Minds to Space™

Artemis Demonstration

Presentation March 13, 2025

By David H. Mitchell

Website: Minds to Space

Purpose of this Presentation

To explain a largely unseen exponential revolution in space exploration and development that is coming

and that

the Artemis moon landing mission is an ideal opportunity

for NASA to demonstrate this at very low cost and risk

NASA has always been a leader is developing innovations in space which then lead to widespread application and use on Earth for the benefit on all humankind

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And a page on the demonstration technology

Plus a page on committed and potential supporters

NASA will now generate excitement for public access to outer space without having to travel to outer space for education, exploration, and development

Space is No Longer a Spectator Sport

1. The public audience has changed in the last 60 years!
2. The global audience is now interactive, not passive
3. Live video is great, but no longer enough

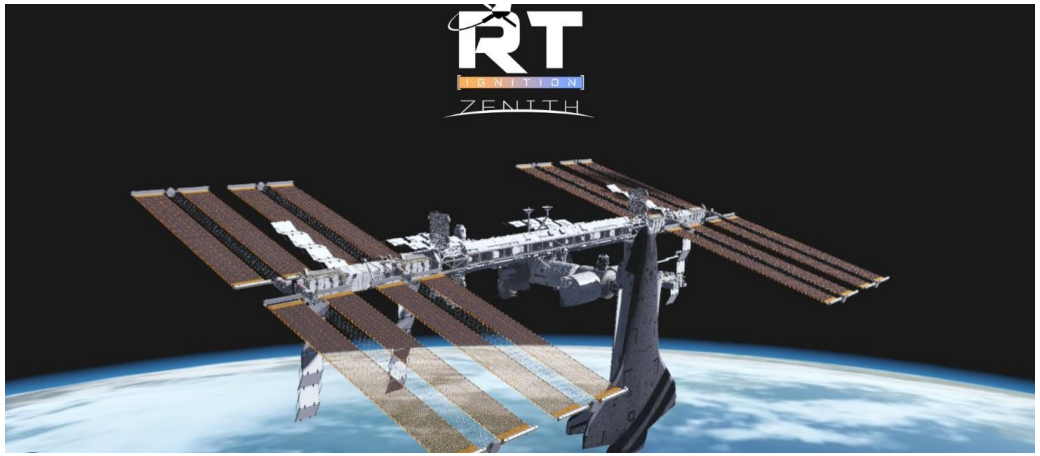
People now consume video in <60 second doses

People are already saturated with space images and video

The Artemis moon landing will now showcase
a new level of public involvement for all Artemis stakeholders
because NASA will make possible direct participation

Space was a Spectator Sport in 1969

The Global Audience is Now Interactive



Live Video is Great, but No Longer Enough

The Artemis missions will have significant competition for the public's attention

In 1969 the concept of landing on the moon was science fiction come true!

The public has now received over 5 decades of space storytelling of all kinds

Telepresence is About to Become Massively Real

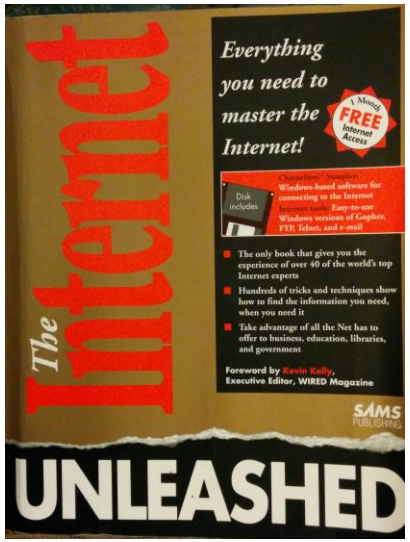
1. Telepresence has been foreseen to be a core use of the Internet
2. NASA can amplify space access and success with Telepresence
3. NASA continues as an innovation leader with Public Telepresence

People will see the potential for Telepresence to put them in space

People will generalize Telepresence to allow them to be anywhere on Earth

The Artemis moon landing Telepresence demonstration will open the floodgate allowing people to realize they can be "here and there" learning, exploring, working, and playing

Telepresence has been foreseen to be a core use of the Internet



1994

Being Here and There

DAVID H. MITCHELL

Tele-presence is like the old-time radio broadcasts in which actors re-created the actions of a distant event, except that with this technology you are a part of the action. With tele-presence, you can be in your office in San Francisco and with your colleagues in London at the same time.

