



# UNIVERSITY of GONDAR

College of Informatics

Department of Information Technology

## AI-Driven Aerospace Ecosystems

Next-Generation Aircraft Design, Sustainable Propulsion and Energy Systems, Intelligent Space Systems and Exploration, and Autonomous Airspace Management



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### Background & Motivation

Rapid transformation in aerospace driven by Artificial Intelligence (AI)

- Urgent need for sustainable propulsion systems
- Growth of autonomous aircraft, satellite constellations, and urban air mobility
- Lack of unified ecosystem-level aerospace integration

### Core Technologies



Physics-Informed Machine Learning (PIML)



Digital Twin Systems



Reinforcement Learning



Geospatial Intelligence



Edge-Cloud Distributed Computing



Sustainable Energy Optimization

### Research Aim

To design and validate an integrated AI-driven aerospace ecosystem architecture that unifies:



Next-Generation Aircraft Design



Sustainable Propulsion Systems



Intelligent space systems



Autonomous Airspace management

### Sustainability Impact



Hybrid-electric & hydrogen propulsion optimization



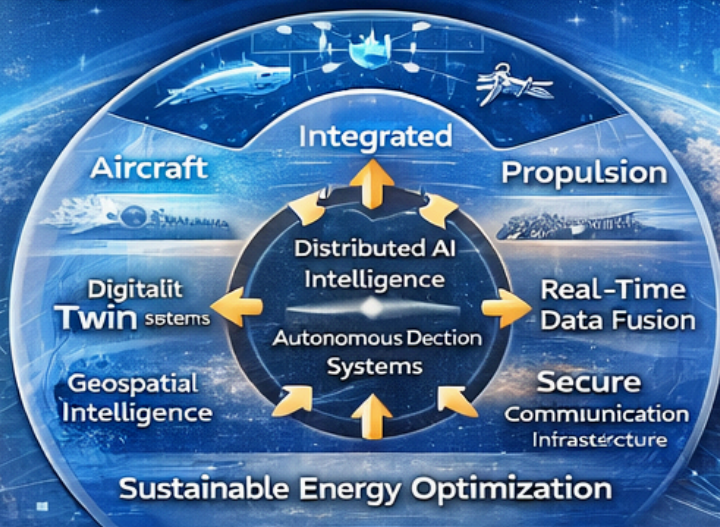
AI-based fuel efficiency enhancement



Intelligent traffic routing to minimize fuel burn

### Proposed Ecosystem Architecture

Integrated Cyber-Physical Aerospace Framework



### Expected Contributions



Novel AI-driven aerospace ecosystem model



Supports digital transformation



Intelligent propulsion energy management system



AI-based geospatial airspace management

Toward Intelligent, Sustainable; and Autonomous Aerospace Infrastructure