



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



Department of Aerospace Engineering

23AST101-Fundamentals of Aerospace Engineering

UNIT-1:
History of Flight

Balloons and Ornithopters

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Balloons



Balloons

Balloons are **lighter-than-air aircraft** that achieve flight through buoyancy by using a gas that is less dense than the surrounding atmosphere.

History of Balloons

Ancient Concepts:

Early Chinese lanterns (2nd century BCE) utilized hot air to rise, though they were not intended for human flight.

Montgolfier Brothers (1783):

Created the first successful hot air balloon, carrying animals and later humans into the sky. Their invention marked the birth of manned flight.

Gas Balloons (Late 18th Century):

Hydrogen balloons were introduced, offering greater lift. Jean-Pierre Blanchard achieved the first balloon flight across the English Channel in 1785.

Modern Balloons:

Hot air balloons for recreation and research use propane burners for heating the air.

Weather balloons, filled with helium or hydrogen, are crucial for atmospheric studies.

How Balloons Work

Lift Mechanism: Heated air or lighter-than-air gases (e.g., helium) create buoyancy, causing the balloon to rise.

Control: Traditional balloons have limited directional control and rely on wind currents. Modern versions use adjustable burners and vents for vertical control.

Applications of Balloons

Recreation: Hot air balloon rides are popular for sightseeing.

Scientific Research: Weather balloons measure atmospheric data like temperature and pressure.

Military: Observation balloons were used in warfare for reconnaissance.



Ornithopters



Ornithopters

Ornithopters are **heavier-than-air flying machines** designed to mimic the flapping-wing motion of birds and insects.

History of Ornithopters

Leonardo da Vinci (1490s):

Da Vinci's sketches, such as the "ornithopter," were among the first designs attempting to replicate bird-like flight. However, they were never constructed or tested successfully during his time.

19th–20th Century Attempts:

Inventors like Gustave Trouvé built mechanical ornithopters, though they lacked sufficient power-to-weight ratios for sustained flight.

Modern Ornithopters:

Advances in lightweight materials and robotics have led to functional ornithopters, particularly at smaller scales, such as drone prototypes and robotic birds.

How Ornithopters Work

Lift and Propulsion: Flapping wings generate both lift and thrust, similar to how birds achieve flight.


Energy Source: Early designs relied on human power, but modern ornithopters use electric motors or elastic energy for wing motion.

Applications of Ornithopters

Research: Used to study bird and insect flight dynamics.

Recreation: Hobbyists build small-scale ornithopters as flying models.

Surveillance: Miniaturized ornithopters are used in military and civilian applications for discreet reconnaissance.



THANK YOU!