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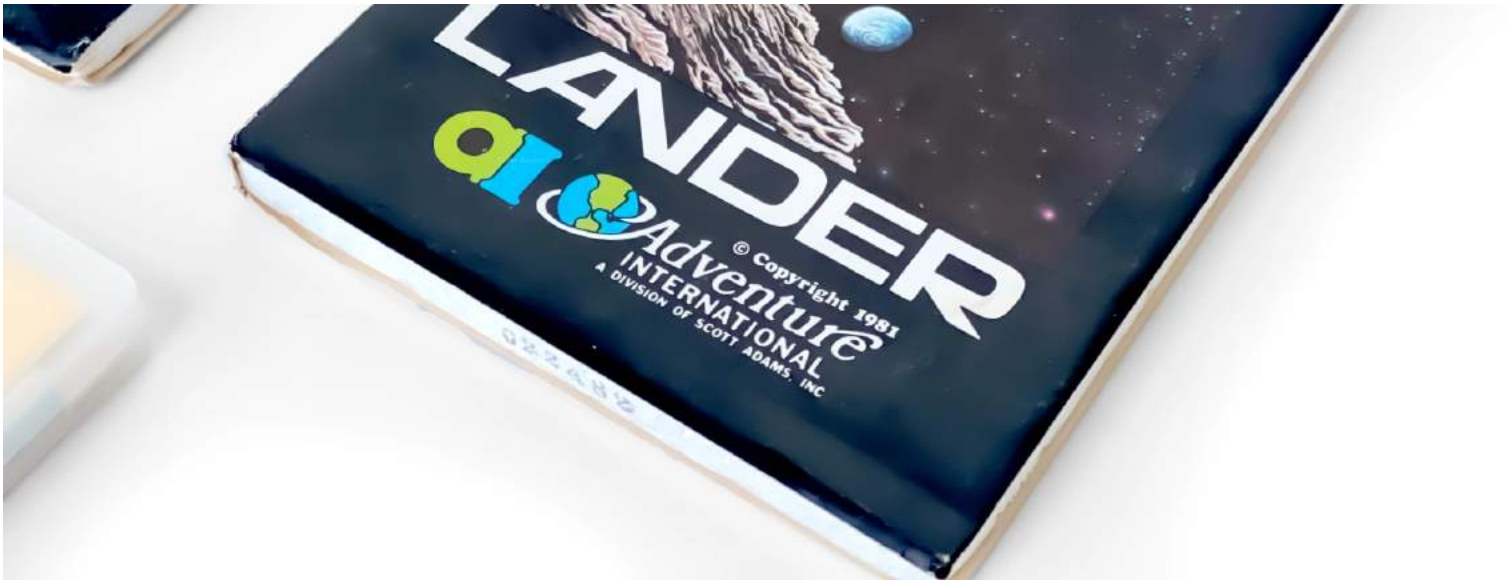

December 2, 2021April 25, 2023

Lunar Lander, 50 years of crashing into the moon. From

mainframes and minicomputers to arcades and personal computers

While history has its fair share of genre-defining games only a few can pride themselves on being over 50 years old. With the advent of transistors and magnetic-core memory in the mid-'50s computers were slowly transforming from multimillion-dollar calculating and batch processing behemoths, taking up entire floors and requiring numerous technicians to run and operate, into much more versatile, much more compact, and much more approachable devices with a wide new variety of applications being possible.

When *Digital Equipment Corporatio*n, *DEC*, introduced its first minicomputer, the *PDP-1* in 1960 it would come to herald a new era in computing. The PDP-1 could be run and operated by a single person, it was small enough to be installed nearly anywhere, and with an introductory price of just over a million dollars in today's money, it was one of the most inexpensive computers at the time.
In September of 1961, DEC donated one of the first PDP-1 minicomputers to the *Massachusetts Institute of Technology*. Here the PDP-1 not only would become instrumental at the *Instrumentation Lab* where it would be used to develop the guidance and control systems for the *Apollo* spacecraft but would also kickstart the famous computer hacker culture at MIT. The PDP-1 was, unlike earlier machines, designed with a bigger focus on human interaction and would come to serve as a platform for a long list of computing innovations.

