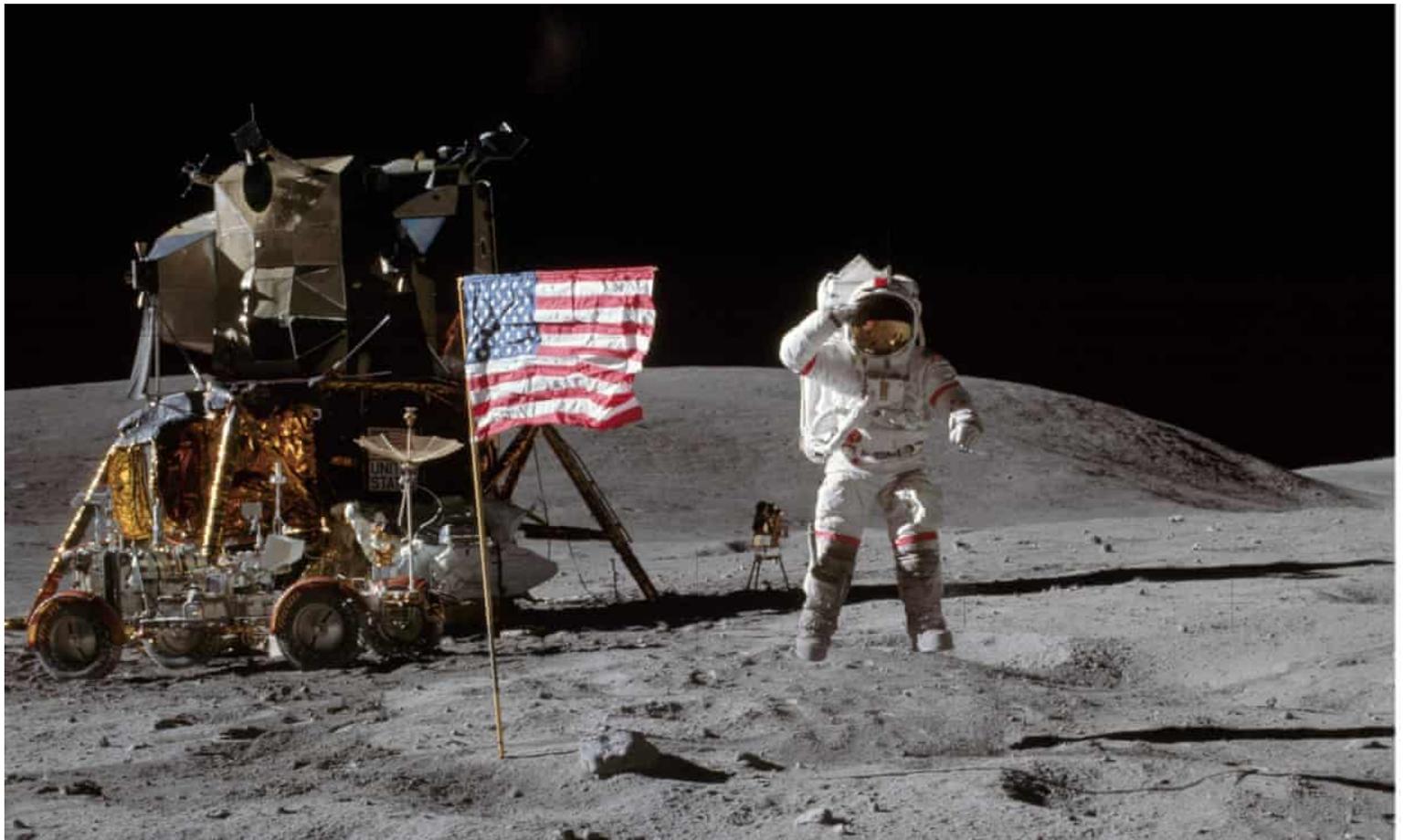# The Guardian

How the moon landing shaped early video games

Some of the earliest video games were influenced by the space race and created using the same computers as Nasa

'It is amazing how they managed to get to the moon with such primitive technology. It had nothing approaching the power of an iPhone' ... Apollo 16 commander John Young on the moon. Photograph: Nasa/Zuma Wire/Rex/Shutterstock

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O n 20 July 1969, before an estimated television audience of 650 million, a lunar module named Eagle touched down on the moon's Sea of Tranquility. The tension of the landing and the images of astronauts in futuristic spacesuits striding over the moon's barren surface, Earth reflected in their oversized visors, would prove wildly influential to artists, writers and film-makers.

