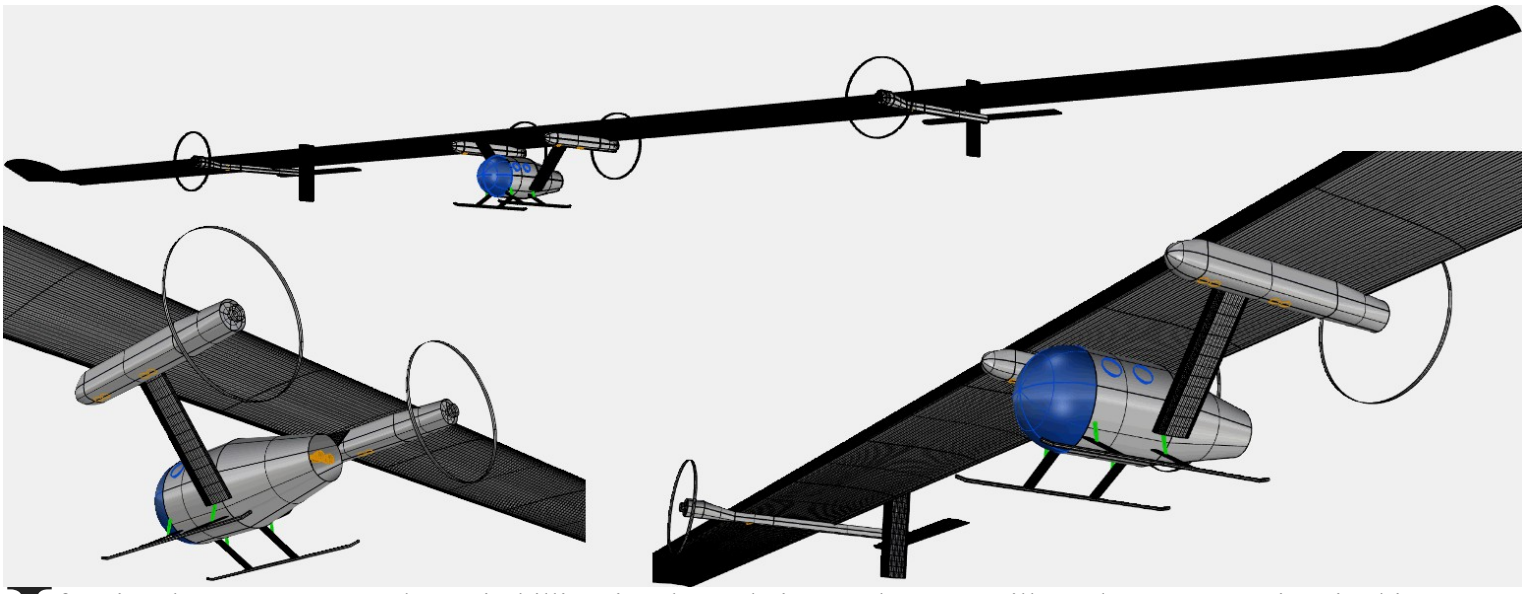
AIAA American Institute of Aeronautics and Astronautics Los Angeles - Las Vegas Section

Newsletter

The Raymer Manned Mars Plane (RMMP)

by Dr. Daniel P. Raymer, President, Conceptual Research Corporation
AIAA Fellow, author of "Aircraft Design: A Conceptual Approach"
http://www.aircraftdesign.com/mannedmarsplane.html (with permission)



If national governments and certain billionaires have their way, humans will reach Mars sometime in this century and set up permanent bases. Eventually they will need a way to get around. This paper describes the conceptual design and analysis of a manned Mars airplane configured for exploration, research, cargo transport, photography, and the linking of multiple settlements.

Design development is being done by an international team of volunteers based on the configuration concept developed by lead author Dr. Daniel P. Raymer and incorporating rocket propulsion concepts suggested by James French.

A two-man vehicle was developed based on overall requirements similar to the capabilities of the classic Jeep of WWII fame, namely a crew of two plus cargo to a total of 500 lbs, carried at least 260 nmi. It is assumed that the flight control system will be capable of fully autonomous operation when desired and that when carrying humans, they need not be trained pilots. VTOL operation is assumed due to the deplorable lack of paved runways on Mars.

(Continued on Page 19)

February 2021 Click title to go to article

To send comments or submissions, or to purchase advertising, please contact: AIAA LA LV Newsletter Editor, editor.aiaalalv@gmail.com

Robert Zubrin | Humans To Mars

The interview was conducted in November 2020 and has been edited for brevity and clarity.
by Pelle Axelsson (with Permission), 7 February, 2021 (Dr. Zubrin is AIAA Distinguished Lecturer)
https://intellectinterviews.com/2021/02/robert-zubrin-humans-to-mars/

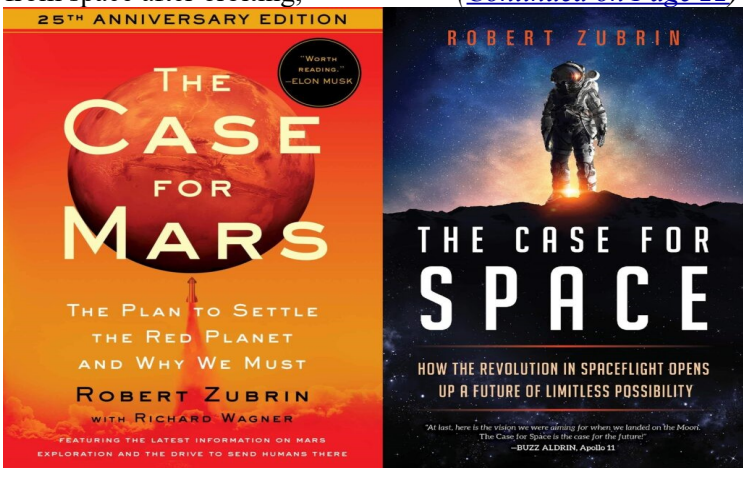
Cover photo credit: Space News photo by J. Lee

About Robert Zubrin

Robert Zubrin is an American aerospace engineer with a PhD from the University of Washington. He is the President of the Mars Society as well as a well-recognized advocate for human exploration of Mars. Zubrin is also an innovative entrepreneur with several companies, inventions and patents on his CV. He was awarded his first patent at age 20 for Three Player Chess. Last but not least, he is also the author of several books including The Case for Mars (1996) and The Case for Space (2019).

You were born in 1952. How did you experience the space race back in the 60s and 70s? How did the Apollo program effect you?

– I was thrilled by the space race! I was five when Sputnik flew and that is the first major world event that I can remember. While the adults may have been terrified of Sputnik, I was delighted. Because what Sputnik said to me was that the stories of the space traveling future are going to be true and I wanted to be a part of that. I even had a dog named Laika, like the first dog in space. I currently have a dog named Strelka, which was the first dog to actually come back from space after orbiting, *(Continued on Page 22)*

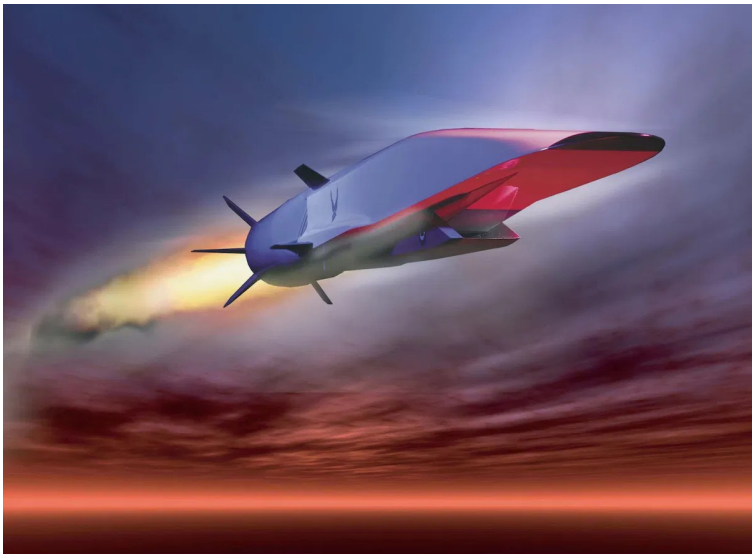


Race is on for hypersonic weapon supremacy

There are no proven defenses against hypersonic weapons but the US, China and Russia are all fast-questing counters

by Dr. Stephen Bryen, Former Deputy Under Secretary of Defense, 6 January, 2021 (with Permission)

https://asiatimes.com/2021/01/race-is-on-for-hypersonic-weapon-supremacy/



This photo illustration courtesy of the US Air Force shows the X-51A Waverider set to demonstrate hypersonic flight. Countries are scrabbling to produce defense system against such weapons. Photo: AFP/US Air Force.

The big powers – the US, Russia and China – and the near-big powers such as India are all hard at work on developing hypersonic weapons. As these go from research, test and evaluation to actual fielding, the race is also on to find a way to counter the weapon systems.

At least one country, Russia, thinks it has an answer in its S-500 "Prometheus" anti-ballistic missile system. The Russians claim the S-500 is capable of destroying hypersonic cruise missiles at speeds higher than Mach 5.

A hypersonic weapon is one that is defined as achieving speeds of Mach 5 or greater. So far at least, the Russians have conducted no tests against any hypersonic targets and the S-500 still is not deployed anywhere.

The US is going in a different direction, as are the Europeans, in at least setting up some sort of space-based defense system, on the theory that such a system will permit early detection and intercept of hypersonic weapons.

A space based defense system would identify a hypersonic weapon on launch, based primarily on the infrared (IR) signature of the booster rocket as it leaves the launch pad or silo.

The US has yet to define how it would respond to a hypersonic vehicle launch, particularly since current generation interceptors probably won't work. Some in the Pentagon are thinking of space based interceptors. There is also consideration being given to laser defense systems mounted on orbiting drones at 60,000 feet above the earth. In Europe there is a different approach: a space based detection system which is already partially funded, and an advanced missile defense system that would be ground-based. That system is called TWISTER (Timely Warning and Interception with Space-based TheatER surveillance). Under TWISTER an endo atmospheric interceptor will be developed, led by MBDA (a consortium of Airbus, Leonardo and BAE Systems). According to MBDA "This new endo-atmospheric interceptor will address a wide range of threats including, manoeuvring ballistic missiles with intermediate ranges, hypersonic or high-supersonic cruise missiles, hypersonic gliders, anti-ship missiles and more conventional targets such as next-generation fighter aircraft. This Interceptor will integrate existing and future land and naval systems."

Both the US and the European systems are in the future and precise timetables are not available. With the new Biden administration and the new US Space Force under scrutiny, it is not certain where space based missile defense will end up. The Union of Concerned Scientists says that "Space-based missile defense is an ineffectual defense at best, and a very dangerous provocation at worst." While the Trump administration would not find such arguments persuasive, that could well change with the new administration.

Hypersonic Cruise Missiles and Glide Vehicles

There are basically two basic types of hypersonic weapons. One category is cruise missiles, that can be launched from land, ship or aircraft. The Russian Zircon 3M22 can be launched from sea or air, or even from submarines. It is short range and will be used mainly in an anti-ship role. It is claimed it can reach a speed of Mach 8 or March 9. It is powered by a scramjet engine but is rocket launched --the scramjet takes over when

(Continued on Page 26)

Women lead way in UAE mission to the red planet

Mars project chief tells of the empowerment the launch has given the Arab state's scientists and engineers

by Dr. Stephen Bryen, Former Deputy Under Secretary of Defense, 13 February, 2021 (with Permission)

https://asiatimes.com/2021/02/women-lead-way-in-uae-mission-to-the-red-planet/

Emirati Minister of State for Advanced Technology Sarah al-Amiri. Photo: Giuseppe Cacace/AFP

A space probe now orbiting Mars has propelled the United Arab Emirates (UAE) into a leading position among Arab states as its 34-year-old mission leader highlights the advanced role women play in the country.

The al-Amal (hope) craft arrived at Mars on February 9 and it was placed in orbit around the red planet, a maneuver that was regarded as particularly tricky.

Of particular note is the leadership provided by Sarah al-Amiri. She is the Emirati Minister of State for Advanced Sciences, chair of the UAE Space Agency and the United Arab Emirates Council of Scientists, and deputy project manager of the Emirates Mars Mission.

Al-Amiri outlined the mission in an interview with the Planetary Society and talked at length about the empowerment the project has given scientists and engineers in the UAE. She also is widely publicized in the Gulf States.

The Emirates Mars Mission probe was assembled in the United States at the Laboratory for Atmospheric and Space Physics at the University of Colorado in collaboration with the Mohammed Bin Rashid Space Centre, which was founded in 2006.

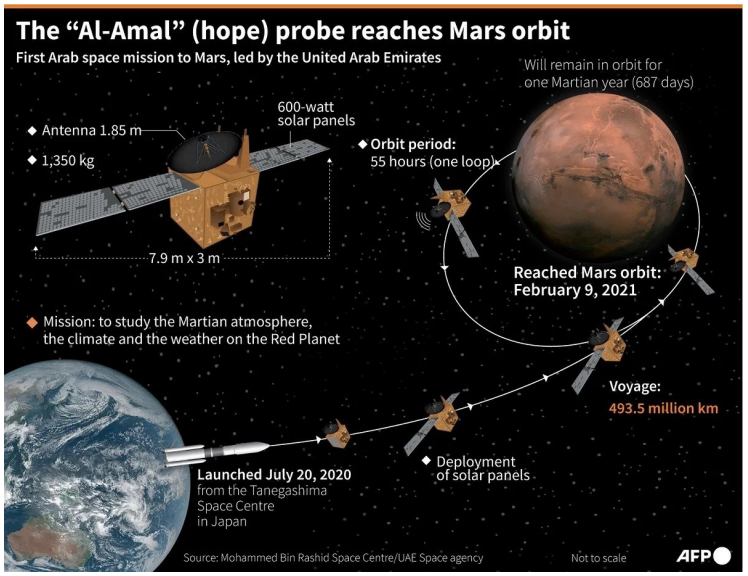
It was launched on a Japanese H-IIA rocket from the Tanegashima Space Center.

The Hope probe weighs 1,350 kilos (2,980 lb) and is built from aluminum in a honeycomb structure and covered with composites. It is equipped with thruster engines and was launched in July last year.

Unlike their neighbor and sometime partner Saudi Arabia, the UAE takes an entirely different approach to the role of women in society. The UAE constitution guarantees equal rights for men and women.

Women enjoy the same legal status, access to education, the right to practice professions, and the right to inherit property as men.

Governmental employment for Emirati women has increased from 11.6% in 1995 to 66% in 2007. Female university students are more than double male enrolments. Women comprise 70% of college graduates.



In the UAE there is a mandatory female presence on boards of directors in all government entities and corporations. There is government-approved maternity leave, laws on equal wages for women and men, and protection for working women.

In the Hope project, women make up 34% of the launch team.

The mission aims to conduct a comprehensive analysis of the Mars atmosphere. The probe will be the first weather satellite for Mars. Its scientific objectives were worked out with NASA in the US.

The Hope project has generated huge excitement in the UAE and symbolizes the growing importance of the country as a leader in the Arab world and beyond.

Aerodynamic Study of the Wright Brothers' 1902 Glider and 1903 Flyer

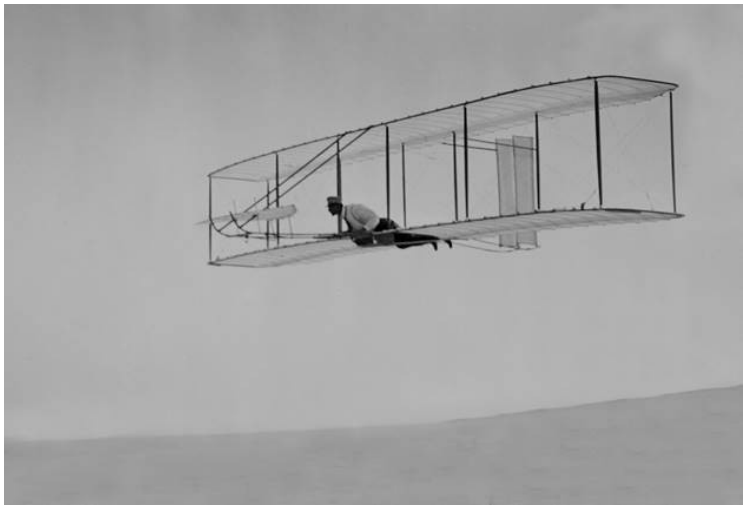
by J. Philip Barnes Senior Technical Fellow, Pelican Aero Group (with Permission)

This article, companion to the author's "Configuration Aerodynamics" study found at www.HowFliesTheAlbatross.com, reviews and renews our understanding of key aerodynamic features of the Wright Brothers' 1902 Glider and 1903 Flyer. In particular, we apply a 3D lifting-line computer model to analyze the distributed aerodynamic forces on the 1902 glider, discuss the impact of the changes with the 1903 flyer, and provide a brief historical narrative.