In 1962, the versatile and *user-friendly* PDP-1 alongside the ongoing space race led to history's very first true computer game experience when seasoned programmer *Steve Russell*, in collaboration with others, completed *Spacewar!* on MIT's newly installed PDP-1. Russell, being a huge fan of space science fiction, and with space programs like *Project Mercury* in the daily news, zeroed in on an idea of two spaceships in a galactic dogfight. The game was two-player only, the PDP-1's 0.187 MHz processing speed was inadequate to run the underlying mechanics, generate the visuals, and at the same time control one of the spaceships. The game was written in PDP-1's assembly language and would take up a total of 4000 18-bit words, around 9 kilobytes in modern computer terms. To display the point graphics the game utilized the PDP-1 *Type 30 Precision* CRT display, originally developed for use in radars. Spacewar! became a huge success in computer circles and paper-tape copies quickly spread to college campuses and research facilities across the US. Even DEC took notice and would start using the program to show off its machine's capabilities to potential new customers.
To avoid the PDP-1 becoming a million-dollar arcade machine, MIT only allowed for Spacewar! to be played in recess and outside of work hours. The game was arguable the first to show what was possible when combining computers and games and became the biggest influence for the early game industry when it slowly took off a decade later, inspiring *Atari* founder *Nolan Bushnell's* first coin-operated arcade game *Computer Space* and later classics like *Asteroids*.

In July of 1969, over 650 million TV-viewers would watch *NASA*, with the efforts of thousands of ingenious people and the aid from computers like the PDP, land *Neil Armstrong* and *Buzz Aldrin* on the lunar surface, humanity's biggest technological achievement and an event that would capture the fascination of humankind, unite and set new hopes for a better world. One of the fascinated viewers was 17 years old *James Storer*, a high school student at *Lexington High School* located only a 20 minutes drive from DEC's headquarter and MIT.
While DEC was still producing the now 10-year-old PDP-1, the company had introduced newer and cheaper computers, one of them being the hugely successful PDP-8. When introduced in 1965 the PDP-8 became the first computer with an introductory price below $20.000, around $150.000 in today's money. The PDP-8 would over its lifetime sell over 50.000 units. The low cost and high volume made the computer available to a potential customer

base that would not only include universities, research facilities, and corporations but also smaller companies and even high schools, one of them being Lexington High School.
In the fall of 1969, around the same time as the Apollo 12 crew was heading for the lunar surface, Storer started programming a text-based simulation of the last stage of a moon landing in his computer class. Since the PDP-8 at Lexington didn't have a graphical display and used a teletype for input and output, Storer chose to use turn-based instructions for gameplay with each move treated as a second. The program would use NASA data and valid equations to realistically simulate an Apollo moon landing with the object to manage fuel levels, thrust, and safely maneuver and descent the lunar module to a soft landing on the lunar surface with a speed less than 0.1 miles per hour and with all fuel consumed. Without any visuals to guide you, the understanding of the different parameters printed out was vital for a successful landing, something which was notoriously difficult.

It would take the better part of a decade before software publishers would start to emerge, the only way for Storer to share his creations was through the DEC user newsletter, a printed media sent out to DEC users to provide up-to-date information on new software, programming notes, etc.
DEC was always on the lookout for innovative and interesting uses of its computers, not only to facilitate the ecosystem but also to demonstrate and market the capabilities. In 1970 the source code to Storer's *Lunar Landing Game* was published in the newsletter.