Also watching were the soon-to-be proponents of another technological field populated by brilliant young geeks: computer games. It is perhaps no coincidence that during the early 1960s, when Nasa was working with the Massachusetts Institute of Technology's Instrumentation Lab to develop the guidance and control systems for Apollo spacecraft, elsewhere on campus a programmer named Steve Russell was working with a small team to create one of the first true video game experiences.

Inspired by the space race, and using the same DEC PDP-1 model of mainframe computer that generated spacecraft telemetry data for Nasa's Mariner programme, Russell wrote Spacewar!, a simple combat game in which two players controlled starships with limited fuel, duelling around the gravitational well of a nearby star. Although only playable in university research labs, SpaceWar! was hugely influential on the nascent games industry, inspiring Atari founder Nolan Bushnell's first coin-operated arcade game Computer Space and later the classic Asteroids, which also attempted to simulate the physics of gravity, thrust and inertia.
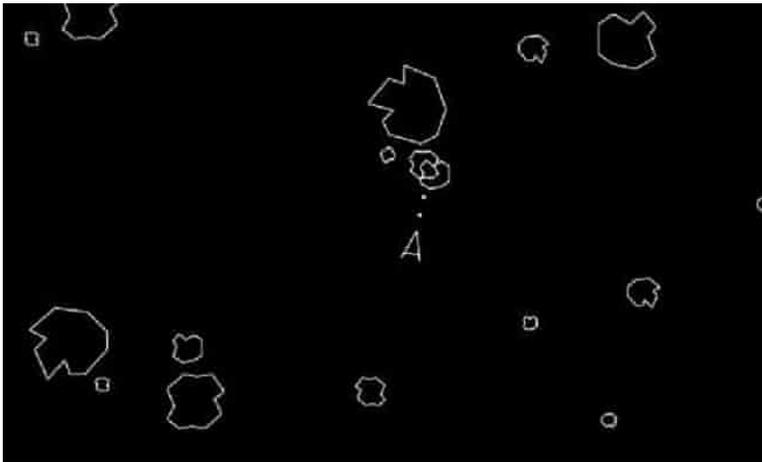
Gravity, thrust and inertia … Asteroids. Photograph: Atari

In the 70s, Bushnell and Atari were fascinated with the space programme. The fourth designer hired at the company, Dennis Koble, previously worked on biofeedback at the Nasa Ames Research Centre, while coder Steve Kitchen spent 18 months researching the STS-2 shuttle flight to write the Atari 2600 simulator game Space Shuttle: A Journey Into Space. Before its release in 1983, the authenticity of the game was tested by Dr Ed Gibson, an astronaut and physicist who worked on the development of the Skylab space station.

The 1969 moon landing also directly inspired a genre of games known as lunar lander simulations, in which players had to fight against the limitations of their craft's technology –

and Newtonian physics – to land safely on the cratered surface. Probably the first example was a text-based simulation, written in 1969 by teenage coder Jim Storer. Watching the Apollo missions on TV, he developed a fascination with the demanding logistics of space flight. At the time he was attending Lexington high school in Massachusetts, near the headquarters of Digital Equipment Corporation, and had access to a PDP-8 mainframe computer.

"I was a science major and the idea that we were going to set foot on a surface that wasn't the Earth was exciting. But what I was most interested in were the computers," says Storer. It is amazing how they managed to get to the moon with such primitive technology. It had nothing approaching the power of an iPhone."