Wilbur and Orville

The Wright Brothers brought us the world's first piloted and powered airplane. They did this without high school diplomas or college degrees. However, they possessed aptitude and persevered over numerous obstacles, often aided by their powerful collaboration. Understanding the importance of learning to control gliding flight before adding power, they became first to independently control pitch, roll, and yaw.

The Wrights implemented a system approach to integrate and develop existing and new methods for aerodynamics, flight control, structures, and propulsion. And, not only did they design their own engine, but they also invented aerial propeller theory. Although with their wind-tunnel they measured the "lift-to-drift" of various wing and multi-wing configurations, they did not measure pitching moment, as they did not understand its importance. This lack of understanding did not prevent their success. Indeed, for their 1902 glider, it may have sheltered the canard from stall. But for their 1903 powered "Flyer," it presented a major obstacle barely overcome by superior piloting skills.



Wilbur pilots the original 1902 Glider at the Outer Banks of N.C.

The Wright Brothers wisely selected the sand dunes of the Outer Banks of North Carolina for their testing. On a windy day, the dunes would provide an updraft to reduce ground speed and to enable slope soaring. But more important, the sand cushioned inevitable hard landings.

The original version of the 1902 glider incorporated a fixed double fin which failed to overcome, or perhaps even aided, the adverse yaw which led to many hard landings. With wing warping, a roll to the left was accompanied by an unwanted yaw to the right.

Notice the modest wing camber and near-zero canard-to-wing decalage. The latter is characteristic of most or all photos of the glider in action, and it provides our first hint that the aircraft was flown "statically unstable" in pitch, where the glider was actively stabilized with small variations in canard incidence set by the pilot holding by eye a fixed horizon. But as noted later, the variations of canard incidence would be far greater for the 1903 Flyer.

Dan Tate and Wilbur launch Orville in the modified 1902 glider

(Continued on Page 27)

Newly Ramped AIAA Online Courses during COVID-19 Pandemic

https://www.aiaa.org/events-learning/online-education
http://aiaa.mycrowdwisdom.com/diweb/catalog

(Editor's Note: Due to the prolonged COVID-19 Pandemic, recently AIAA has significantly ramped up the reputable AIAA online course program. Some of our AIAA LA-LV members will be instructing the courses (Highlighted below. For those by an LA-LV member but not highlighted, apology, as we might not be able to identify as an LA-LV member right away. Please inform us. Thank you very much !)

Browse the Learning Catalog:

- Nuclear and Future Flight Propulsion: Advanced Concepts in Rocket Propulsion, Nuclear Systems, Advanced Physics, and Propellants
- Fundamentals of Space Systems - On-Demand Short Course
  by Prof. Mike Gruntman (AIAA LA-LV Member)
  preview first lecture at https://youtu.be/-_8-qGfXjEo
- Taking the Next Steps in Your Aerospace Career - On-Demand Short Course
- Optimal Control Techniques for Unmanned Aerial Vehicles (UAVs) - On-Demand Short Course
- Design of Experiments: Improved Experimental Methods in Aerospace Testing – Online Short Course (Starts February 26, 2021)
- Hypersonics: Test and Evaluation – Online Short Course (Starts March 18, 2021)
- Electrochemical Energy Systems for Electrified Aircraft Propulsion: Batteries and Fuel Cell Systems (Starts May 5, 2021)
- Fundamentals of Data and Information Fusion for Aerospace Systems - Online Short Course (Starts April 7, 2021)
- Fundamentals of Python Programming with Libraries for Aerospace Engineers – Online Short Course (Starts April 13, 2021)
- Understanding Space: An Introduction to Astronautics and Space Systems Engineering - Online Short Course (Starts April 9, 2021)
- Fundamentals of Classical Astrodynamics and Applications – Online Short Course (Starts March 4, 2021)
- Design of Space Launch Vehicles – Online Short Course (Starts April 6, 2021)
  by Prof. Don Edberg (AIAA LA-LV Member)
- Missile Aerodynamics, Propulsion, and Guidance – Online Short Course (Starts April 14, 2021)
- Foundations of Model-Based Systems Engineering (MBSE) - Online Short Course (Starts May 7, 2021)
- Technical Writing Essentials for Engineers - Online Short Course (Starts March 24, 2021)
- Design of Electrified Propulsion Aircraft - On-Demand Short Course
- Design and Operation of Composite Overwrapped Pressure Vessels (COPV) – On-Demand Short Course
- Electrified Aircraft Propulsion Technologies: Powering the Future of Air Transportation – On-Demand Short Course
- Structural Considerations in Liquid Rocket Engine Design
- Advances in Turbomachinery in Liquid Propulsion - On-Demand Course
- Advanced and Additive Manufacturing for Liquid Rocket Engines - On-Demand Course
- Liquid Rocket Engines: Emerging Technologies in Liquid Propulsion – On-Demand Short Course
- Hypersonic Flight Vehicle Design and Performance Analysis – On-Demand Short Course
- Sustainable Aviation - On-Demand Short Course
  by Dr. Marty Bradley (AIAA LA-LV Member)
- Design of Modern Aircraft Structures – On-Demand Short Course
- Fundamentals of Airplane Performance, Stability, Dynamics and Control - On-Demand Short Course
- Rocket Testing - On-Demand Workshop
- Hypersonic Air Breathing Propulsion - On-Demand Short Course
- Fundamentals of Space Vehicle Guidance, Control, and Astrodynamics – On-Demand Short Course
- Aircraft and Rotorcraft System Identification Engineering Methods for UAV Applications
- Applications of Model-Based Systems Engineering
- Deciding on the Form of Missile Defense
- Electric Aircraft Design Fundamentals: Enabling Technologies and Analysis Methods for More-, Hybrid-, and All-Electric Aircraft
- Flight Dynamics and Einsteins Covariance Principle
- Fundamentals of Communicating by Satellite
- Fundamentals of Systems-of-Systems
- Introduction to Bio-Inspired Engineering
- Introduction to Communication Satellites and their Subsystems
- Introduction to Computational Aerodynamics
- Introduction to Launch Vehicle Pogo Stability
- Introduction to Uncertainty Quantification and Industry Challenges
- Lessons from Subsonic Ultra Green Aircraft Research (SUGAR) Study
- Materials and Structures for Hypersonic Vehicles
- Mechanics of Structure Genome: A New Unified Approach to Modeling Composite Structures
- Overview of Missile Design and System Engineering
- Practical Design Methods for Aircraft and Rotorcraft Flight Control for UAV Applications
- Predictive Maintenance with MATLAB: A Data-Based Approach
- Space Radiation Environment and Its Effects
- Space Systems: Risk Analysis and Management
- Step-by-Step Process for Designing Weightless Space Habitats
- Thermal Modeling and Regenerative Cooling of Liquid Rocket Engines
- Pulse Code Modulation (PCM) Processing - Bit Recognition, Frame Synchronization, Decommutation and Real-Time Analysis
- Advanced Composite Materials and Structures
- A Tutorial on Recent Advances in Alternative Fuels Combustion
- A Tutorial on a Unified Approach for Computational Aeroelasticity

AIAA Announces its Class of 2021 Honorary Fellows and Fellows

25 February, 2021

https://www.aiaa.org/news/news/2021/02/25/aiaa-announces-its-class-of-2021-honorary-fellows-and-fellows

(Editor's Note: Highlighted below for the AIAA LA-LV Members who just got elected into AIAA Honorary Fellow / Fellow. For those LA-LV members but not highlighted, apology, as we might not be able to identify you as an LA-LV member right away. Please inform us. Thank you very much !)

FOR IMMEDIATE RELEASE

Three Honorary Fellows and 28 Fellows Elected

February 25, 2021 – Reston, Va. – The American Institute of Aeronautics and Astronautics (AIAA) proudly congratulates its newly elected Class of 2021 Honorary Fellows and Fellows. The induction ceremony for the new Honorary Fellows and Fellows will take place later this year.

"The Class of 2021 AIAA Honorary Fellows and Fellows are among the best minds in our profession. I commend each member of this year's Class on their career accomplishments and dedication to furthering our industry," said Basil Hassan, AIAA president. "This distinguished set of individuals has earned the respect and gratitude of the aerospace community for their creativity and valued contributions to better understanding our universe and mentoring future generations of aerospace professionals."

Honorary Fellow is the highest distinction conferred by AIAA and recognizes preeminent individuals who have had long and highly contributory careers in aerospace and who embody the highest possible standards in aeronautics and astronautics. In 1933, Orville Wright became the first AIAA Honorary Fellow. Today, AIAA Honorary Fellows and AIAA Fellows are the most respected names in the aerospace industry.

AIAA confers the distinction of Fellow upon individuals in recognition of their notable and valuable contributions to the arts, sciences or technology of aeronautics and astronautics. Nominees are AIAA Associate Fellows. Since the inception of this honor, 1,980 distinguished persons have been elected as a Fellow.

"AIAA takes great pride in honoring this Class of Honorary Fellows and Fellows. These professionals have distinguished themselves by their significant and lasting contributions to the aerospace community. Their passion, accomplishment and dedication to the industry are worthy of this recognition. They are the inspiration to aspire to even greater heights for the generations that follow," added Dan Dumbacher, AIAA Executive Director.

For more information on the AIAA Honors Program, AIAA Honorary Fellows, or AIAA Fellows, contact Patricia A. Carr at patriciac@aiaa.org.

2021 AIAA Honorary Fellows

Daniel E. Hastings, Massachusetts Institute of Technology
Gwynne E. Shotwell, Space Exploration Technologies Corporation (SpaceX)
The Honorable Heidi Shyu, Heidi Shyu Inc.

2021 AIAA Fellows

Juan J. Alonso, Stanford University
Randal W. Beard, Brigham Young University
Chiara Bisagni, Delft University of Technology
Stanley K. Borowski, NASA Glenn Research Center (retired)
Chia-Chun "George" Chao, The Aerospace Corporation (retired)
Olivier L. de Weck, Massachusetts Institute of Technology
Jeanette L. Domber, Ball Aerospace
Eric H. Ducharme, GE Aviation
Jack R. Edwards, North Carolina State University
Richard Scott Erwin, U.S. Air Force
Eric M. Feron, Georgia Institute of Technology
Irene M. Gregory, NASA Langley Research Center
W. Michael Hawes, Lockheed Martin Corporation
Michael Keidar, George Washington University
Erick Lansard, Thales
Roger D. Launius, Launius Historical Services
Ivett A. Leyva, Office of the Deputy Assistant Secretary of the Air Force for Science, Technology and Engineering
Ioannis G. Mikellides, NASA Jet Propulsion Laboratory
Kristi A. Morgansen, University of Washington
Greg F. Naterer, Memorial University
Daniel I. Newman, Boeing Defense, Space & Security
Guillermo Paniagua, Purdue University
James E. Polk, NASA Jet Propulsion Laboratory
Shahrokh Shahpar, Rolls-Royce PLC
Walter A. Silva, NASA Langley Research Center
Karen A. Thole, Pennsylvania State University
William A. Welsh, Sikorsky, a Lockheed Martin Company
Oleg A. Yakimenko, Naval Postgraduate School

About AIAA

The American Institute of Aeronautics and Astronautics (AIAA) is the world's largest aerospace technical society. With nearly 30,000 individual members from 91 countries, and 100 corporate members, AIAA brings together industry, academia, and government to advance engineering and science in aviation, space, and defense.

AIAA's First Scholarship for High School Seniors (Deadline This Monday 1 March, 2021)

https://www.aiaa.org/get-involved/k-12-students/scholarships/?utm_source=Informz&utm_medium=email&utm_campaign=MembershipPrograms2021&utm_content=KahnScholarship

Do You Know a High School Senior Who Intends to Major in Aerospace or STEM?

AIAA is excited to announce the **Roger W. Kahn Scholarship** to honor the memory of Roger Kahn and his passion for aviation. AIAA will award up to four $10,000 scholarships to high school seniors intending to pursue an engineering or scientific degree at a college or university!

Scholarship also includes:

- A $2,500 travel stipend to attend an AIAA event or program such as AIAA SciTech Forum, AIAA AVIATION Forum, AIAA Propulsion and Energy Forum, or ASCEND
- A mentor from AIAA's professional members group to help guide the student toward achieving a career in aerospace

Eligibility requirements:

- Current high school seniors intending to pursue an aerospace or STEM major at a college or university
- Minimum high school GPA of 3.5
- Demonstrated interest in aerospace through extracurricular activities
- Underrepresented students encouraged to apply

Application documents:

- Transcript that shows high school GPA
- 1-page statement that describes STEM-related studies and/or extracurricular activities
- Letter of recommendation from STEM educator or mentor
- Application form

Applications Now:

https://www.aiaa.org/get-involved/k-12-students/scholarships/?utm_source=Informz&utm_medium=email&utm_campaign=MembershipPrograms2021&utm_content=KahnScholarship

The application deadline is **1 March 2021**. Contact AIAA if you have any questions.

Eligibility Requirements

Current high school senior intending to pursue an aerospace or STEM major at a college or university (must provide proof of enrollment to receive the scholarship funds)

Minimum high school GPA of 3.5

Demonstrated interest in aerospace through extracurricular activities

Underrepresented students encouraged to apply

Application Documents

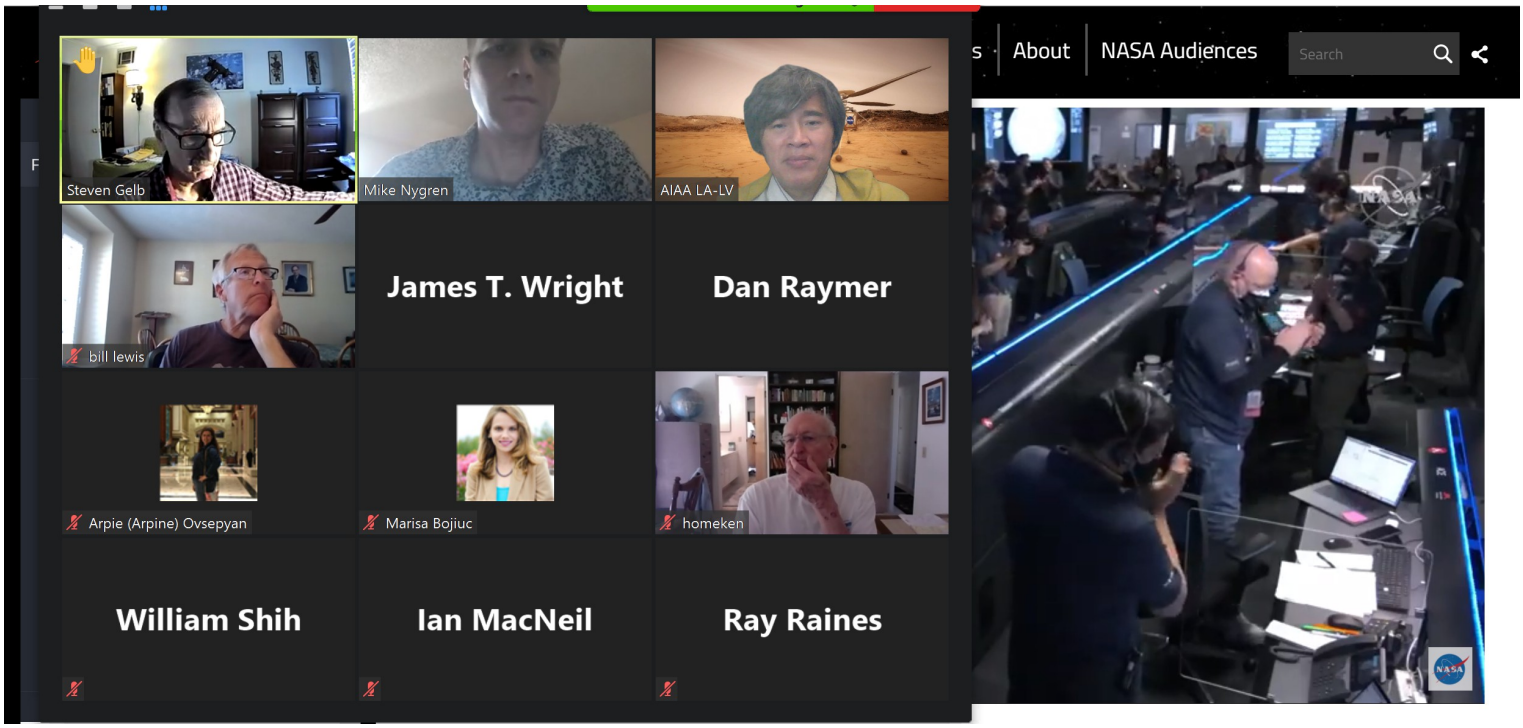
Transcript that shows high school GPA

1-page statement that describes STEM-related studies and/or extracurricular activities