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C-FOCAL,1969

01.04 T "CONTROL CALLING LUNAR MODULE. MANUAL CONTROL IS NECESSARY"!
01.06 T "YOU MAY RESET FUEL RATE K EACH 10 SECS TO 0 OR ANY VALUE"!
01.08 T "BETWEEN 8 & 200 LBS/SEC. YOU'VE 16000 LBS FUEL. ESTIMATED"!
01.11 T "FREE FALL IMPACT TIME-120 SECS. CAPSULE WEIGHT-32500 LBS"!
01.20 T "FIRST RADAR CHECK COMING UP"!!!;E
01.30 T "COMMENCE LANDING PROCEDURE"!"TIME,SECS   ALTITUDE,"
01.40 T "MILES+FEET   VELOCITY,MPH   FUEL,LBS   FUEL RATE"!
01.50 S A=120;S V=1;S M=32500;S N=16500;S G=.001;S Z=1.8

02.10 T "    "%3,L,"          "FITR(A),"  "%4,5280*(A-FITR(A))
02.20 T %6.02,"       "3600*V,"    "%6.01,M-N,"      K=";A K;S T=10
02.70 T %7.02;I (200-K)2.72;I (8-K)3.1,3.1;I (K)2.72,3.1
02.72 T "NOT POSSIBLE";F X=1,51;T "."
02.73 T "K=";A K;G 2.7

03.10 I (M-N-.001)4.1;I (T-.001)2.1;S S=T
03.40 I (N+S*K-M)3.5,3.5;S S=(M-N)/K
03.50 D 9;I (I)7.1,7.1;I (V)3.8,3.8;I (J)8.1
03.80 D 6;G 3.1

04.10 T "FUEL OUT AT"L," SECS"!
04.40 S S=(FSQT(V*V+2*A*G)-V)/G;S V=V+G*S;S L=L+S

05.10 T "ON THE MOON AT"L," SECS"!;S W=3600*V
05.20 T "IMPACT VELOCITY OF"W," M.P.H."!"FUEL LEFT:"M-N," LBS"!
05.40 I (1-W)5.5,5.5;T "PERFECT LANDING !-(LUCKY)"!;G 5.9
05.50 I (10-W)5.6,5.6;T "GOOD LANDING-(COULD BE BETTER)";G 5.9
05.60 I (22-W)5.7,5.7;T "CONGRATULATIONS ON A POOR LANDING";G 5.9
05.70 I (40-W)5.81,5.81;T "CRAFT DAMAGE. GOOD LUCK";G 5.9
05.81 I (60-W)5.82,5.82;T "CRASH LANDING-YOU'VE 5 HRS OXYGEN";G 5.9
05.82 T "SORRY,BUT THERE WERE NO SURVIVORS-YOU BLEW IT!"!"IN "
05.83 T "FACT YOU BLASTED A NEW LUNAR CRATER"W*.277777," FT. DEEP"!
05.90 T !!!!"TRY AGAIN?"!
05.92 A "(ANS. YES OR NO)"P;I (P-0NO)5.94,5.98
05.94 I (P-0YES)5.92,1.2,5.92
05.98 T "CONTROL OUT"!!!;Q

06.10 S L=L+S;S T=T-S;S M=M-S*K;S A=I;S V=J

07.10 I (S-.005)5.1;S S=2*A/(V+FSQT(V*V+2*A*(G-Z*K/M)))
07.30 D 9;D 6;G 7.1

08.10 S W=(1-M*G/Z*K)/2;S S=M*V/(Z*K*(W+FSQT(W*W+V/Z)))+.05;D 9
08.30 I (I)7.1,7.1;D 6;I (-J)3.1,3.1;I (V)3.1,3.1,8.1

09.10 S Q=S*K/M;S J=V+G*S+Z*(-Q-Q↑2/2-Q↑3/3-Q↑4/4-Q↑5/5)
09.40 S I=A-G*S*S/2-V*S+Z*S*(Q/2+Q↑2/6+Q↑3/12+Q↑4/20+Q↑5/30)
*
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(https://retro365.files.wordpress.com/2021/10/216902-lunar-other-1.jpg)