Tele-presence uses virtual-reality technology to simulate objects, people, sounds, and worlds (see photo A). You are hooked to your computer through tactile-sensor-equipped gloves and head-mounted displays (see photo B). Your computer (an Amiga 4000 or a Sun Sparcstation 2 is muscular enough) brings to life events in a distant, virtual world using databases or real-time objects and sounds.

Modem-to-modem links or a packet network convey the distant event's essence to you. High-speed (i.e., 19,200 bps) modems are sufficient for two users. ISDN channels are recommended when large amounts of data must be moved quickly for true tele-presence. "With the proliferation of broadband ISDN, virtual worlds will be able to be shared over the phone lines," says Dave Blackburn, founder of The Virtual Reality Institute (Santa Monica, CA).

The output from the digital databases of real objects and sounds are sent to your head-mounted display, depicting scenes such as the one in photo A. Your senses are immersed in an illusionary, yet sensate, world.

These databases are key: They minimize the amount of information that has to be sent to you through your communications pipeline. "With a tele-presence database, you simulate virtual reality without having to pass horrendous amounts of data back and forth," explains Clint Woeltjen, a virtual-reality researcher and developer.

Photos A and B: *Photo A (above) is a virtual model of San Francisco. Photo B (right) shows a man wearing tele-presence equipment. (Photo courtesy of Sense8 Corp.)*

Photo B shows a man wearing a head-mounted display and a tactile-sensor-equipped glove, with which he is reaching out to manipulate a remote object. The roller panels underneath his wheelchair measure direction and velocity, which are used to create a viewpoint in his virtual world. As the man moves, his viewpoint of the world he's seeing changes.

Today, this equipment is as rare as it is expensive. A typical setup like this requires remotely operable hands to manipulate objects, two-way microphones for conversations, and stereoscopic TV cameras so that you can see what's going on. Costs can start at more than $100,000 per user.

In spite of the high costs, tele-presence's proponents are increasingly optimistic. Programs that let you design custom databases of real-world objects are already beginning to show up on the market. For example, the WorldToolKit from Sense8 (Sausalito, CA) gives you a set of C functions that you use to build interactive, 3-D, real-time graphical simulations. WorldToolKit runs on IBM ATs, Sun Sparcstations, and Silicon Graphics Indigo computers. It costs $3500.

Tele-presence is "going to be on-line by the end of 1993 in several large corporations," says Mike J. Donahue, president and CEO of Ono-Sendai (San Francisco, CA), a start-up company specializing in virtual-reality products. Industry insiders anticipate that the first generation of mass-market, affordable tele-presence gear will enter the market in 1994.

David H. Mitchell is president of the Diaspar Virtual Reality Network (Laguna Beach, CA), an on-line system devoted to providing an experimental platform for virtual-reality development.

VideoTelecom (Austin, TX) for video meetings. This conferencing system works with DOS-based PCs and ISDN connections to manage multiple-participant video teleconferencing. Tim Bell, a communications officer, finds that MediaMax is able to handle five or six participants simultaneously before the group's size becomes unmanageable. Participants see color images of each other, accompanied by audio, and they can pass around data through the ISDN link. "The productivity gains are tremendous," says Bell. The video allows them to exchange graphical information and to see facial expressions.

