

SPECIAL ISSUE ON Hubble Space Telescope Astronauts

Hubble Space Telescope Astronauts
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The immense success we have seen with the Hubble Space Telescope (HST) program is the result of the three key players working in perfect union: The Space Shuttle, The HST design approach and the amazing people who made this success possible during their six missions.

SPACE SHUTTLE PROGRAM: The space shuttle program was envisioned to make use of the manned and reusable capabilities: launching satellites, aid building and upgrading space stations etc.. In some cases, a few satellites were retrieved from their stranded locations and brought back to earth or even relaunching to their prescribed orbits. This gave us the first glimpse of the joint capabilities of the space shuttle and its astronauts. However, during the different stages of the HST, this was taken to a different level, leading to the belief that the space shuttle and HST were a match made in heaven: Space Shuttle missions were used to make up for the disastrous start of the program, starting from the first servicing mission, and also more than double its expected life by its subsequent four upgrade missions.

HUBBLE SPACE TELESCOPE: The early concept of rocket launched space telescope was proposed in his 1923 book by Hermann Oberth (a rocket pioneer and a mentor of Werner Von Braun). Later on, a detailed plan for a space telescope was proposed by Lyman Spitzer in 1946, continuing his lobbying for many subsequent years. The early space telescopes (OAO) were launched using rockets in the 60s, but two of the four ended up failing in orbit, with no way of retrieving or servicing in orbit. The plan for a larger telescope was approved in 1973 and funding for the Large Space Telescope, which was later renamed as the Hubble Space Telescope, started in 1977, as a collaboration between NASA and ESA. While HST was always envisioned to be launched and subsequently serviced in space, by the Space Shuttle, which was also being designed at that time, few would have imagined the impact of the Space Shuttle to the ultimate success of HST. The discovery of the flaw in the telescope mirror, just after the launch in 1990, made the first service mission in 1993, all the more significant than a regular upgrade mission, saving the program from a disaster. The subsequent four servicing missions, until 2009, led to replacing the unexpected failed instruments, causing the operational shutdown and also vital upgrades of several other instruments and also upgrading equipment such as battery, gyros, solar panels etc., extending its life beyond the expected 15 years.

The HST Astronauts: The contribution of the multitude of engineers who worked on the HST program, managed by NASA Goddard, cannot be understated, especially coming up with a fix for the mirror aberration, which transformed the program from a disaster to a resounding success. The six Space Shuttle Missions, clearly exhibited the dedication, hard work and the individual contributions of the 32 Astronauts, on these missions, from launch in 1990, to the final service mission in 2009. In addition to executing the actions needed to repair and upgrade the HST, many of them were actually involved in developing the tools that were used during these mission. As one who follows people history, I tried to trace the history of these astronauts over the last several years visiting many of the sites associated with them. I also had an opportunity to visit some of the special exhibits dedicated to their contributions to the HST program.

1. [About Hubble - NASA Science](#)
2. The Hubble Space Telescope: From Concept to Success by David Shayler, David Harland
3. Enhancing Hubble's Vision : Service Missions That Expanded Our View of the Universe, by David Shayler, David Harland
4. Handprints on Hubble: An Astronaut's Story of Invention by Kathryn Sullivan
5. Servicing the Hubble Space Telescope, Dennis Jenkins, Jorge Frank (Focused on STS-125)

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The primary focus of this newsletter is about the history of astronauts, based on our history travel, but I briefly discuss about each mission to provide the context, with my limited knowledge, acquired during our travels.

****Special Thanks to my father Parthasarathy Ramanujam (Rama) who had spent almost 35 years of his professional career living with, compensate for and eventually exploited the aberrations in multi-reflector optics systems. He added technical input to this document, while I focused on the astronauts' history. We sincerely hope to update this document as we get more information on the astronauts while we continue to visit their sites and also meet them.**

A BRIEF INTRODUCTION TO HST MISSIONS AND ITS INSTRUMENTS

The Hubble Space Telescope was designed to be maintained in space i.e., upgraded over time after launch, by a series of servicing missions. The original design started off with five instruments comprising of cameras and spectrographs operating over infrared, visible and ultraviolet spectrum. However due to the flaw in the main mirror, which affected all the instruments, a major correction device, COSTAR, had to be introduced, requiring one of the initial instruments to be removed during the first servicing mission. This resulted in using only four instruments for a long duration. The subsequent upgrades of these instruments resulted in the final set of instruments to be different from the starting design, although functionally the same but a lot better. There were also other vital components such as gyros, solar panels, batteries, guidance sensors, cooling systems, computers etc., that were replaced and upgraded, during the five servicing missions. A quick summary of the starting instruments and their subsequent upgrades in a chronological order, may be useful to better understand the servicing missions. Interestingly, the upgraded instruments had their own correction device for the primary mirror in their design, resulting in gradually removing the dependency of the upgraded instruments, on COSTAR. Due to this, it was possible to remove COSTAR during the last servicing mission, and reintroduce the fifth instrument, which had to be removed to accommodate COSTAR during the first servicing mission SM1.

STARTING FIVE

Faint Object CAMERA (**FOC**); Wide Field and Planetary Camera (**WFPC**); Goddard High Resolution Spectrograph (**GHRS**)
Faint Object Spectrograph (**FOS**); High Speed Photometer (**HSP**)

DURING FIRST SERVICING MISSION (SM1)

Wide Field and Planetary Camera (WFPC) replaced by WFPC2

High Speed Photometer (HSP) was removed to make room for Corrective Optics Space Telescope Axial Replacement (COSTAR) that compensated for Primary Mirror flaw

DURING SECOND SERVICING MISSION (SM2)

Faint Object Spectrograph (FOS) replaced by Near Infrared Camera and Multi-Object Spectrograph (NICMOS)

Goddard High Resolution Spectrograph (GHRS) replaced by Space Telescope Imaging Spectrograph (STIS)

Both these had corrective optics to remove the dependency on COSTAR

DURING THIRD SERVICING MISSION (SM3A)

No instruments were replaced or upgraded but the vital Gyroscopes (all six) were replaced. Prior to this, four of them had failed forcing the shutdown of the telescope for a few weeks.

DURING FOURTH SERVICING MISSION (SM3B)

Faint Object Camera (FOC) replaced by Advanced Camera for Surveys (ACS) with corrective optics, removing the dependency of Hubble on COSTAR

DURING FIFTH SERVICING MISSION (SM4)

COSTAR was finally removed from the telescope.

In the space available, the Cosmic Origin Spectrograph (COS) was installed.

Wide Field and Planetary Camera 2 (WFPC2) replaced by Wide Field camera (WFC3).

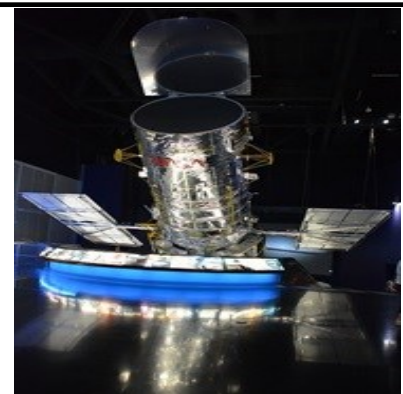
Due to the wide frequency range of WFC3, NICMOS is no longer used

Also, all the six Gyroscopes were replaced as well as the batteries, to prolong the life of Hubble

FINAL FIVE

Wide Field camera 3 (**WFC3**); Cosmic Origins Spectrograph (**COS**); Advanced Camera for Surveys (**ACS**)

Space Telescope Imaging Spectrograph (**STIS**); Near Infrared Camera and Multi-object Spectrometer (**NICMOS**) - Not under use



The exhibit summarizing the launch and subsequent Hubble Servicing Missions
Kennedy Space Center Visitor Complex

HST LAUNCHING MISSION - STS-31 - DISCOVERY



STS - 31 DISCOVERY CREW

Charles Bolden - Pilot, Steven Hawley - Mission Specialist, Loren Shriver - Commander, Bruce McCandless - Mission Specialist, Kathy Sullivan - Mission Specialist,

Mission Highlights

Originally planned to be launched in 1983, due to technical delays, and the Challenger disaster of 1986, the eventual launch was pushed to 1990. The main purpose of this mission was to deploy the HST.

The original intended commander John Young, was replaced by Loren Shriver, with Charles Bolden as the Pilot. The two astronauts Bruce McCandless and Kathryn Sullivan were involved since the very early stages of the project and were trained to perform EVAs in case of any problem associated with the deployment (HST was deployed without the help of any EVAs, although both of them were ready in their EVA suits). The other astronaut Steven Hawley was an expert on astronomy and was an astrophysicist.

Due to the high altitude of the orbit of the Hubble Space Telescope, this mission had to approach about 620 Kms (386 miles), possibly recording the highest for any space shuttle mission.



STS-31

DISCOVERY

April 24, 1990

First of the Great Observatories, the Hubble Space Telescope was delivered into Earth orbit.

HST LAUNCHING MISSION - STS-31

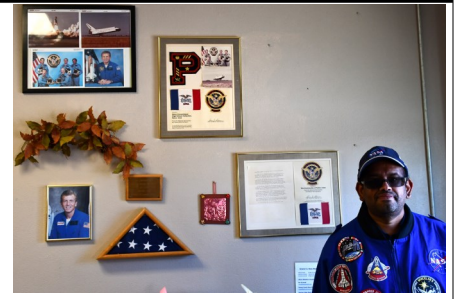
Loren Shriver - Commander

Loren Shriver was born on September 23, 1944 in Jefferson Iowa. He graduated from Paton high school in 1962. He received a Bachelor of Science degree in Aeronautical Engineering from United States Air Force Academy, Colorado Springs, CO. He obtained a Master of Science degree in Astronautical Engineering from Purdue. After that he joined the Air Force and was a test pilot. He became an astronaut in 1978. Loren Shriver commanded STS-31 to the highest orbit of any space shuttle at 386 miles.

His other missions: STS 51-C (pilot), and STS-46 (Commander).

We had visited his hometown of Paton IA. Although his school has been demolished, a historical monument is built on the site. This has the name of the school and a photograph of the school. Nearby is the Loren Shriver Community Center in his honor that has his artifacts. There is also the community bank and a library with many of his artifacts including his yearbook. We were also fortunate to meet his close family who directed us to his old farmhouse. We also visited the US Air Force Academy and Purdue University to see his artifacts.

[LOREN SHRIVER – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Jefferson IA,

Loren Shriver Community Center Paton IA



Loren Shriver Community Center, Paton IA



Site of Paton Consolidated School, Paton IA



US Air Force Academy Colorado Springs, CO

Purdue University, IN

HST LAUNCHING MISSION - STS-31

Charles Bolden - Pilot

Charles Bolden was born on August 19, 1946 in Columbia, South Carolina. He graduated from C.A Johnson High School from Columbia, South Carolina. He earned a Bachelor of Science Degree in United States Naval Academy in Annapolis, Maryland in 1968 and a Master of Science degree from University of Southern California in 1977. After several US Naval appointments, he was selected as an astronaut in 1980. After his service as an astronaut he became a Deputy Commandant of Midshipman at the US Naval Academy. He went on to serve as the NASA Administrator from 2009 to 2017. He was the pilot on STS-31.

His other missions: STS-61-C (pilot), STS-45 (Commander), STS-60 (Commander)

We had visited Columbia SC to see his high school, family home and also the South Carolina State Museum, in Columbia, that has his artifacts. We visited the South Carolina Hall of Fame in Myrtle Beach, where he is honored and also visited the US Naval Academy in Maryland to see his artifacts.

[Charles Bolden – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Columbia, SC (high school, family home)



South Carolina State Museum, Columbia, SC

South Carolina Hall of Fame, Myrtle Beach, SC



United States Naval Academy, Annapolis, MD

HST LAUNCHING MISSION - STS-31

Bruce McCandless - Mission Specialist

Bruce McCandless was born on June 8, 1937, in Boston, Massachusetts. He graduated from Woodrow Wilson Senior High school from Long Beach California in 1954. He received Bachelor of Science degree from United States Naval Academy, from Annapolis, Maryland in 1958. He received Masters in Electrical Engineering degree in Stanford University in 1965 and also MBA from university of Houston Clear Lake in 1987. After multiple Naval assignments, he was selected as a NASA astronaut in 1966. He was well known as the first to space walk using a MMU (Manned Maneuvering Unit) without a tether, on his STS-41B mission in 1984. His development work on MMU and some hardware and procedures on the Hubble, led to his selection on STS-31. Though he was 'space walk ready', during this mission, it was not necessary during the mission.

His other missions: STS-41-B (Mission Specialist)

We have visited his high school in Long Beach, CA and also the US Naval Academy in Maryland to see his artifacts. We have visited Stanford and the University of Houston, Clear Lake. We also saw his exhibit on MMU at the Udvar Hazy center of Smithsonian in Chantilly, VA. He died in 2017 and is buried in Annapolis at the US Naval Academy Cemetery.

