

Air and Space this Week

Item of the Week

Inspired to Soar: Orville Wright and Gene Roddenberry

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August 19, 2021 Nichelle Nichols Inspiration

The exploration of Space has not only stimulated the development of technology and scientific knowledge, it has also produced very large economic benefits and, most importantly, very large intangible benefits. Foremost among these is how so many young people are inspired to learn STEM subjects because of Space exploration.

But Space isn't the only universal engager! Aviation is, too. Long before Goddard dreamed of rockets to Mars, young people were inspired to learn by the derring-do of the first aviators, starting with the First Flyer, Orville Wright, who would have been 150 this Thursday (August 19, 2021).

This Thursday, in a quirk of the calendar, is also the 100th birthday of Gene Roddenberry, the creator of Star Trek. Just as the Wrights inspired (more than) a generation, many scientists and engineers will gladly describe how Star Trek made them want to learn.

ORVILLE WRIGHT

Milton Wright was a bishop in the Church of the United Brethren in Christ, living in Dayton, Ohio. He and his wife, Catherine, had seven children. Wilbur was born third, with two older brothers (Reuchlin and Lorin) ahead of him. Twins that died in infancy came next, and then came Orville, born 150 years ago this week, on **August 19**, 1871. Katharine was the youngest of the brood, born in 1874.

Catharine died when Wil and Orv were teenagers, the Bishop traveled extensively, and the two oldest boys had left home, so the three youngest siblings bonded closely. Katharine was the only female figure in the Wright Brothers' life; neither of the boys married.

Wil and Orv were indifferent students, although both were very sharp and quite mechanically-inclined. Neither finished high school (although a diploma was granted to Wilbur on his 127th birthday), but the Bishop was a big believer in book learning, and the boys were reasonably well-read. Wil had been a serious student, but Orv, not so much. He was a mischievous kid, and even got expelled from elementary school briefly.

A number of factors affected the brothers' education. Late in his stint in high school, Wil lost his front teeth playing hockey, after which he was quite withdrawn, distracted by his mother's tuberculosis and the turmoil in his father's Church. Orville was more immersed in the social

environment of the day, and dropped out of high school. The boys built a printing press out of scrap, published a weekly newspaper for a while, and then concentrated on commercial printing.

Bicycles became a national craze in the 1890s, and the boys opened a bicycle repair/sales store in 1892. They may not have had educational credentials, but they were both excellent “shirt sleeve engineers,” building and testing bicycles of their own design. Both were avid bicyclists on their own time, and Orv especially loved their potential speed, racing often.

The boys developed an interest in flight at this time, inspired by the publicity surrounding Otto Lilienthal’s experiments with gliders. Octave Chanute began publicly testing gliders in the Indiana Dunes at Lake Michigan, and the Smithsonian Secretary, Samuel Langley, built a steam-powered, fixed-wing model airplane that worked (at that small scale) in 1896.

Then Lilienthal was killed in a glider accident. That really focused the boy’s attention, as did the death of another early aeronaut, Percy Pilcher, a few years later. Rather than shy away from danger, however, the boys got much more serious about applying the same kind of design and testing to aircraft that had worked so well for them with bicycles. Wil was definitely the leader of their joint effort, but Orv brought a lot of basic engineering to the process.

The boys studied the writings of Lilienthal, aerodynamics expert George Cayley, and others to guide their design process. Like Lilienthal, they built and tested gliders first, and they were particularly interested in controlling flight, using the behavior of bird wings (and an empty inner tube carton) as inspiration. They built their own wind tunnel for testing wing shapes, and had an ingenious testing rig built on one of their bicycles for assessing airfoil efficiency.

The bicycle business is rather seasonal, so the boys had some time in the winter to test their gliders. They found out that Kill Devil Hills in North Carolina was an ideal place for their tests, and they went there in 1900, 1901, and 1902 to test gliders of increasingly-sophisticated designs. Lilienthal had been killed when his glider nose-dived into the ground, so the Wrights were using a “tail first” setup, with a canard wing in front of the main wings. They had found an ingenious way for the pilot to warp the main wings slightly, allowing for some control around the yaw axis; the canard wing could be canted by the pilot for control on the pitch axis.