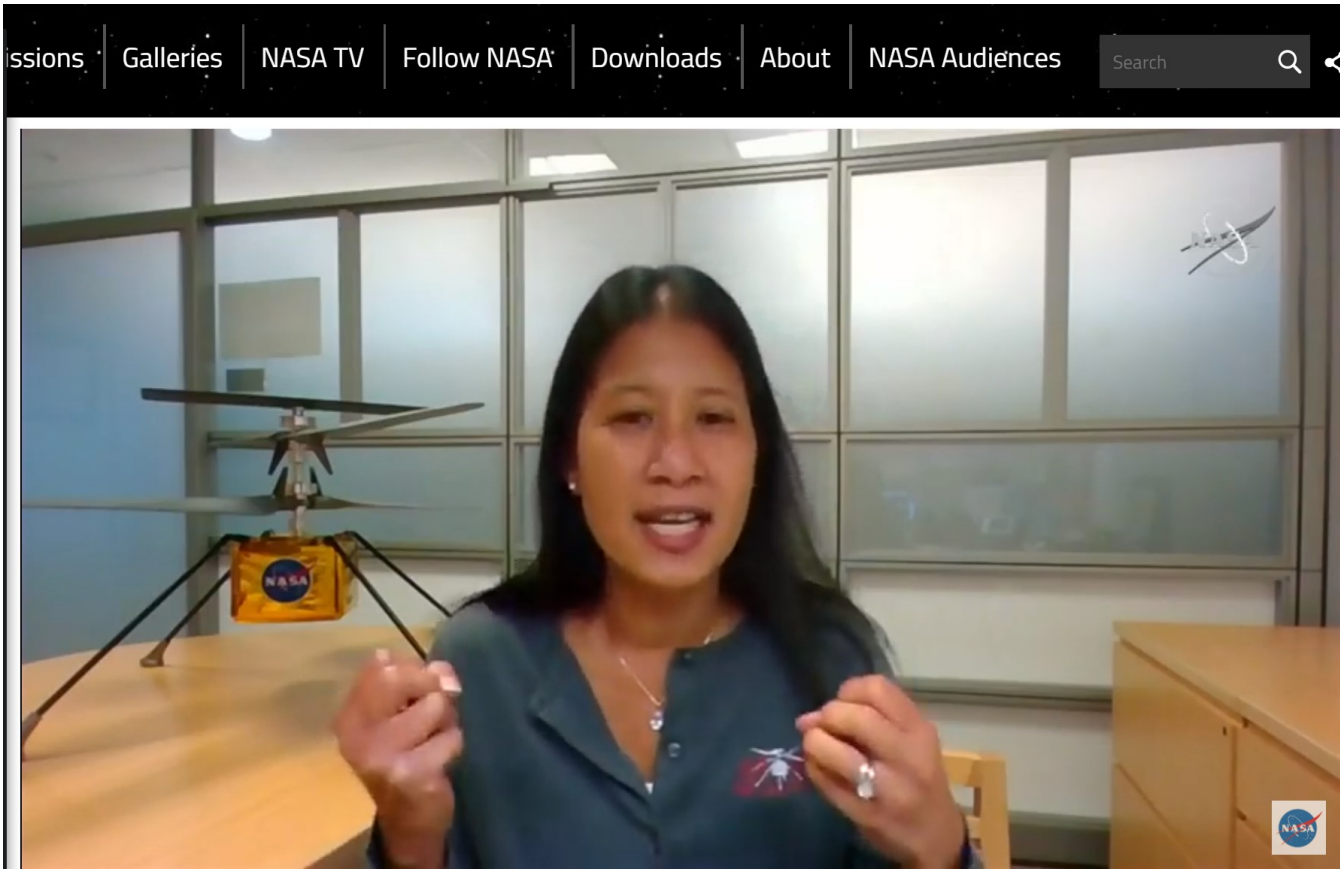
Letter of recommendation from STEM educator or mentor

Application form

AIAA LA-LV e-Happy Hour: Countdown to Mars (Mars 2020 Perseverance EDL) (18 February, 2021) *(Screenshots only)*



Attendees in this e-Happy Hour Countdown to Mars, cheering for the successful landing, while watching the online TV broadcast when people in the Control Center busrt into cheers.



Attendees watching together online the post-landing interview with Ms. MiMi Aung, a JPL ead engineer on the Mars Helicopter Ingenuity, the first extraterrestrial aircraft, sharing her excitement and explanation on the mission.

AIAA LA-LV Martin Luther King Jr. Memorial (18 January, 2021)

(Screenshots only)

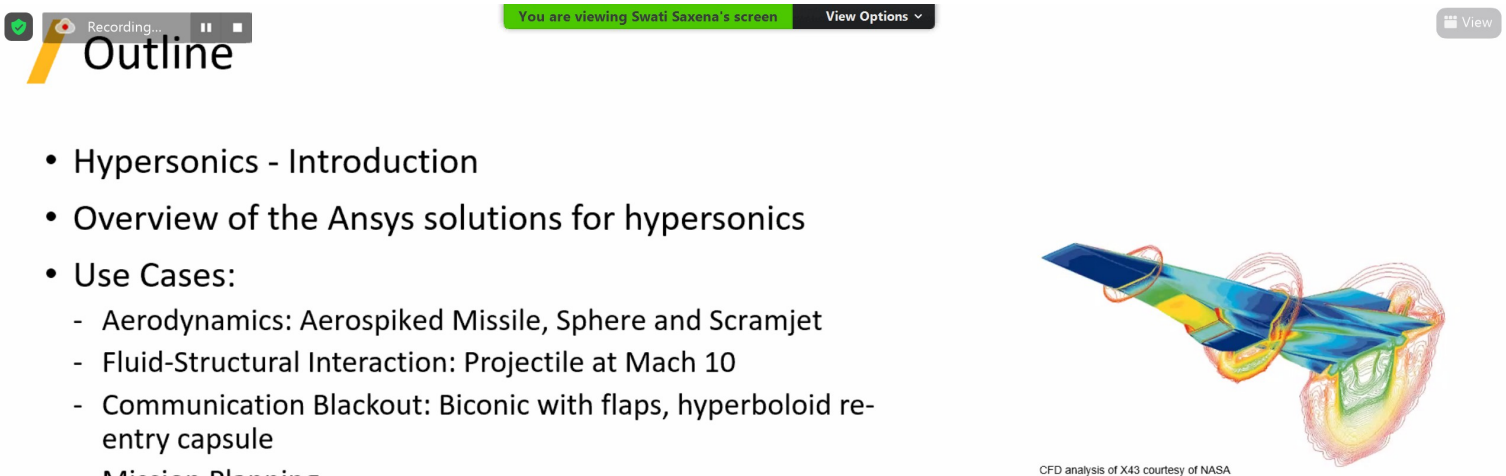
Ms. Michelle Evans sharing her experiencs discussing with the panelists as being transgender, and the issue of being LGBTQ and GSM, empahsizing the improtance of some of the teachings of Dr. Martin Luther King's Jr Memerical Service, moderated by Pastor Ivy, with each of the panelists/speakers sharing their experiences and learning from Dr. King's teachings. The other panelists/speakers also discussed Dr. King's peaceful teachings and their views/experiences related to Women, African Aemricans, Asian Americans, and other minorities, with touching and inspiring stories, as well as the better ways of viewing the efforts for true equality and dealing with discrimination, glass ceilings, and challenges in career development.

AIAA LA-LV Aero Alumni Meeting (20 January, 2021) *(Screenshots only)*

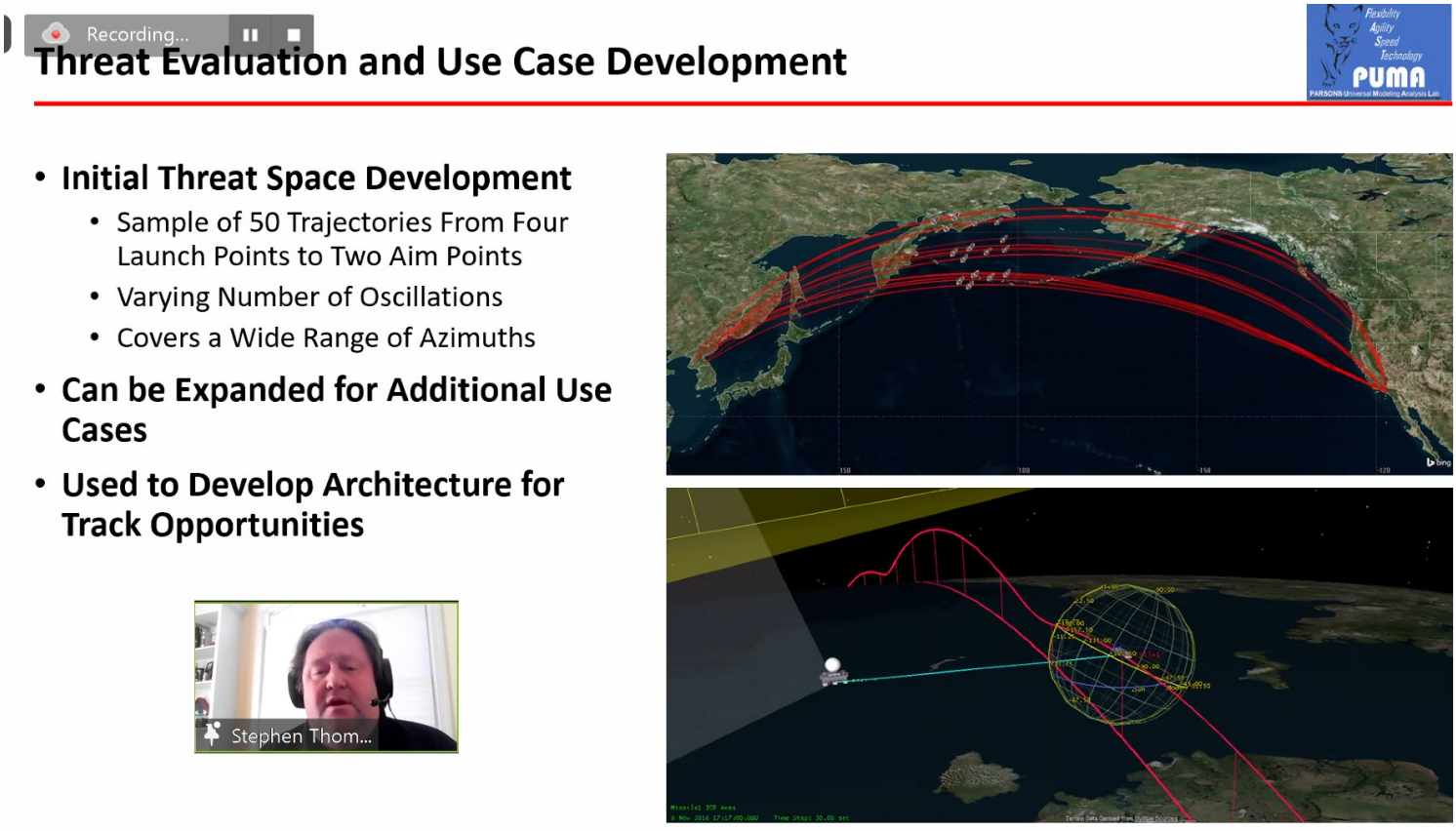
Several retirees and experienced professionals gatherinng in the AIAA LA-LV aero alumni meeting on 20 January, 2021, to sharing their storiesa and experiences about the Apollo 14 mission, capsule designs, and the exhibition in the Western Museum of Flight.

AIAA LA-LV e-Town Hall Meeting (23 January, 2021) *(Screenshots only)*

(Part 1) Dr. Swati Saxena (ANSYS)
(Part 2) Mr. Stephen Thomas (Parsons)
https://aiaa-lalv.org/january-23-2021-e-town-hall-meeting-with-dr-swati-saxena-and-mr-stephen-thomas/



Dr. Swati Saxena showing the audience the ANSYS simulation on hypersonics.

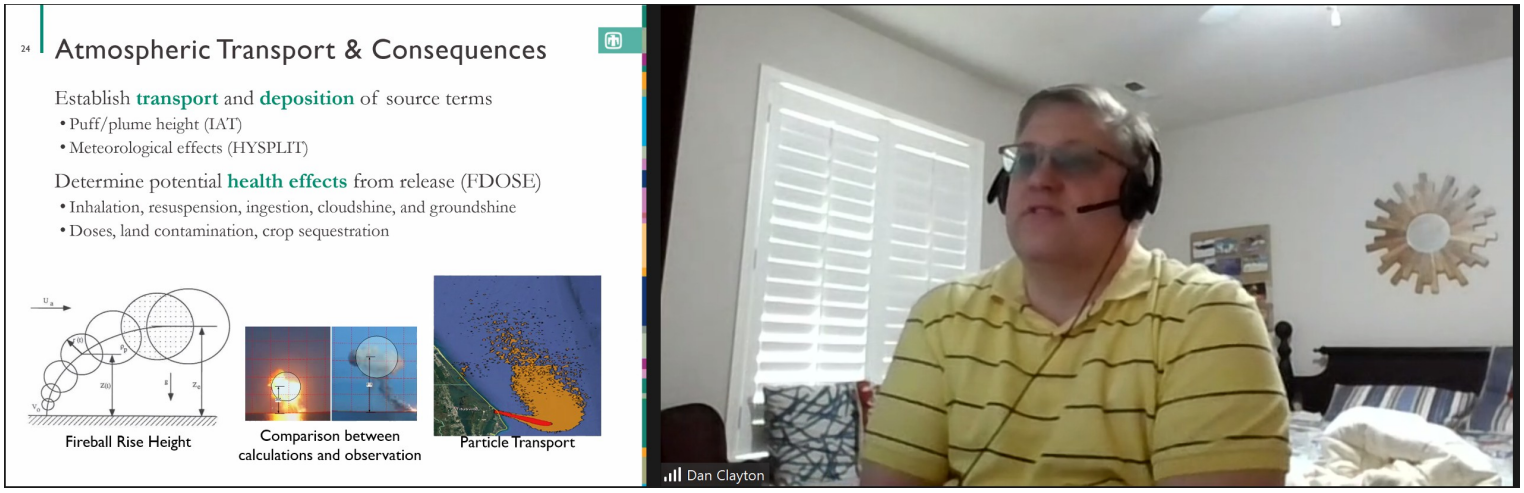


Mr. Stephen Thomas demonstrating the hypersonic threat detection using Parsons Digital Engineering Framework (PDEF).

AIAA LA-LV e-Town Hall Meeting (30 January, 2021) *(Screenshots only)*

(Part 1) Mr. Al Globus (NASA Ames Center Contract Software Engineer AIAA Space Colonization Technical Committee)
(Part 2) Dr. Daniel Clayton (Sandia National Laboratories)

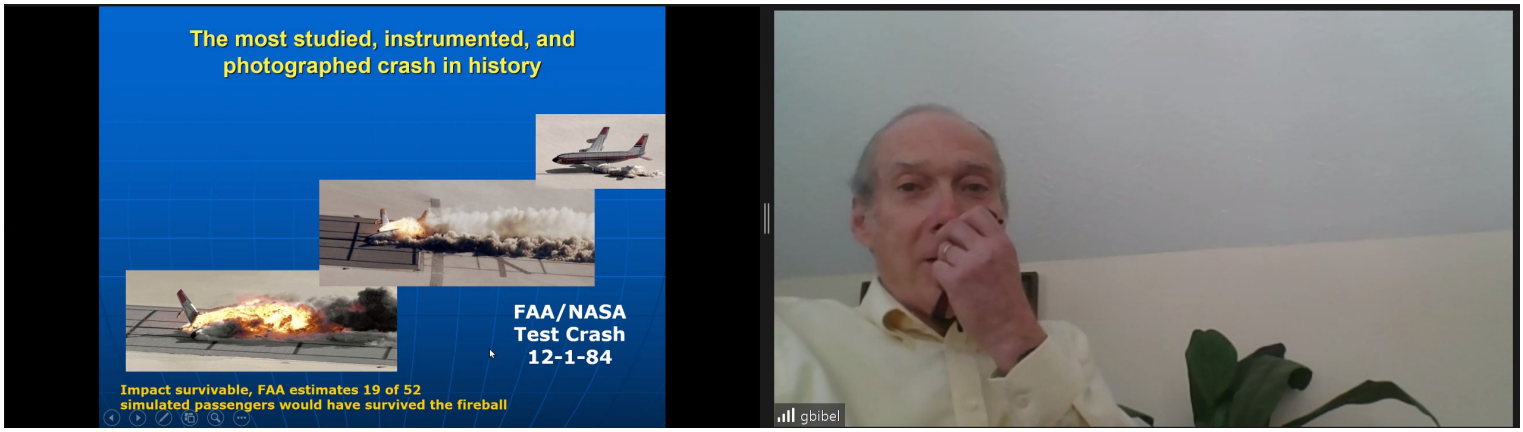
Mr.Al Globus showing the excitng approach, the Kapana One, as an easier way for Space Settlement. It's also to serve as the test ground beyong the International Space Station (ISS) and the future development of Space Settlement.