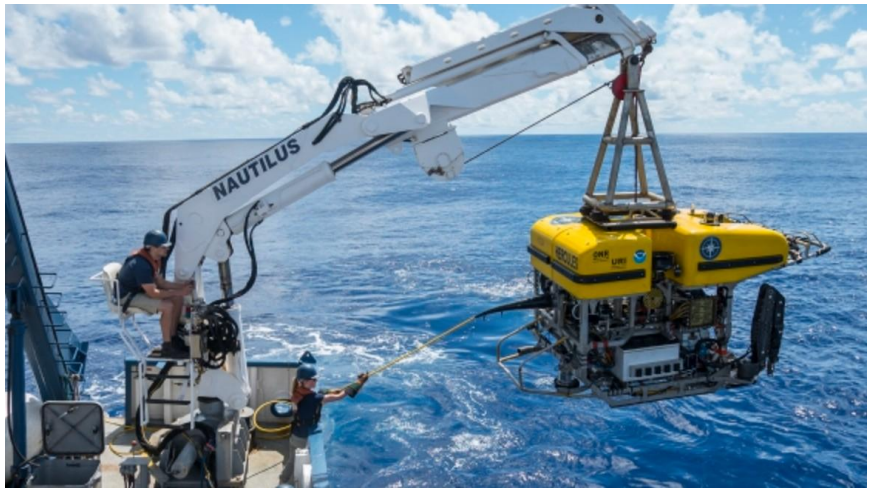
Redstone conference members have to trek to specially equipped video-teleconferencing rooms. There are no plans to equip every desk with video, but offices big enough for small meetings may be set up for video teleconferencing, says Bell.

1993

2019

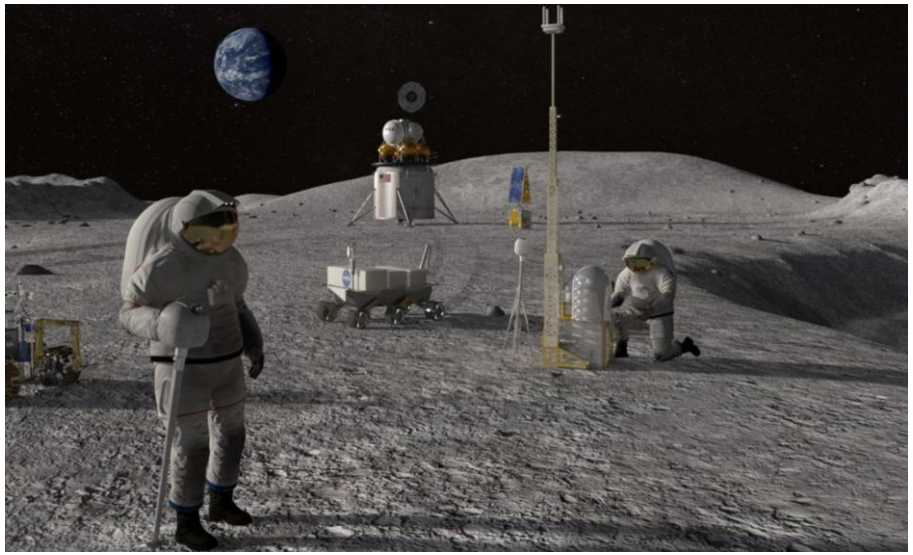
In 2010 Google held a closed forum to discuss what would be the most important long-term use of the Internet?
The author listed Telepresence with his justifications and examples
Voting at the end of 3 days choose Telepresence

NASA can amplify space access and success with Telepresence



NASA has a long history of experimenting with Telepresence

NASA Continues as an Innovation Leader with Public Telepresence



The Artemis Lunar Mission is the Perfect Demonstration Opportunity for Public Mass Adoption of Telepresence

An Artemis Lunar Demonstration is Now Feasible

1. Pournelle vs Sagan debate now has a third option - Telepresence
2. Thirty years ago LTM1 demonstrated the technology and demand
3. Ten Little Rovers will allow 24,000 Minds to Space during 10 days

LTM1 in the early 1990s let people worldwide drive model lunar rovers

24,000 people with 6-minute driving with unlimited viewing over 10 days

"Children" of all ages will have a chance to actually interact with the lunar surface in an educational entertaining way which will drive interest and excitement for future tele-robotics

Pournelle - Telepresence - Sagan

Niven & Pournelle 2004 @XCOR

Human Space Operations

High Risk and High Cost

STAFF PHOTO/MIKE SCHWARTZ

Meet the lunatics: Moonlighters, from the left, Katrin Karamian, David Mitchell, Jon Pike and Michael Bryon, rest beside their lunar landscape. They built a remote control moon rover that anyone with a modem and the free software can drive on the lunarscape.