For the 1903 test season at Kitty Hawk, the boys were going to add an engine with counter-rotating pusher propellers to their glider. The problem was the engine. Designs of the day were much too heavy. Their bicycle shop mechanic, Charlie Taylor, realized that the engine block was the issue, and if they used aluminum to build it, a large reduction in weight would be realized. A lot of other parts on the *Wright Flyer* were either originally intended for bicycles, or were modified from parts that were.

The test season had a few discouraging delays. One of the biggest problems were the two propeller shafts’ fragility, requiring two trips back to Dayton to fix. They were finally ready on December 14. Wil won a coin toss and would be the first to make an attempt to fly a heavier-than-air plane. He was a little ham-fisted at the point of take-off, however, and caused minor damage to the *Flyer*.

Repairs took three days. It was Orville's turn to make the attempt. Fortunately, he had his camera handy, and one of the five witnesses that day would use it to take the famous photo you are all familiar with. **At 10:35 AM local time, Orville took the Flyer down its guide rail and managed to fly 120 feet**, at an average ground speed of less than 7 MPH (remember, they were using a strong headwind to provide lift).

The plan was for the two brothers to alternate flights the rest of the day, as they advanced up the piloting learning curve. Wil flew his first flight for ~175 feet, and Orv went again for ~200 feet. They both reached a higher altitude than Orv managed on the First Flight, all of ~10 feet.

The last flight of the day came around noon local time. Wil got the Flyer off the ground, with some difficulty in pitch control (which had also affected the first three flights). He managed to dampen the oscillations for about 800 feet of travel, but one final dip caused him to hit the ground abruptly, 852 feet from the take-off point. The *Flyer* suffered minor damage, but another wind gust caused additional problems, ending their test season on a high note.

Having only a few eye-witnesses raised some skepticism, especially for those vying to be the first pilots. The boys updated the *Flyer*, and made flights again the next season, this time from Huffman Prairie, near Dayton. Again, there were few witnesses, and the only published account of their accomplishments was by Amos Root's magazine about beekeeping and a tiny article in the *Dayton Daily News*' agricultural section! The longest flights in this season were almost three miles (four times around a circle at the Prairie), taking five-plus minutes. The boys made over 100 flights during 1904. [Huffman Prairie is now the site of Wright-Patterson Air Force Base and the home of the Museum of the U.S. Air Force!]

The next year, the Wrights built a new aircraft, the *Flyer III*. They were able now to cover almost 25 miles of flying, staying aloft for more than half-an-hour. There was no shortage of witnesses this time, even the Bishop showed up for one of the flights. But when reporters showed up, the Wrights declined to fly. The brothers did not have a patent for their invention, and were a bit reluctant to publicize their accomplishments widely. They had no outside financial support, either.

But they had developed a technology that would quite literally "Change the World!"

THE EFFECT OF WRIGHT FLIGHT ON SOCIETY

The First Flight is now beyond living memory, and it is almost impossible to imagine our modern society without air flight. Aviation touches everything, from the spectacular (military aircraft) to the mundane (mail/parcel delivery). Rapid travel and fresh lobsters in Colorado are examples of the many, many other things we now take for granted.

But that wasn't always so. While dreams of flight are as old as Humanity, actually achieving those dreams had a profound effect on society, and more importantly for the topic here, had an extremely inspirational effect on the younger people alive at the time of Kitty Hawk.

Once the public realized that the Wright brothers had actually flown a heavier-than-air, controllable, device, public interest soared (sorry). To be fair, there were a number of other inventors working to develop a workable aircraft, but subsequent analysis conclusively proves

that the Wrights were the first. I'll leave the controversies (save the one following) and their resolution for another day.