The limitations of Nasa's computing power reflected the challenges all early programmers faced. As Storer recalls, "The computer we had at our school was a huge cabinet but all it had was 12kb of memory and 8kb of that was the operating system. So you had 4kb and that was shared between eight users. It was hard because you had to keep track of every line of code. If there had been one more line in my program, the computer couldn't have run it. So what I wrote was a question and answer game – at each stage of the landing you'd find out your current velocity and then you had to enter in how much fuel to use. If you burned fuel too early, you stopped too high and end up crashing to the ground – it's a delicate balance to make a graceful landing without hitting the moon too hard."
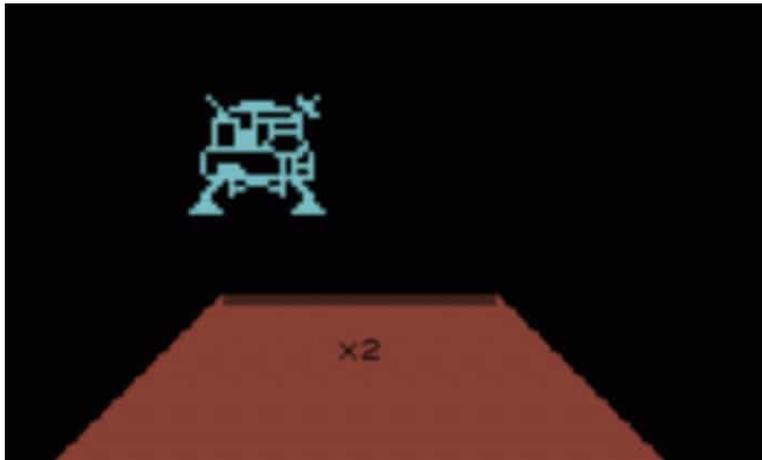
Deft joystick control … Jupiter Lander. Photograph: Mobygames

A slew of other moon landing simulations followed, including Atari's 1979 arcade hit Lunar Lander and the early home-computer title Jupiter Lander, both requiring the player to employ deft joystick control and careful use of the thrust button to land on rocky surfaces. In 1982, Rendezvous: A Space Shuttle Simulation, an educational sim programmed by Nasa scientist Wesley Huntress, was released. Later titles expanded on the core rotate-and-thrust inputs of the lunar lander games into larger environments. Atari's Gravitar and BBC Micro release Thrust both had players navigating complex extraterrestrial environments in tiny spaceships resembling classic Apollo landing craft.

But as home-computer technology advanced, developers became more ambitious, looking

beyond the lunar surface towards the vastness beyond. Released in 1984, legendary BBC Micro adventure Elite simulated whole galaxies and used simple vector graphics to capture the quiet, sparse beauty of space travel. Co-creator David Braben was five years old in 1969, but recalls watching the landing live on television and was later given a View-Master toy with moon landing photographs in 3D.

"[The Nasa missions] led the mood at the time," says Braben. "I had dozens of astronomy books, I read the novels of Asimov and Larry Niven, I followed the Voyager mission religiously. I remember seeing the volcanoes on Io, it was absolutely incredible. And by the time I was at university it had visited Uranus and Neptune. The idea of space travel was really appealing."

The Voyager influence is especially clear in Elite – that sense of hopping from planet to planet in a tiny vulnerable craft, watching the stars drift past. But Braben also sees other important parallels between the space programme and the early years of the games industry beyond the cultural impact.

"One of the achievements attributed to the space programme was the development of the silicon chip," he says. "Prior to that, manufacturers were using individual transistors which were extremely bulky, and shielding was a challenge. So from a technical point of view, the amount of money and learning that came from the space programme in terms of how to make small, light pieces of electronics that didn't use too much power really enabled home computers. Without integrated circuits, they wouldn't have been realistic from a cost point of view."

Quiet, sparse beauty of space travel … Elite. Photograph: Firebird

The imagery, technology and aesthetics of the Apollo programme remain with game developers to this day. The sense of peril and isolation is there in the Dead Space series, in Destiny, and in the space station thriller Observation, while the idea of interplanetary exploration feeds into both Elite Dangerous, with its authentic database of 150,000 star systems, and No Man's Sky, which channels the idealism of the Voyager mission into a vast, hypnotic open-universe adventure.

In the modern era, the relationship between space travel and video games has come full circle. One speaker at the E3 games event in Los Angeles this year was technology entrepreneur and SpaceX founder Elon Musk, one of the leading figures in the highly commercialised space flight scene of the 21st century. Aged 12, Musk wrote his first computer game, Blastar, and told the E3 audience: "I probably wouldn't have started programming if it wasn't for video games. [They have] way bigger knock-on effects than people may realise."

Perhaps the next time a human being sets foot on the Sea of Tranquility, it won't just be game designers watching. It will be game designers putting them there.

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