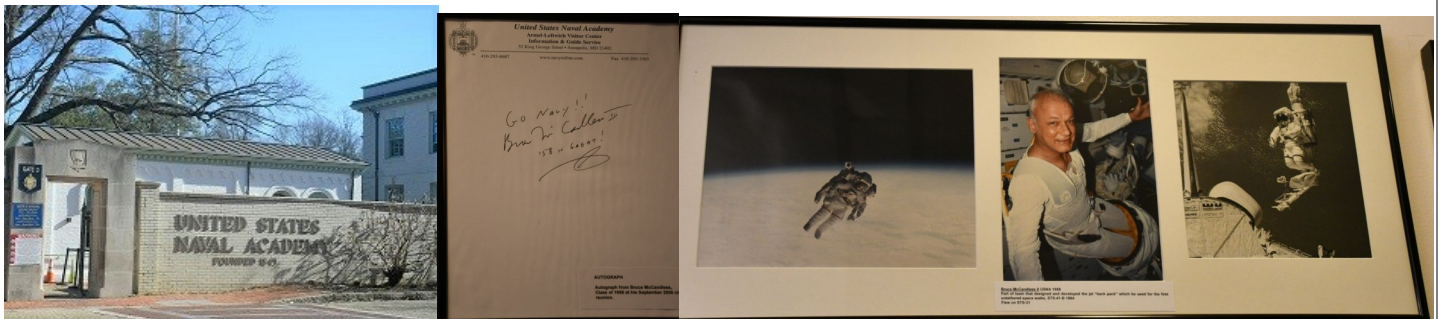
[Bruce Mccandless – History Travel US \(historytravel-us.com\)](http://BruceMcCandless-HistoryTravelUS.com)



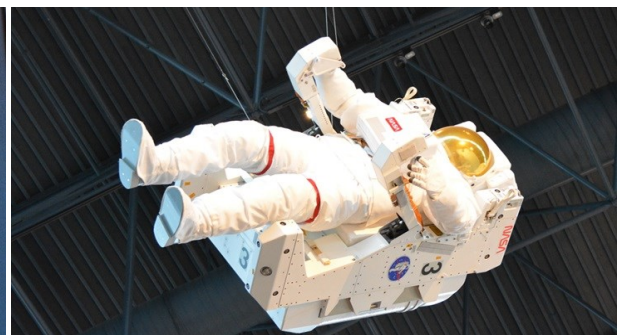
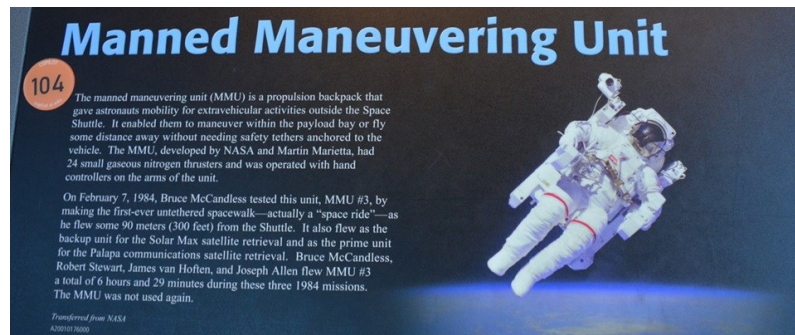
At Spacefest 2017
Tucson AZ



Woodrow Wilson
Senior High School
Long Beach, CA



US Naval Academy, Annapolis, MD



MMU Unit tested by Bruce McCandless in 1984, Smithsonian

HST LAUNCHING MISSION - STS-31

Steven A Hawley - Mission Specialist

Steven A Hawley was born in Ottawa, Kansas in 1951. He graduated from Salina High School Central in Salina, KS in 1969. He attended the University of Kansas graduating in 1973. He attended the graduate school at Lick Observatory at University Of California at Santa Cruz, completing his Doctorate in Astronomy and Astrophysics in 1977. He was selected as a NASA astronaut in 1978. He was one of the three Mission Specialists on this mission.

His other missions: STS-41-D (Mission Specialist), STS-61-C (Mission Specialist), STS-82 (Mission Specialist)

We visited his birth town of Ottawa, Kansas (saw possibly his birthplace hospital). We visited his high school, Central High School in Salina to see his Hall of Fame plaque and also the University of Kansas where he was still a staff. The special collection department had the shirt he had taken to space on STS-82, another Hubble mission. We also visited the University of California at Santa Cruz, CA, to look at his artifacts at the Special Collections.

[STEVEN HAWLEY – History Travel US \(historytravel-us.com\)](http://www.historytravel-us.com)



Salina High School, Salina, KS



University of Kansas, Lawrence, KS



University of California Santa Cruz, CA

From University of California Special Collections

HST LAUNCHING MISSION - STS-31

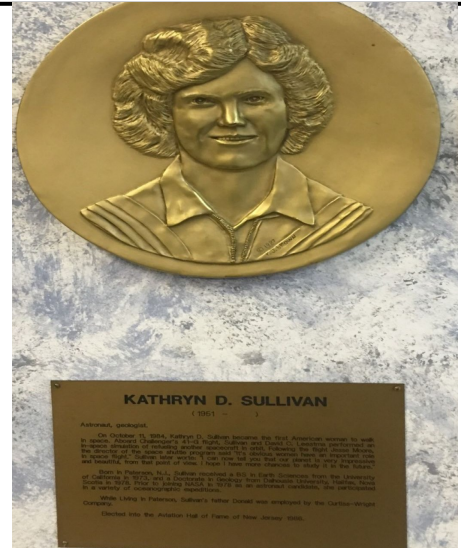
Kathryn Sullivan - Mission Specialist

Kathryn Sullivan was born on Oct 3 ,1951 in Patterson, New Jersey. She graduated from William Howard Taft High school in Los Angeles in 1969. She went to University of California at Santa Cruz to obtain her Bachelor's degree in 1973. She obtained Ph.D. at Dalhousie University from Halifax, Nova Scotia, Canada in 1978. In the same year she was selected as a NASA astronaut candidate, completing her training in 1979. She had several unique opportunities: to work with many other astronauts, served as mission CAPCOM, being the first woman to wear a pressured space suit, and also got involved during the development of Hubble Space Telescope. She was assigned to the Hubble deployment mission STS-61-J, that was cancelled due to Challenger disaster. Later on she was assigned to STS-31. She was the first American woman to perform a space walk (on STS-41-G). On STS-31 she was one of the two, trained to space walk.

Other Missions: STS-41-G (Mission Specialist), STS-45 (Mission Specialist)

We had visited her birth town of Patterson, NJ. We also visited the New Jersey Aviation Hall of Fame where she is honored. We visited her high school in Los Angeles and also University of California at Santa Cruz. Recently she has been inducted into the Aviation Hall of Fame in Dayton OH and also honored at UC Santa Cruz with a library wing named in her honor, which we had visited.

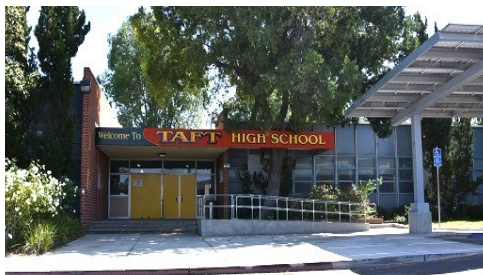
[Kathryn Sullivan – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Patterson, NJ



New Jersey Aviation Hall of Fame, Teterboro, NJ



Taft High School, Woodland Hills, CA

University of California, Santa Cruz, CA



Kathryn Sullivan Hall, Science and Technical Library University of California, Santa Cruz, CA

FIRST HST SERVICING MISSION - STS-61 - SMI - ENDEAVOUR**STS-61- Endeavour Crew**

Ken Bowersox - Pilot, Richard Covey - Commander, Kathy Thornton - Mission Specialist, Jeffrey Hoffman- Mission Specialist, Story Musgrave - Payload Commander, Thomas D Akers- Mission Specialist, Claude Nicollier- Mission Specialist

Mission Highlights

Within few weeks after the launch of the HST on STS-31, the de-focused images from the HST cameras, emerged. The subsequent investigations, indicated a flaw in the surface of the primary mirror. Unfortunately, the performance of all the instruments were affected by this error. The mitigation approach was to build in corrections for the individual instruments in future upgrades but use a common approach for all the instruments in the interim. Since the upgrade for Wide-Field Planetary Camera (WFPC2) had already started, the correction was already built into this and ready before this mission in 1993. All other instruments were corrected using the Corrective Optics Space telescope Axial Replacement (COSTAR).

The COSTAR and WFPC2 were the primary focus for this mission although other upgrades were also performed. For this important mission, critical for the future of HST and the reputation of NASA, all four space walk astronauts had previous EVA experience: Story Musgrave on STS-6, Tom Akers and Kathy Thornton on STS-49, Jeffery Hoffman on STS-51D. The other Mission Specialist was Claude Nicollier, from ESA.

The commander was Richard Covey, with experience of deploying/repairing satellites on STS-51I. Ken Bowersox was the pilot.

STS-61

ENDEAVOUR

December 2, 1993



Five spacewalks were needed to successfully restore the Hubble Space Telescope's flawed vision.

FIRST HST SERVICING MISSION - STS-61 - SMI

Richard Covey - Commander

He was born on August 1, 1946, in Fayetteville, Arkansas, but considers Fort Walton Beach, Florida, to be his hometown. He went to Choctawhatchee High School in Fort Walton Beach, graduating in 1964. He received Bachelor of Science degree at the United States Air Force Academy in 1968. He got his Masters degree from Purdue university in 1969. During his Air Force Career he had flown many aircrafts and over more than 5000 hours. He became a NASA astronaut in 1979. He was a veteran of three previous flights before STS-61, with unique experience: grappled, retrieved and repaired a satellite in orbit on STS-51I, piloted the first mission after Challenger on STS-26. On STS-61 he was the commander of the mission, successfully completing the important First Servicing Mission.

His Other Missions: STS-51I (Pilot), STS 26 (Pilot), STS 38 (Commander)

We had visited his high school in Fort Walton Beach. We also visited Purdue University where he is honored in the astronaut Hall of Fame. We also visited the United States Air Force Academy where Richard Covey is honored.

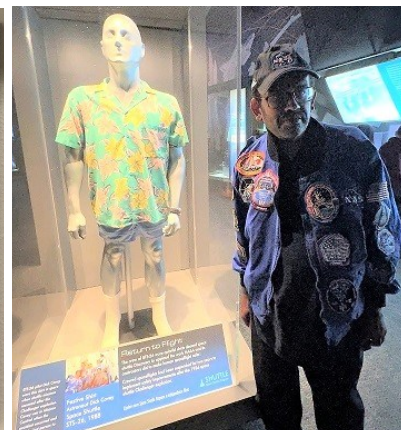
[RICHARD COVEY – History Travel US \(historytravel-us.com\)](http://RICHARD COVEY – History Travel US (historytravel-us.com))



Choctawhatchee High school in Fort Walton Beach FL



Purdue University Astronaut Hall of fame IN



Space Center Houston



United States Air Force Academy Colorado Springs CO



FIRST HST SERVICING MISSION - STS-61 - SMI

Ken Bowersox - Pilot

He was born in Portsmouth VA in 1956, but considers Bedford IN, his hometown. He went to Rio Real Elementary School in Oxnard CA. He graduated from Bedford High School, Bedford, Indiana, in 1974. He received a Bachelor of Science degree in Aerospace Engineering from the United States Naval Academy in 1978, and a Master of Science degree in Mechanical Engineering from Columbia University in 1979. He attended the US Air Force Test Pilot School at Edwards Air Force Base, CA and served as a test pilot. He was selected as a NASA astronaut candidate in 1987 and completed his astronaut training in 1988.

His Other Missions: STS-50 (Pilot), STS 73(Commander), STS 82-Commander, STS 113/Expedition 6/Soyuz TMA-1 (Mission Specialist /ISS Commander)

We had visited Rio Real Elementary School in Oxnard CA and his high school in Bedford Indiana, his hometown. We saw his home in Bedford. We also visited the Lawrence County History Museum, Bedford, that has many of his artifacts. We visited the United States Naval Academy where he is displayed together with other Naval Academy astronauts.

[KENNETH BOWERSOX – History Travel US \(historytravel-us.com\)](http://www.historytravel-us.com)



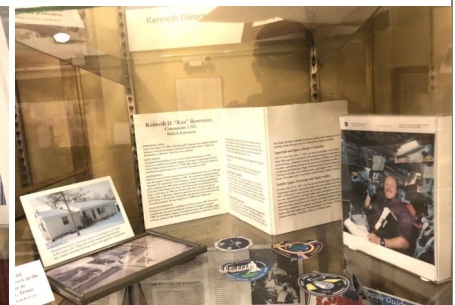
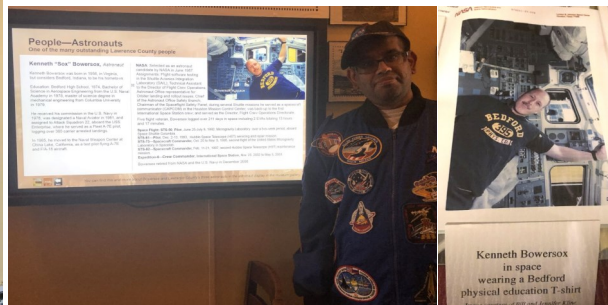
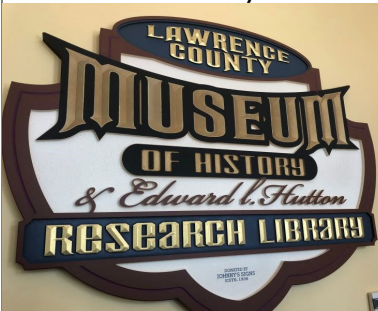
Rio Real Elementary School Oxnard, CA



Bedford High School Bedford IN



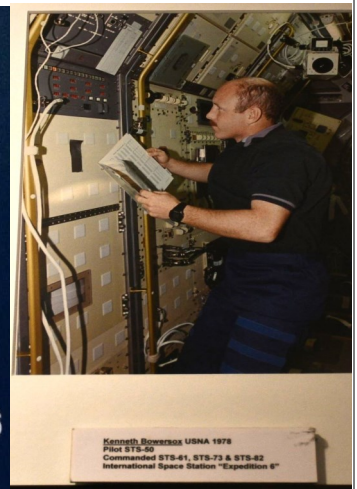
His home in Bedford IN



Artifacts from Lawrence County History Museum, Bedford IN

ASTRONAUTS GRADUATED FROM THE UNITED STATES NAVAL ACADEMY LISTED WITH CLASS YEAR

- Alan B. Shepard Jr. 1945 Walter M. Schirra Jr. 1946 James B. Irwin 1951 James A. Lovell 1952 Thomas P. Stafford 1952
- Donn F. Eisele 1952 Edward G. Givens 1952 Theodore C. Freeman 1953 William A. Anders 1955 Charles M. Duke, Jr. 1957
- Bruce McCandless II 1958 S. David Griggs 1962 Robert C. Springer 1964 David M. Walker 1966 John O. Creighton 1966
- James F. Buchli 1967 Michael J. Smith 1967 Charles F. Bolden Jr. 1968 Michael L. Coats 1968 Bryan D. O'Connor 1968
- James M. "Mike" Lounge 1969 Robert D. Cabana 1971 Frank L. Culbertson Jr. 1971 William M. Shepherd 1971
- David C. Leestma 1971 John L. Phillips 1972 Stephen S. Oswald 1973 Kenneth S. Reightler 1973 William F. Readdy 1974
- Stephen D. Thorne 1975 Jerry M. Linenger 1977 Pierre J. Thuot 1977 Kenneth D. Bowersox 1978 Daniel W. Bursch 1979
- Dominic L. Gorie 1979 Michael J. Foreman 1979 Joe. F. Edwards Jr. 1980 Michael E. Lopez-Algeria 1980 Brent W. Jett 1981
- Wendy B. Lawrence 1981 Kathryn P. Hire 1981 Christopher J. Loria 1983 William C. McCool 1983 Robert L. Curbeam 1984
- Charles O. Hobaugh 1984 George D. Zamka 1984 Lisa M. (Caputo) Nowak 1985 Stephen N. Frick 1986 Stephen G. Bowen 1986
- Kenneth T. Ham 1987 Sunita L. (Pandy) Williams 1987 Christopher J. Cassidy 1993 Nicole A. Mann 1999 Kayla Barron 2010



Kenneth Bowersox USNA 1978
Pilot STS-50
Commanded STS-61, STS-73 & STS-82
International Space Station "Expedition 6"

FIRST HST SERVICING MISSION - STS-61 - SMI**Kathryn Thornton - Mission Specialist**

Kathryn Thornton was born in Montgomery Alabama in August 1952. She went to Sidney Lanier High School in Montgomery Alabama, where she graduated in 1970. Then she went to Auburn University in Auburn, Alabama, completing Bachelor of Science in Physics in 1974. She joined the University Of Virginia, Charlottesville, VA and completed her Masters and Ph. D in 1977 and 1979. She worked as a Postdoctoral Fellow at Max Plank Institute For Nuclear Physics at Heidelberg, Germany. She was selected as a NASA astronaut in 1984. She worked at Houston as a Spacecraft Communicator, in Shuttle Avionics Integration Laboratory, and Vehicle Assembly Test team in Orlando Florida. Kathryn Thornton was one of the space walk specialists in STS-61, having gained that experience on her previous flight STS-49.

