Forty Years of Lunar Lander

In 1969, an Apollo-crazy high school student wrote one of the most influential computer games of all time.

By Benj Edwards | Sunday, July 19, 2009 at 11:54 pm

Lunar Lander games abound on every platform. Along with Tetris and Pac-Man, the game—in which your mission is to safely maneuver your lunar module onto the moon’s surface—is one of the most widely cloned computer games of all time. But did you know that game players began touching down on the moon in Lunar Lander just months after Apollo 11 astronauts Neil Armstrong and Buzz Aldrin did so on July 20th, 1969?
Today’s versions of Lunar Lander are easily taken for granted; they’re generally regarded as dinky games you can get for free—“Who would pay for that?”

But the mother of all realistic space simulations wasn’t always perceived that way. In 1969, it was, in its own way, a sophisticated, ambitious piece of digital entertainment. And during the BASIC era of the 1970s and 80s, many programmers cut their teeth by attempting to program their own version of Lunar Lander. David Ahl, founder of Creative Computing magazine, called it “by far and away the single most popular computer game” in 1978 (and he was only talking about the text version!). Indeed, Lunar Lander was one of the early computer games that helped define computer games.

The Eagle Lands

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YOU ARE LANDING ON THE MOON AND HAVE TAKEN OVER MANUAL
CONTROL 500 FEET ABOVE A GOOD LANDING SPOT. YOU HAVE A DOWNWARD VELOCITY OF 50 FT/SEC. 120 UNITS OF FUEL REMAIN.

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Among the millions who watched the Apollo 11 landing was a 17 year old Massachusetts high school student named Jim Storer. In the fall of 1969, around the time of the Apollo 12 launch, Storer took his inspiration to class with him. There, he programmed a simple text-based simulation of humanity’s greatest technological achievement on his school’s Digital Equipment Corp. PDP-8 minicomputer system.

“Lexington High School had a PDP-8,” Storer recalls. “It had 8 Teletypes, a small hard drive, and 12KB of main memory, where 8KB was used by the system and 4KB time shared by the users.”

Storer wrote his new program, “Lunar Landing Game,” in FOCAL, a programming language for the PDP-8 that was similar in some ways to BASIC (both were introductory languages known for their ease of use). His simulation was simple, yet powerful: underneath lay a realistic set of equations Storer believes his father may have taught him.
Lunar Landing Game’s gameplay consisted of a turn-based question and answer session, asking the user for the rocket fuel burn rate at each turn, which the user would then enter as a number from 0 to 200. The constraints against you were simple:

HERE ARE THE RULES THAT GOVERN YOUR SPACE VEHICLE:
(1) AFTER EACH SECOND, THE HEIGHT, VELOCITY, AND REMAINING FUEL WILL BE REPORTED.

(2) AFTER THE REPORT, A ‘?’ WILL BE TYPED. ENTER THE NUMBER OF UNITS OF FUEL YOU WISH TO BURN DURING THE NEXT SECOND. EACH UNIT OF FUEL WILL SLOW YOUR DESCENT BY 1 FT/SEC.

(3) THE MAXIMUM THRUST OF YOUR ENGINE IS 30 FT/SEC/SEC OR 30 UNITS OF FUEL PER SECOND.

(4) WHEN YOU CONTACT THE LUNAR SURFACE, YOUR DESCENT ENGINE WILL AUTOMATICALLY CUT OFF AND YOU WILL BE GIVEN A REPORT OF YOUR LANDING SPEED AND REMAINING FUEL.

(5) IF YOU RUN OUT OF FUEL, THE ‘?’ WILL NO LONGER APPEAR, BUT YOUR SECOND BY SECOND REPORT WILL CONTINUE UNTIL YOU CONTACT THE LUNAR SURFACE.

Along the way, Jim Storer created one of the earliest computer games—one of a handful of text-based PDP-8 games of the 1960s, and one of the first computer simulation games ever. In less than 50 lines of code, Storer captured the imaginations of an entire generation of programmers with a gripping space drama composed of nothing more than simple text statements.

Storer submitted his game to PDP-8 maker DEC, which was always looking for innovative and interesting uses of its computers. The programs were usually distributed for free or used as demonstrations to potential clients, serving as a powerful marketing tool. At DEC, an employee named David H. Ahl translated Storer’s Lunar Lander into the BASIC language, which soon overtook FOCAL as the most popular introduction to programming. From there, both the FOCAL and BASIC versions of Storer’s simulation spread to other PDP-8 users through DEC’s EDU newsletter and through distribution by DEC’s Education Product Group.
After that, Storer forgot about the game. Life went on. He never sold it, and never followed the progress or influence of its imitators as they echoed down through the years. “After leaving high school I never thought about the game again,” says Storer. “Until about a couple of months ago when someone e-mailed me about this, I was completely unaware of any Lunar Lander game other than the one I wrote in high school.”

But Storer’s computer experiences in high school shaped the rest of his career: “I became interested in computer science as a result of taking that computer class and doing programming on the PDP-8.” Storer later studied computer science as an undergraduate at Cornell University and then received his Ph.D. in Computer Science at Princeton University. He is now a professor of computer science at Brandeis University.

In 1973, DEC published a book edited by Ahl called “101 BASIC Computer Games” that included both Storer’s version of Lunar Lander and two others that had been inspired by Storer’s program. In 1978, Ahl revamped the book with a focus on home microcomputers that were common at the time, and it sold over a million copies. Thanks to Ahl’s book, Lunar Lander’s status as one of the classics of early computer gaming was assured.
Lunar Lander Gets Graphical

DEC consultant Jack Burness had long been a fan of America’s race to the moon. He recalls with great clarity the excitement of the period: “The space program was an incredibly big project then. More than a project, it was a national embracing of the future.”

Inspired by a co-worker who attended the launch of Apollo 16, Burness pestered his local senator for passes to see the launch of the final Apollo mission, Apollo 17, in December 1972. “A bunch of my friends went with me to see it,” recalls Burness. “It was the last launch and was at night—an overwhelming powerfully experience.”

That experience simmered in the back of his mind for the next few months, and it proved influential when DEC needed a software demo for its new GT40 terminal.
The DEC GT40 was a graphical computer terminal—unusual for its time, since it used a vector CRT display. One electron gun directly drew geometric shapes on the screen, providing a potent way to generate sharp, high-resolution computer graphics with the limited computing power available at the time. Conventional bitmapped raster displays (like those on conventional TV video games) draw the screen progressively from top to bottom, one row at a time, and required vastly more memory to compose a detailed on-screen image.

“I actually had quit Digital the previous spring and moved to Cambridge to consult for Draper Labs,” says Burness. “For some now long-forgotten reason I was back consulting to DEC that winter.”