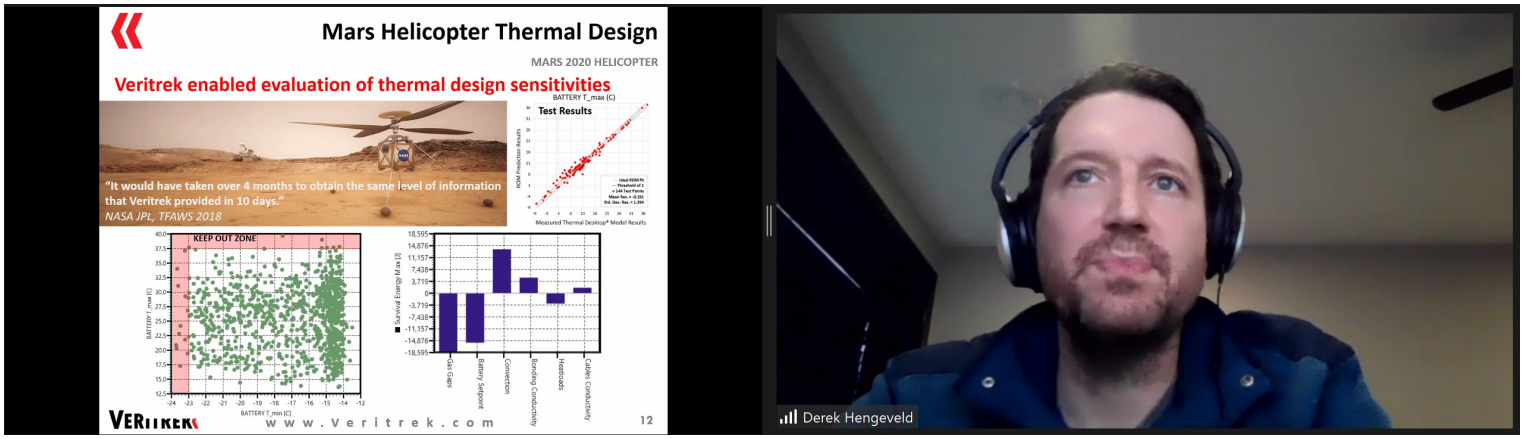
Dr. Daniel Clayton showing the analysis for the nucleaar fallouts for a simulated launch failure / explosion, as one of the studies for Space Nuclear Systems Launch Safety.

AIAA LA-LV e-Town Hall Meeting (6 February, 2021) *(Screenshots only)*

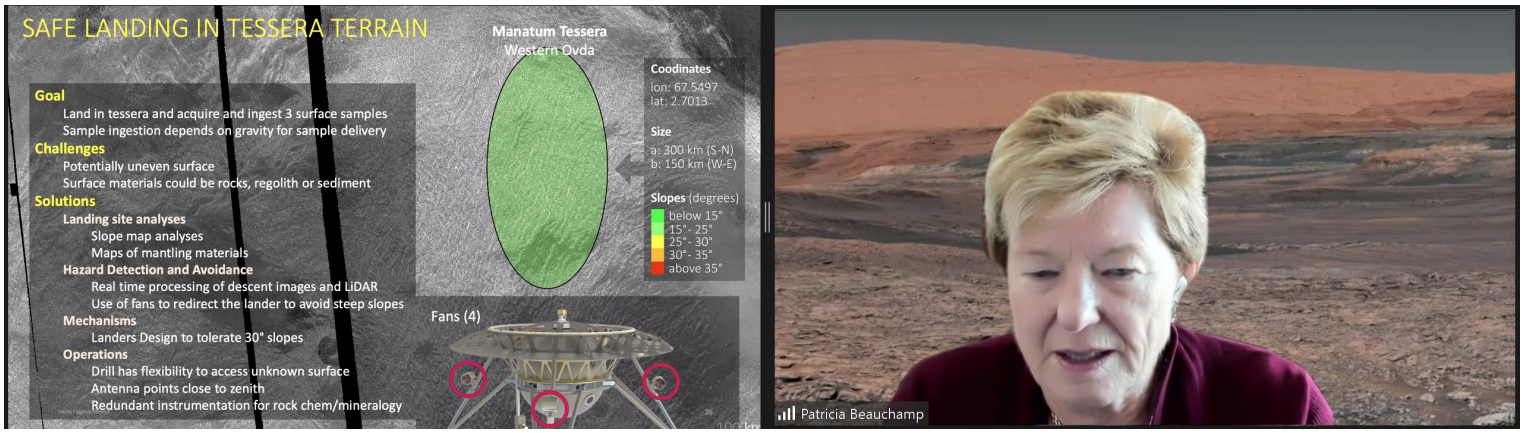
(Part I) Prof. George Bibel (University of North Dakota, AIAA Distinguished Lecturer)
(Part II) Dr. Derek Hengeveld / Mr. Jacob Moulton (LoadPath / Veritrek)
(Part III) Dr. Patricia M. Beauchamp (Jet Propulsion Laboratory, California Institute of Technology)
https://aiaa-lalv.org/feb-6-2021-prof-george-bibel-dr-derek-hengeveld-mr-jacob-moulton-dr-patricia-m-beauchamp/



Prof. Bibel taking about the most studied instrumented and photographed crash in history, leading to the later discussions on studying some historic and newer / recent disaststers.

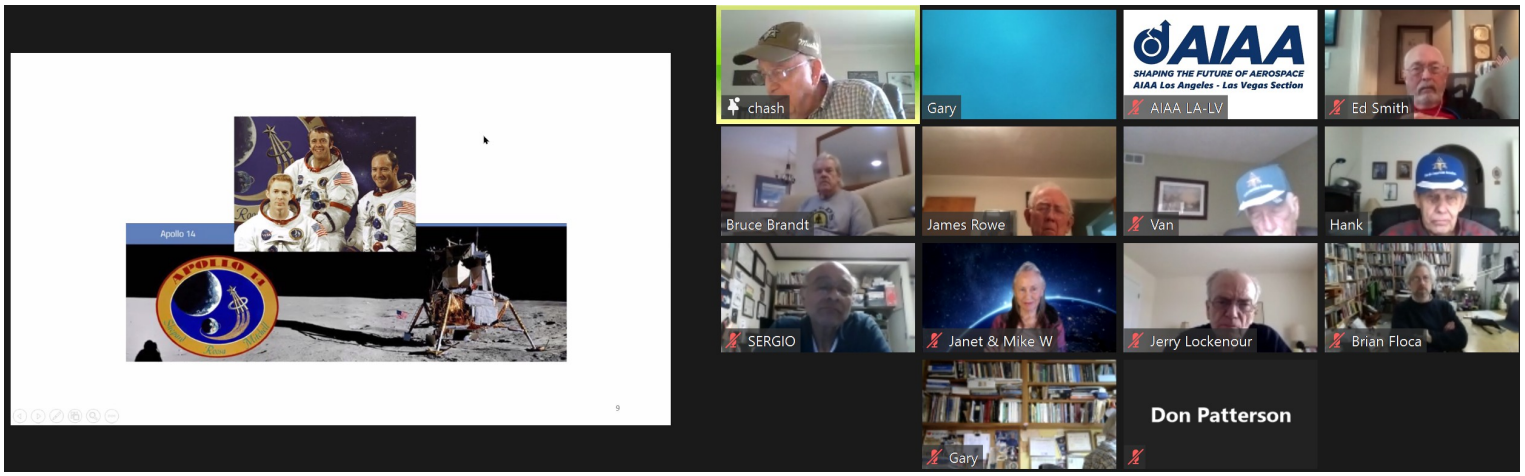


Dr. Derek Hengeveld (and Mr. Jacob Moulton with audio/voice presentation), not showing up in the camera, demonstrating Veritrek Enhanced thermal analysis using reduced-order models with the example of Mars 2020 Helicopter Ingenuity, which was going to land on Mars in a few days from the day of this event.

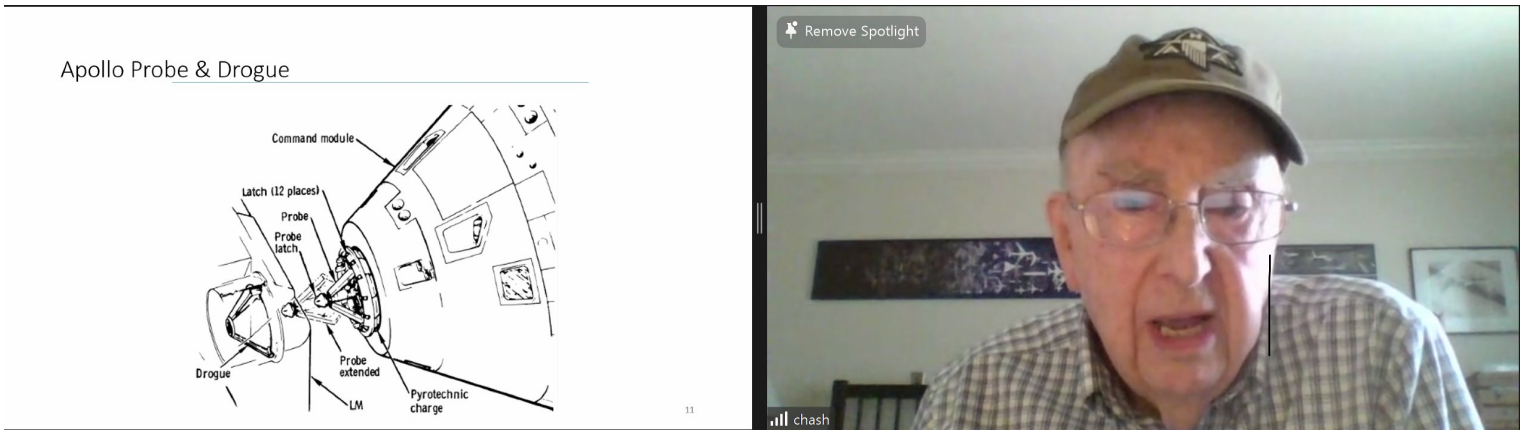


Dr. Patricia M. Beauchamp showning the proposed landing mission and lander on Venus in Teser Terrain after 2031, a key goal and step in the Venus Flagship Mission Planetary Decadal Study for future exploration Earth nearest neighbor and twin sister. Verus, Mercury, Uranus, Neptune etc. were kind of overlooked in the past many decades.

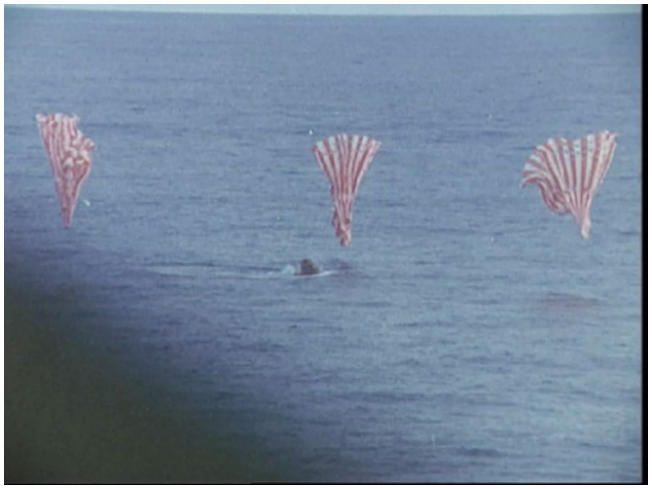
AIAA LA-LV Aero Alumni Meeting Apollo 14 50th Anniversary (9 February, 2021) *(Screenshots only)*



Attendees gathering for remembering and celebrating the 50th Anniversary of Apollo 14, chatting about the mission, astronauts, excitement, implications for the successful back-to-the-moon after the successful failure of Apollo 13.



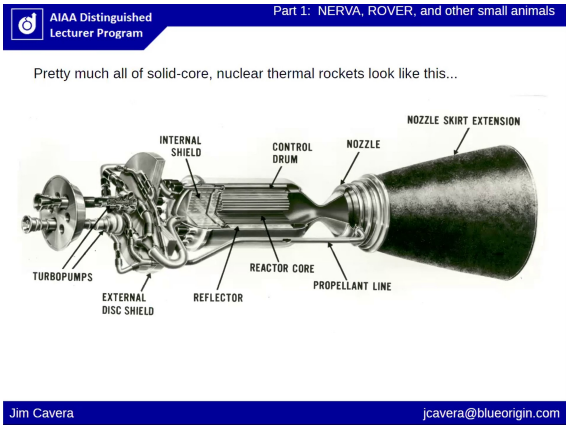
Mr. Chuck Lowry speaking for about 10-15 minutes sharing some key features about Apollo 14, especially after the Apollo 13 , including the famous story about Astronaut Alan Shepard's demo for playing golf on the Moon during the mission.



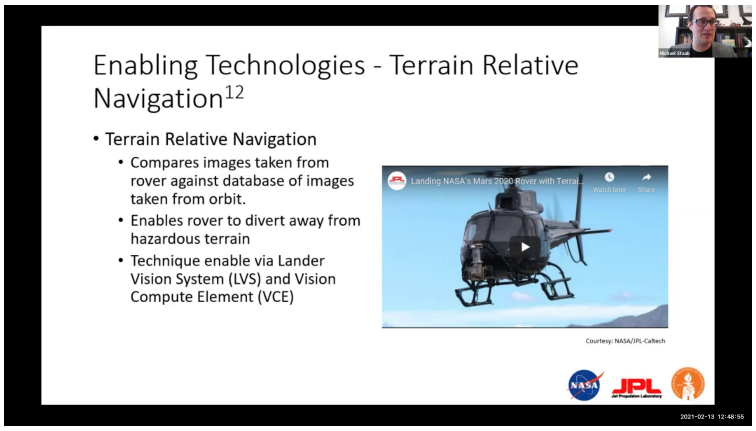
All 3 astronauts returend to Earth safely. As Mr. Ed Smith mentioed in the meeting, Apollo 14 made people at that time feeling very confident that the Apollo Program will continute, alo the Space Program.

AIAA LA-LV e-Town Hall Meeting (13 February, 2021) *(Screenshots only)*

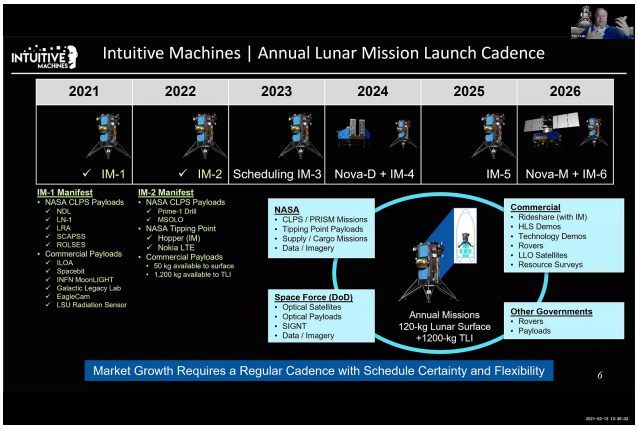
(Part 1) Mr. Jim Cavera (Blue Origin)
(Part 2) Mr. Michael Staab (Northrop Grumman Corporation)
(Part 3) Dr. Timothy Crain (Intuitive Machines)
https://aiaa-lalv.org/feb-13-2021-e-town-hall-meeting-with-jim-cavera-mr-michael-staab-and-dr-timothy-crain/



Mr. Cavera showing the attendees the basics of nuclear physics, neutronics, RTGs, historical designs, and some advanced nuclear propulsion.