Her Other Missions : STS 33 (Mission Specialist), STS 49 (Mission Specialists), STS 73 (Mission Specialist)

We had visited her high school in Montgomery, AL and also the University in Auburn, where many astronaut artifacts are displayed in special collections. We also visited the University of Virginia in Charlottesville, including the Physics Building.

[Kathryn Thornton – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Sydney Lanier High School, Montgomery, AL



University of Auburn, AL



University of Virginia, Charlottesville, VA

FIRST HST SERVICING MISSION - STS-61 - SMI

Story Musgrave - Mission Specialist - Payload Commander

He was born on August 19, 1935 in Stockbridge, Massachusetts. He considers Lexington, KY his hometown. He attended Dexter School in Brooklyn Massachusetts and St Marks school in Southborough, Massachusetts. He received a Bachelor of Science degree in Mathematics and Statistics from Syracuse University in 1958, a Master of Business Administration degree in operations analysis and computer programming from the University of California at Los Angeles in 1959 and B.A in Chemistry degree from Marietta College, OH in 1960. He had a Doctorate in medicine from Columbia University College of Physicians and Surgeons in 1964 and a Master of Science in Physiology and Biophysics from the University of Kentucky in 1966. He also had a Master of Arts in literature from the University of Houston, Clear Lake, later in 1987. He was selected as a NASA astronaut in 1967. Story Musgrave has the distinction of the only astronaut who has flown on all five space shuttle orbiters. Prior to STS-61 he was a veteran of three space shuttle missions. Musgrave helped design the spacesuits, life support systems, airlocks and manned maneuvering units that would be used for spacewalks. He was one of the space walk specialists and the payload commander on STS-61.

His other missions : STS 6 (mission Specialist), STS 51-F (Mission Specialist) STS-33 (Mission Specialist), STS-44 (Mission Specialist), STS-80 (Mission Specialist)

We have visited several of his sites in the US. We also had a unique opportunity to meet him in his home in Florida. We have visited his schools in Stockbridge, Dexter and St. Marks schools in MA, Syracuse University (turning point in his education), UCLA, Marietta College OH, Columbia University. We have also met him at the Kennedy Space Center.

[Story Musgrave – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



His home in FL

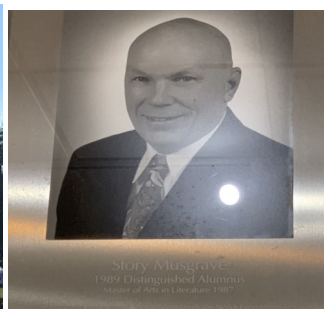
His Birthplace farm, Stockbridge, MA



Syracuse University, Syracuse, NY



Marietta College, OH



Hall of Fame, University of Houston



Columbia University College of Physicians and Surgeons, New York, NY

FIRST HST SERVICING MISSION - STS-61 SMI

Jeffrey Hoffman - Mission Specialist

He was born on November 2, 1944, in Brooklyn, New York . He studied in Fox Meadow Elementary School and graduated from Scarsdale High School, Scarsdale, New York, in 1962. He received a Bachelor of Arts degree in Astronomy (graduated summa cum laude) from Amherst College, MA in 1966, a doctor of philosophy in Astrophysics from Harvard University, MA in 1971, and a Masters degree in Materials Science from Rice University TX, in 1988. He became a NASA astronaut in 1979.

His Other Missions : STS 51D (Mission Specialist), STS 35, (Mission Specialist), STS 46, (Mission Specialist), STS 75, (Mission Specialist).

We had visited his Fox Meadow Elementary and Scarsdale high school in Scarsdale, NY where he is honored with several artifacts inside the schools. We have also visited Amherst College and Harvard University. We also visited him in his office at MIT, where he works currently. We also visited the Cradle of Aviation Museum in Long Island where his artifacts are exhibited.

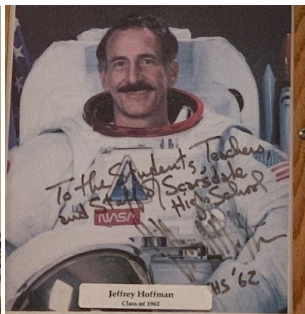
[Jeffrey Hoffman – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Fox Meadow Elementary School



Scarsdale High School Scarsdale NY



Scarsdale High School Scarsdale NY



Amherst College, Amherst MA



Cradle of Aviation Museum Long Island NY

FIRST HST SERVICING MISSION - STS-61 SMI

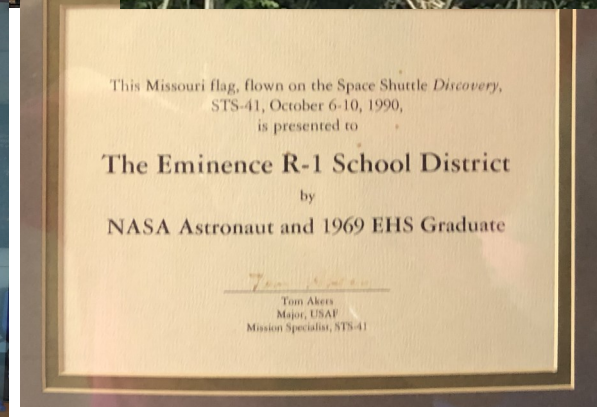
Thomas Akers - Mission Specialist

He was born on May 20, 1951, in St. Louis, Missouri, He Graduated from Eminence High School, Eminence, Missouri, in 1969. He received Bachelor of Science degree and a Master of Science degree in Applied Mathematics from the University of Missouri-Rolla in 1973 and 1975, respectively. He returned to Eminence to become a high school principal. He joined the US Air Force in 1979. He was selected for the NASA astronaut program in 1987. Tom Akers was a Mission Specialist and was one of the four space walk specialists on STS-61. On his previous mission STS-49, he was one of three astronauts space walking, to retrieve the Intelsat VI satellite.

His other missions : STS 41 (Mission Specialist), STS 49 (Mission Specialist), STS 79 (Mission Specialist)

We had visited his home town of Eminence MO and visited his elementary school and high school, that had many of his artifacts displayed in the hallway. In the town he is honored by a welcome sign to the town with his name on it. We also went to his university in Rolla, which is currently known as Missouri University of Science and Technology

[TOM AKERS – History Travel US \(historytravel-us.com\)](http://TOM AKERS – History Travel US (historytravel-us.com))



His Schools, hometown, Eminence MO



Missouri University of Science and Technology, Rolla. MO

FIRST HST SERVICING MISSION - STS-61

Claude Nicollier - Mission Specialist

Claude Nicollier was born on Sept 2 1944 in Vevey, Switzerland. He went to Gymnase de Lausanne high school in Lausanne. He studied Physics at the University Of Lausanne and received a BSc degree in 1970. He then worked at the Geneva Observatory, before getting a MSc degree in Astrophysics from University of Geneva in 1975. In 2004, he started teaching at the École Polytechnique Fédérale de Lausanne (Swiss Federal Institute of Technology in Lausanne) and became a full professor in March 2007. In 1978, he was selected for the first group of European Astronauts. After joining the NASA Astronaut Group 9 in 1980, he became the first non-American to become a full-time NASA astronaut. Claude was a mission specialist on STS-61.

His other missions : STS 46 (Mission Specialist), STS 75 (Mission Specialist), STS 103 (Mission Specialist)

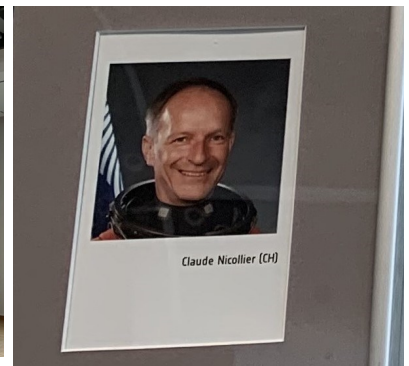
We are yet to visit his sites in Switzerland. However we have visited the sites in Toulouse (Cite de Space, that has his hall of fame) and also DLR, the German Space Center, in Cologne Germany, where he is honored as a part of European Astronauts. He is also featured in the UK Space museum in Leicester, which we had visited.

[CLAUDE NICOLLIER – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Cite de l'Espace, Toulouse France

National Space Center, Leicester, UK



German Aerospace Center
DLR
Köln Germany



SECOND HST SERVICE MISSION - STS - 82 - SM2 - DISCOVERY**STS - 82 DISCOVERY CREW**

Joseph R Tanner - Mission Specialist, Kenneth D Bowersox - Commander, Gregory J Harbaugh - Mission Specialist, Steven A Hawley - Mission Specialist, Mark C Lee - Payload Commander, Scott J Horowitz - Pilot, Steven Smith - Mission Specialist

**Mission Highlights**

Unlike all the excitement, anxiety and expectations associated with the first servicing mission STS-61, which became a rescue mission, this was an upgrade mission, very significant, nevertheless.

As part of the plan, two of the instruments were replaced by their upgraded versions: Space Telescope Imaging Spectrograph and Near-Infrared Camera and Multi-Object Spectrometer (NICMOS). Both these had the embedded corrective optics for the main mirror, continuing to remove the dependency of COSTAR. A few other upgrades were also performed.

The EVA crew of four was led by Mark C Lee, the Payload Commander, with Steven Smith, Greg Harbaugh and Joe Tanner as the other three. Ken Bowersox the commander, was a pilot on STS-61 and Scott Horowitz was the pilot. Steven Hawley, who had flown previously on the Hubble launching mission STS-31, performed the role of operating the robot arm.



STS-82

DISCOVERY

February 11, 1997

The second servicing mission to the Hubble Space Telescope upgraded its science instruments and made repairs to the telescope's insulation.

SECOND HST SERVICE MISSION - STS - 82 - SM2

Ken Bowersox - Pilot

He was born in Portsmouth VA in 1956, but considers Bedford IN, his hometown. He went to Rio Real Elementary School in Oxnard CA. He graduated from Bedford High School, Bedford, Indiana, in 1974. He received a Bachelor of Science degree in Aerospace Engineering from the United States Naval Academy in 1978, and a Master of Science degree in Mechanical Engineering from Columbia University in 1979. He attended the US Air Force Test Pilot School and served as a test pilot. Having selected as a NASA astronaut candidate in 1987, he completed his NASA astronaut training in 1988.

His Other Missions: STS-50 (Pilot), STS 73(Commander) STS 61 (Pilot), STS 113/Expedition 6/Soyuz TMA-1 (Mission Specialist /ISS Commander)

We had visited Rio Real Elementary School in Oxnard CA and his high school in Bedford Indiana his hometown. His home in Bedford still exists. We also visited Bedford Historical Museum that has many of his artifacts. We visited the United States Naval Academy where he studied and he is featured with other Naval Academy astronauts.

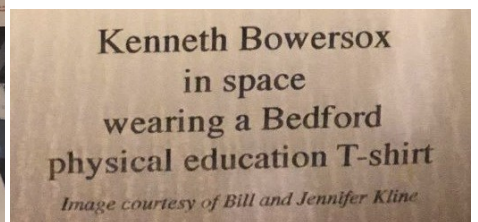
[KENNETH BOWERSOX – History Travel US \(historytravel-us.com\)](http://www.historytravel-us.com)



United States Naval Academy
Annapolis MD



Lawrence County
History Museum
Bedford IN



SECOND HST SERVICE MISSION - STS-82 - SM2

Scott J Horowitz - Pilot

He was born in Philadelphia on March 24 1957. He graduated from Newbury Park High School, Newbury Park, California, in 1974; He went to California State University Northridge for his Bachelor of Science in Engineering in 1978. He got a Masters and a Ph. D degree from Georgia Institute of Technology in 1979 and 1982. After working as a Scientist at Lockheed, he joined the United States Air force. He flew on T-38 Talon and F-15. He did teach courses in aircraft design and propulsion while working at Embry Riddle University, FL and later at California State University, Fresno, CA. He was selected as a NASA astronaut candidate in 1992. He was a pilot on STS-82.

His Other Missions : STS 75 (Pilot), STS 101 (Pilot), STS 105 (Commander)

We have visited his high school in Newbury Park California State University Northridge and also Georgia Tech where he completed his Ph. D. We have also visited Embry Riddle and California State University in Fresno.

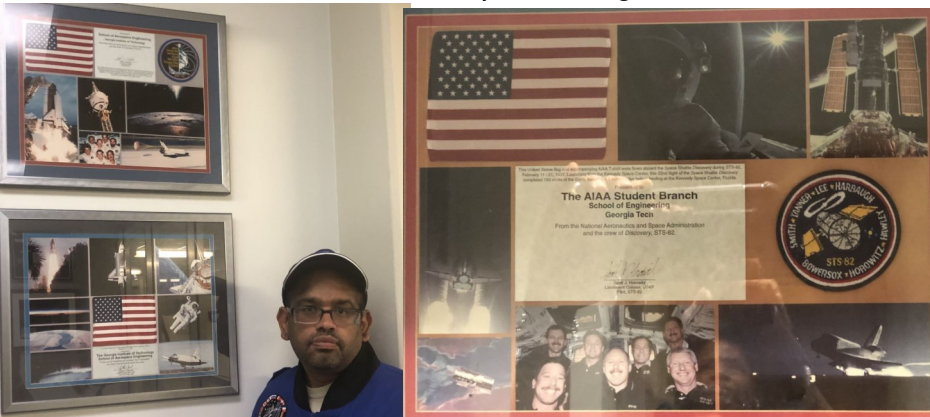
[SCOTT J HOROWITZ – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Newbury Park High School
Newbury Park, CA



California State University, Northridge CA



Georgia Institute of Technology Atlanta GA



SECOND HST SERVICE MISSION - STS - 82 - SM2

Joe Tanner - Mission Specialist

Joe Tanner was born in Danville, Illinois in 1950. He graduated from Danville High School, Danville, Illinois, in 1968. He received a Bachelor of Science degree in Mechanical Engineering from the University of Illinois at Urbana Champaign in 1973. He then joined the US Navy. He was selected as a NASA astronaut candidate in 1992. He was a Mission Specialist for this crew on STS-82. He was one of four space walk specialists on this mission.