The FOCAL source code to Storer's Lunar Landing Game was published in the DEC newsletter in 1970. The game took up less than 50 lines of code

Storer had written his game in *FOCAL*, an introductory and efficient programming language but not widely used outside the realms of DEC minicomputers. *David H. Ahl*, the editor of the DEC newsletter, converted Storer's Lunar Landing Game to *BASIC*, largely as a demonstration of the language on the PDP-8. The popularity of his publications led Ahl to start printing BASIC games in the DEC newsletter, both his own and reader submissions. With the source code in the hands of other DEC users, alternate versions of the lunar landing concept quickly emerged. DEC employee *Eric Peters* wrote *Rocket* in BASIC, the first version to have *graphics* with a simple *ASCII* representation of the incoming surface.
In 1973, Ahl wrote the book, *101 BASIC Games*. In it, he included the lunar landing games. The book sold more than 10,000 copies, making the included games some of the most widely-distributed computer games up to that point in history. After disagreements with DEC, Ahl left in 1974 and founded *Creative Computing*, the earliest magazine to cover personal computing. The magazine ran from October 1974 until December 1985.

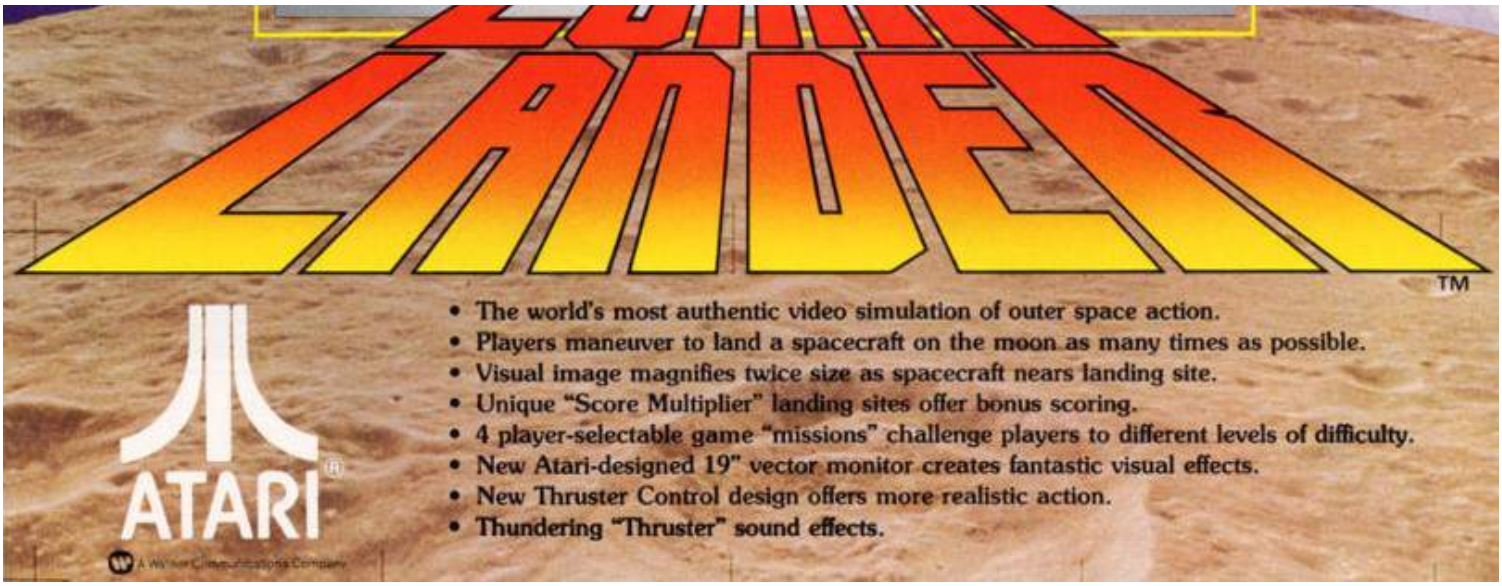
In 1973 when DEC released its high-end vector CRT terminal, the *DEC GT40*, for its *PDP-10* and *PDP-11* systems, the company was looking for a way to showcase the capabilities of the new display and commissioned a graphical version of Lunar Lander. Former DEC engineer *Jack Burness* went ahead and in 10 days created *Moonlander*, a technologically superior version, written in Assembly language. Moonlander would go on to become the most influential version of the concept. Alongside the real-time gameplay and graphics, Burness introduced the iconic variable lunar surface, elements that would be copied to every future version of the concept. Moonlander went on to be distributed with new DEC computers and displayed at trade shows around.