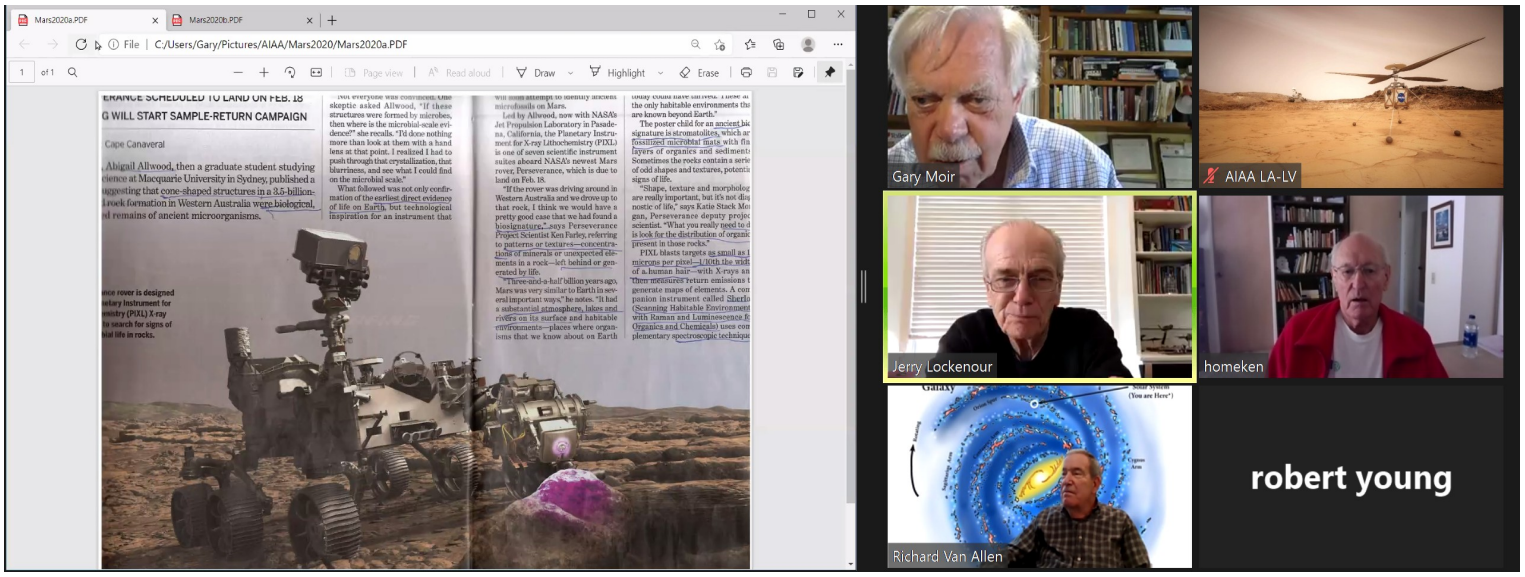
Mr. Michael Staab, the Mars 2020 Guy/Guru, sharing the excitement and insider views on each of the important aspects of the mission, including the new AI used for landing: the TRN: Terrain Relative Navigation, fully tested with helicopter in advance.



Dr. Tim Crain (left) talked about the team culture and the long term AIAA experiences, which enabled the success of his company, the Intuitive Machine, one of the few that were awarded the NASA Tipping Point grant. Each years from 2021-2026, they will launch several landers, 1-2 per year for the Artemis Lunar efforts. He also gave good advice for students perusing excellence in aerospace.

(All the three speakers on 13 February, 2021 are AIAA Members, Mr. Jim Cavera is also AIAA Distinguished Lecturer, Mr. Michael Staab was AIAA San Gabriel Section Chair, Dr. Tim Crain has been a long time member since student membership and also was in the AIAA Standards Technological Committee.)

AIAA LA-LV Aero Alumni February Meeting (17 February, 2020) *(Screenshots Only)*

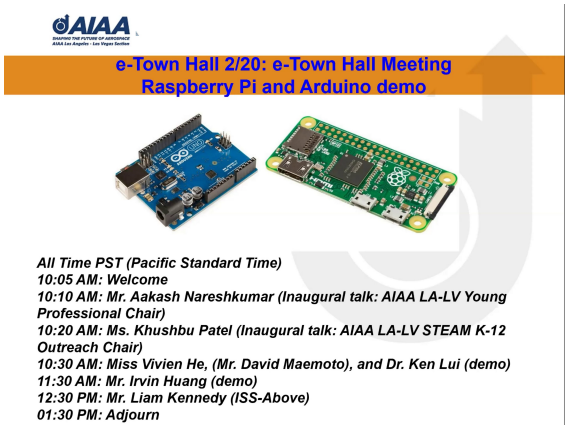


Some retirees gathering for an aero alumni meeting, a day before the landing of Mars 2020 Perseverance on Mars, checking the information for the landing discussing some issues like the mission designs, helicopter on Mars etc.

AIAA LA-LV e-Town Hall Meeting (20 February, 2021) *(Screenshots only)*

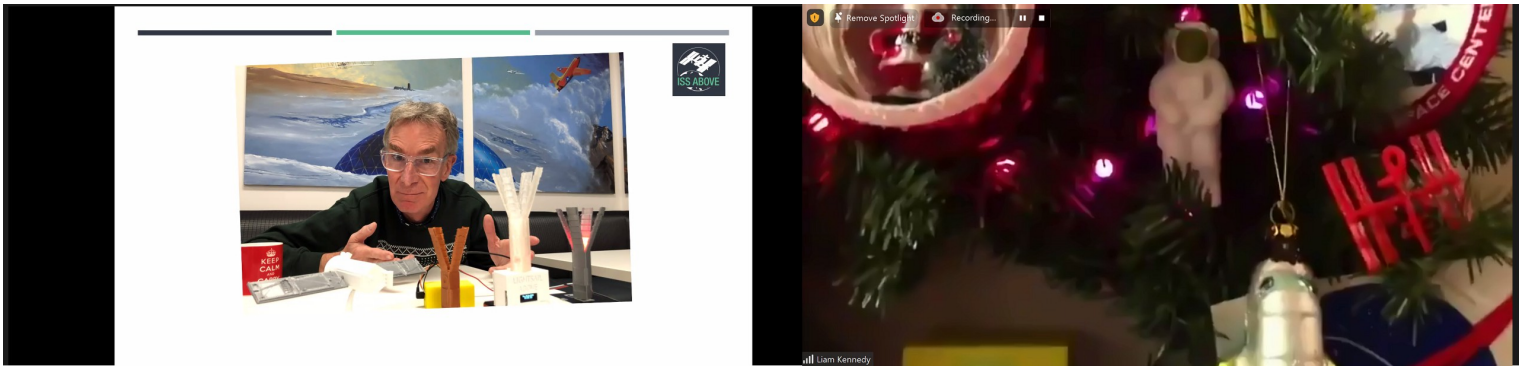
Raspberry Pi and Arduino demo

(Part 1) Miss Vivien He and Dr. Ken Lui
(Part 2) Mr. Irvin Huang
(Part 3) Mr. Liam Kennedy (ISS-Above)
https://aiaa-lalv.org/february-20-2021-e-town-hall-meeting-raspberry-pi-and-arduino-demo/



Mr. Aakash Nareshkumar (left), giving his inaugural speech for becoming the new Young Professional Chair of AIAA LA-LV Section. (Right) Agenda of the event on 20 February, 2021.

Mr. Liam Kenndy (left) asking questions and making comments for Vivien He's (right) Earthquake detection Raspberry Pi device, praising her for the great effort and gadget she made as a High School project.

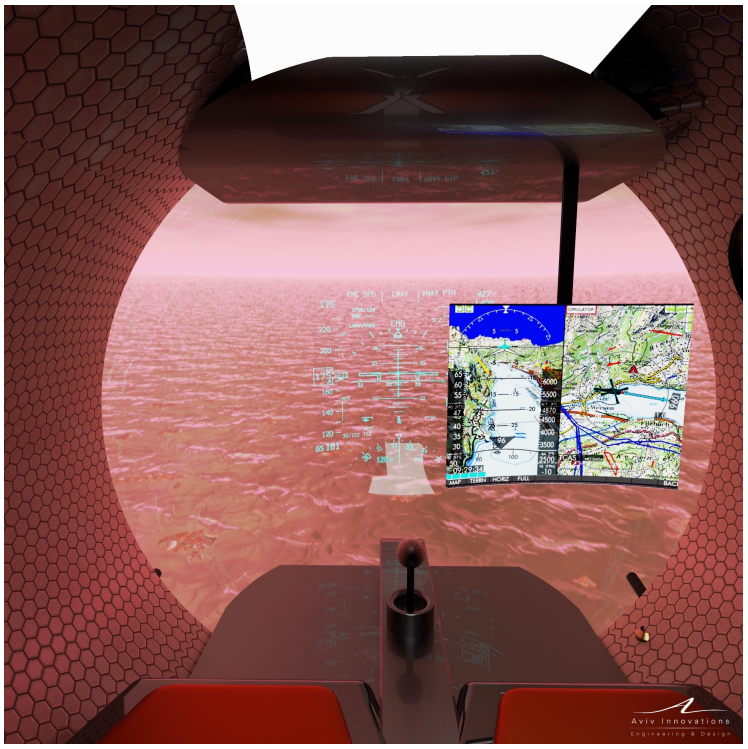


Mr. Liam Kenndy's ISS-Above Raspberry Pi has been well-known, including Mr. Bill Nye (left), the Science Guy, (who used to attend / participate in AIAA Los Angeles meetings / events many years ago, similar to Dr. Buzz Aldrin, Mr. Elon Musk, Ms. Gwynne Shotwell (and more in the Proud Bird). (Right) The Raspberry Pi Christmas Tree Mr. Kennedy made for his family. He mentioned many other Raspberry Pi applications he and others did, along with the testing he made along the way, leading to the successful development of his ISS-Above.

(Continued on Page 29

The Raymer Manned Mars Plane (RMMP) (Continued from Page 1)

Results to date indicate that, with sufficiently advanced technologies, such a manned Mars airplane should be feasible. The configuration presented herein seems viable (existence proof) and has certain desirable features but future trade studies may find an even better design.



Raymer's AIAA SciTech 2021 paper:

- The Raymer Manned Mars Airplane: A Conceptual Design and Feasibility Study
- Video presentation at AIAA SciTech 2021 - Daniel Raymer
- Viewgraphs used in the video presentation (limited to 10 minutes)
- Complete viewgraph presentation of RMMP as of Jan 2021

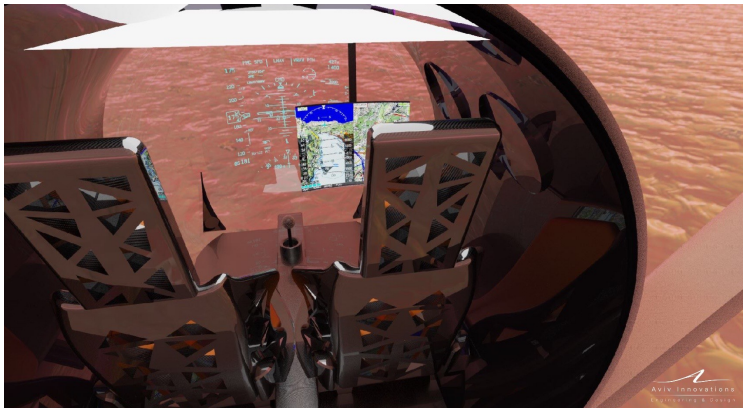
Click here to download a gorgeous animation by Jean-Francois Clavreul (mp4)

RMMP Volunteer Team Reports:

- Airfoil Design
- CFD Analysis
- Wing box structure
- Crew Cabin Sizing
- Stability & Control
- Rocket Takeoff Simulation
- Performance Calculations (text)
- Performance Calculations (viewgraphs)

RMMP Volunteer Team Renderings

Aviv Levy



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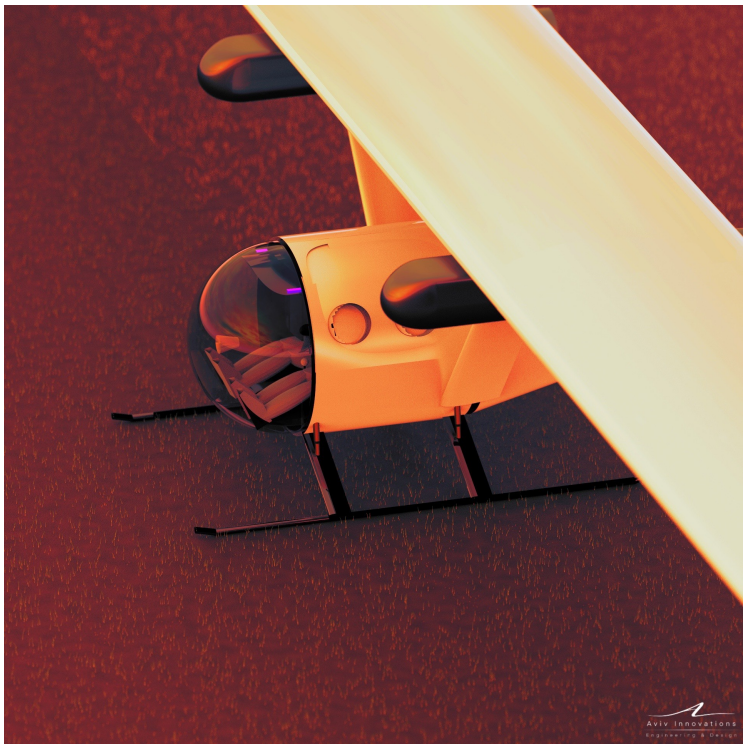
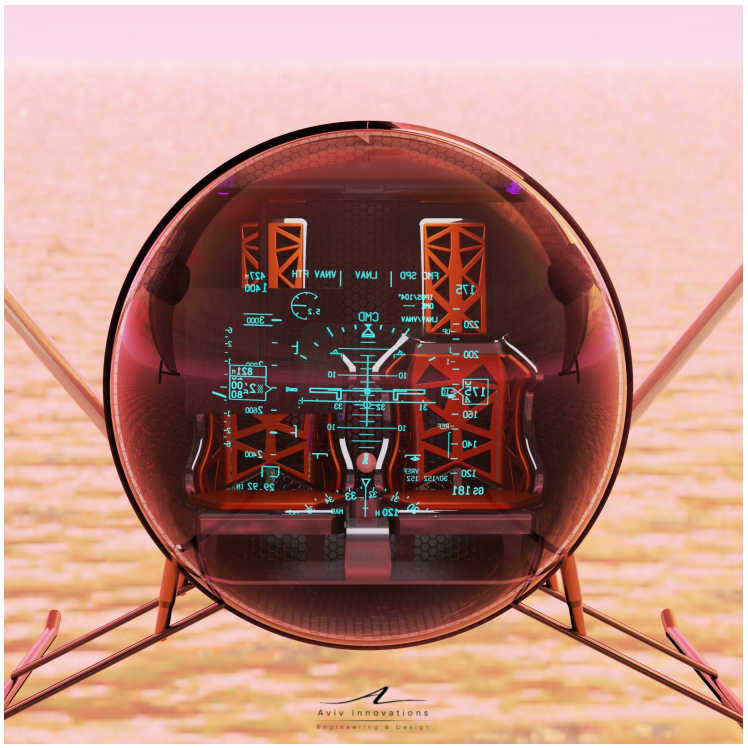
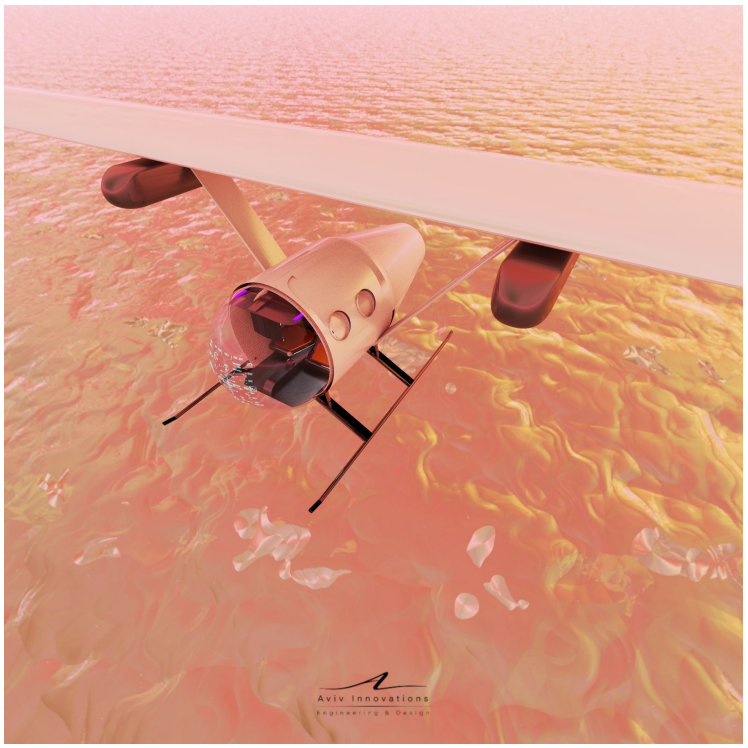
The Raymer Manned Mars Plane (RMMP) *(Continued from the Previous Page)*







