Architectural Insights into Space Tourism

5 Minutes Read

Introduction

Space tourism is a growing sector that allows people to go to space for recreational, leisure, or adventure purposes. Space tourism architecture includes a variety of components such as designing spacecraft, launch facilities, orbital destinations, creating an enhanced overall customer experience sustainability, rules, accessibility, and economic viability. As the tourism sector evolves, architectural ideas will be critical in designing the future of space travel.

It has been more than 20 years since the first space tourist flew, but there is still much more to come in the developing sector of space tourism. While the concept of space tourism may appear futuristic, it has a long history. So far, however, only the Russian Space Agency has effectively facilitated orbital space tourism. In the early 2000s, seven space travellers were launched into space. In 2010, the Russian Space Agency discontinued its space tourism operations. Since then, other commercial companies have investigated space travel, resulting in a variety of concepts.

Proposals from firms including SpaceX, Virgin Galactic, and Orion Span have pushed the concept of space travel to a whole new level. The first space tourist, however, was an American, Dennis Tito, who spent millions of dollars to the Russian Space Agency in 2001.

Figure 1_ The first space tourist, Dennis Tito (left) aboard the ISS _© https://en.wikipedia.org/wiki/Space_tourism#/media/File:ISS-02_Soyuz_TM-32_Taxi_crewmembers_in_the_Zvezda_Service_Module.jpg

Birth of space tourism:

Following the Apollo period, corporations examined the possibility of sending citizens into space rather than government professionals (NASA astronauts). Rockwell International, a contractor for NASA's Space Shuttle program, investigated the feasibility of passenger modules that could fit inside the Space Shuttle's payload bay in the 1970s, with similar concepts developed by other businesses during the next decade. Of course, that never happened. However, as the Space Age progressed, so did space tourism. Dennis Tito, an American entrepreneur, became the first true space tourist in 2001, traveling on a Russian Soyuz spacecraft and staying more than a week aboard the International Space Station (ISS) for an estimated $20 million.

Figure 2_ In the wake of the missions of Space X, Blue Origin and Virgin Galactic in 2021, space tourism seems more possible than ever before._© https://www.kdcresource.com/insights/space-tourism-how-does-it-work/

Present of space tourism:

Leisure travel may become more interesting for the world's wealthiest adventure seekers now that space, hitherto the exclusive domain of professional astronauts, is open to tourists.
Virgin Galactic and Blue Origin both successfully began suborbital tourism programs from their separate spaceports in New Mexico and Texas in July 2021 (Blue Origin completed its second flight in October 2021).
SpaceX's Inspiration4 mission launched the company's orbital tourism program from Kennedy Space Center's historic Launch Complex 39A in September 2021.
Each of these enterprises hopes to make space a popular destination by providing private people with regular launch services. Space Adventures is also back in business, having planned a voyage to the International Space Station for Japanese entrepreneur Yusaku Maezawa in December 2021. Further, Maezawa plans to charter SpaceX's under-development Starship spacecraft for the dearMoon project, which will take eight citizens to the moon.

Figure 3_ Space tourism balloon
_© https://i.ytimg.com/vi/kS0Jg6hlUSs/maxresdefault.jpg

Future of space tourism:

Space tourism is still in its infancy, with much work to be done. Existing suborbital businesses are still modifying launch vehicles and boosting launch cadence to approach regularity, while new ones are awaiting FAA license to begin operations. Ideally, space tourism companies will be able to lower flight costs as well.

In 2023, the global space tourism market soared to US$747.1 million, with a robust year-on-year growth of 14.0%. Forecasts predict a valuation of US$851.7 million by 2024, and an impressive 19.8% CAGR is expected to drive the industry to US$5,191.7 million by 2034.

The growth is fueled by factors such as the increasing interest of adventure travellers and high-net-worth individuals in spaceflight, the growing affordability of space travel, and advancements in technology.