The economic potential of a patented flying machine led to some serious lawsuits, especially between the Wrights and aviation pioneer Glenn Hammond Curtiss, and the Wrights and Samuel P. Langley. Unlike the Wrights, Langley had a lot of financial backing and was much better known than the two bicycle guys from Dayton. Langley had built a couple of [models](#) of a steam-powered airplane that flew (somewhat) successfully, but was a comical dud when he built a full-scale version. Two months prior to the success at Kittyhawk, Langley tried catapulting his "[airplane](#)" from a specially-built barge in the Potomac River. It was slung ballistically into the water, with all the flight characteristics of a rock. He tried again two months later; this time the rear wing collapsed at launch.

But Langley had friends in high places. One of them, Charles Wolcott, became the Secretary of the Smithsonian in 1906. He had funded some of Langley's work, and when Langley died in that same year, Wolcott proclaimed him as having the first "successful" airplane, and created an award, research lab, and memorial to his pal. In 1914, he hired Curtiss, still smarting from his lawsuit loss, to rebuild the Langley Aerodrome A to prove that it could, and therefore did, fly. Curtiss made so many changes that his version of Langley's plane was almost a completely different aircraft. But it could fly, after a fashion, even if it bore little resemblance to Langley's 1903 effort.

Orville was livid, and stewed over the gross slight for several years. He finally got even by taking the Wright Flyer to England, where it was displayed for years at the London Science Museum.

Imagine, one of the United States' most treasured artifacts, the symbol of American technological ingenuity, was no longer even in the United States!

A new Smithsonian Secretary, Charles Abbot, moved to rectify this ridiculous situation, and oversaw a Smithsonian publication that admitted that the Langley/Curtiss test was bogus, and that the Wrights were indeed the true inventors of the airplane.

WWII was blazing at that time, making transfer of the Wright Flyer back home a lesser priority, but Orville did agree to allow the plane to be returned after the War. It took a couple of years, and Orv's death in 1948, to get the aircraft to its final destination, the Smithsonian's National Air and Space Museum.

I'm looking forward to seeing the reimagined exhibit gallery at the Smithsonian's National Air and Space Museum that will showcase the Wrights and their accomplishments, now under construction at NASM's National Mall Building. The original exhibit, "The Wright Brothers and the Invention of the Aerial Age," was outstanding. It devoted about a third of the gallery to the Wrights and their lives before the First Flight, a third to the Wright Flyer and the First Flight, and a third to the impact the First Flight had on society worldwide. It's the latter third I want to concentrate on in this Item segment.

The world of 1903 was a very different place than it is today. Everyday life was quite rustic by today's standards, and much more provincial, since most people never traveled very far from the place of birth, the biggest exception being military or diplomatic service. It's hard for me, in

my sixties, to imagine what life would have been like then; so it is no surprise that when you mention to a pre-teen today that there was once a time without the Internet, social media, thousands of TV stations, cell phones, and GPS, they just cannot get their minds around it. That's why I liked that latter third of the WB gallery so much!

The notion that people could now actually fly affected the books of the day. Many were about flying, or involved flying in the story line, especially in the two decades following the First Flight, as more and more authors actually witnessed, or even experienced, flying. The music of the day, too, was affected profoundly, with a lot of now-seemingly-goofy songs being released (on Edison's tubular records). Art was affected, too: one of my favorite examples was a painting of the Eiffel Tower, as [seen from above](#). The artist had just seen an air show and was inspired to think of seeing the Tower in a whole new way (all previous depictions were from the ground perspective).

Air shows became wildly popular in the first decade of flight. Everyone wanted to see these new contraptions, and shows, competitions, and other demonstrations of flight became large-scale events, a trend that continued for many years and still manifests today with the demonstration teams of the U.S. Air Force, the U.S. Navy, and others.

Flight also inspired a whole generation of young men to be mindful of aviation's coming role in military affairs, and were eager to use the new technology in WWI.

As communications technology improved, from motion pictures to talkies (e.g. *Wings*, 1927) to movies today looking back on flight (e.g. *Flyboys*, 2006), from telegraph to telephone to the Internet, the cachet of aviation grew right alongside.