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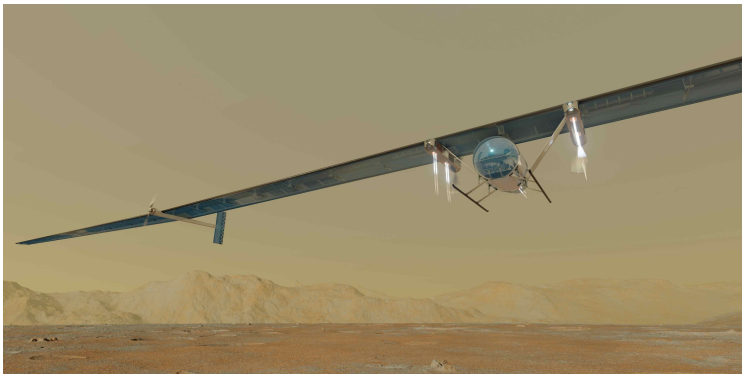
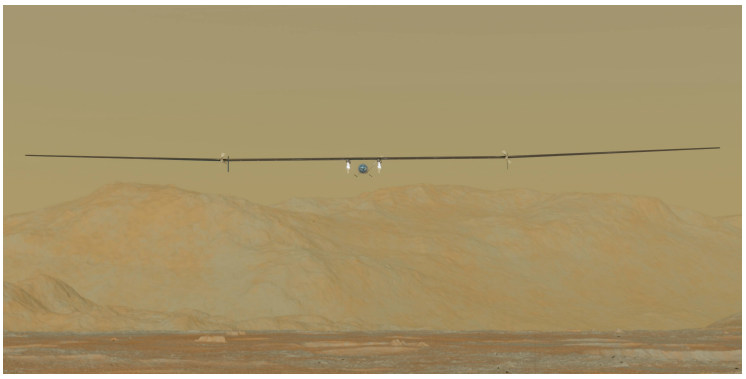
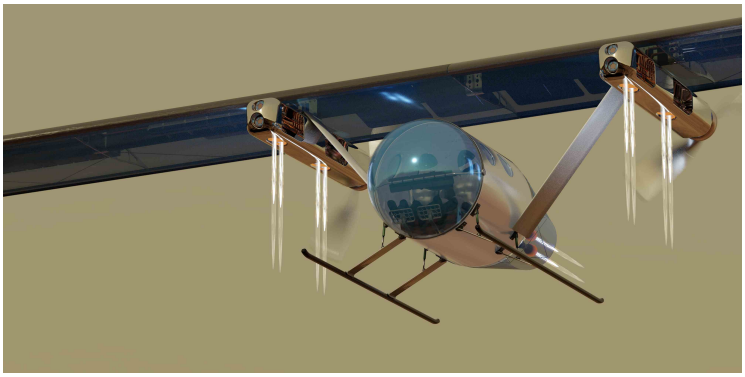
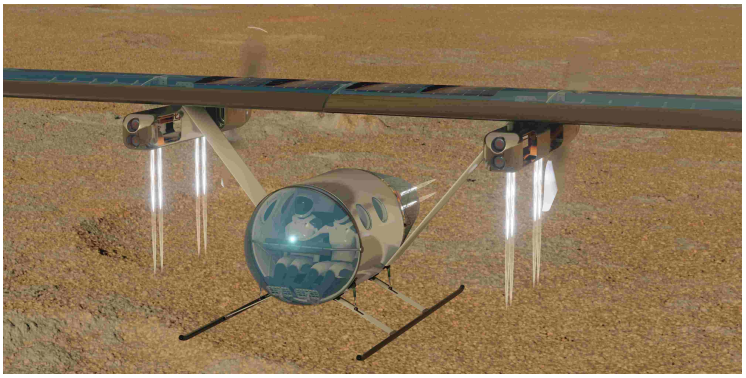
The Raymer Manned Mars Plane (RMMP) *(Continued from the Previous Page)*





Jean-Francois Clavreul





Robert Zubrin | Humans To Mars (Continued from Page 2)

– I was 17 when we landed on the Moon, and the push leading up to it made me want to be part of it, so I decided to learn all the science I could. But I wasn't alone. The number of science graduates in the United States doubled during the 1960s, and in some fields even tripled, as a direct result of Apollo. What Apollo actually said was *learn your science and you can be an explorer of new worlds.*, This led to a massively increase of our scientific capital. I ended up actually working with space, but most went into other fields, computers for example. When people ask what the benefit of the human to Mars program would be, that's what it would be! NASA talks about the technological spin offs, and there have been some, solar energy being one of the most notable. But the real benefit is the intellectual capital! That is what defines the wealth, the strength, the health of a nation.

"I believe that the end goal is the transformation of humanity from a single-planet species into a multi-planet, space-faring species."

– If you want proof of that, just look at Germany and Japan. They were bombed flat in World War II and by 1960 they had among the highest living standards in the world. Other countries remained totally impoverished no matter how much foreign aid they received. I'm not saying that it is on the space station that they will find the cure to COVID-19, but you can bet your bottom dollar that the teams that are finding the vaccines include people who became scientists because they were excited about the space program.

The Moon landing in 1969.

Let's take it to a philosophical level. What is the end goal of exploring space?

– I believe that the end goal is the transformation of humanity from a single-planet species into a multi-planet, space-faring species. You know, humans are not really native to the Earth. We are native to Kenya. We are actually tropical animals and that's why we have these long thin arms with no fur. Nobody could survive a single winter night here in Colorado without technology, for example clothing, houses and fire. We became a global species by virtue of our technological creativity. Starting in the 1500s, we became able to communicate over global distances – first by long distance sailing ships and eventually by telegraphs, telephones, radios, satellites and now the internet. We have truly become a global species at this point. In the same way, technology can enable us to become a multi-planet species. I believe that if we become space-faring, we'll create a future that is grand and its possibilities compared to now will be what we have now compared to our origin in Kenya.

Have wars and other existential threats on Earth increased your passion when it comes to colonizing Mars?

– One possible future is where people imagine that resources are limited. This would mean limited possibilities and seeing other people as adversaries. Then the killing starts. In 1914, Europe was by far doing better than it ever had before, The German generals thought that a war with Russia for Eurasia would happen sooner or later, so why not hit before they industrialize? Right now the same is said about the West and China, both with a population of a billion people. There are Western national security professionals who believe that the a war with China is inevitable, and you can bet that in Beijing there are people who look at the chessboard from the other side, thinking the same thing.

"I believe the goal should be humans to Mars, and it should be by 2030 and not

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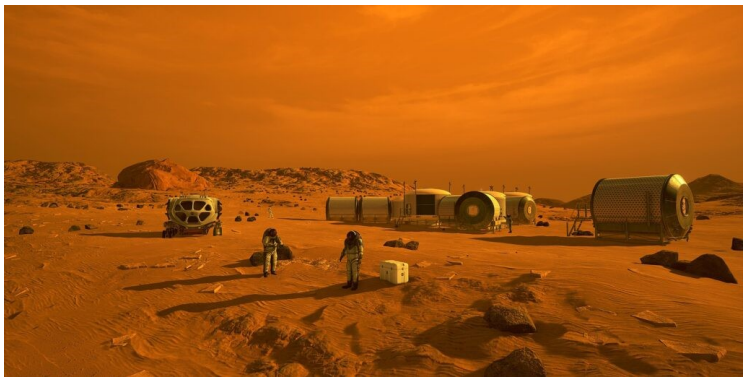
Robert Zubrin | Humans To Mars *(Continued from the Previous Page)*

– The worst part is that it's wrong, complete nonsense! The living standard of the world has gone up as the population has increased. This is because the more people, the more inventions. Inventions are what determines what is a resource and what is not. Consequently, this means the more people, the more resources. It may seem totally counterintuitive but it's facts of history. We're not going to get oil from Mars, but we will get an understanding. We will understand that the true human condition is not one of nations in a struggle of existence over limited resources. It is one of a family of nations that are engaged in a common project. If we use the diverse creative potentials of the different nations of the Earth, we can open up for new planets. So why fight over provinces?

Has NASA been too lunar-focused in your opinion? – If we talk about the current administration, one might say that, but I think the bigger problem is that NASA's Human Spaceflight Program has had no focus since the end of the Apollo program. I'm not a fan of Mr. Trump but I'll give him that at least they stated that the Human Spaceflight Program should have a goal. Now, they didn't do what was necessary to achieve that goal, getting to the Moon by 2024. But it is crucial that we have a goal, and that the goal is soon enough to command current activities. Obama said his goal was Mars, but there was nothing being done to reach the goal. I believe the goal should be humans to Mars, and it should be by 2030 and not 2050.



Artistic concept by NASA for the first humans on Mars.

– Kennedy said the goal was to reach the Moon by the end of the decade. The key there is the time limit, because if Kennedy had said that they would do it by the year 2000, then nothing would have been done in his term of office. Actually, by 1990 nothing would have been done. People would probably look at it in 1990 and say we'll do it by 2040, and so forth. The goal has to be proximate. What was wrong with the plan to go to the Moon by 2024 was that instead of developing a lunar lander, which of course you need if you want to land on the Moon, they had a program to develop a lunar orbiting space station which you don't need if you want to land on the Moon.

Mars missions have been going on since the mid 1960s. What would you say have been the most significant discoveries about Mars since then? – The first flybys debunked the very optimistic claim that there were networks of canals on the Martian surface. The images we got at that point were of a Mars with craters of the kind there is on the Moon. But then came Mariner 9 that got into orbit around Mars and first observed water erosion features on the surface, which does not exist on the Moon. Rovers have found salt deposits that are left behind when water evaporates. There's no question that the early Mars was warm and wet. With the ground penetrating radars of the Mars Express and the Mars Reconnaissance orbiter, we discovered glaciers on the surface and underground lakes. In fact, it seems like the early Mars and the early Earth were very similar to each other. They both had climates suitable for liquid water and they both had carbon dioxide atmospheres.

– To me, it appears that Mars is the Rosetta Stone for testing the hypothesis of whether life evolves naturally in places where there are the right physical and chemical conditions. If Mars did develop life, it would inform us of much more than just the probability of life. It would tell us something about the diversity of life. All Earth-life uses the same information system, RNA and DNA. But there could be more to life than DNA and RNA. There could be different kinds of information systems offering totally different possibilities of creation. Just think of the silicon computers that we're using right now, and how they're accomplishing the same things as us but with a different set of principles.

"We're going to find out if life is a spontaneous phenomenon, if all life has a common origin or if there are diverse origins."

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Robert Zubrin | Humans To Mars *(Continued from the Previous Page)*

How likely do you think it is that we find evidence of life on Mars?

– I think it's very likely. Because the one fact that we know about life on Earth that's relevant to this discussion is that it appeared virtually as soon as it could. We have fossils of life on Earth that go back 3,5 billion years, and there are actually biomarkers that have been found on Greenland that date back 3,7 billion years. That is immediately after the end of the heavy bombardment, which makes the claim that life appeared on Earth virtually as soon as it could quite believable. There's no evidence supporting the existence of an Earth that was both habitable and sterile at the same time. It never seems to have happened.

– There are two possibilities. Either life is a highly probable phenomenon that just appears out of chemical complexification as soon as it is possible for it to happen, or life has been floating around in space, and as soon as the place becomes habitable it lands and picks up. Now, if we find life on Mars, is it going to be the same as Earth-life with DNA/RNA, or is it something completely different? We're going to find out if life is a spontaneous phenomenon, if all life has a common origin or if there are diverse origins.

Dr. Robert Zubrin.

Photo Credit: Jason Rhian / SpaceFlight Insider

– There's also another possibility, which is that life originated from Mars and was transferred to Earth by meteoric travel. We get rocks all the time that we're knocked off Mars by impact. If microbes originate from Mars, they could have come here. If they originated on Earth they can as well have gone to Mars. There was a great Swedish scientist, Svante Arrhenius, who developed the theory of panspermia – the idea of life being transferred throughout the Universe. The thing that drove Arrhenius' theory was that we don't find any evidence of free living organisms on Earth simpler than bacteria. There's no prior history. You might think bacteria seem simple, but they're extremely complex. A bacteria is a far more complex than an iPhone for example.

– When we look at the iPhone, we can see a whole history of prior machines like telephones, desktop computers, generators and batteries. You can see the technological evolution. But with life it's like the iPhone appears out of rock. This suggests that life on Earth could be an immigrant phenomenon. You could try to explain it by saying that maybe all prior, more primitive lifeforms were wiped out by the bacteria. But this is something we don't generally see. We see simple forms of life coexisting with more advanced forms that evolved from them. We could hope to find the ancestors to Earth-life on Mars.

What would be the biggest challenge trying to colonize Mars? Lack of atmosphere? Lack of magnetic field? Sand storms?

– Lack of atmosphere. The shielding we get here on Earth from cosmic radiation is not due to the Earth's magnetic field; it's due to the atmosphere. The magnetic field is blocking out solar flares, but the more penetrating cosmic rays are stopped by the air. It's of course also the air that let's you walk around without a pressure suit. So the Martians are going to need air. The initial settlers are going to live in the spacecrafts and walk around in space suits. Later on we can build domes, we can have underground systems, or probably a combination of them. People could spend most of the time sleeping underground where they're well shielded against cosmic rays, but with domes above them. But eventually I do believe that humans will give Mars an atmosphere, thick enough so you don't need a spacesuit. We will terraform the planet.

"There's for sure going to be a Chinese SpaceX, and probably others, that are going to be competing."

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Robert Zubrin | Humans To Mars *(Continued from the Previous Page)*

I have to ask what did you think of the movie The Martian (2015)?
– I thought it was a pretty good movie. There are some technical errors that people pointed out with the film, but my real problem is that the principle character played by Matt Damon is not interested in Mars. He is not interested in the search for life on Mars, he is not interested with Mars as a new frontier for humanity. He just wants to get home. He should have stayed home in my opinion! If you think about the first Jurassic Park movie, it doesn't just tell you about the terror of the dinosaurs but also the wonder of the dinosaurs. We need a similar movie about Mars, that is not only about the adventure of Mars, but the wonder.

You know Elon Musk and you have said he has initiated a revolution. He has contributed in terms of technology, vision, hope, excitement and more. What would you say is his most valuable contribution?
– I would say that his most important contribution is that he has proven that it is possible for a well-led entrepreneurial team to do things in the space field that was previously thought to cost ten times as much and take three times as long. It's even things that were considered impossible all together. He has completely refuted the myth that everything you do in space has to cost a billion dollars. He has also developed some revolutionary hardware. In the past 10 years he has caused the cost of space launch to drop with a factor of five.

Elon Musk and Dr. Robert Zubrin – two great Mars enthusiasts.

– Elon Musk has inspired an international space race. There's for sure going to be a Chinese SpaceX, and probably others, that are going to be competing. There will be companies similar to SpaceX for building satellites, spacecrafts and everything you can think of. It has even had effects outside of the space world, for example in the area of controlled fusion. It is an area that has been so stagnant as to inspire a lot of cynicism about its prospects for ever succeeding. Investors looked at SpaceX and thought that maybe the problem with fusion is not fundamentally technological but organizational, Entrepreneurial fusion companies are now getting serious money and they're looking at developing fusion reactors, not in 30 years but in five. One of them will probably succeed and I think ultimately that is due to Musk.

Let's do some rapid fire questions! What year will the first human set foot on Mars?
– 2030.

What year will the first human be born that will live his/her whole life on Mars?
– That's an interesting question… 2038!

Where will we go after Mars?
– After Mars, then the stars!

What is your best book recommendation?
– The Rational Optimist by Matt Ridley. I think there's a lot of wisdom in that book, and I think we have to be rational optimists.

Editor's note: Please also refer to the NBC News interview on 9 February, 2021:

https://www.nbcnews.com/science/space/mars-set-visits-uae-china-u-s-spacecraft-n1257126

as well as the one on Fox News on 24 February, 2021

https://video.foxnews.com/v/6234885051001#sp=show-clips

Race is on for hypersonic weapon supremacy (Continued from P. 3)

China claims it has a new hypersonic cruise missile that can be launched by its H-6N strategic bombers. There is no further information yet to confirm the claim.

India is building a new version of its BrahMos sea skimming missile that will operate at Mach 7 or March 8. The project, dubbed BrahMos-II like its predecessor missiles is a venture between the Defence Research and Development Organisation (DRDO) of India and the Federal State Unitary Enterprise NPO Mashinostroyenia (NPOM) of Russia.