Telepresence Team 1996 @LTM1

Telepresence Space Operations

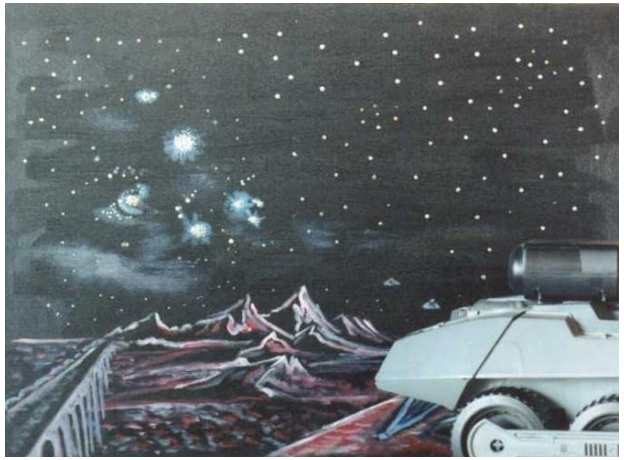
Low Risk and Low Cost

Sagan & Friedman 1980 @TPS

Robotic Space Operations

Low Risk and Medium Cost

LTM1 Demonstrated the ***Technology*** and Demand



The Lunar Teleoperations Model 1 (1992-1996) was a 5-year "Hackathon" ahead of its time

Using available technology LTM1 showed that telepresence is possible between Earth/Moon

Users worldwide were able to operate the rovers effectively with simulated lunar time delays

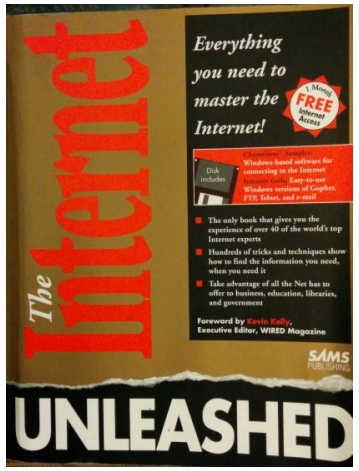
LTM1 Demonstrated the Technology and ***Demand***

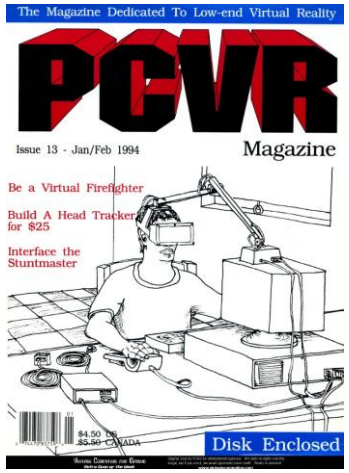
LTM1 Operated in 2 modes – Remote Access and Portable Exhibit with HMD and Gloves

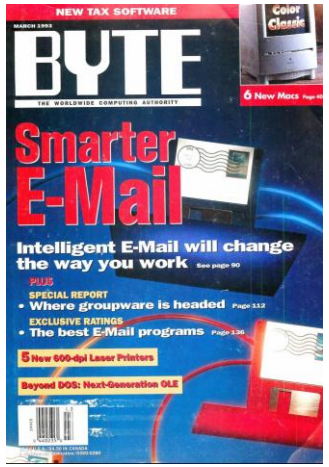
Hundreds of people (inner city school children, exhibit attendees, space events) used LTM1

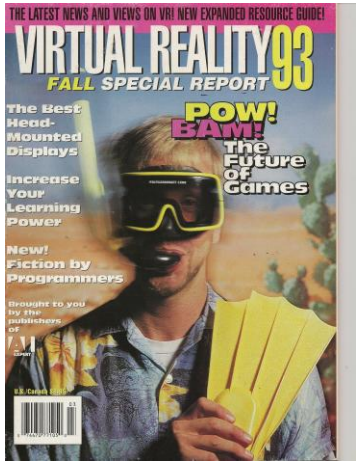
Users worldwide were able to operate the rovers effectively with simulated lunar time delays