(https://retro365.files.wordpress.com/2021/12/moonlander_on_dec.png)

Moonlander, the first graphical real-time version of Lunar Lander, was created in 1973 and distributed with new DEC computers.
The game depicted a real-time side view of a mountainous lunar landscape in vector graphics. By using the light pen the direction and throttle of the thruster could be adjusted.
Image courtesy of Wikipedia

Up through the '70s, the lunar lander concept started to emerge outside the realms of minicomputers and mainframes. Versions for hobbyist computer kits like the *Altair 8800* and even a version for the *HP-25 calculator* reached a new audience and led to a wider interest but it wasn't until Atari in August of 1979 released a video arcade game based on the concept that the wide public finally had a chance to try and land on the moon. Atari

programmer *Howard Delman* had in the mid-70s when touring NASA's *Ames Research Center* seen an implementation of Burness' Moonlander game.
In 1979, when Atari was looking for a game for its first vector display arcade game, Delman and fellow Atari employee *Rich Moore* decided to refine the Moonlander concept into a more commercial format. Atari's Moonlander, when released in August of 1979, proved relatively popular and around 4.800 cabinets but it was soon overtaken when the company released, Asteroids, one of the most successful arcade games of the time. Nonetheless, the concept had already swept into the home computer market where nearly every aspiring programmer and hobbyist would take a swing at the simple concept. With a few lines of algebraic calculations, some simple input and print statements a simple BASIC text game could be created. Over the next few years, the concept got more and more advanced with added graphics, more complex control systems, and more challenging landing operations, some in real-time.



(https://retro365.files.wordpress.com/2021/10/11009701.jpg)

Advertising flyer for Atari's Lunar Lander. The cabinet sold around 4.800 units, a moderate success. Atari's Asteroid released the same year quickly turned into a huge success overshadowing Lunar Lander

In 1978 *Wayne Greens*' *Instant Software*, one of the largest sellers of microcomputer software in the late '70s, picked up the Lunar Lander concept. Instant Software, a subsidiary of *Kilobaud Microcomputing* was started by Green in January of 1977. Green had earlier published the first four issues of *Byte Magazine* but differences led him to start his own microcomputer magazine. Initially Green wanted it to be called *KiloByte* to trump Byte but Byte had already trademarked the name and Kilobaud was chosen.

Green advertised to his readers that anybody could send in programs and he would publish them against royalties. About 250 programs reached Green, one of them being *Ed Juge's Basic and Intermediate Lunar Lander*, a real-time variant of the concept and one of the first commercially available Lunar Lander clones when released by Green's Instant Software in 1978.
Juge had earlier offered the program to DEC and offspring *Data General* but none of the two mainframe and minicomputer companies believed in personal computers and showed no interest.
Basic and Intermediate Lunar Lander, as the name implies, came with two Lunar Lander programs on the cassette. Basic was a simpler variant that could be played by younger kids or as training for the more advanced and challenging Intermediate version.