GENE RODDENBERRY

Eugene Wesley Roddenberry was born on **August 19**, 1921, in El Paso, Texas, but his family soon moved to Los Angeles, where his father became a policeman. Like many young people in the 1920s and 30s, he was inspired by the exploits of WWI aviators and those on the barnstormer circuit. He majored in criminal science in school, but had a strong interest in aeronautical engineering. War clouds loomed again, and the Army established a Civilian Pilot Training Program to build a cadre of men who might be called upon to fight in the sky. Gene was an eager pilot-in-training with the program, and looked forward to a possible career as a military aviator.

Then Pearl Harbor happened.

Gene enlisted immediately thereafter, completed his flight training, and was commissioned on August 5, 1942, while he was still 18 years old. He also got married at that time, to Eileen-Anita Rexroat, with whom he would ultimately have two daughters. He was posted to the 394th Bomb Squadron, 5th Bombardment Group, of the Thirteenth Air Force, and would pilot B-17s in the Pacific Theater. He flew ~90 combat missions, was involved in two crashes, and earned a DFC.

Roddenberry rotated back to the States, served a stint as an air crash investigator, then left service after to War to fly long-haul routes for Pan Am.

Gene was a “dead heading” third officer on Pan Am Flight 121, a flight from Karachi to Istanbul, departing on June 18, 1947. The aircraft was a Lockheed L-049 Constellation, the *Clipper Eclipse*.

The plane was a dog. It had suffered severe engine trouble in the week preceding, having to turn back to Gander on its flight. Two days later, after a cylinder was replaced on the #2 engine, the plane made it to Rome, where a malfunctioning hydraulic pump on that same engine was replaced. The aircraft made Karachi without further incident.

Thirty-six souls were aboard on the flight to Istanbul, normally a flight requiring 10-11 hours. Roddenberry was at the controls half-way in, spelling the pilot or a short break, when engine #1 suffered a rocker-arm failure and had to be shut down.

The Conny was capable of maintaining altitude on three engines, and there were no airports near their flight path capable of making the engine repairs necessary, so the pilot chose to carry on with the flight. Three good engines would have been more than enough, but these were not good engines, and they couldn't handle the extra strain and heat at power settings needed for three-engine flight. The pilot reduced power, descended, and slowed down to ease the load on his remaining powerplants. The overheating continued, and the crew starting looking for an airfield. Then engine #2 caught fire.

Now they were in a real jam. The fire suppression system did not quench the fire, and the magnesium in the engine and nacelle began burning – very bad news. The engine mounts could not take much of the intense heat now being generated, and the pilot radioed a “may day” call. Roddenberry went to the passenger compartment to help the flight attendants to calm the passengers and to review emergency procedures with them.

Off fell the engine, severing gas lines that added to the intensity of the fire. It was just after 3 AM local time, so the fire really stood out against the dark sky, and panic began to affect the passengers. Gene moved forward to comfort a particularly distraught passenger, and was out of his seat when the plane hit the ground.

The pilot had made a valiant effort to crash-land in the middle of the desert at night. But that darn #1 engine had one last slap in the face for all aboard; it dug into the soil and caused the plane to slew into a ground loop and break apart, in flames. The cockpit crew was killed immediately, but the broken fuselage gave Roddenberry and some of the passengers a chance to escape the wreckage. Fifteen people were killed, eight passengers and seven crew. Gene and the surviving crew assisted the evacuation of the other survivors; one of them had a jammed seatbelt and would have died with Gene's assistance in freeing it. He made several trips into the burning debris to rescue people; the last one he pulled out died in his arms.

Roddenberry was the sole surviving Pan Am officer, so he took command of the situation. The flames attracted bands of native tribesmen, who were more interested in robbing the survivors and stealing from the wreck than they were in aiding the crash victims. At dawn, Roddenberry sent out two search parties to scout the area. One returned having learned the direction and distance to the nearest settlement. Roddenberry then led the survivors to that relative safety

with further (major) incident. Roddenberry was commended by Pan Am for his role in the rescues.