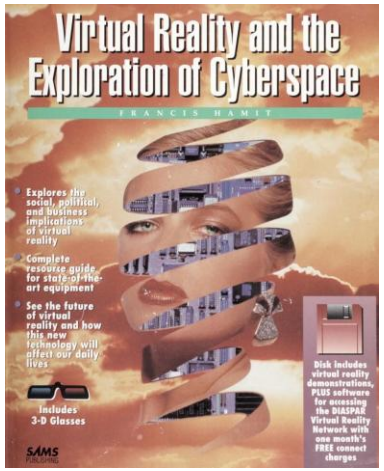
LTM1 Received ***Significant*** Publicity

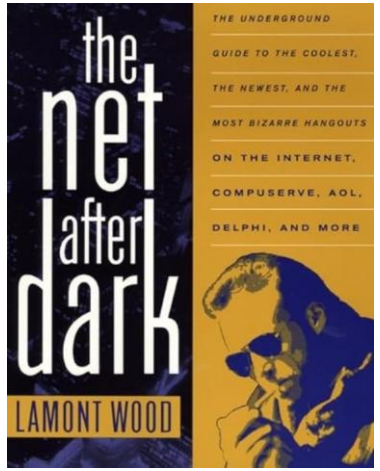












LTM1 was an unfunded volunteer effort with no organizational support and before mass Internet use

Yet, LTM1 received attention by newspapers, magazines, books, and network television news

Users worldwide were able to operate the rovers effectively with simulated lunar time delays

Ten Little Rovers for 24,000 People to Drive *Massive Potential Publicity and Participation*

NASA has the ability to generate "off-the-charts" excitement by giving everyone the ability to

Explore the Moon in Person – "I Drove a Lunar Rover!"

The options for excitement are endless: awards, prizes, certificates, games …

Artemis Demonstration Technology

Anyone anywhere may use their smartphone, tablet, or laptop to drive a lunar rover on the Moon!

The components for this demonstration are ubiquitous

The rover chassis, smartphone, and software are available

University students and other groups can build 1 KG chassis rovers

Software already exists supporting variable bandwidth down to 25 kbps

Smartphones provide power, telecom, video, and rover chassis interface

The entire system is extremely modular, requiring only thirty minutes of astronaut time for set up on the lunar surface with ground support on Earth being a single server feeding the streaming service

Committed and Potential Supporters

Ecoflix.com is the non-profit global streaming network and has committed to handle video streaming of the rover operations

David H. Mitchell as instigator, supporter, and advisor

Robert Lock (retired NASA/JPL) as supporter and advisor

Potential supporters include:

Artemis global stakeholders
XPRIZE Foundation (author is a brain trust member)
University of California at Irvine
The National Academy of Sciences – Science and Entertainment Exchange (author is a past member)
Various public companies (such as LEGO STEM)

“There are no limits to what humanity can accomplish when we can be anywhere anytime”

Website: Minds to Space

WEEKENDER/DIVERSIONS

Moonlighters taking one small step for every man's ticket to the moon

By Peggy Goetz
for Weekender

It hardly seems a place to step into the future. The two-story, circa 1930s gray art-deco office building on Glenneyre Street in Laguna Beach is more a reminder of the past.

Through the black-glass paned double doors a visitor enters a hallway that feels too narrow to be in an office building. It opens to a garden just up a steep flight of stairs at the back.

There is the damp smell of old buildings. The plaster is cracked but has been painted sometime in the last couple of years. Wooden door and window frames along the hall look like originals, but they've been painted bright turquoise.

The doorway at the end of the hall seems too short. It makes a visitor want to duck when entering to avoid the once-white paint that's curling off the ceiling from several seasons of rain seepage.

But this is the doorway to the future. It is a scene worthy of some slightly funky science fiction tale, complete with a small group of self-proclaimed space activists, the Moonlighters, gathered in the crowded back room behind the door.

The focus of their attention is a moonscape model that takes up most of the floor in the 8-by-15-foot low-ceilinged room. They call it Lunar Tele-operations Model 1.

The model has been in operation 24 hours a day for nearly two years. With it, children of all ages have driven a model moon rover from their homes, schools and science centers, including the Exploratorium in San Francisco and a science expo in Japan. The children receive live television images on their computer screens while they are driving.