(https://retro365.files.wordpress.com/2021/12/lunar_lander-02.12.2021-15.26.08.jpg)

Ed Juge's Basic and Intermediate Lunar Lander was picked up by Wayne Green and published through his Instant Software in 1978.
The game was written in BASIC for the TRS-80 Level 1 (4K) and Level II (16K)

The object in both versions was to guide the landing craft to a soft landing, at the lowest possible speed, in a predetermined flat landing area.
The only input was the crafts burn rate but you had to keep a close watch on your altitude, descent velocity, and remaining fuel. Gravity would increase the closer you got to the lunar surface

In 1983 Green sold his publishing company *Wayne Green Inc.* to *CW Communications*, a subsidiary of *International Data Group* (*IDG*) for $60 million.
Juge went on to play an instrumental role in popularizing the personal computer in the '80s and '90s where he would work as a marketing executive at Tandy Corporation's computer business.

In 1980 *Scott Adam's Adventure International* picked up *Mike Wall* and *Jack Moncrief's* TRS-80 adaption of Atari's Lunar Lander. Adams and his wife *Alexis* had built their business upon the initial success of Adam's first popular text-adventure games. The success led Adams to start publishing third-party-developed titles and soon the company's portfolio of games expanded to hundreds of titles.
While the market for Lunar Lander concepts had been saturated, Wall's and Moncrief's Lunar Lander was received as one of the best computer versions at the time. The game was written in Machine language and was visually impressive, on the 16K TRS-80, with fullscreen graphics. When approaching a landing site the display switched to a close-up for the final descent and landing (or more likely the impending crash).

Mike Wall and Jack Moncrief's 1980 TRS-80 Lunar Lander title was converted to the Atari 8-bit by Jeff Jesse, the same year.

In 1981 Adventure International was moving away from the crude, almost childish cover artwork style the company had been using since its inception in 1978 (right) to a more professional look (Left). I really like the crude artwork as it tells the story of a young industry

Mike Wall and Jack Montcrief's Lunar Lander simulated the last few minutes of the Lunar Excursion Module (LEM) descent to the lunar surface.
The game was an adaption of Atari's coin-op version. The craft was controlled by firing the main boosters to slow your descent and thrusters controlling the lateral movement. The surface had different lading spots, the more difficult, the more points

Adventure International's Lunar Lander was featured at the *Northeast Computer Faire* in Boston in 1981. A tradeshow that impressively managed to draw in 50.000 attendees. Here players could try their luck landing their own craft, with a cash prize to the highest score, which landed at 6400 points.

Following Atari's Lunar Lander and the many early variants, many developers tried their luck with the concept, and over the next few years, home computer owners could not only try and land on the moon but on other celestial bodies as well. One of the most popular variants became *Hitoshi Suzuki's* Commodore VIC-20 game, *Jupiter Lander*. The small inexpensive computer quickly became the best-selling home computer in the earliest part of the '80s and its popularity helped Jupiter Lander become one of the most recognizable variants of the Lunar Lander concept.

Jupiter Landed became immensely popular among Commodore VIC-20 owners. The title was also released for the Commodore 64

(https://retro365.files.wordpress.com/2021/12/lunar_lander-02.12.2021-15.37.08.jpg)

If you like me have an interest in the Apollo program and the people and technology that made humankind's greatest technological achievement possible, here's some of my newer books on the subject for inspiration

Sources: *Technologizer, The Guardian, PC World, Infoworld Dec 1983 & Feb 1992, LA Times, Legacy.com, Wikipedia, Brandeis University, CoCo: The Colorful History of Tandy's Underdog Computer by Boisy G Pitre & Bill Loguidice, fictionphile, Softside Magazine Feb 1981,*

Posted in **Adventure International**, **Collecting**, **Instant Software**, **Retro gaming**Tagged **1978**, **1980**, **1981**, **Adventure International**, **DEC**, **Ed Juge**, **Instant Software**, **Jack Moncrief**, **Lunar Lander**, **Mike Wall**, **TRS-80**, **Wayne Green**By **Ernst KrogtoftLeave a comment**