The crash soured Roddenberry somewhat on commercial aviation, and after another incident (about which I could learn little), Gene quit Pan Am and followed his father's footsteps to become a policeman in LAPD's Traffic Division. He liked police work, but like so many drawn to Southern California, he yearned to become involved with the growing television industry, not as an actor, but as a writer.

Roddenberry was skilled with words, and he transferred from the Traffic Division to the LAPD newspaper unit, where among other duties, he wrote speeches for Chief William H. Parker. Parker had taken over a department riddled with corruption in 1950, and used his WWII experience with military PR to good effect. Roddenberry's talent was just what Chief Parker needed, and both began to enjoy a good reputation. In Gene's case, that meant he was asked to serve as a technical advisor on the TV version of the older radio show, "Mr. District Attorney," which gave him the opportunity to moonlight writing scripts for the new TV version of the show (under a pseudonym). [BTW, Parker had a rational "cold fish" style of human interaction, rumored to be a role model for a future "Mr. Spock!"] When Gene tested for police sergeant, one of his buddies was a guy named Wilbur **Clingan** – guess how he ended up in the future *Star Trek*! Maybe Wilbur wasn't so much of a buddy, after all.]

Gene's writing gig became more lucrative than his police work, so he resigned the LAPD in 1956 to write full time for TV. Hollywood, especially the TV side, was a pretty small group in those days, and Gene had made (with Parker's help) a lot of connections in his moonlighting that would prove significant in the coming decade.

Gene sold some scripts during this period, and was promoted to head writer on a new series called "West Point Story." He chafed a bit when his stuff got re-written during production, and aspired to be a producer of his own show. He tried several series concepts without success, but the quality of his writing earned him a Writer's Guild award in 1958.

Roddenberry had a well-developed social conscience, and turned down a gig for a show that avoided having any Blacks. He did, however, get a producer position from Screen Gems for a summer replacement series called "Wrangler." Along the way at this time, he met DeForest Kelley and Majel Leigh Hudec...

In 1961, Gene pitched a series idea about an airship with a multi-ethnic crew traveling the world, based on the film from that year, "Master of the World." But this was a bad time for science fiction, but he was able to get a good writing gig on a show called "The Lieutenant," which premiered on September 14, 1963. The series was popular, and it introduced Gene to future colleagues Gene Coon, Gary Lockwood, Leonard Nimoy, D.C. Fontana, and Nichelle Nichols.

The Lieutenant was set in the Pentagon, and had (initially) a lot of military support. But Gene's liberal tendencies often clashed with the early 1960s military establishment, coming to a head

when Gene pushed a script that showed a black/white working relationship in a positive light (the episode was Nichelle Nichol's first TV appearance). *The Lieutenant* lasted only one season.

Gene didn't lament the cancellation of *The Lieutenant* because he was already working on a new series concept, as sort of a follow-up to "Master of the World." He added a Horatio Hornblower-type leader, a multi-ethnic crew, and a positive attitude toward the future (in spite of the real World's trying times). *Star Trek* was born. Now he had to sell it.'

Roddenberry pitched *Star Trek* to MGM – no go. He went to Desilu next, and got a much more favorable response. Desilu was in dire straits financially (they had some valuable property and equipment they could rent to other studios, but the only successful program they had in production was the aging *The Lucy Show*), but they offered Gene a producer slot and let him work on his own projects. Gene pitched his *Star Trek* idea to Oscar Katz, Desilu's head of programming, who was enthusiastic about the concept.

Gene and Oscar approached CBS, but they "already had a science fiction show," the dreadful *Lost in Space* kiddie show, and turned him down. NBC was next, and they spun the *Star Trek* concept more along the lines of "Hornblower does Wagon Train," and Mort Werner there authorized an NBC-funded pilot. Gene delivered "The Cage," starring Jeffrey Hunter.

