



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



Department of Aerospace Engineering

23AST101-Fundamentals of Aerospace Engineering

UNIT-2:
AERODYNAMICS

Space vehicles and their functions

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Space vehicles are designed for various functions, including exploration, communication, Earth observation, and scientific research. Below is an overview of different types of space vehicles and their primary functions:

1. Satellites

Functions:

Communication: Enable global communication (e.g., TV, internet, GPS).

Earth Observation: Monitor weather, climate, and environmental changes.

Navigation: Provide GPS and other positioning services.

Scientific Research: Study space phenomena, Earth's atmosphere, and more.

Examples:

GPS Satellites: Provide global positioning data.

Hubble Space Telescope: Observes distant galaxies and celestial objects.

GOES Satellites: Monitor weather and climate.

2. Space Probes

Functions:

Explore celestial bodies (planets, moons, asteroids, comets).

Collect data on space environments and transmit it back to Earth.

Examples:

Voyager 1 & 2: Explore the outer solar system and interstellar space.

Mars Rovers (e.g., Curiosity, Perseverance): Study the Martian surface.

New Horizons: Flew by Pluto and explored the Kuiper Belt.



3. Spacecraft (Manned)

Functions:

- Transport astronauts to space stations or other celestial bodies.
- Conduct experiments in microgravity.
- Enable human space exploration.

Examples:

Apollo Missions: Landed humans on the Moon.

Space Shuttle: Transported astronauts and cargo to low Earth orbit.

Soyuz: Transports crew to the International Space Station (ISS).

4. Space Stations

Functions:

- Serve as long-term habitats for astronauts.
- Conduct scientific experiments in microgravity.
- Test technologies for future space exploration.

Examples:

International Space Station (ISS): A collaborative effort among multiple nations.

Tiangong Space Station: China's modular space station.

5. Rockets and Launch Vehicles

Functions:

- Transport payloads (satellites, probes, spacecraft) into space.
- Provide the thrust needed to escape Earth's gravity.

Examples:

Falcon 9 (SpaceX): Reusable rocket for launching payloads.

Saturn V: Used in the Apollo missions to reach the Moon.



6. Space Telescopes

Functions:

- Observe distant stars, galaxies, and cosmic phenomena.
- Avoid atmospheric distortion for clearer images.

Examples:

Hubble Space Telescope: Captures high-resolution images of deep space.

James Webb Space Telescope: Studies the early universe and exoplanets.

7. Reusable Spacecraft

Functions:

- Reduce the cost of space travel by reusing vehicles.
- Transport cargo and crew to space stations.

Examples:

SpaceX Dragon: Resupplies the ISS and returns cargo to Earth.

Space Shuttle (Retired): First reusable orbital spacecraft.

8. Lunar and Planetary Landers

Functions:

- Land on the surface of moons or planets.
- Conduct surface experiments and collect samples.

Examples:

Lunar Module (Apollo): Landed astronauts on the Moon.

InSight Lander: Studies Mars' interior.



9. Spaceplanes

•Functions:

- Combine features of aircraft and spacecraft.
- Operate in both Earth's atmosphere and space.

•Examples:

- **Boeing X-37**: An unmanned spaceplane for experimental missions.
- **SpaceShipOne**: A suborbital spaceplane for tourism.

10. Interplanetary and Interstellar Missions

Functions:

Explore other planets, moons, and beyond the solar system.
Search for signs of life and study planetary systems.

Examples:

Cassini-Huygens: Studied Saturn and its moons.

Voyager Probes: Entered interstellar space.

11. Space Tugs and Service Modules

Functions:

Assist in maneuvering other spacecraft.
Provide propulsion, power, and support for missions.

Examples:

Cygnus Service Module: Supports cargo missions to the ISS.

Lunar Gateway Modules: Planned for future lunar missions.



THANK YOU!