Governments worldwide are pivotal in propelling this growth, providing financial support, regulatory frameworks, and infrastructure. Simultaneously, the focus on environmental sustainability is driving exploration into greener propulsion systems to address concerns about the carbon footprint of space tourism.

Innovation in propulsion, materials, and manufacturing is yielding safer, more efficient, and accessible spacecraft. These advancements promise tourists an unparalleled space travel experience, marking a transformative era in exploration.

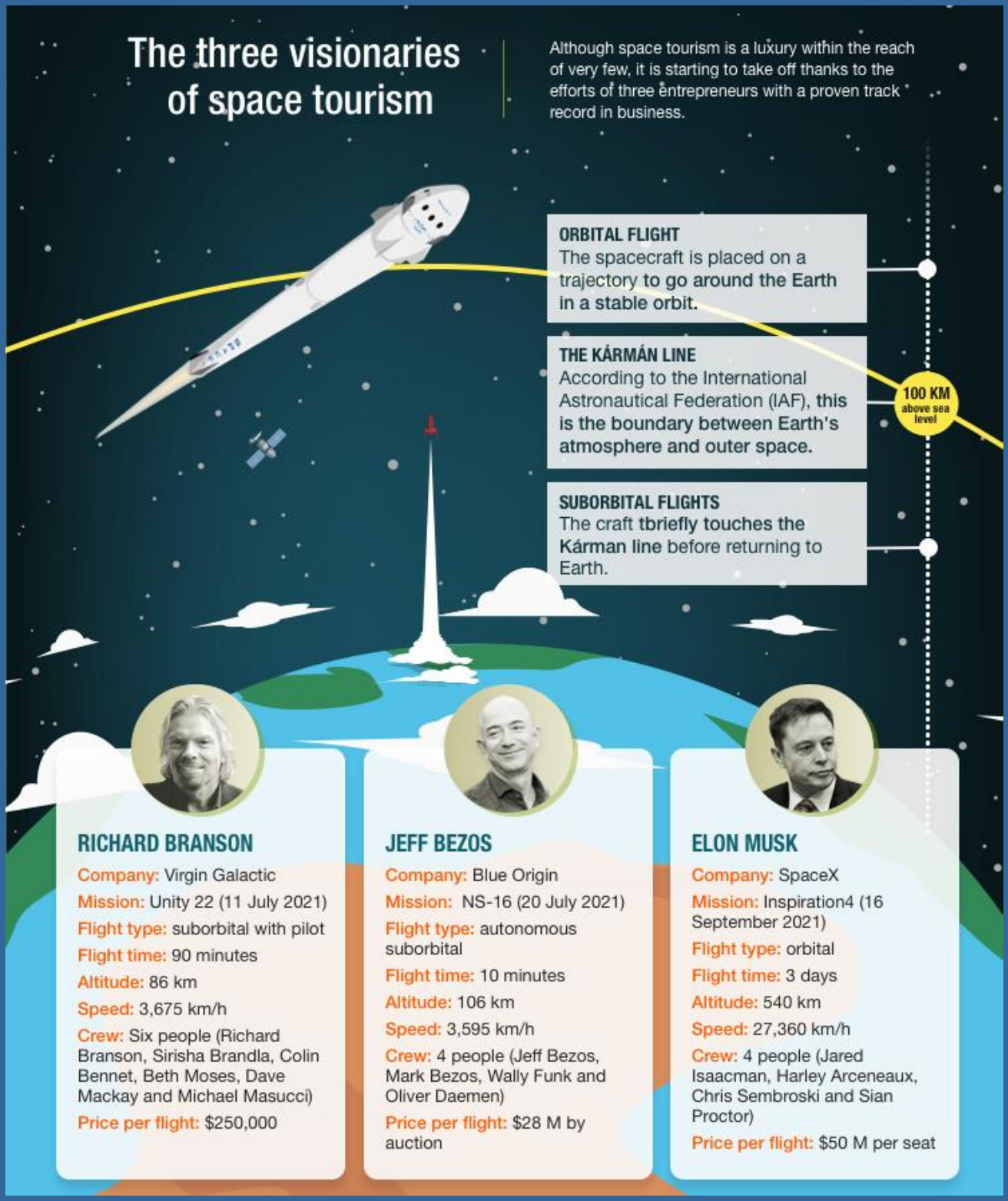

Figure 4_ The three visionaries of space tourism_© https://www.iberdrola.com/innovation/space-tourism