His other missions: STS 66 (Mission Specialist), STS 97 (Mission Specialist), STS 115 (Mission Specialist)

We had visited his hometown of Danville, IL. We possibly saw his birthplace hospital. We also visited the Danville high school where there are quite a few artifacts for him in the school library. We also visited the Alumni office of the University of Illinois in Urbana-Champaign, where there are quite a few artifacts about him.

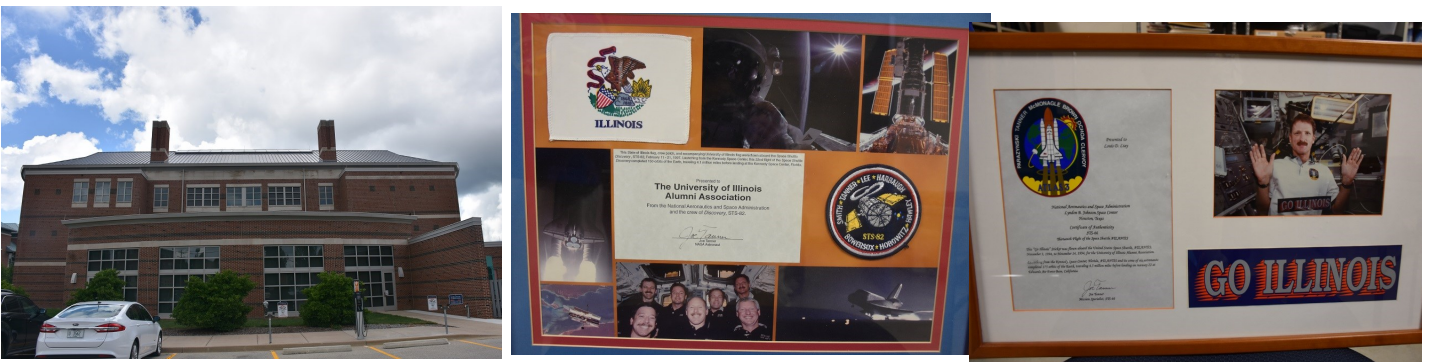
[JOE TANNER – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Danville High School, Danville, IL



Danville High School, Danville, IL



University of Illinois, Urbana Champaign, IL

SECOND HST SERVICE MISSION - STS - 82 - SM2

Steven A Hawley - Mission Specialist

Steven A Hawley was born in Ottawa Kansas in 1951. He graduated from Salina High School Central in Salina, KS in 1969. He attended University of Kansas graduating in 1973. He attended the graduate school at Lick Observatory at University Of California at Santa Cruz, completing his Doctorate in Astronomy and Astrophysics in 1977. He was selected as a NASA astronaut in 1978. He was the designated robotic arm operator on STS-82. He had previously flown on the Hubble launch mission STS-31.

His other missions: STS-41-D (Mission Specialist), STS-61-C (Mission Specialist), STS-31 (Mission Specialist)

We visited his birth town of Ottawa, Kansas (saw possibly his birthplace hospital). We visited his high school, Central High School in Salina to see his Hall of Fame plaque and also the University of Kansas. The special collection department had the shirt he had taken to space on STS-82. We also visited the University of California at Santa Cruz, CA, to look at his artifacts at the Special Collections.

[STEVEN HAWLEY – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Ottawa , KS

Ottawa KS



Salinas High School, KS



University of Kansas
Lawrence, KS



University of California, Santa Cruz, CA

SECOND HST SERVICE MISSION - STS - 82 - SM2

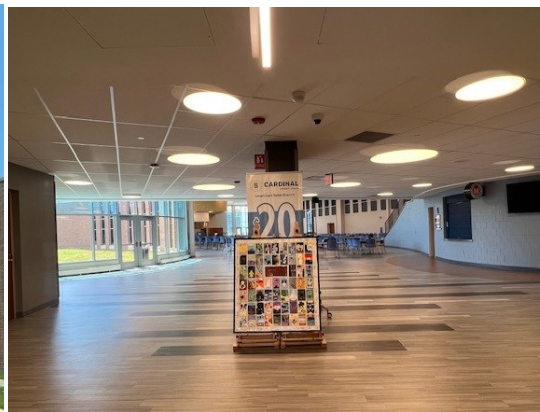
Gregory J Harbaugh - Mission Specialist

He was born on April 15, 1956 in Cleveland Ohio . He graduated from Willoughby South High School in 1974 and received a Bachelor of Science degree in Aeronautical and Astronautical engineering from Purdue University in 1978, and a Master of Science degree in Physical Science from University of Houston-Clear Lake in 1986. He worked in Johnson Space Center, after his education, working in several engineering and management positions. He was selected as a NASA astronaut in 1987. Greg was a mission specialist on STS-82, being one of four crew members trained for EVA .

His other missions : STS 39 (Mission Specialist) STS 54 (Mission Specialist) STS 71 (Mission Specialist)

We had visited his high school in Willoughby, OH and also saw his artifacts in University in Purdue. We have also visited the University of Houston, Clear lake.

[GREGORY HARBAUGH – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Willoughby South High School
Willoughby OH



GREGORY J. HARBAUGH
B.S. '78, Aeronautical and Astronautical Engineering, Purdue
M.S. '86, Physical Science, University of Houston – Clear Lake

A veteran of four space flights, Gregory Harbaugh became an astronaut in 1988. He did a four-hour, 28-minute space walk as a flight engineer on space shuttle flight 54 in 1993, which deployed a NASA Tracking and Data Relay Satellite. He also was responsible for the in-flight operation of the docking system aboard flight 71 in 1995, the first docking with the Russian Space Station Mir. In 1997, Mr. Harbaugh flew aboard flight 82, where crew members did upgrades and repairs to the Hubble Space Telescope (HST). On this mission, he participated in two space walks that totaled 14 hours and one minute.

Purdue University, IN



University of Houston
Clearlake, TX

SECOND HST SERVICE MISSION - STS - 82 - SM2

Mark C Lee - Mission Specialist - Payload - Commander

He was born on August 14, 1952, in Viroqua, Wisconsin. He graduated from Viroqua High School, Viroqua, Wisconsin, in 1970. He received a Bachelor of Science degree in Civil Engineering from the U.S. Air Force Academy in 1974, and a Master of Science degree in Mechanical Engineering from Massachusetts Institute of Technology in 1980. After being experienced in several aircrafts, he became a NASA astronaut in 1985. He was a mission specialist on STS-82, being one of the four space walkers.

His other missions : STS 30 (Mission Specialist), STS 47 (Mission Specialist), STS 64 (Mission Specialist)

We visited his hometown of Viroqua, WI and saw his birthplace hospital. We also visited all his educational institutions to see his artifacts. We also saw a detailed collection about him, in a separate room, in the history museum in Viroqua, Vernon County Museum.

[Mark C Lee – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Viroqua, WI

Viroqua High School



Viroqua School District



Viroqua History Museum



United States Air Force Academy
Colorado Springs, CO



Mark C. Lee (Col, USAF, RET) Class of 1974 • CS34
Mission Specialist STS-30 • Payload Commander STS-47
Mission Specialist STS-64 • Mission Specialist STS-82

SECOND HST SERVICE MISSION - STS - 82 - SM2

Steven Smith - Mission Specialist

He was born on December 30, 1958 in Phoenix Arizona. He considers San Jose to be his hometown. He attended Bret Harte Middle School in San Jose, California and graduated from Leland High School, San Jose, California, in 1977. He received a Bachelor of Science degree in Electrical Engineering in 1981 and a Master of Science degree in Electrical Engineering in 1982. Then he had a Masters degree in Business Administration in 1987. All his three degrees are from Stanford University. He worked at IBM until 1989 when he joined NASA. He was selected as a NASA astronaut candidate in 1992.

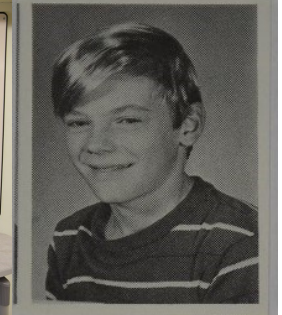
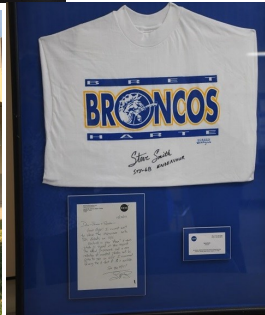
His other missions : STS 68 (Mission Specialist), STS 103 (Mission Specialist), STS 110 (Mission Specialist)

We saw his birthplace hospital in Phoenix. We also visited his schools, middle school and high school in San Jose CA. We also visited the Stanford University where he completed all his three degrees. We also visited the Tech Museum in San Jose, CA to see his artifacts.

[STEVE SMITH – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



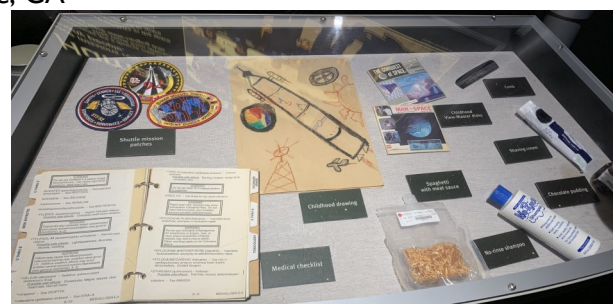
Hospital, Phoenix, AZ



Artifacts from Bret Harte Middle School, San Jose, CA



Leland High School, San Jose, CA



The Tech Museum of Innovation, San Jose, CA

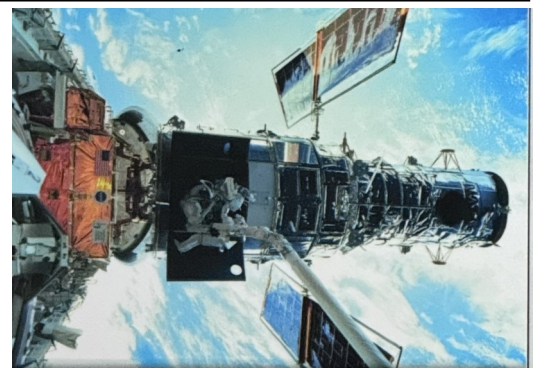
THIRD HST SERVICE MISSION - STS - 103 - SM3A DISCOVERY**STS - 103 DISCOVERY CREW**

Micheal Foale - Mission Specialist, Claude Nicollier - Mission Specialist, Scott Kelly - Pilot, Curtis L Brown - Commander, Jean-François Clervoy - Mission Specialist, John Grunsfeld - Mission Specialist, Steven L Smith - Payload Commander

**Mission Highlights**

After the second servicing mission in 1997, the next one for upgrading the instruments was planned for 2000. However three of the six gyroscopes started failing. Since a minimum of three was required for the HST, to be in operation, the third mission was split into two missions 3A and 3B, with 3A due to happen early, in 1999. The problem was so severe that just a month before the 3A mission, the fourth gyroscope failed forcing the telescope to be shutdown until the gyroscopes were replaced during this mission. Fewer than three working gyroscopes stopped the science observations, but the telescope remained safe in orbit until the servicing crew arrived.

The mission was commanded by Curtis Brown with Scott Kelly as the pilot. The four EVA mission specialists were Steven Smith, Michael Foale, John Grunsfeld and Claude Nicollier. Clervoy was responsible for the robotic arm to capture and deploy the telescope. During the EVAs, an upgrade to a faster computer and few other upgrades were also performed.



STS-103

DISCOVERY

December 19, 1999

The third Hubble Space Telescope servicing mission upgraded science instruments and operating systems.

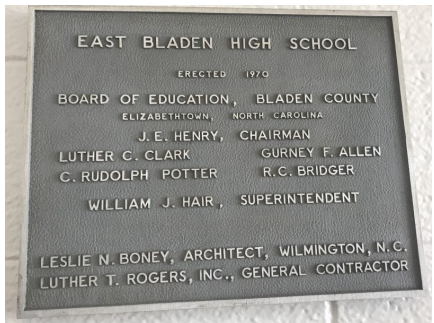
THIRD HST SERVICE MISSION - STS - 103 - SM3A**Curtis L Brown Jr – Commander**

He was born on March 11, 1956, in Elizabethtown, North Carolina. He Graduated from East Bladen High School, Elizabethtown, in 1974. He received a Bachelor of Science degree in Electrical Engineering from the United States Air Force Academy in 1978. He flew as a test pilot on A-10 and F-16 Aircraft. He was selected as a NASA astronaut candidate in 1987 and was qualified as a NASA astronaut in 1988. He was a spacecraft Communicator (Capcom), Astronaut Office Lead of Shuttle Operations, and Deputy Director, Flight Crew Operations Directorate. He was the commander on STS-103.

His other missions : STS 47 (Pilot), STS 66 (Pilot), STS 77 (Pilot), STS 85 (Commander), STS 95 (Commander)

We toured his hometown of Elizabethtown, North Carolina. He is a hero in his hometown and is honored by a big mural in the town and also the local airport is named for him. We also visited his high school, which is the current middle school.

[CURTIS BROWN – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



East Bladen High School (currently Elizabethtown Middle School)



East Bladen High School (currently Elizabethtown Middle School)



Local Airport and a huge mural in his honor

THIRD HST SERVICE MISSION - STS - 103 - SM3A

Scott Kelly - Pilot

He was born on February 21, 1964, in Orange NJ. He went to West Orange Mountain High School, graduating in 1982. He enrolled in University of Maryland, but transferred to State University of New York Maritime College, where he received his Bachelor of Engineering degree in 1987. He got a Master of Science degree in aviation systems from the University of Tennessee in 1996. During his Naval carrier he flew over 8,000 hours in more than 40 aircrafts. He was selected in 1996 as a NASA astronaut candidate to start his one year training.

His other Missions : STS 118 (Commander), Expeditions 25/26 (Soyuz TMA-01M), Expedition 43/44/45/46 (Soyuz TMA-16M/ Soyuz TMA-18M)

We were able to visit all his schools including the elementary school in his honor in Orange, New Jersey. We spent quite some time at the Marine Academy (SUNY Maritime College) in Bronx, NY, visiting the Schuyler Museum that has many of his artifacts. We also visited the University of Tennessee and the New Jersey Aviation Hall of Fame and saw his artifacts.