The pilot tested poorly, being deemed "too cerebral" for TV. But instead of an outright rejection, NBC agreed to fund a second pilot (almost unheard of). This was the mid-60s, and the growing success of the U.S. Space program may have greased the skids for the embryonic *Star Trek*.

IMHO, the second pilot was a stinker ("Where No Man Has Gone Before"), but the first would be re-written as a two-part episode, "The Menagerie," and won that year's Hugo Award.

Gene had caught lightning in a bottle, and *Star Trek* went on to become a multi-billion-dollar franchise. More importantly, *Star Trek* inspired an entire generation of young people to become scientists and engineers, in order to be part of the Space "enterprise."

EFFECT OF *STAR TREK* ON SOCIETY

The effect of *Star Trek* on (American) society was not as broad as that of the First Flight, but it was every bit as deep. The technological advances (semi-)realistically presented fired the imagination, as did *Star Trek's* positive and inclusive view of future society. Many scientists and engineers now at/near retirement age had their career paths profoundly affected by watching *Star Trek* during their formative years.

But don't take my word for it! Check out the following examples of what successful people have said about the role of *Star Trek* in their lives.

Martin Cooper was responsible for building the first cell phone, and made the first cell phone call. He was inspired as a boy by *Star Trek's* communicators, so when he built Motorola's 1983 DynaTAC 8000X device, it had one, too, because that's what his inspiration had.

SpaceX's **Elon Musk**: "So, in terms of sort of key influences, I mean, I certainly like *Star Trek*, because that actually shows like more of a utopian future."

Apple's Steve Wozniak: "*Star Trek* had done so much for me. I'm not sure I would've had the inspiration that I had to ever start Apple, and do all these technical things, and I don't think I would've had the meaning in my life if I hadn't gone to *Star Trek* conventions when I was young."

Jeff Jenkins, CTO and co-Founder, Upskill: "*Star Trek* absolutely inspired me to enter the tech field, specifically computer science. ... (W)hat I found most intriguing was how ubiquitous all of that computing power was and how it seamlessly integrated into the day-to-day lives of those aboard the starship *Enterprise*. Nearly every surface of the ship was festooned with adaptive touch screen interfaces (just like my iPhone today), and they all were integrated via a very cloud-like central processing core (just like all my devices today). The computer was also never more than a convenient voice command away to turn on the lights or retrieve data from the archives (Alexa anyone?)."

ZK Research CEO **Aues Kerravala**: "*Star Trek* absolutely inspired me to enter the tech field, specifically computer science *Star Trek* set a vision for science and technology that is still unmatched for any other TV show and the thought of 'what's possible' was partially responsible for my passion for that field today."

Milind Tambe, Fellow, Association for the Advancement of Artificial Intelligence: ""Science fiction in general and *Star Trek* in particular was instrumental in inspiring me to pursue a Ph.D. in computer science and more specifically in artificial intelligence. ... (W)hen I completed my Ph.D. and began teaching AI at USC, I used *Star Trek* extensively in a class I had designed on 'AI and Science Fiction' to teach AI."

Apple's **Steve Jobs** was a *Star Trek* fan, commenting once that if he could have it his way, he'd want our world to be like *Star Trek's* universe, especially technology-wise. It's hard to say just how much direct inspiration for the iPad was drawn from the [pad-like devices](#) on *Star Trek*, but if you look at this [promo image](#) for the original iPad announcement, you might get (more than) a hint of it!

Apple's **Steve Perlman** was inspired to create Quicktime software when he saw a character in *Star Trek: The Next Generation* using a computer with multiple input/output tracks.

I personally know a number of colleagues whose career path was favorably altered because they watched *Star Trek* during their formative years. Me, too!

The quotes and anecdotes above are examples of *Star Trek's* impact on future scientists, engineers, and technologists. But that is only part of the story. *Star Trek's* optimistic inclusivity also had a big impact in the underserved population.