Figure 5_ Virgin Galactic Design for Its Spaceship
_© https://www.travelandleisure.com/trip-ideas/space-astronomy/virgin-galactic-spaceship-cabin-design

Notable commercial space tourism proposals:

The **Virgin Galactic** space tourism corporation, which is part of the larger Virgin Group, seeks to provide regular suborbital space flights for paying customers. Its current space plane, VSS Unity, entered space as part of its testing procedure in December 2018, bringing the potential of regular commercial space flights closer.

Figure 6_ SpaceX Tourism_© https://www.theverge.com/2020/2/18/21142137/spacex-tourism-orbit-earth-private-citizens-dragon-space-flight

SpaceX has a lot of expertise launching spacecraft, and the corporation also wants to go into the space tourism business. However, unlike the majority of other enterprises in this industry, they prioritize moon tourism and other forms of space travel beyond Earth's orbit. Elon Musk, the company's creator, stated in 2017 his desire to send two paying clients on a first lunar tourism journey around the moon. The mission was originally scheduled for 2018, but has since been postponed. SpaceX has yet to unveil a pricing strategy or a waiting list for lunar missions.

Figure 7_ The interior of the New Shepard crew capsule, which will carry people for the first time on a July 20 suborbital launch. _© https://spacenews.com/blue-origin-to-fly-first-people-on-new-shepard-in-july/

Blue Origin Virgin Galactic's main opponent in terms of suborbital space flight tourism have their tourism concept based on a more traditional rocket known as the New Shepard, which takes off and lands vertically, with the goal of eventually reaching orbital travel.

Figure 8_ Aurora Station Interior_© https://edition.cnn.com/travel/article/aurora-station-luxury-space-hotel/index.html