[SCOTT KELLY – History Travel US \(historytravel-us.com\)](http://SCOTT KELLY – History Travel US (historytravel-us.com))



West Orange High School, NJ



State University of New York Maritime College Bronx NY



University of Tennessee



Kelly Elementary School in 'Space Twins' Honor

New Jersey Aviation Hall of Fame. Teterboro, NJ

THIRD HST SERVICE MISSION - STS - 103 - SM3A

John M Grunsfeld - Mission Specialist

John was born on October 10, 1958 in Chicago, Illinois. He went to Highland Park High School graduating in 1976. He attended Massachusetts Institute of Technology getting a Bachelor of Science degree in Physics in 1980. He then attended the University of Chicago, getting a Master of Science degree in Physics in 1984, and a Doctor of Philosophy in physics in 1988. He was selected as an astronaut candidate in 1992. He was the only astronaut who went on three Hubble missions. He has been very much involved in astronomy and Space Telescopes before, during and after his space missions. After leaving NASA in 2009, he served as deputy director of the Space Telescope Science Institute in Baltimore, getting involved in James Webb Telescope. He came back to NASA in 2012, to serve at the Science Mission Directorate. He was a mission specialist on STS-103 and one of the four space walk specialists.

His Other missions : STS 67 (Mission Specialist), STS 81 (Mission Specialist), STS 109 (Mission Specialist) STS 125 (Mission Specialist)

We had visited his high school in Highland Park and also visited the University of Chicago to see his artifacts. We have also visited MIT. We witnessed his presentation on the history of Hubble Missions and also an introduction to the James Webb Telescope.

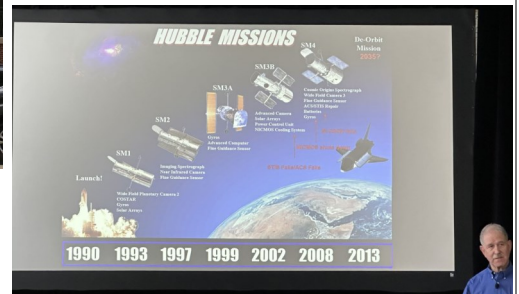
[JOHN GRUNSFELD – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Highland Park High School (Chicago suburb), IL



University of Chicago
Chicago IL



HST Presentation

THIRD HST SERVICE MISSION - STS - 103 - SM3A

Jean Francois Clervoy - Mission Specialist

Jean Francois Clervoy was born on November 19, 1958 in Longeville-lès-Metz France. He considers Toulouse France to be his hometown. He got his baccalaureate from Collège Militaire de Saint-Cyr-l'École in 1976. He graduated from École Polytechnique school in Paris in 1981. He graduated from École nationale supérieure de l'aéronautique et de l'espace, in Toulouse in 1983. In 1991 he trained in Star City Moscow on the Soyuz and Mir Systems. In 1992, he joined the European Space Agency (ESA) at the European Astronaut Center EAC in Cologne Germany. In 1992 he moved to Johnson Space Center, Houston to gain experience on Space Shuttle. In between his three flights Clervoy was assigned as flight software verification lead in the Shuttle Avionics Integration Laboratory (SAIL) and as robotics display design lead for Shuttle and ISS. He was a mission specialist on STS-103 responsible for the robotic arm.

His other Missions : STS 66 (Mission Specialist), STS 84 (Mission Specialist)

We are yet to visit his sites in France. However we have visited the sites in Toulouse (Cite de Space, that has his hall of fame and his space suit) and also DLR, the German Space Center, in cologne Germany, where he is honored as a part of European Astronauts. He is also featured in the UK Space museum in Leicester, which we had visited.

[JEAN-FRANCOIS CLERVOY – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Cite de l'Espace, Toulouse France

National Space Center Leicester, UK



German Aerospace Center
DLR
Köln (Cologne) Germany



THIRD HST SERVICE MISSION - STS - 103 - SM3A

Micheal Foale - Mission Specialist

Micheal was born in Jan 6 1957 in Louth, Lincolnshire England. He was raised in Cambridge. He graduated from Kings School, Canterbury, in 1975. He attended the University of Cambridge, Queens' College and received a Bachelor of Arts in Physics, Natural Sciences Tripos, with 1st class honors, in 1978. While at the Cavendish Laboratories, he completed his Doctorate in Laboratory Astrophysics in 1982. He is a Fellow of the Royal Aeronautical Society (FRAeS) and Fellow of the Institute of Physics (FInstP). In 2005, Foale was awarded Commander of the Most Excellent Order of the British Empire (CBE) in 2005. To pursue a career in space, Foale moved to Houston, Texas, to work on Space Shuttle navigation problems for McDonnell Douglas. In 1983 he joined Space Center Houston in payload operations, contributing to several space shuttle missions. He was selected as a NASA astronaut candidate in 1987.

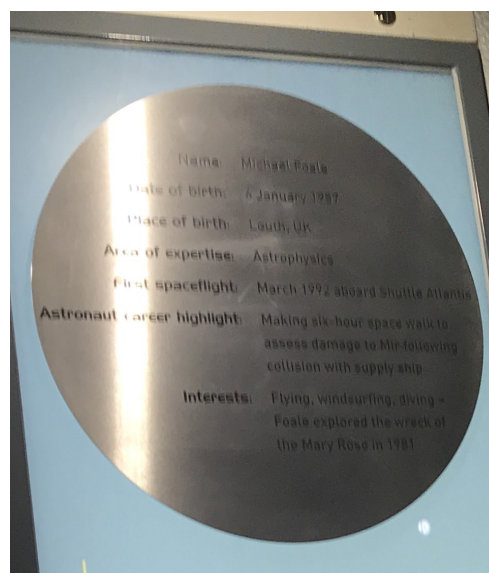
His other missions: STS 45 (Mission Specialist) STS 56 (Mission Specialist) STS 63 (Mission Specialist) STS 84 (Mission Specialist) STS 86 (Mission Specialist)

We are yet to visit his educational sites in the United Kingdom but we did visit the National Space Center at Leicester, that had his artifacts.

[MICHAEL FOALE – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Astronaut hall of Fame, Kennedy Space Center, FL



National Space Center, Leicester, UK

THIRD HST SERVICE MISSION - STS - 103 - SM3A**Steven Smith - Mission Specialist - Payload Commander**

He was born on December 30, 1958 in Phoenix Arizona. He considers San Jose to be his hometown. He attended Bret Harte Middle School in San Jose, California and graduated from Leland High School, San Jose, California, in 1977. He received a Bachelor of Science degree in Electrical Engineering in 1981 and a Master of Science degree in Electrical Engineering in 1982. Then he had a Masters degree in Business Administration in 1987. All his three degrees are from Stanford University. He worked at IBM until 1989 when he joined NASA. He was selected as a NASA astronaut candidate in 1992.

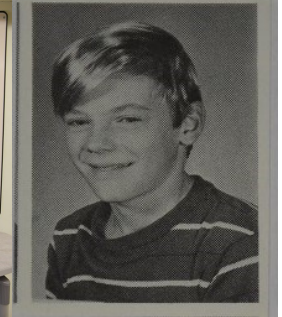
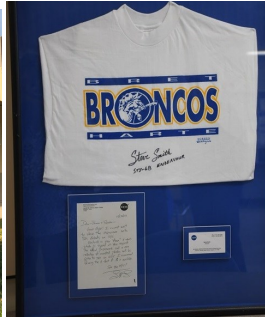
His other missions : STS 68 (Mission Specialist), STS 82 (Mission Specialist), STS 110 (Mission Specialist)

We saw his birthplace hospital in Phoenix. We also visited his schools, middle school and high school in San Jose CA. We also visited the Stanford University where he completed all his three degrees. We also visited the Tech museum in Sa Jose to see his artifacts.

[STEVE SMITH – History Travel US \(historytravel-us.com\)](http://STEVE SMITH – History Travel US (historytravel-us.com))



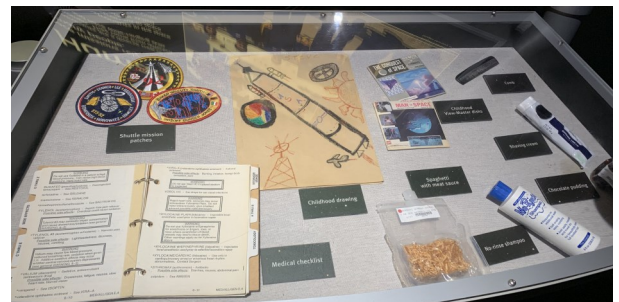
Hospital, Phoenix, AZ



Artifacts from Bret Harte Middle School, San Jose, CA



Leland High School, San Jose, CA



The Tech Museum of Innovation, San Jose, CA

THIRD HST SERVICE MISSION - STS - 103 - SM3A

Claude Nicollier

Claude Nicollier was born on Sept 2 1944 in Vevey , Switzerland. He went to Gymnase de Lausanne high school in Lausanne. He studied Physics at University Of Lausanne and received a BSc degree in 1970. He then worked at the Geneva Observatory, before getting a MSc degree in astrophysics from University of Geneva in 1975. In 2004, he started teaching at the École Polytechnique Fédérale de Lausanne (Swiss Federal Institute of Technology in Lausanne) and became a full professor in March 2007. In 1978, he was selected for the first group of European Astronauts. After joining the NASA Astronaut Group 9 in 1980, he became the first non-American to become a full-time NASA astronaut. Claude was a mission specialist on STS-103. Unlike STS-61, he was one of the four space walk specialist on this mission.

His other missions : STS 46 (Mission Specialist), STS 75 (Mission Specialist), STS 61 (Mission Specialist)

We are yet to visit his sites in Switzerland. However we have visited sites in Toulouse (Cite de Space, that has his hall of fame) and also DLR in cologne Germany, where he is honored as a part of European Astronauts. He is also honored in the UK Space museum in Leicester, which we had visited.

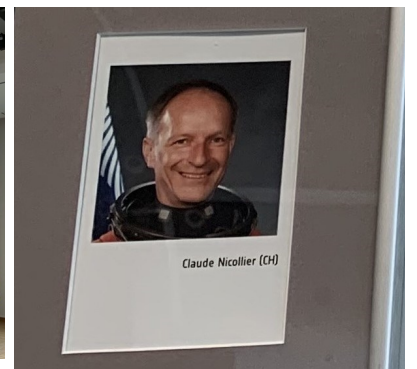
[CLAUDE NICOLLIER – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Cite de l'Espece, Toulouse France



National Space Center Leicester, UK



German Aerospace Center
DLR
Köln (Cologne) Germany



FOURTH HST SERVICE MISSION - STS - 109 - SM3B - COLUMBIA**STS - 109 COLUMBIA CREW**

Micheal J Massimino - Mission Specialist, Richard M Linnehan - Mission Specialist, Duane Carey - Pilot, Scott Altman - Commander, Nancy J Currie - Mission specialist, John M Grunsfeld - Payload Commander, James H Newman- mission Specialist

**Mission Highlights**

The primary goals for this mission in 2002, was to upgrade and repair many instruments. The replacement of Faint Object Camera by the Advanced Camera for Surveys, which had its own embedded correction for the large mirror aberration, eliminated the need for the COSTARS. However COSTARS was removed only during the next servicing mission.

It was commanded by Scott Altman with Duane Carey as the pilot. In this mission again there were four EVA specialists to allow two alternating shifts with two on each. They were John Grunsfeld, Richard Linnehan, Jim Neuman and Mike Massimino. Nancy Currie was responsible for operating the robotic arm. This mission also upgraded the existing solar arrays with a highly efficient and smaller solar arrays. Lastly the cooling system on the NICMOS that had failed in 1999 (within two years after its installation in 1997) was also installed, making it operational again.



STS-109

COLUMBIA

March 1, 2002

This servicing mission to the Hubble Space Telescope replaced a science instrument and malfunctioning hardware.

FOURTH HST SERVICE MISSION - STS - 109 SM3B

Scott Altman - Commander

Scott Altman was born on August 15, 1959 in Lincoln Illinois. He graduated from Pekin Community High School, Pekin, Illinois in 1977. He received Bachelor of Science degree in aeronautical and astronautical engineering from the University of Illinois in 1981 and a Master of Science degree in aeronautical engineering from the Naval Postgraduate School in Monterey CA, in 1990. During his time in the Navy he worked on several projects on F-14. He was very prolific on the aircraft and also performed during the filming of the movie Top Gun. He was selected as a NASA astronaut in 1994. On STS-109 he was the commander.

His other Missions : STS 90 (Pilot), STS 106 (Pilot), STS 125 (Commander).

We have visited many of his sites including his birthplace Lincoln IL, his high school in Pekin, the school named in his honor, University of Illinois, Urbana Champaign, Naval Postgraduate School, Monterey Ca and the museum in Peoria, IL, where many of his artifacts have been displayed.

[Scott Altman – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)

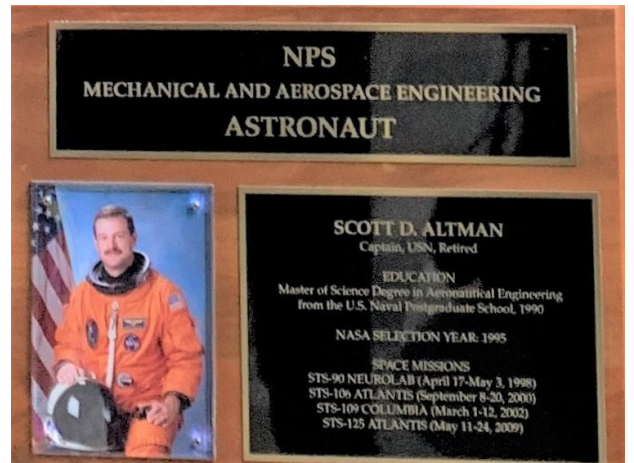


Hospital, Lincoln, IL

Pekin Community High School IL



Pekin Community High School IL



University of Illinois, Urbana Champaign, IL

US Naval Postgraduate School, Monterey, CA

FOURTH HST SERVICE MISSION - STS - 109 SM3B**Duane Carey - Pilot**

He was born on April 30, 1957 in St Paul, Minnesota. He went to Highland Park High School in St Paul Minnesota in 1975. He received both his degrees from university of Minnesota: Bachelors, Masters. After his career in Air Force he was selected as a NASA Astronaut in 1996. He was the pilot on STS-109.

We have visited his hometown of St. Paul Minnesota. We also visited his high school and the University of Minnesota.

[DUANE CAREY – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Highland Park High School, St Paul Minnesota



University of Minnesota

FOURTH HST SERVICE MISSION - STS - 109 SM3B

John M Grunsfeld - Mission Specialist - Payload Commander

John was born on October 10, 1958 in Chicago, Illinois. He went to Highland Park High School graduating in 1976. He attended Massachusetts Institute of Technology getting a Bachelor of Science degree in Physics in 1980. He then attended the University of Chicago, getting a Master of Science degree in Physics in 1984, and a Doctor of Philosophy in Physics in 1988. He was an astronaut candidate and reported to the Johnson Space Center in August 1992. As part of this activity, he directed an effort combining the resources of the Mission Control Center (MCC) Display Team and the Space Station Training Facility. He was the only astronaut who went on three Hubble missions. He has been very much involved in astronomy and Space Telescopes before, during and after his space missions. After leaving NASA in 2009, he served as deputy director of the Space Telescope Science Institute in Baltimore, getting involved in James Webb Telescope. He came back to NASA in 2012, to serve at the Science Mission Directorate.