Star Trek was in many ways a groundbreaking production. Remember (your history) about how America was in the mid-1960s. It was an "interesting time," with amazing technological advances occurring frequently, seeing planets up close for the first time, advances in civil rights, all while conducting the Vietnam War.

Star Trek was the first major network show that had a Black person in a chain-of-command position. Nichelle Nichol's Lt. Uhura opened a lot of hailing frequencies, but she was also a key member of a major vessel's bridge crew. Nichelle had aspirations for a singing/dancing career, and was frustrated by the limitations of her role, and looked to quit the show after the first season. Dr. Martin Luther King, himself a Trekker, told her in no uncertain terms that her presence, even in the background at times, was a major symbolic victory for the Civil Rights movement, and that she was performing a great service to America in the role. [She later would tell this story often, and I have personally witnessed the powerful effect of this story as told by her in person.] Mae Jemison was a young girl at that time, and she was inspired by Uhura to believe that she, too, could play an important role in Space. And she did, she was America's first Black woman astronaut!

If one believes that something difficult is possible, they can be inspired to reach goals that would otherwise be unattainable.

Carl Sagan wrote eloquently in *Cosmos* about how the glory that was ancient Greece was fueled in large part by Greece being a crossroads connecting many different cultures, drawing the best from each to make a greater whole than the mere sum of its parts. IMHO, America and the rest of the World has benefitted similarly due to the international stimulus of the Space program, of which *Star Trek* has been an important part.

The Smithsonian National Air and Space Museum agrees with that assessment. That's why they acquired, refurbished, and placed on very prominent display the filming model of the original [Starship Enterprise!](#)

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The National Mall Building of the Smithsonian's National Air and Space Museum had an outstanding exhibit gallery, centered by the Wright Flyer, with the same title as the Jakab and Crouch book. That gallery was demolished in the present renovation of the NMB, but a new version of the original gallery will replace the first one. See the latest on the new gallery at: <https://airandspace.si.edu/exhibitions/wright-brothers-reimagined>.

https://en.wikipedia.org/wiki/Wright_brothers

<https://www.pbs.org/newshour/science/8-things-didnt-know-orville-wright>

An assessment of the impact of aviation circa 2011:

https://www.icao.int/Meetings/wrdss2011/Documents/JointWorkshop2005/ATAG_SocialBenefitsAirTransport.pdf

While the Wright Flyer was the first “aircraft that changed the world,” there were others that came later: <https://www.airspacemag.com/history-of-flight/aircraft-that-changed-the-world-45532020> and “The Feud Between the Wright Brothers and the Smithsonian” by Tom Crouch in the Spring 1987 edition of *American Heritage of Invention & Technology*, pp 34-46.

Flight in Films: <https://www.imdb.com/list/ls063642101>

This is just a small sampling of the information about the significance of flight, especially in the Early Days!

Gene Roddenberry

https://en.wikipedia.org/wiki/Gene_Roddenberry

https://military.wikia.org/wiki/Early_life_and_career_of_Gene_Roddenberry

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There are many other *Star Trek* books and websites out there, including one by just about everyone associated with The Original Series. I like the Solow/Justman book the best.

Effect of Star Trek on Society

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<https://www.thrillist.com/tech/when-entertainment-inspired-technology-tech-inspired-by-star-trek-inventions-inspired-by-jules-verne>

NASA and Star Trek: <https://www.nasa.gov/feature/50-years-of-nasa-and-star-trek-connections>

<https://www.startrek.com/news/nichelle-nichols-remembers-dr-king>

“How William Shatner Changed the World” [He didn’t, but *Star Trek* did!] Several examples are cited; see: https://en.wikipedia.org/wiki/How_William_Shatner_Changed_the_World

<https://www.smithsonianmag.com/smithsonian-institution/air-and-space-curator-margaret-weitekamp-explains-why-star-trek-matters-62034195/#vYSPw1EyBxiRbydl.99>

See also the Smithsonian Channel’s *Building Star Trek*:

<https://www.smithsonianchannel.com/details/show/3436402>

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