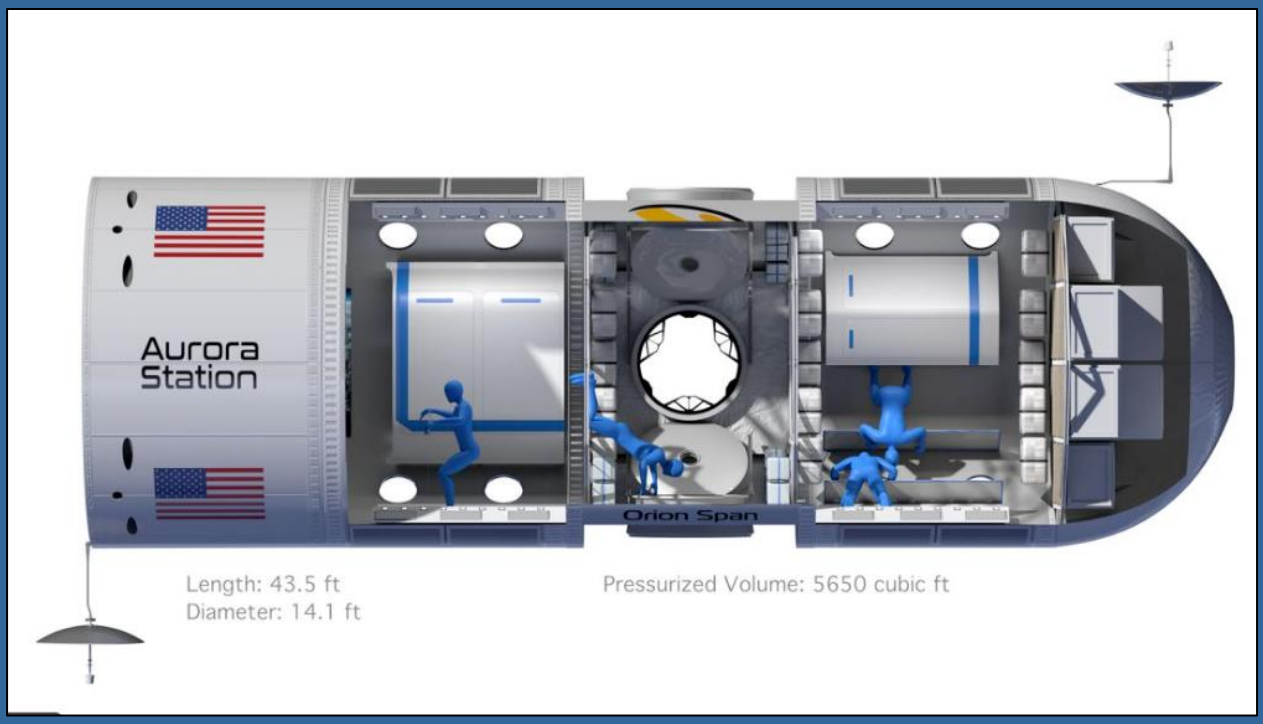

Figure 9_ Aurora Station Interior_© https://edition.cnn.com/travel/article/aurora-station-luxury-space-hotel/index.html

Orion Span is a space travel corporation based in the United States that has unveiled plans for the Aurora Space Station, a private commercial space station. This would be put in low Earth orbit and would act as a space hotel, accommodating up to six space visitors at a time. When the Boeing Company secured an arrangement with NASA as part of its Commercial Crew Development program, it became a key player in the space tourism sector. This program was created to enhance private sector participation in the development of personnel vehicles for launch into space.

Space Adventures, Inc. is a space tourism corporation situated in Vienna, Virginia, that was founded in 1998. Eric C. Anderson started the company and has a long list of satisfied customers who have participated in orbital space flights, zero-gravity flights, and astronaut training programs.

Figure 10_ Spanish startup Zero 2 Infinity plans to float civilians some 130,000 feet above the surface using a helium balloon measuring 420 feet in diameter
_© https://www.dailymail.co.uk/sciencetech/article-9271971/Zero2Infinity-wants-send-tourists-space-using-giant-hot-air-balloon-just-132-000.html

Zero 2 Infinity, also known as 0II∞, is a Spanish aerospace business situated in Barcelona. The company, which was founded in 2009, is known for its environmentally friendly approach, and its launch mechanisms use balloon technology to lessen the carbon emissions generally connected with space tourism.

Delve into the significance of architectural engagement within the space tourism sector:

The function of architecture in the space tourism sector is critical in influencing the future of space flight and the entire experience for both tourists and astronauts. Architectural involvement in the space tourism sector is critical for providing space visitors with a safe, enjoyable, and sustainable experience. It takes into account a wide range of factors, from user experience and safety to aesthetics and cultural importance, and it is critical in moulding the future of space travel and exploration.
The design of space tourism architecture has a direct impact on passenger comfort and enjoyment. Space tourists pay a premium for their trip, and architecture is critical to their

safety, convenience, and general enjoyment of the experience. Space tourism architecture must adhere to strict safety standards. The structural design of spacecraft, space stations, and spaceports is critical for safeguarding passengers from harsh space environments like microgravity, radiation, and extreme temperatures. Space tourism architecture must adhere to international norms and standards, such as safety, environmental impact studies, and international space use agreements. Compliance is essential for guaranteeing the safety and long-term viability of space travel. Ground facilities such as spaceports, launch sites, and tourist centers are critical to the smooth operation of the space tourism industry. Effective architectural design can help to expedite processes while also improving the overall tourist experience.