His Other missions: STS 67 (Mission Specialist), STS 81 (Mission Specialist), STS 109 (Mission Specialist), STS 125 (Mission Specialist)

We had visited his high school in Highland Park and also visited the University of Chicago to see his artifacts. We also visited MIT. We witnessed his presentation on the history of Hubble Missions and also an introduction to the James Webb Telescope.

[JOHN GRUNSFELD – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



University of Chicago



University of Chicago



FOURTH HST SERVICE MISSION - STS - 109 SM3B

Nancy J Currie - Mission Specialist

Nancy J Currie was born on Dec 29, 1958 in Wilmington, Delaware. She considers Troy, Ohio to be her hometown. She Graduated from Troy High School, Troy, Ohio, in 1977. She received a Bachelor of Science, with honors, in biological science from The Ohio State University, Columbus, Ohio, in 1980 and a Master of Science in Safety Engineering from the University of Southern California in 1985 and a Doctorate in Industrial Engineering from the University of Houston in 1997. After serving in the United States Army for over 23 years she was assigned to Johnson Space Center, in September of 1987 as a flight simulation engineer on the Shuttle Training Aircraft. She was selected as a NASA astronaut in 1990.

Her other missions : STS 57 (Mission Specialist), STS 70 (Mission Specialist), STS 88 (Mission Specialist).

We have visited her hometown of Troy, OH where she is honored in the city's Hobert Arena and also with a statue as one of the 'Pioneers of Aviation', in the town of Troy. We have visited all her educational institutions: Troy High School, Ohio State University, University of Southern California and University of Houston.

[NANCY J CURRIE – History Travel US \(historytravel-us.com\)](http://NANCYJCURRIE-HistoryTravelUS(historytravel-us.com))



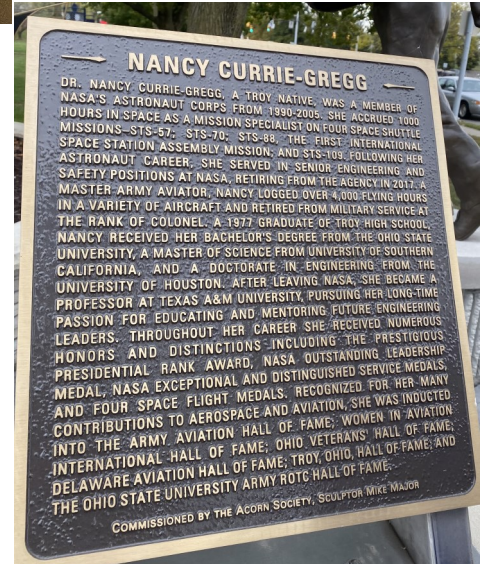
Troy High School, Troy, OH



Hobert Arena, Troy, OH



Statue as a part of 'Pioneers of Aviation', Troy, OH



HST FOURTH SERVICE MISSION - STS - 109 SM3B

Richard M Linnehan - Mission Specialist

He was born on September 19, 1957 in Lowell Massachusetts. He attended Alvirne High School, Hudson, New Hampshire from 1971 through 1974. He Graduated from Pelham High School, Pelham, New Hampshire, in 1975. He attended the University of New Hampshire in Durham, graduating in 1980 with a Bachelor of Science Degree in Animal Sciences with a minor in Microbiology. He received a Doctorate of Veterinary Medicine (DVM) from The Ohio State University College of Veterinary Medicine in 1985. He reported to the Johnson Space Center as a NASA astronaut candidate in 1992. He was assigned to flight software verification in the Shuttle Avionics Integration Laboratory (SAIL). He was a mission specialist on this mission STS-109 and was one of the four space walk specialists.

His other missions : STS 78 (Mission Specialist), STS 90 (Mission Specialist), STS 123 (Mission Specialist)

We visited his possible birthplace hospital in Lowell. We also visited his first high school, his second, where he graduated from, that had his artifacts. We also visited the University of New Hampshire and also Ohio State University.

[RICHARD LINNEHAN – History Travel US \(historytravel-us.com\)](http://RICHARD LINNEHAN – History Travel US (historytravel-us.com))



Alvirne High School, Hudson MA

(studied here from 1971-1974 but graduated from Pelham High School in 1975)



Pelham High School , Pelham NH



Pelham High School



University of New Hampshire Durham NH

HST FOURTH SERVICE MISSION - STS - 109 SM3B

James Newman

James was born on Oct 16, 1956 in Trust Territory of the Pacific Islands, which is now Federated States of Micronesia. He graduated from La Jolla High School, San Diego, California in 1974. He received a bachelor of arts degree in physics from Dartmouth College in 1978 and a master of arts degree and a doctorate in physics from Rice University in 1982 and 1984, respectively. He started working in Space Center Houston while he was at Rice and he was selected as a NASA astronaut in 1990. where his duties included responsibility for conducting flight crew and flight control team training for all mission phases in the areas of Orbiter propulsion, guidance, and control . After his association with Naval Postgraduate School during his NASA work, in March 2006, he moved to the Naval Postgraduate School (NPS) in Monterey, California, as a Professor.

His other missions : STS 51 (Mission Specialist), STS 69 (Mission Specialist), STS 88 (Mission Specialist)

We had visited his school in San Diego, CA and saw quite a few artifacts he had donated. We also visited the Dartmouth College and its special collections to view some of his artifacts. We also met him at the Naval Postgraduate School and he was kind enough to show us around the space artifacts at the school.

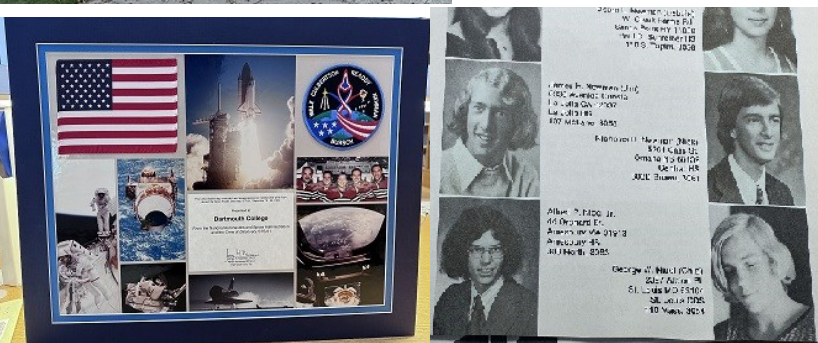
[JAMES NEWMAN – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



La Jolla High School
San Diego, CA



Dartmouth College
Hanover NH



HST FOURTH SERVICE MISSION - STS - 109 SM3B

Mike Massimino - Mission Specialist

Mike was born on August 19, 1962 in Oceanside, New York. He was raised in Franklin Square New York. He went to H Frank Carey junior senior high school in Franklin Square, New York in 1980. He attended Columbia University getting Bachelor of Science degree in industrial engineering in 1984. He then attended the Massachusetts institute of technology with a Master of Science degree in Mechanical Engineering and a Master of Science degree in technology and public policy in 1988. He continued his education at MIT by getting a degree in Mechanical Engineering in 1990 and also getting a Doctor of Philosophy degree in Mechanical Engineering in 1992. He is now a professor at Columbia University, New York City. He was selected as a NASA astronaut in 1996. He is very actively involved in the Intrepid Air and Space Museum, NYC. Prior to being selected as a NASA Astronaut candidate in 1996, he was involved or employed on several space related organizations: DLR in Germany, McDonnell Douglas Aerospace in Houston, developing computer displays for the Space Shuttle. He was a mission specialist on STS-109 and also one of the four space walkers during the mission.

His other missions : STS 125 (Mission Specialist)

We have visited his birthplace, high school and also Columbia University. We had visited MIT. We also visited the Intrepid Air Museum in NYC, in which he is very closely involved. Se also visited the Cradle of Aviation Museum in Long Island where many of his artifacts are displayed. Recently he was honored with a street with his name in Franklin Square.

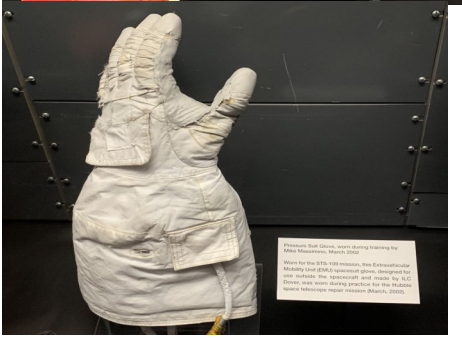
[MIKE MASSIMINO – History Travel US \(historytravel-us.com\)](http://MIKE MASSIMINO – History Travel US (historytravel-us.com))



H Frank Cary Junior Senior High School



Columbia University



Mike Massimino's Hall Of Fame and other exhibits, Cradle of Aviation Museum, Long Island, NY

FIFTH HST SERVICE MISSION - STS - 125 - SM4 - ATLANTIS



STS - 125 COLUMBIA CREW

Mike Massimino - Mission Specialist, Micheal T Good – Mission Specialist, Gregory C Johnson - Pilot, Scott Altman - Commander, Megan McArthur - Mission Specialist, John M Grunsfeld - Mission Specialist, Andrew Feustel - Mission Specialist

**Mission Highlights:**

This last service mission in 2009, was significant since this was the last opportunity to service the telescope before the end of the Space Shuttle program. This missions goal was to perform upgrades to instruments and repair and resurrect failed instruments and provide vital upgrades to prolong its life. After the Columbia disaster in 2003, it took a while to get approval for this mission.

The third version of Wide Field Camera was installed. By removing the COSTARS, Cosmic Origins Spectrograph was installed in its place. Two upgraded instruments which were already upgraded but failed (STIS failed in 2004 and ACS failed in 2007). For prolonging the life, all the gyros and the batteries were replaced.

This mission was commanded by Scott Altman with Gregory Johnson as the pilot. The EVA team comprised of John Grunsfeld, Mike Massimino, Michael T Good and Andrew Feustel. Megan McArthur was responsible for the robotic arm.



STS-125
ATLANTIS

May 11, 2009

The fifth and final servicing mission to NASA's Hubble Space Telescope. The 12-day mission included five spacewalks to install two new instruments and thermal blankets, repair two existing instruments, refurbish subsystems and replace gyroscopes, batteries and a computer. The mission brought Hubble to the apex of its scientific capabilities and extended its likely operational lifespan to at least 2014.

FIFTH HST SERVICE MISSION - STS - 125 SM4

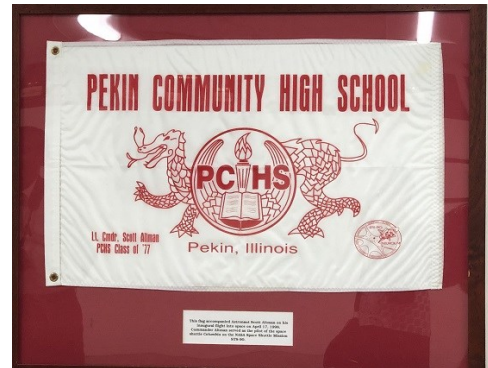
Scott Altman - Commander

Scott Altman was born on August 15, 1959 in Lincoln Illinois. He graduated from Pekin Community High School, Pekin, Illinois in 1977. He received bachelor of science degree in aeronautical and astronautical engineering from the University of Illinois in May 1981 and a master of science degree in aeronautical engineering from the Naval Postgraduate School in Monterey CA, in 1990. During his time in the Navy he worked on several projects on F-14. He was very prolific on the aircraft and also performed during the filming of the movie Top Gun. He was selected as a NASA astronaut in 1994. On STS-109 he was a commander.

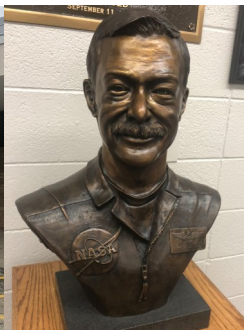
His other Missions : STS 90 (Pilot), STS 106 (Pilot), STS 109 (Commander).

We have visited many of his sites including his birthplace Lincoln IL, his high school in Pekin, the school name in his honor, University of Illinois, Urbana Champaign, Naval Postgraduate School, Monterey Ca and the museum in Peoria, IL, where many of his artifacts have been displayed.

[SCOTT ALTMAN – History Travel US \(historytravel-us.com\)](http://SCOTT ALTMAN – History Travel US (historytravel-us.com))



Pekin Community High School, Pekin IL



Scott Altman Elementary School, Pekin, IL (in his honor)



University of Illinois Urbana Champaign, IL



Peoria Riverfront Museum, Peoria IL



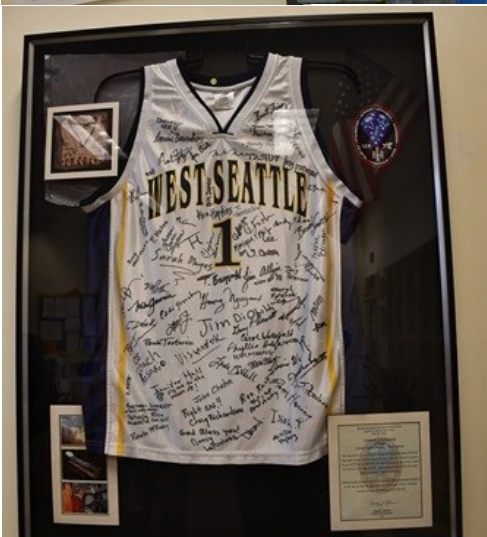
FIFTH HST SERVICE MISSION - STS - 125 SM4

Gregory Johnson - Pilot

Greg was born on July 30, 1954 in Seattle Washington. He graduated from West Seattle High School, Seattle, Washington, in 1972. He obtained his Bachelor of Science degree in Aeronautics and Astronautics, University of Washington, 1977. He later became a Naval Aviator and Test Pilot. His association with NASA started when he was accepted as an aerospace engineer and research pilot at the NASA JSC Aircraft Operations Division, Ellington Field, Texas. He was elected by NASA as an astronaut candidate in June 1998. On his only space flight on STS-125, he was a pilot.

We visited his high school in Seattle and saw many of his artifacts displayed. We also visited the astronomy and aeronautics departments of University of Washington in Seattle.

