A short history of human space travel

Michael Regnier follows the stepping stones we took to the stars

“One small step for a man; one giant leap for mankind.” Neil Armstrong’s words, broadcast to the world as he stepped onto the Moon in 1969, became a defining phrase of the 20th century. They marked the first time a human being stood on a world other than planet Earth.

But in almost 50 years since that moment, a total of just 12 people have walked on the Moon (and none since 1972). No one has travelled any further than the far side of the Moon (400,171 km away) and we don’t really look like doing so any time soon. Has human space travel stalled?

Destination: Moon

The desire to go to space is as old as humanity. Although the Sun and Moon were often characterised as gods by ancient civilisations, others saw them as places we might dream of visiting.

Many writers used their imagination to step off the Earth, usually in order to reflect satirically on its inhabitants. Tall tales of trips to the Moon include True History by Lucian of Samosata (2nd century), Cyrano de Bergerac’s Voyage dans la lune (1656) and Edgar Allan Poe’s The Unparalleled Adventure of one Hans Pfaall (1835).

By the start of the 20th century, however, technology was catching up with literary imagination, and a trip to the Moon was no longer just a flight of fancy.

Rocket science

The first step was getting into orbit around the Earth. In 1903, Konstantin Tsiolkovsky showed this would be possible if liquid hydrogen and oxygen were used instead of solid fuels.

He also developed the ‘rocket equation’, which relates three variables: the energy needed to overcome gravity, the energy available in your fuel, and the proportion of your rocket’s mass that is fuel. It is still the basis of modern rocket science.

In the 1920s, societies for rocket research sprang up across Europe, the USA and the Soviet Union. They began experimenting with liquid fuels – sometimes attaching rocket engines to cars as well as planes. Progress was made, but it was the advent of World War II that gave rocket science its biggest boost.
War force

In the race to develop rockets as long-range weapons, the Nazi regime in Germany had the edge. Production of the infamous V2 rocket began in 1943: it used ethanol and liquid oxygen as fuel, carried an explosive warhead, and had a guidance system and rudders on the tail fins to steer it. More than 3,000 V2s were launched at Allied cities from September 1944 – first London, then Antwerp and Liège in Belgium – killing thousands of people.

At the end of the war, Allied forces captured many German rockets, factories and scientists. Both the USA and the Soviet Union used these captured assets to advance their own programmes, effectively launching the space race of the 1950s and 1960s.

High hopes

A significant turning-point in the history of space travel came in the spring of 1961. The Soviet space programme had already put the first artificial satellites in orbit and even crashed a spacecraft into the Moon. The Americans, meanwhile, had shown that a trained chimpanzee was capable of performing tasks such as pulling levers in orbit, paving the way for human spaceflight.

The Soviets got there first, however, when Yuri Gagarin became the first human in space on board Vostok 1 in April 1961. This prompted the US President, John F Kennedy, to commit his country to landing a man on the Moon before the end of the decade.

Kennedy's challenge cleverly moved the finishing line of the space race, stealing the thunder from Gagarin's achievement. But it also put enormous pressure on both sides – American and Soviet – to reach the Moon first.

Lunar landing

It was neck and neck. Initially, the Soviets had the lead: in 1966, Luna 9 took the first photos from the surface of the Moon, and Luna 10 was the first artificial satellite to orbit the Moon.

But the Americans weren't far behind, and with Apollo 8, they sent a manned spacecraft beyond Earth orbit for the first time in 1968. Its crew were the first people to see the far side of the Moon. And, of course, America achieved its goal of beating the Soviets – and JFK's time limit – when Neil Armstrong took his “one small step” on 21 July 1969.

With the Moon conquered but Mars, our nearest planetary neighbour, out of reach, the focus of space travel shifted. Instead of ‘firsts’ to fuel political propaganda, a more scientific approach emerged.
Orbital science

Alongside unpublicised military objectives, research became an increasingly important motive for space travel from the 1970s. The Americans and the Soviets each developed space stations – vehicles designed to stay in orbit for months or even years, allowing people to run sustained experiments in astronomy and space biology.

An era of international collaboration dawned as US space shuttles docked with the Russian Mir space station, and then the International Space Station was established. Continuously occupied since 2000, it has now hosted more than 200 visitors of 15 different nationalities.

But since the last lunar landing in 1972, no missions beyond a low Earth orbit have had people on board. In 1977, the Voyager probes were sent on a trip past the planets of the solar system and out into deep space. More recently, robotic probes have landed on Mars, and even on a comet at the end of 2014. Humans, however, have been all but grounded.

Private space

Spaceflight is prohibitively expensive. Rather than governments putting up the cash to fund it, future human space travel may depend on private enterprise instead.

The first ‘space tourist’ was Dennis Tito, an American who reportedly paid $20 million for a seat on a Russian mission to the International Space Station in 2001. A similar sum ($25m) from another American millionaire funded the first private spacecraft, SpaceShipOne, which successfully crossed the boundary into outer space in 2004.

In the same year, Virgin Galactic began accepting reservations for suborbital spaceflights and has since developed SpaceShip Two to carry passengers to altitudes above 100 km. Another company, Xcor Aerospace, is building the Lynx, also intended to fly to 100 km.

The commercial space race is proving as challenging as the pioneering programmes of last century. But despite years of delays getting the Lynx into the air and a fatal crash of SpaceShipTwo during a test flight in 2014, there is little doubt they will eventually succeed. On the ground, countries including the UK are already considering building spaceports to help launch this new generation of spacecraft.

But what about those who still dream of human spaceflight beyond Earth’s orbit? Mars is the obvious next step, but getting there is on a different scale to landing on the Moon.
The next giant leap

A round trip to Mars would cost billions of dollars and require at least eight months in space, probably a lot longer, depending on what technology is available. Nevertheless, NASA has provisional plans to begin human missions to Mars in the mid-2030s.

Others are in more of a hurry. Dennis Tito set up the Inspiration Mars foundation in 2013 with the aim of launching a man and a woman to Mars and back in January 2018. He admits it is a long shot.

More controversial is Mars One, a Dutch organisation that claims it will establish a human colony on Mars by 2027. Although it has attracted public donations and lots of applicants for a berth on the one-way trip, it has also attracted strong criticism over its fundraising capacity, ethics and overall credibility.

Whether by public or private means, it seems the will is there once more to land on Mars. It is a daunting challenge, but so was flying to the Moon in 1969. And if we do manage to send people to Mars, a human footprint on another world may well become the defining moment of this century, too.

QUESTIONS FOR DISCUSSION

Have you ever imagined what it would be like to visit another world?

Do you think humans would have landed on the Moon if World War II and the Cold War had never happened?

Should national governments fund the development of civilian spaceflight?

Would you like a spaceport to be built near your home?

Would you volunteer for a one-way trip to Mars?