During their journey, space travellers may endure tension and anxiety. By providing a comfortable, relaxing, and familiar setting, architectural design can help reduce psychological problems. Space tourism architecture must adhere to international norms and standards, such as safety, environmental impact studies, and international space use agreements. Compliance is essential for guaranteeing the safety and long-term viability of space travel.

Figure 11_ Moon Holidays _© https://nypost.com/wp-content/uploads/sites/2/2022/04/lunar-1143.jpg?quality=75&strip=a ll&w=744

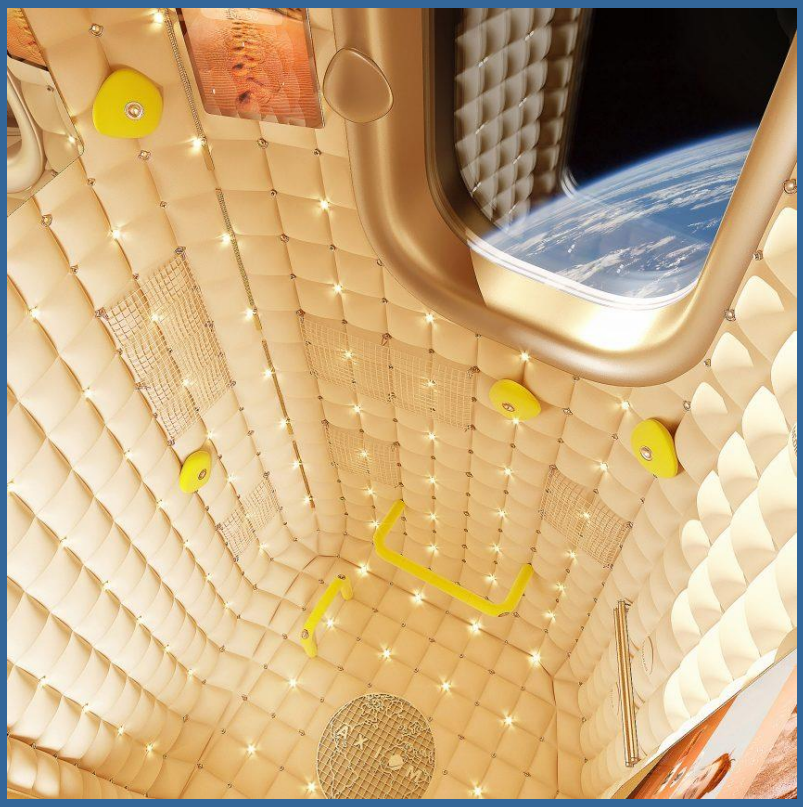

Figure 11_ Axiom Station by Phillipe Starck
_© https://www.dezeen.com/2022/04/12/space-tourism-roundups/

Figure 12_ Inside Space Neptune's climate-controlled, pressurized capsule.
_© https://edition.cnn.com/travel/article/space-perspective-patented-capsule-design-scn/index.html

Author: Siddhi Amar Salokhe

Siddhi is a B.Tech student and a dedicated aerospace enthusiast aspiring to specialize in aerodynamics, propulsion, space science, satellites, and launch vehicles. Having recently completed an internship at the National Aerospace Laboratory, she has co-authored two international conference papers [IAC 2023, Baku]. Siddhi has also served as an ambassador for the International Astronomy and Astrophysics Competition 2023 and the National Students' Space Challenge 2023, in addition to holding the position of joint secretary at the Alatus Space Club in her college.

Currently involved in the student satellite project at the Centre of Space and Technology, Siddhi's daily commitment to design, writing, and knowledge reflects her unwavering dedication to achieving her career goals in the aerospace field.

Editor: Vedika Adukia

INSPACEDESIGNERS

Beyond the realms of Earth

InSpaceDesigners is an online publication that disseminates newsletters, articles, and reports on space architecture, engineering, and related subjects, along with the most recent space news updates with the intention of advancing the discipline of space architecture in India.