Last April the US Air Force began a process of asking US industry for information on developing a hypersonic cruise missile. While not specified as scramjet propulsion, the Air Force made clear it was looking for an air breathing hypersonic cruise missile.

In August, the Pentagon awarded Lockheed Martin its second multimillion-dollar contract to develop the AGM-183A Air-Launched Rapid Response Weapon, or ARRW, hypersonic missile. This is a so-called "boost-glide" vehicle that could be carried on US strategic bombers, most likely the B-52. This weapon, when developed, is projected to have a range of 1,000 miles. Exactly what kind of warhead and how large is not public information. The AGM-183A is projected to reach Mach 20.

The Russian Avanguard (rated at above Mach 20) and the Chinese DF-ZF are examples of glide vehicles that are launched from rockets and reenter the atmosphere at very high speed. Because they are designed to glide in the atmosphere they can ride in at a reduced glide angle and can be manoeuvrable. Both the Russian and Chinese glide vehicles are equipped with nuclear warheads. Russia claims it has already deployed Avanguard starting in November, 2019 as part of its strategic nuclear forces.

As of today there are no known missile defenses that can defend against a high speed hypersonic glide vehicle, and certainly none that can respond quickly enough if the vehicle's tagert is unpredictable until the last few seconds, a feature that is attributed to glide vehicles like the Avanguard.

Some existing shipboard and land-based missile defense systems may have a better chance against hypersonic cruise missiles, although this is primarily based on the lower speed of air breathing hypersonic cruise missiles and that present-day hypersonic cruise missiles follow a fixed flight path. One of the reasons the US Navy is upgrading older SPY radars on its Flight IIA Arleigh Burke-class destroyers (using SPY-6 radars built by Raytheon) is to improve its AEGIS ballistic missile defense system so it can more easily detect and destroy Chinese and Russian hypersonic cruise missiles. The new Spy-6 radars use gallium nitride technology.

The Rand Corporation, a leading "think tank" that supports the Department of Defense in the United States, thinks the only answer to hypersonic weapons are arms treaties, and Rand is proposing the Missile Technology Control Regime as a way of containing the spread of hypersonic weapons. Unfortunately, the MTCR has failed to control missiles of all kinds since it went into force in 1987. Since then China has vastly expanded its missile forces; North Korea has developed its first ICBMs; Iran has become a missile threat in the Middle East.

Perhaps it could be possible to put a lid on the development and deployment of hypersonic systems through a type of arms limitation agreement. But there are two flies in the ointment: China and Russia think they are ahead of the United States and may be unwilling to even engage on the issue; China has steadfastly refused to take part in arms limitations agreements. In fact, one of the primary reasons the US decided to end its participation in the Intermediate Nuclear Forces agreement with Russia was because it perceived it as limiting what it could do to balance China's growing mid-range missile forces.

Meanwhile the race to find solutions to hypersonic weapons will have increased emphasis. The US will spend $3.2 billion in fiscal year 2021 on hypersonic systems, of which $206.8 million will go to hypersonic defense systems. Readers should expect that number to jump up if the US finally commits to space based defenses.

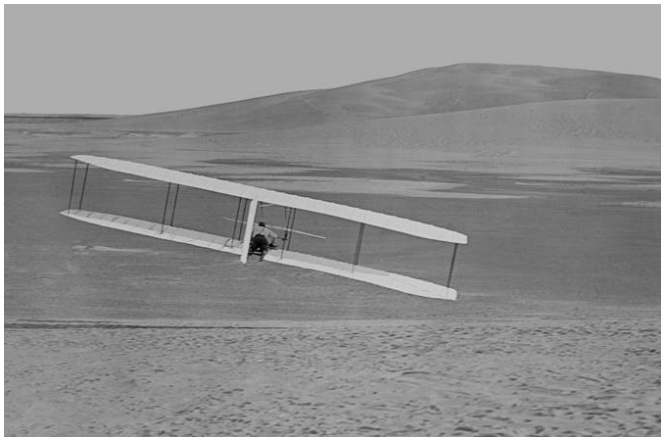
Aerodynamic Study of the Wright Brothers' 1902 Glider and 1903 Flyer

(Continued from Page 5)

Upon Wilbur's discovery of adverse yaw, the Brothers' powerful collaboration came to the rescue. Orville suggested making the fin movable, thus increasing its ability to generate yawing moments. Wilbur then added that the fin should be coupled with roll to promote coordinated turns. These features, together with changing the "bi-fin" to a "mono-fin," were implemented with great success. The photo below shows coupled roll and yaw in action. The right-hand wing incidence has been increased by warping, with the fin deflected trailing-edge-left in an attempt to negate the adverse yaw due to the increased drag on the right-hand wing.

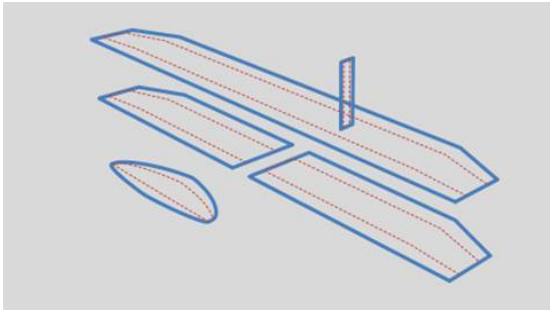
> *This is the third photo of the glider supporting our assessment that the average decalage for the canard was near zero.*

The modified glider enjoyed over a thousand flights, the longest lasting more than a minute. We don't need a *YouTube* video to imagine the excitement the brothers must have felt as each took a turn piloting a flight.



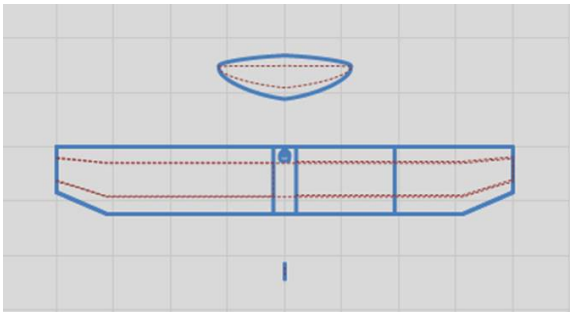
Coupled roll and yaw in action

We now turn to our 3D lifting-line analysis of the 1902 Wright Glider, beginning with various views of the model. Notice first the lower-wing cutout for the pilot. This in effect transforms the aircraft into somewhat of a triplane, not counting the canard.



Isometric view of the 1902 Glider

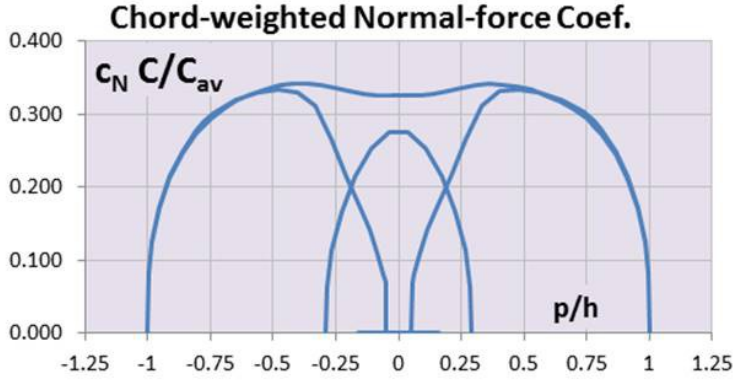
With what amounts to an *aerodynamic finite-element method,* we align horseshoe vortices at the lifting lines (nominally at ¼-chord) of each aerodynamic surface, then solving about 100 linear-simultaneous equations representing the mutual influences of the vortices with the boundary conditions set by the local slope of the "equivalent-plate" airfoil along a downwash line positioned at ¾-chord. The vector-based approach accommodates sideslip and/or asymmetric geometry, including non-planar and/or vertical surfaces.



Plan view of the 1902 Glider with lifting and downwash lines

Plan view of the 1902 Glider with lifting and downwash lines

Next we show the spanwise distribution of chord-weighted lift, including the effects of pitch trim for the estimated center of gravity position with -5% static margin. The canard lift balances not only the nose-down moment of the wing lift vector acting (at 23% chord) aft of the c.g., but also the nose-down pitching moment coefficient (-0.02 each) of the modestly-cambered wings.



Spanwise distribution of chord-weighted lift, 1902 Glider

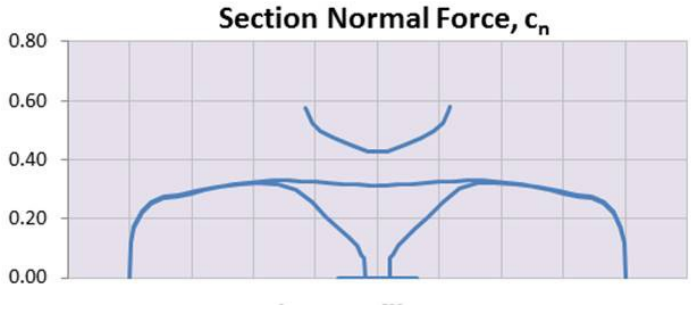
(Continued on the Next Page)

Aerodynamic Study of the Wright Brothers' 1902 Glider and 1903 Flyer

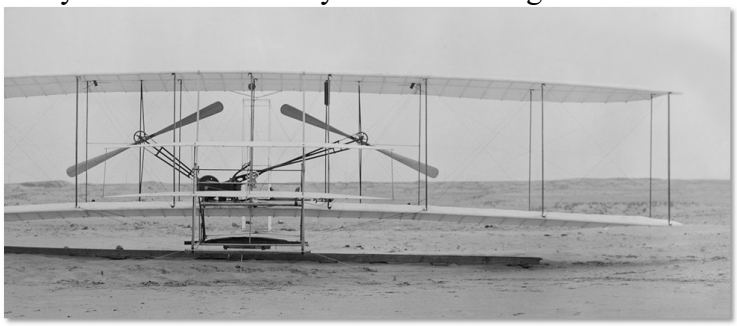
(Continued from the Previous Page)

Next is shown the distribution of lift ("normal force") coefficient. Notice that the canard is loaded about 50% greater than any of the "three" wings. As previously noted, the center of gravity (with pilot) is aft of the aerodynamic center by about 5% of the mean aerodynamic chord. The photos of the glider in flight suggest that this level of pitch instability was manageable. Curiously, if the Wrights had balanced the glider farther forward, the added canard load would risk canard stall with incidence excursions, and this might have delayed or prevented their success. Thus for the *1902 Glider*, what the Wrights didn't know (pitch stability) may have aided success. But that same lack of understanding was nearly disasterous for the *1903 Flyer*.

With the 1903 Flyer, the brothers dangerously departed from their usual step-by-step approach. Instead of "simply" adding a propulsion system to their 1902 glider, or a scaled-up version thereof, they made significant changes which, initially unknown to them, would have undesirable effects. First, they mounted the engine and propellers well aft of an already tail-heavy c.g. But they also changed the canard from a monoplane to a biplane, doubling both its aerodynamic lift capability and its pitch-destabilizing influence. Whereas the 1902 glider flew at a manageable -5% static margin (+5% would be the norm in the following decades), their 1903 Flyer would now be all but unflyable at -25% static margin, easily twice the instability of a modern fighter aircraft.



Spanwise distribution of lift coefficient

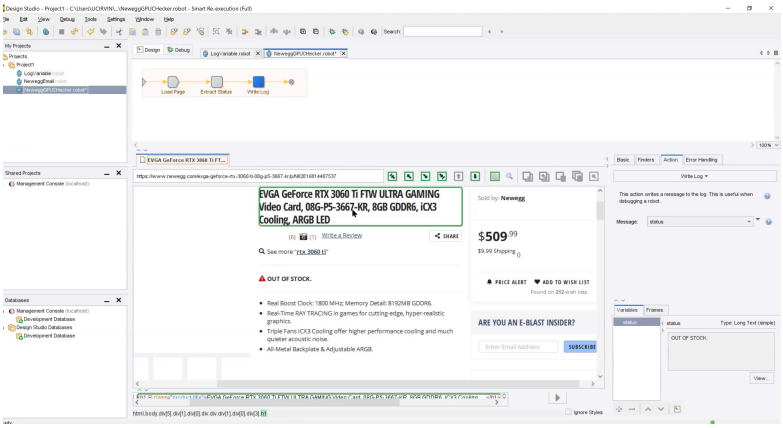


Front view of the 1903 Flyer

The world's most historic aviation photograph - Wilbur gives chase to Orville - 17 Dec 1903 - Notice fighting with the canard

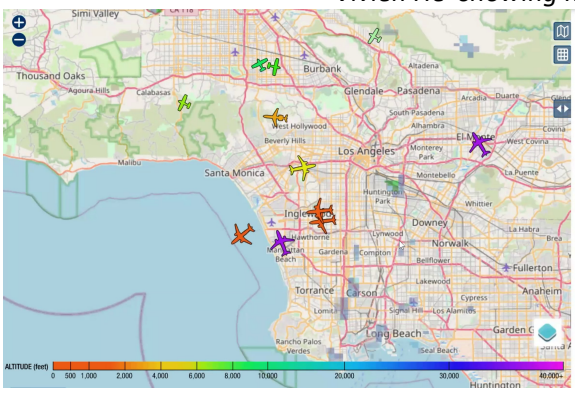
AIAA LA-LV e-Town Hall Meeting (20 February, 2021) *(Screenshots only)*

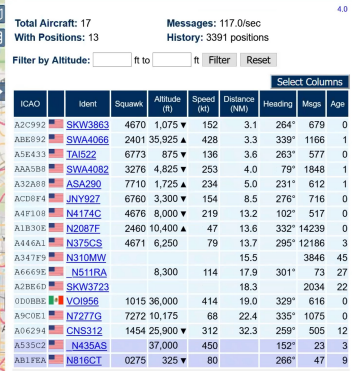
Raspberry Pi and Arduino demo *(Continued from Page 18)*

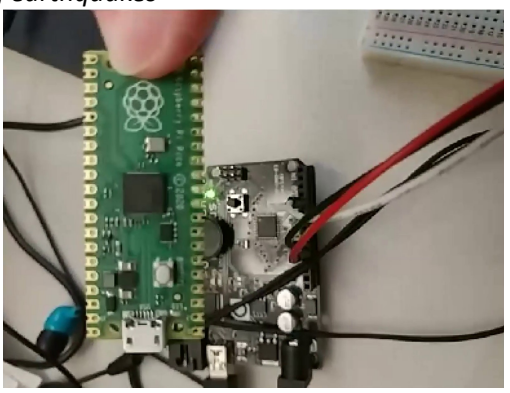


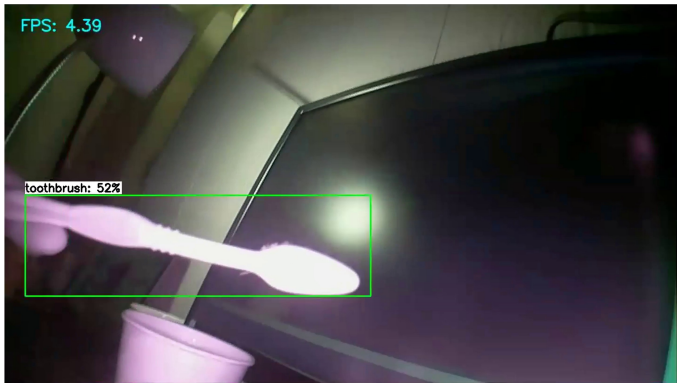
Mr. Irvin Huang showing a Raspberry Pi Retro Game (left), and the Design View Studio (right) (desktop automation)

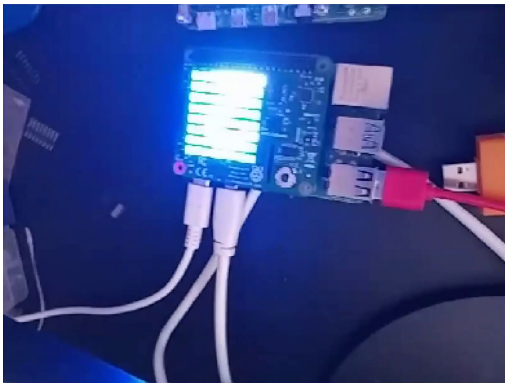
Vivien He showing her Raspberry Pi gadget for detecting earthquakes