[GREGORY C JOHNSON – History Travel US \(historytravel-us.com\)](http://GREGORY C JOHNSON – History Travel US (historytravel-us.com))



West Seattle High School
Seattle, WA



University of Washington
Seattle, WA
Department of
Aeronautics and
Astronautics

FIFTH HST SERVICE MISSION - STS - 125 SM4

Michael T Good - Mission Specialist

Micheal was born on Oct 13, 1962 in Parma, Ohio. He was raised in Broadview Heights, OH. He graduated from Brecksville-Broadview Heights High School, Ohio, 1980; He completed Bachelor of Science in Aerospace Engineering in 1984 and Master of Science in Aerospace Engineering in 1986, both from the University of Notre Dame. As a military aviator, he has flown more than 30 types of aircraft. He was selected as a NASA astronaut in 2000.

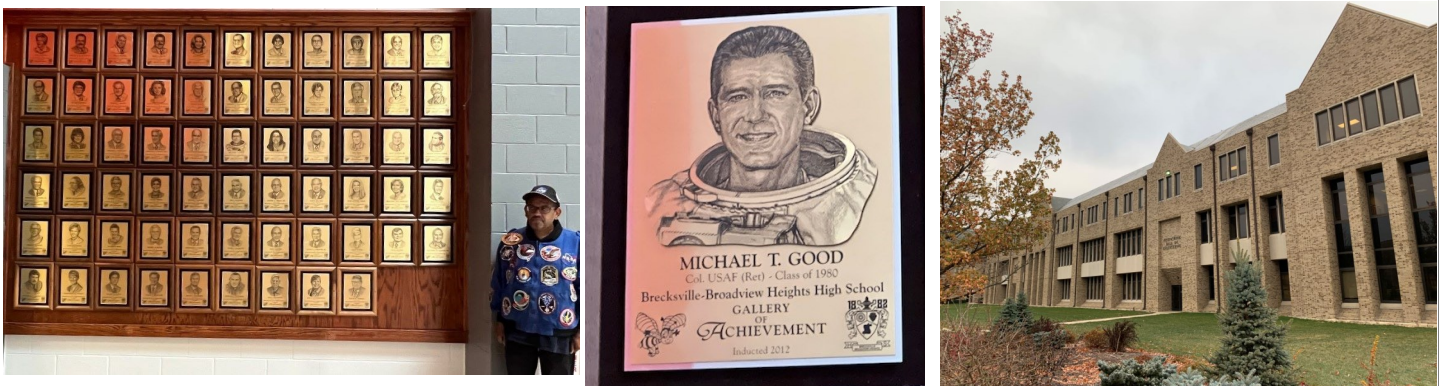
His other missions : STS 132 (Mission Specialist)

We have visited his hometown of Parma. We also visited his high school in Broadview Heights to view his artifacts. When we visited Notre Dame University, we saw his artifacts.

[MICHEAL T GOOD – History Travel US \(historytravel-us.com\)](http://MICHEAL T GOOD – History Travel US (historytravel-us.com))



Brecksville-Broadview Heights High School, Broadview Heights OH



Brecksville-Broadview Heights High School, Broadview Heights OH

University at Notre Dame IN



University at Notre Dame IN

FIFTH HST SERVICE MISSION - STS - 125 SM4

Megan McArthur - Mission Specialist

Megan was born on August 30, 1971 in Honolulu Hawaii . She graduated from St. Francis High School, Mountain View, California in 1989. She obtained the Bachelor of Science in Aerospace Engineering from University of California, Los Angeles, 1993 and Ph.D. in Oceanography from Scripps Institution of Oceanography at the University of California, San Diego, in 2002. She was selected as a NASA astronaut as a mission specialist in 2000. She served as Spacecraft Communicator (CAPCOM) on STS-116 and STS-117. On STS-125, she was on the controls of the remote manipulator system (RMS).

Her other missions : Expedition 65/66 to ISS, on Crew Dragon in 2021.

We have visited her high school, University of California Los Angeles CA and also Scripps Institute of Oceanography at the University of California San Diego.

[MEGAN MCARTHUR – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



Saint Francis High School, Mountain View, CA



University of California Los Angeles



Scripps Institute of Oceanography San Diego

FIFTH HST SERVICE MISSION - STS - 125 SM4

John M Grunsfeld - Mission Specialist

John was born on October 10, 1958 in Chicago, Illinois. He went to Highland Park High School graduating in 1976. He attended Massachusetts Institute of Technology getting a Bachelor of Science degree in Physics in 1980. He then attended the University of Chicago, getting a Master of Science degree in Physics in 1984, and a Doctor of Philosophy in Physics in 1988. He was an astronaut candidate and reported to the Johnson Space Center in August 1992. As part of this activity, he directed an effort combining the resources of the Mission Control Center (MCC) Display Team and the Space Station Training Facility. He was the only astronaut who went on three Hubble missions. He has been very much involved in astronomy and Space Telescopes before, during and after his space missions. After leaving NASA in 2009, he served as deputy director of the Space Telescope Science Institute in Baltimore, getting involved in James Webb Telescope. He came back to NASA in 2012, to serve at the Science Mission Directorate.

His Other missions: STS 67 (Mission Specialist), STS 81 (Mission Specialist), STS 103 (Mission Specialist), STS 109 (Mission Specialist)

We had visited his high school in Highland Park and also visited the University of Chicago to see his artifacts. We also visited MIT. We witnessed his presentation on the history of Hubble Missions and also an introduction to the James Webb Telescope, based on his experience at Space Telescope Science Institute.

[John Grunsfeld – History Travel US \(historytravel-us.com\)](http://historytravel-us.com)



University of Chicago



University of Chicago



University of Chicago

FIFTH HST SERVICE MISSION - STS - 125 SM4

Mike Massimino - Mission Specialist

Mike was born on August 19, 1962 in Oceanside, New York. He was raised in Franklin Square, New York. He went to H Frank Carey Junior Senior High School in Franklin Square, New York in 1980. He attended Columbia University getting a Bachelor of Science degree in Industrial Engineering in 1984. He then attended the Massachusetts Institute of Technology with a Master of Science degree in Mechanical Engineering and a Master of Science degree in Technology and Public Policy in 1988. He continued his degree at MIT by getting a degree in Mechanical Engineering in 1990 and also getting a Doctor of Philosophy degree in Mechanical Engineering in 1992. He is now a professor at Columbia University, New York City. He was selected as a NASA astronaut in 1996. He is very actively involved in the Intrepid Air and Space Museum, NYC. Prior to being selected as a NASA Astronaut candidate in 1996, he was involved or employed on several space-related organizations: DLR in Germany, McDonnell Douglas Aerospace in Houston, developing computer displays for the Space Shuttle. He was a mission specialist on STS-109 and also one of the four spacewalkers during the mission.

His other missions : STS 109 (Mission Specialist)

We have visited his birthplace, high school and also Columbia University. We had visited MIT. We also visited the Intrepid Air Museum in NYC, in which he is very closely involved. We also visited the Cradle of Aviation Museum in Long Island where many of his artifacts are displayed. Recently he was honored with a street with his name in Franklin Square.

[MIKE MASSIMINO – History Travel US \(historytravel-us.com\)](http://MIKE.MASSIMINO-HistoryTravelUS(historytravel-us.com))



H Frank Cary Junior Senior High School



Columbia University



Mike Massimino's Hall Of Fame and other exhibits
Cradle of Aviation Museum, Long Island, NY

FIFTH HST SERVICE MISSION - STS - 125 SM4

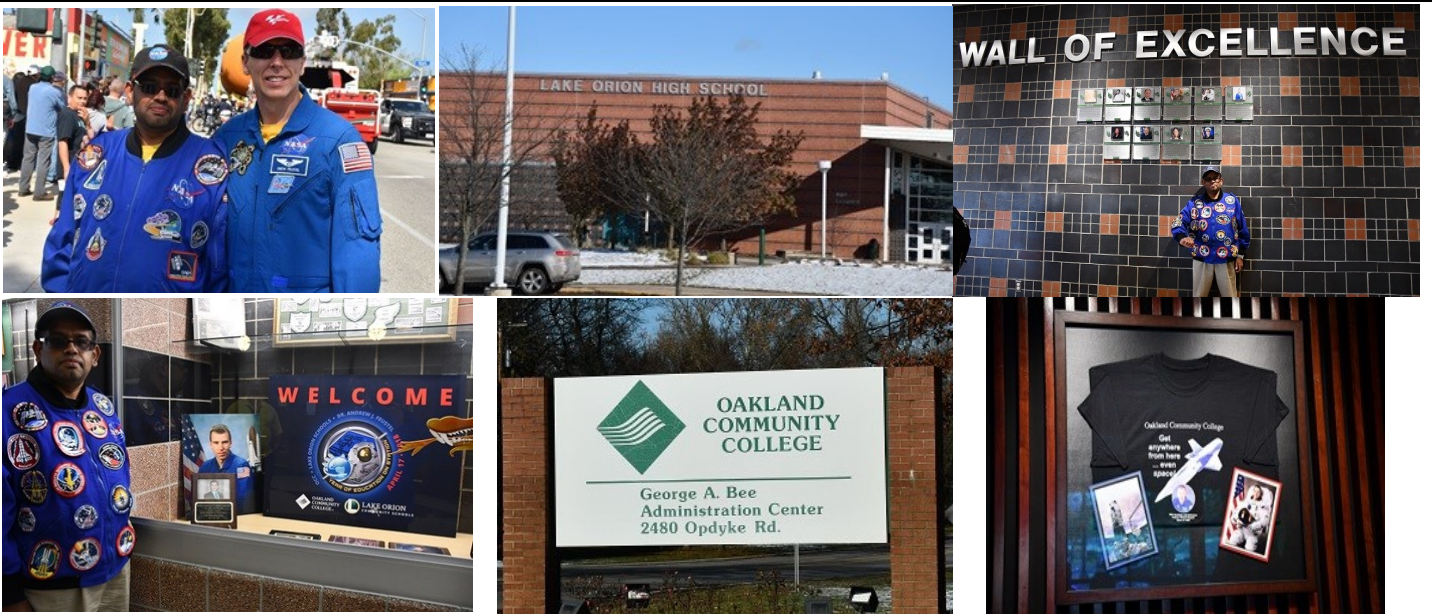
Andrew Feustel - Mission Specialist

He was born April 25, 1965 in Lancaster, Pennsylvania. He was raised and educated in Lake Orion, Michigan. He Graduated from Lake Orion High School, Michigan. He got an Associate Science degree, at Oakland Community College, Michigan in 1985. He graduated as a Bachelor of Science in Solid Earth Sciences and also obtained his Master of Science degree in Geophysics, at Purdue University in 1989 and 1991. He completed his Ph.D. in Geological Sciences, specializing in Seismology, at Queen's University, Kingston, Ontario, Canada, 1995. He was selected as a NASA astronaut candidate in 2000, where he began NASA's two-year training program, as a mission specialist. He was one of the space walk specialists on STS-125.

His other missions : STS 134/Soyuz (MS-08) (Expedition 55/56)

I first met him first time during the historic arrival of External Tank at the California Science center. I also met him after he returned from ISS during the ISS debrief in Houston. We have visited the Lake Orion High School MI. We saw many of his artifacts at the district office for both his school and community college. We also visited the Michigan Heroes museum in Frankenmuth Mi, where he is honored with other Michigan Astronauts. We have also visited the Czech Center Houston with a special exhibit on his efforts to honor Petr Ginz who was imprisoned in Terezin camp.

[ANDREW J FEUSTEL – History Travel US \(historytravel-us.com\)](http://ANDREW J FEUSTEL – History Travel US (historytravel-us.com))



Lake Orion High School, MI, Lake Orion School District, Oakland Community College, Auburn Hills, MI



Purdue University, IN



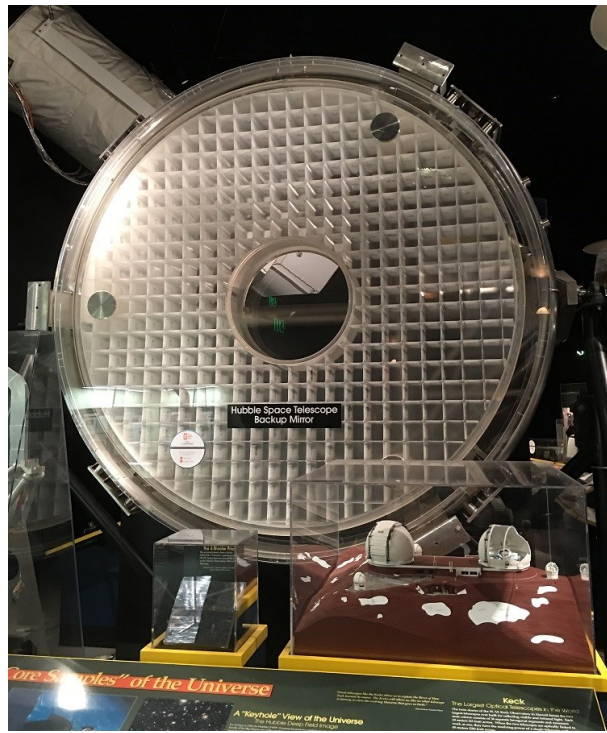
Michigan Heroes Museum
Frankenmuth MI

HUBBLE SPACE TELESCOPE EXHIBITS—SMITHSONIAN AIR AND SPACE

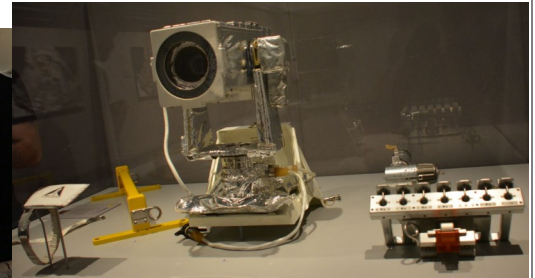
The Smithsonian Air and Space Museum in Washington DC had several exhibits related to the Hubble Space Telescope, including a full scale model, three other artifacts directly related to the HST are shown here. Some of the unique exhibits are the COSTAR which became obsolete in 2002 brought back in 2009 and the WFPC2 which was replaced in 2009. Both returned from Hubble in 2009. Another exhibit is the backup Hubble Space Telescope mirror, which was never used and made by Kodak. Interestingly this mirror was manufactured accurately without any error, unlike the one in space.