Giving kids a chance to drive a model moon rover by remote control is giving them a taste of the future, said the project's creators one recent afternoon.

The father of the project is David Mitchell. He's tall, with thinning red hair and beard. A young grandfather at 42, he seems energetic in a dark polo shirt and athletic shoes. When he's not a Moonlighter, he runs a computer consultation business out of an office in the front of the building as well as from an office in Irvine.

He's a gregarious guy and it's no surprise that he hasn't been toiling away on the moon by himself. He is quick to introduce some of the other "lunatics," all of whom seem to delight in puns, who were there helping.

Michael Byron is a 39-year-old political science graduate student at UC Irvine. His slightly shaggy, but clean, black hair is combed neatly around his round mustached face. He describes himself as a "liberal libertarian." His enthusiasm surfaces quickly when he talks about his doctoral project, a computer model of the world political system.

Byron met Mitchell in 1994 at the Cyber Cafe in Santa Monica. He brought most of the other Moonlighters into the fold, several fellow students from the UCI chapter of the Space Society.

Katrin Karamian is the dark-harried, brainy beauty that every science fiction story needs. She's 23 and graduated last year from UCI with a degree in biochemistry. She was one of the founders and the first president of the UCI Space Society.

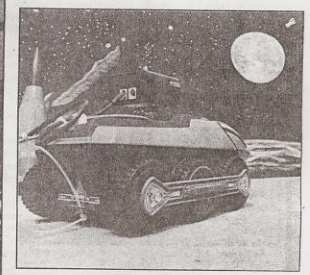
Karamian seems to know where everything is in the small crowded room. She demonstrates how the rover can be driven using a pair of Frankenstein-like wired gloves and an old virtual reality headset that someone donated.

The quiet, man-on-the-street-like guy in the back is

See MOON / A18

'So far we've proved you can do anything if you spend thousands of hours doing it.'

–David Mitchell, Moonlighter

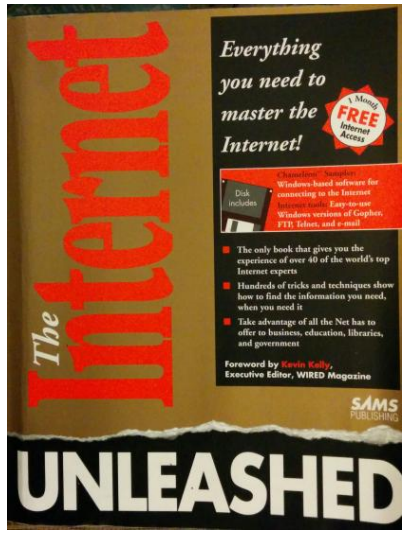


Rover roams: The remote-control moon rover (above), with a video camera mounted on top, can be driven by people from nearly anywhere via a computer-linked modem. Moonlighter Katrin Karamian (left) uses a version of the Lunar Tele-operations Model that lets the user see what the moon rover sees in wrap-around goggles.

Staff Photo/Mike Schwartz

Meet the lunatics: Moonlighters, from the left, Katrin Karamian, David Mitchell, Jon Pike and Michael Bryon, rest beside their lunar landscape. They built a remote control moon rover that anyone with a modem and the free software can drive on the lunarscape.

The Internet Unleashed – 1994 – 1153 pages



62 Chapters

Closing Chapter
by
David H. Mitchell

What's the Bottom Line?

We are at the beginning of two Golden Ages—the Golden Age of Information and the Golden Age of Space Development. The Internet may well be the glue that not only holds this planet's civilization together but also binds the solar system into a community of people and machines. This community has the potential of great progress in a renaissance for the human condition and spirit. We are on the verge of taking our first steps towards being a cohesive global village. We are about to take our first steps into new eras of education, exploration, and development. We are about to become a space-faring people.

There are unlimited intellectual resources available on the Internet now. There will be unlimited tangible and intellectual resources on SolNet as it forms in the next 50 years.

Virtual reality is the interface between man and machine and man again. We are about to wear the cosmic attire. We can look up, out, and now reach to the stars and touch them. With virtual hat and glove in hand, the future is in our grasp!