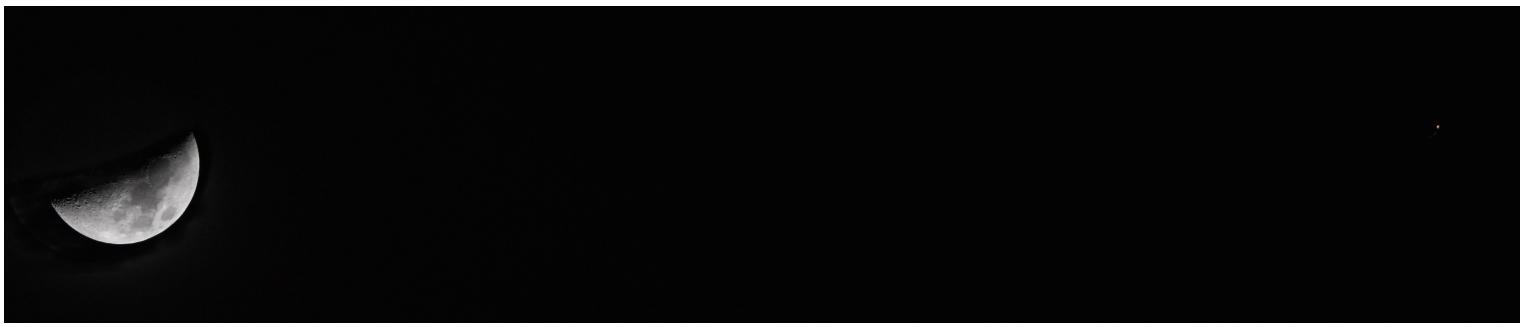






Dr. Ken Lui's demos: an ADS-B receiver (Upper Left), Machine Learning / Deep Learning AI (Lower Left), and an ISS-Tracker LED showing ISS location/passing (Lower Right) using Raspberry Pi, Raspberry Pi Pico and Arduino Uno (on the table) (Upper Right)

Photo Gallery (Michelle Evans): The Moon and Mars on the same day after Mars 2020 Perseverance Landed



The Moon and Mars into the same frame on the same day as the Perseverance rover landed (February 18, 2021). The photo was taken 7 hours and 4 minutes after landing, at 7:59 pm. (Nikon D5600 at 300mm). (Courtesy of Ms. Michelle Evans, AIAA Distinguished Lecturer, https://aiaa-lalv.org/september-28-2020-aiaa-member-spotlight-on-michelle-evan/)

Photo Gallery (Prof. Madhu Thangavelu): The Moon

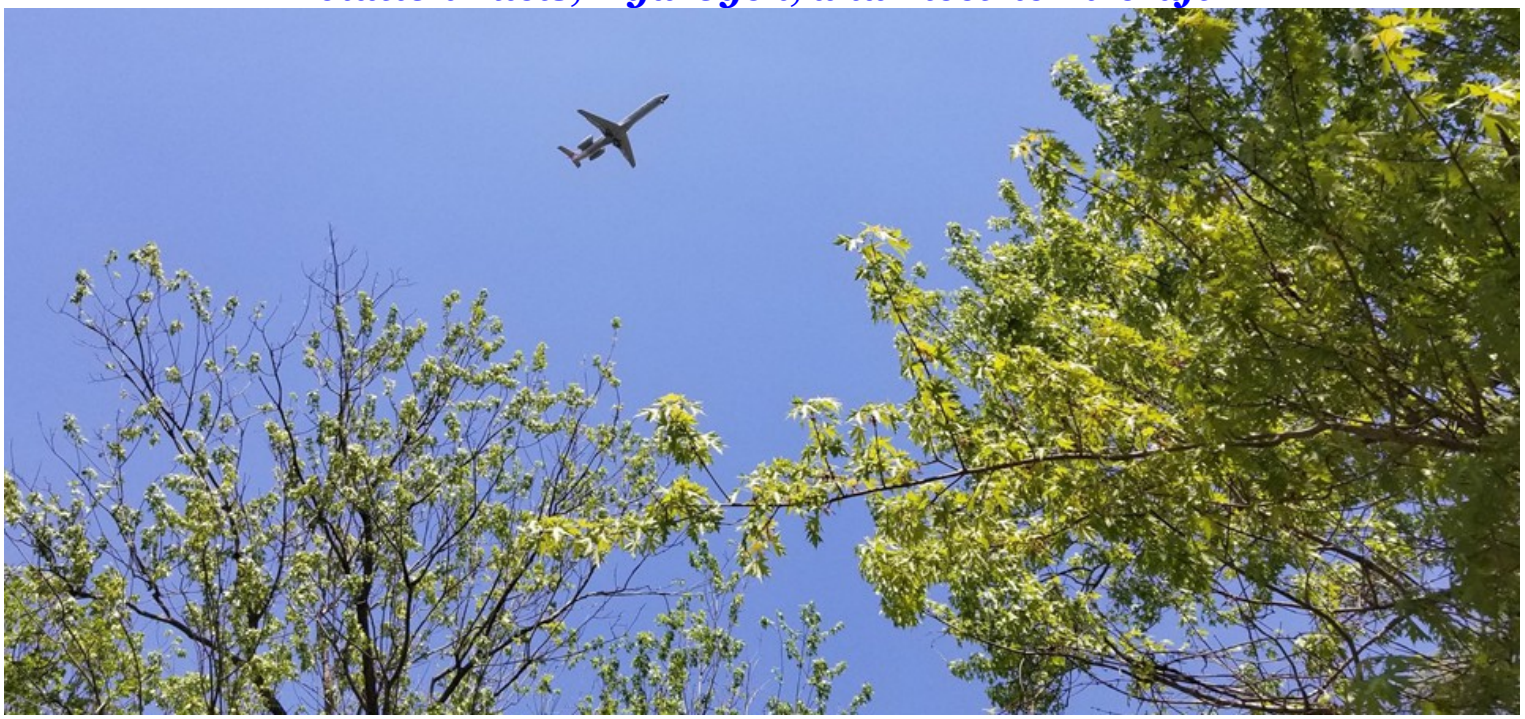
A handheld shot using compact Leica D-Lux 4 through the eyepiece of a 10" Dobsonian on February 21st. Very clear seeing in Palos Verdes, CA. (Photo by Prof. Madhu Thangavelu)

RSVP and Information: *https://conta.cc/3c7kx2d*

*Saturday, February 27, 2021, 10 AM PST (**Add to Calendar**)*

AIAA LA-LV Sustainable Aviation mini-Conference 2021 (Engineers Week)

"Current Topics in Sustainable Aviation, including Biofuels/Sustainable Aviation Fuels, Hydrogen, and Electric Aircraft"



				
Dr. Marty K. Bradley *AIAA Fellow* *Keynote Speaker and Moderator / Panelist* Senior Technical Fellow, Electra.aero Technical Fellow for The Boeing Company (ret.)	Mr. Steve Csonka *Speaker / Panelist* President, Csonka Aviation Consultancy, LLC Executive Director, CAAFI (Commercial Aviation Alternative Fuels Initiative)	*Dr. Bruce J. Holmes, D.E., AIAA Fellow* *Speaker / Panelist* *RAeS Fellow* Chief Technology Officer, Alakai Technologies Corporation	*Dr. Val Miftakhov* *Speaker / Panelist* Founder & CEO ZeroAvia	*Dr. Ed Lovelace* *Speaker / Panelist* Chief Technology Officer, Ampaire

Questions about Events/Program: events.aiaalalv@gmail.com

RSVP and Information: *https://conta.cc/37028B7*

Saturday, March 6, 2021, 10 AM PST (Add to Calendar)

AIAA LA-LV Universty Student Branches mini-Conference 2021

(with a career panel and breakout sessions with individul speakers/panelists)

Tentative Agenda (All Time PST (Pacific Standard Time)

AIAA Cal State University Long Beach

AIAA University of Southern California

AIAA Student Branch at UCLA

AIAA American Institute of Aeronautics and Astronautics University of Nevada, Las Vegas Chapter

10:05 AM PST: Welcome
10:10 AM PST: Mr. J. Philip Barnes (Pelican Aero Group) Professional Session 1
10:55 AM PST: University Student Branches Group and Individual talks Session 1
11:55 AM PST: Dr. Nahum Melamed (Aerospace Corp.) Professional Session 2
12:25 PM PST: Mr. Bill Kelly (Aerojet-Rocketdyne Retired) Professional Session 3
12:55 PM PST: University Student Branches Group and Individual talks Session 2
01:30 PM PST: Career Panel Discussion and further Q&A
02:30 PM PST: Breakout meeting 1-1 or 1-few with the speakers/panelists
(Panelists: Prof. Claire Leon, Mr. J. Philip Barnes, Dr. Nahum Melamed, Mr. Bill Kelly, Sina Aboutorabi) (More TBD)
03:30 PM PST: Adjourn (and networking if preferred)

For University Eductaion Liaison: AIAA LA-LV Education Chair

(Tentatively supported by the STEAM K-12 Outreach Chair Kushbhu Patel) [**patel.khushbu@utexas.edu**]

Questions about Events/Program: mailto:events.aiaalalv@gmail.com

RSVP and Information: *https://conta.cc/3uyfyhZ*

Saturday, March 13, 2021, 10 AM PST (Add to Calendar)

AIAA LA-LV e-Town Hall Meeting 3/13

(Part I)

Hyperloop - The Next Phase: Evacuated Tube Testing for Capsule Acceleration to Sub-Mach One

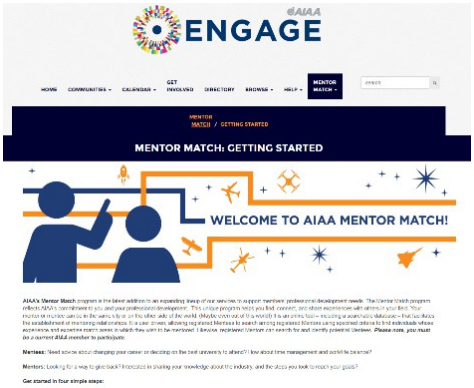
by

Mr. Paul Neuhausen, MSCIS

Notary Signing Agent
Refinance, New Loans and Reverse Mortgages
Living Wills and Trusts (Estate Planning); Error and Ommissions

and

Mr. Greg Henk



(Part II)

AIAA Engage & Community Discussion Board demo and discussion (+ AIAA Online Courses Intro.)

with

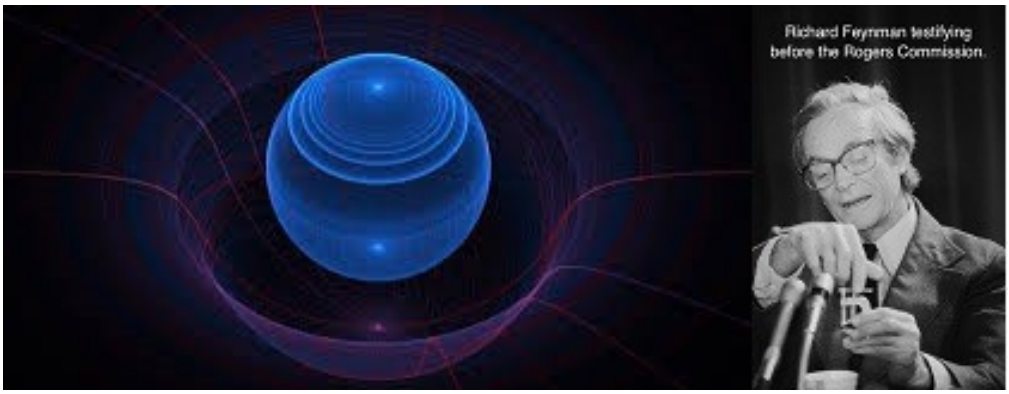
Dr. Ken Lui (More TBD)

AIAA LA-LV Events/Program Chair, LA

AIAA Engage: A great tool for AIAA Members

Chat with fellow AIAA Members !

Questions about Events/Program: events.aiaalalv@gmail.com



RSVP and Information: https://conta.cc/3dCr4mw

Saturday, March 20, 2021, 10 AM PST (Add to Caldendar)

AIAA LA-LV e-Town Hall Meeting 3/20

(Part I)

"Feasible Warp Speeds From Quantum Gravity"

(Celebrate Black History Month)

(+Science/Engineering Education in Botswana/Africa)

(+relation to LIGO of CalTech)

by

Mr. Stuart Marongwe

Scientific Director, Deep Time Technologies

Tutume, Botswana

(Part II)

A brief discussion on

Quantum Computation / Quantum Supremacy

with

Dr. Ken Lui (more TBD)

Ken's Consulting

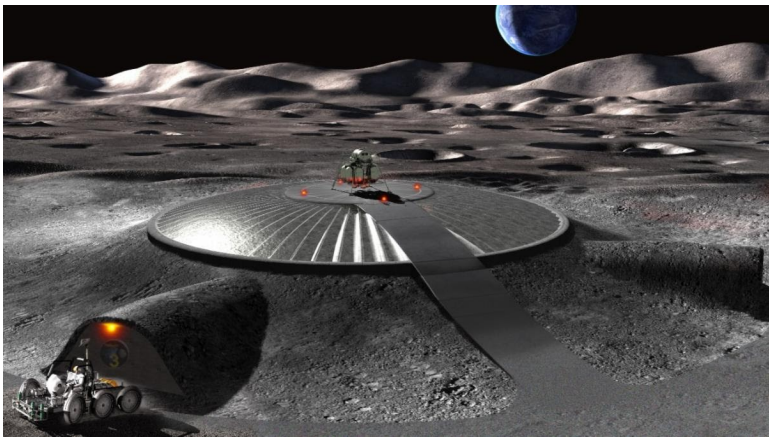
10:05 AM PST: Welcome
10:10 AM PST: Mr. Stuart Marongwe
11:40 AM PST: Dr. Ken Lui (Tentative)
12:10 PM PST: (TBD)
01:40 PM PST: Adjourn (and networking if preferred)

Questions about Events/Program: events.aiaalalv@gmail.com

RSVP and Information: https://conta.cc/3e0r1Bh

Saturday, March 27, 2021, 10 AM PST (**Add to Calendar**)

The 3rd AIAA LA-LV Space Architecture Gathering 3/27



Space Architects are involved in proposing visions and a variety of concepts for habitation in extreme environments that include human space activity, especially for near term missions. Preintegrated, deployable, erectable and hybrid structures that use local resources are sought. Visions range from habitats in Earth Orbit, on the Moon, Mars and in cislunar space.

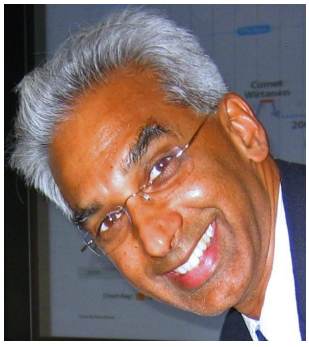
Here on Earth, several simulations have provided insight into crew needs and behavior and many more are planned or in various stages of development. Out of these missions, exercises and proposals are also born energy and resource conscious designs for immediate applications on Earth, in specialized facilities and in our smart cities, and dwellings.

This international gathering of space architects will present some visions and projects being contemplated for both space and Earth applications.

Event will conclude with a panel discussion.

moderated by

Prof. Madhu Thangavelu



USC Astronautical Engineering Department and USC School of Architecture

Mr. Kurt Lundell, Regional Business Development Manager, **Sprung.com**

Mr. Giuseppe Calabrese

Mahsa Esfandabadi, AeroSpace Architect

Sasakawa International Center for Space Architecture (SICSA), University of Houston

(More Speakers/Panelists: TBA Soon)

Questions about Events/Program: events.aiaalalv@gmail.com

AIAA American Institute of Aeronautics and Astronautics Los Angeles - Las Vegas Section

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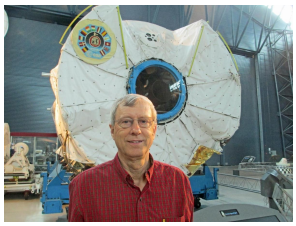
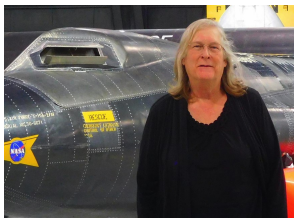
engage.aiaa.org/losangeles-lasvegas

RSVP and Information: https://conta.cc/3tHV5a4

*Saturday, April 10, 2021, 10 AM PST (**Add to Calendar**)*

AIAA LA-LV Special: In Honor of the 40th Anniversary of the First Flight of the Space Shuttle:

The Outward Odyssey Authors Present "Columbia and the Legacy of the Space Shuttle Program."

 *Mr. Geoffrey Bowman*	 *Mr. Colin Burgess*	 *Mr. Jay Chladek*	 *Mr. Melvin Croft*	 *Ms. Michelle Evans*
 *Mr. Francis French*	 *Mr. Chris Gainor*	 *Mr. Jay Gallentine*	 *Mr. David Hitt (Moderator)*	

Questions about Events/Program: events.aiaalalv@gmail.com