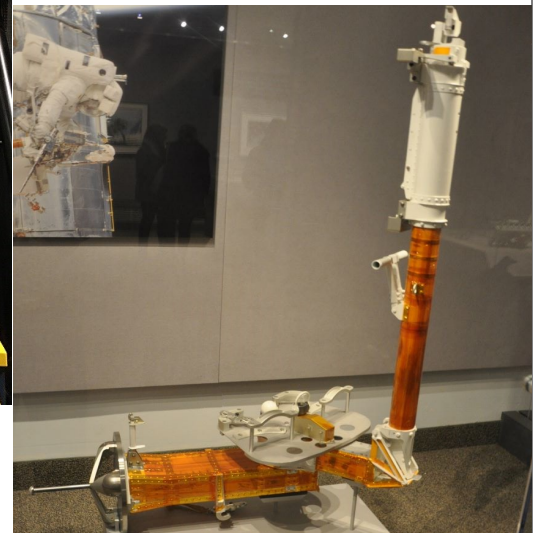
Full Scale Hubble Space Telescope Model



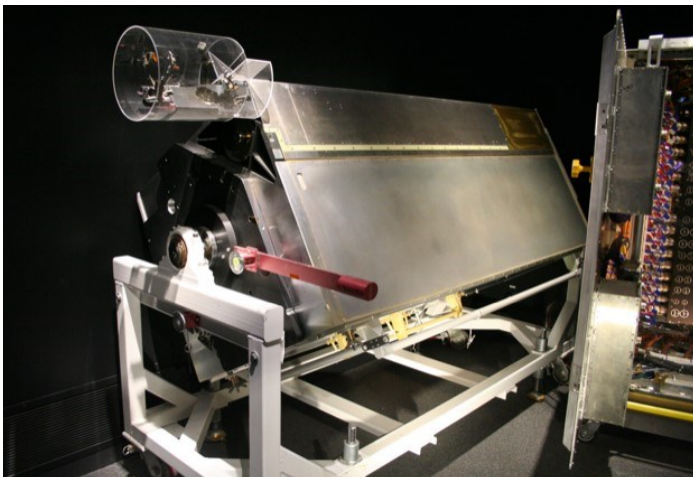
The back-up mirror made by Kodak. This was never used but notably, did not have the surface error present in the one actually in space.



Tools and equipment such as Payload camera etc., used on Hubble missions



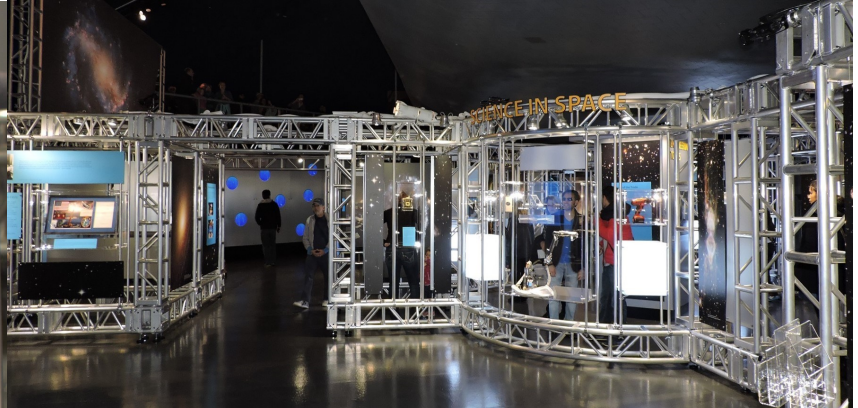
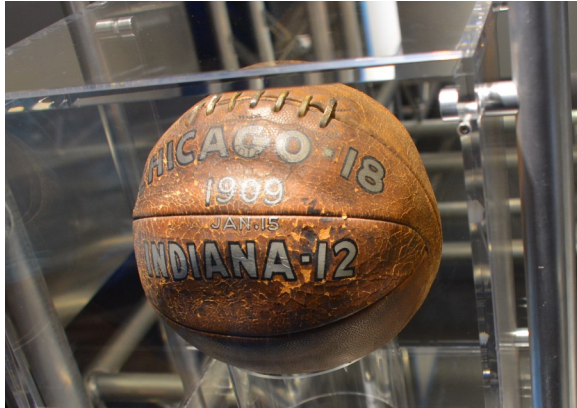
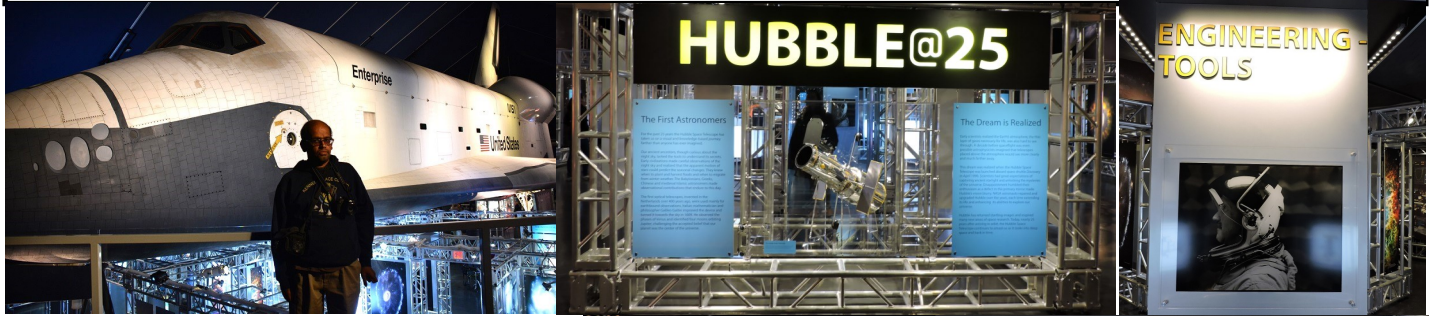
The manipulator foot restraint used on multiple Hubble Space Telescope missions



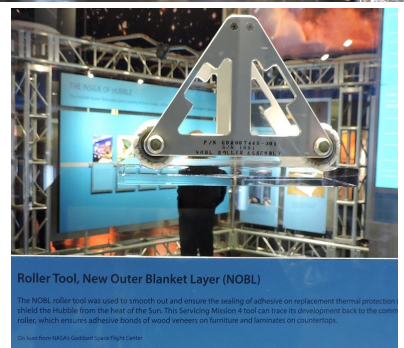
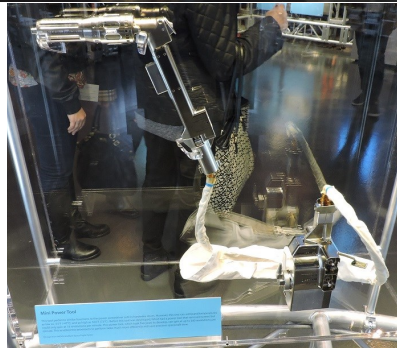
COSTAR which became obsolete in 2002 brought back in 2009 and the WFPC2 which was replaced in 2009

HUBBLE SPECIAL EXHIBIT HUBBLE @ 25—INTREPID AIR AND SPACE MUSEUM

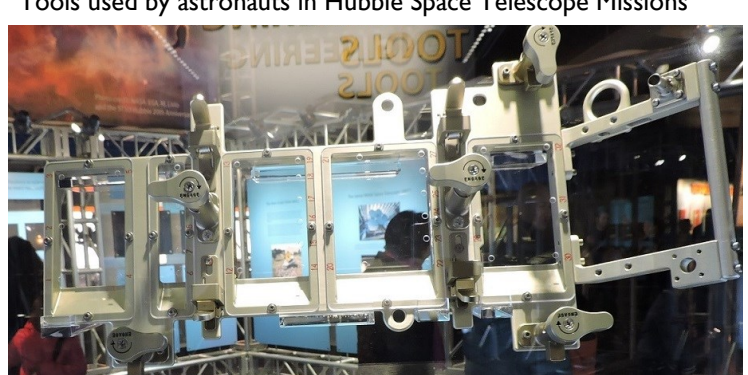
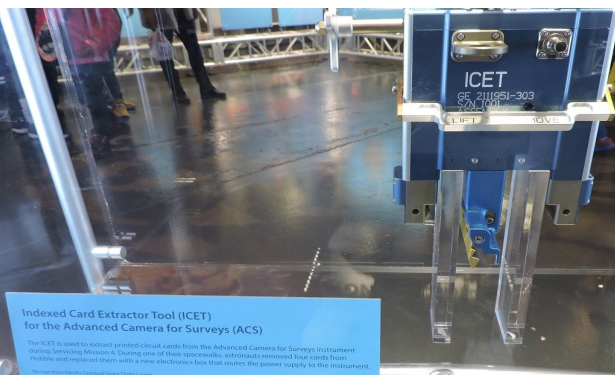
Unlike the Smithsonian Air and Space that displays bigger Hubble artifacts, the Intrepid Air and Space Museum in New York, NY, which houses the Space Shuttle Enterprise, focused more on the people aspects of Hubble Space Telescope. The HUBBLE@25 exhibit, on the 25th anniversary of HST, in 2015, focused on the Tools developed and used by the Hubble Astronauts during their different service missions. This exhibit also had a section to honor Edwin Hubble, the father of extragalactic astronomy and whose is honored by the name of the telescope itself. John Grunsfeld, a University of Chicago Alumni, took two unique artifacts to Honor Edwin Hubble, who is also from University of Chicago: Edwin Hubble's Championship Basketball from 1909 and also the copy of first page of Hubble's Ph. D Thesis. Astronaut Mike Massimino, who went on two servicing missions is the senior adviser of space programs at this museum.



Edwin Hubble's Championship basketball and a copy of the first page of his Ph.D. Thesis



Tools used by astronauts in Hubble Space Telescope Missions



Tools used by astronauts in Hubble Space Telescope Missions

HUBBLE SPECIAL EXHIBIT - INTREPID AIR AND SPACE MUSEUM

The 'Personal Space' Exhibit at the Intrepid Air and Space in 2018, also followed the same theme of astronaut artifacts similar to the Hubble@25 exhibit in 2015. In this exhibit, many of the personal items taken by astronauts to space are displayed. While the exhibits are not limited to Hubble Astronauts, many of them were carried by Hubble astronauts, which are presented here.

PERSONAL SPACE

Like anyone leaving home for a long trip, astronauts bring along personal possessions to remind them of family, friends and their life back on Earth. These reminders of home are as individual as the astronauts themselves. This collection of personal objects offers a glimpse into the makings and motivations of space explorers.

What would you bring on your journey to outer space?



'Personal Space' Exhibit



Charles F. Bolden Jr.
Charles Bolden flew the A-6 Intruder on more than 100 combat missions during the Vietnam War. He went on to pilot the space shuttle on four missions and spent 28 days in space. After leaving NASA, he returned to the U.S. Marine Corps and achieved the rank of major general. In 2009, President Barack Obama appointed Bolden the administrator of NASA, a position he held until his retirement in 2017.

Charles F. Bolden Jr.
Charles Bolden voló el Intruder A-6 en más de 100 misiones de combate durante la guerra de Vietnam. Luego pilotó el transbordador espacial en cuatro misiones, donde acumuló 28 días en el espacio. Al culminar su trabajo en la NASA, Bolden regresó al Cuerpo de Marines de los Estados Unidos donde logró el rango de general mayor. En el año 2009, el presidente Barack Obama designó a Bolden como administrador de la NASA, posición que mantuvo hasta su retiro en el año 2017.



Michael T. Good
Before joining NASA, Michael Good trained as a weapons system officer in the U.S. Air Force and logged 3,000 hours in more than 30 types of aircraft. He completed four spacewalks, including two on a mission to add components to the International Space Station. Good spent 25 days in space and logged 30 hours of spacewalking.



Michael T Good's medal with his wedding ring and his wife's ring



John Grunsfeld's Hubble model

John M. Grunsfeld
John Grunsfeld served on five space shuttle missions. He spent 28 days in space and performed eight spacewalks. His first mission was the unmanned operation of the Russian space station Mir for six weeks. On his next mission, the space shuttle docked with the Russian space station Mir for six weeks and conducted experiments. His final three missions serviced the Hubble Space Telescope.

John M. Grunsfeld
John Grunsfeld sirvió en cinco misiones espaciales, pasó 28 días en el espacio y realizó ocho paseos espaciales. Su primera misión consistió en la operación no tripulada de la estación espacial rusa Mir durante seis semanas. En su segunda misión el transbordador espacial se acopló con la estación espacial rusa Mir y realizó experimentos personales y condujo experimentos. En sus últimas tres misiones realizó trabajos de mantenimiento en el telescopio espacial Hubble.

"Before my first space shuttle mission in 1996, I recorded songs from my LP collection onto a cassette tape. Most of the songs were jazz and gospel, but I probably played the 'Yallahah Chorus' from Handel's Messiah more than anything else on that flight."
—Charles Bolden



Charles Bolden's audio cassette with his favorite songs,



Scott D. Altman
Scott "Scooter" Altman was a naval aviator before he became an astronaut. He logged 7,000 hours in 60 types of aircraft and flew the F-14 Tomcat in the flying scenes of the film Top Gun. Altman served as the pilot on two space shuttle missions. He was also the mission commander on two missions to repair the Hubble Space Telescope. He has spent more than 40 days in space.



Scott D. Altman
Scott "Scooter" Altman era un aviador naval antes de convertirse en astronauta. Como piloto registró 7.000 horas en 60 tipos de aviones y voló el Tomcat F-14 en las escenas de acción de la película Top Gun. Altman fue piloto en dos misiones espaciales y también comandante de dos misiones de reparación al telescopio espacial Hubble. Altman ha pasado más de 40 días en el espacio.

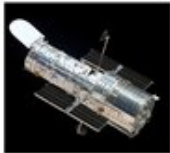
Scott Altman's grandfather's pocket watch



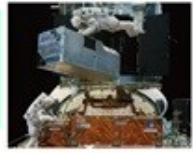
Michael J. Massimino
Michael Massimino flew to space on two missions to repair the Hubble Space Telescope: mission STS-109 in 2002 and mission STS-125 in 2009. He spent 24 days in orbit and logged more than 30 hours of spacewalking. Today he is a professor of mechanical engineering at Columbia University in New York City, and he serves as the senior advisor of space programs here at the Museum.

Mike Massimino's Snoopy

COMMEMORATIVE POSTER AND T SHIRT 30TH ANNIVERSARY OF HUBBLE SPACE TELESCOPE FIRST SERVICE MISSION



**30th Anniversary of
Hubble Space Telescope
First Servicing Mission**



**STS - 31
DISCOVERY
HST LAUNCH
APR 24 - APR 29 1990**



**STS - 61 (SM1)
ENDEAVOUR
FIRST SERVICING MISSION
DEC 2 - DEC 13 1993**



**STS - 82 (SM2)
DISCOVERY
SECOND SERVICING MISSION
FEB 11 - FEB 21 1997**



**STS - 103 (SM3A)
DISCOVERY
THIRD SERVICING MISSION
DEC 19 - DEC 27 1999**



**STS - 109 (SM3B)
COLUMBIA
FOURTH SERVICING MISSION
MAR 1 - MAR 12 2002**



**STS - 125 (SM4)
ATLANTIS
FIFTH SERVICING MISSION
MAY 11 - MAY 24 2009**

