pray.

Supporters of the \$1.4 billion giant telescope say the cutting-edge instrument will not only make important scientific discov-

eries but bring educational and economic opportunities to Hawaii.

The telescope's primary mirror would measure 98 feet (30 meters) in diameter. It would be three times as wide as the world's largest existing visible-light telescope, with nine times more area.

Gov David Ige said unarmed National Guard units will be used to transport personnel and supplies and enforce some road closures, but they will not be used in a law enforcement capacity during planned protests.

In a news conference Sunday, Ige said that he "respected the right of people to protest" at the telescope site as long as protesters behave lawfully.

"As construction begins, our number one priority is keeping everyone safe," Ige said, adding that he wants to make sure construction workers and truck drivers have unimpeded access to the telescope site. (AP)



Momoa



Pisciotta

SUPER BRANDS

Bringing your favourite brands closer to you!



To advertise in this page please call: (+965) 1838281 Ext.: 175 Fax: 24911307 or E-mail: advt@arabtimesonline.com

grandcinemas
always entertaining

GUIDE
JULY.11 - JULY.17

PHONE BOOKING AND INQUIRIES
GATE MALL 220 56 464
HAMRA LUXURY CENTER 222 70 333
GrandCinemasme.com

GCKuwait @GC_Kuwait

NOW SHOWING

EXPERIENCE IT IN **MX4D**

STEP UP
ANNABELLE
ESCAPE PLAN THE EXTRACTORS
CRAWL
THE QUEEN'S CORGI
TROUBLE
LION KING
SPIDER-MAN: FAR FROM HOME

IN CINEMAS SOON

IN CINEMAS JULY 18