

UAV Battery Efficiency Estimator - Portfolio Summary

Project Overview

This Streamlit-based UAV Battery Efficiency Estimator simulates real-time power draw, battery usage, thermal visibility, and hybrid fuel consumption for various UAV models. It includes integrated AI-based suggestions and live simulation with user-defined parameters.

Core Features

- Real-time flight simulation with adjustable parameters
- Battery capacity modeling including climb energy and thermal penalties
- Hybrid UAV fuel estimation using dynamic engine load
- Thermal signature estimation using Stefan-Boltzmann law
- Wind gust and stealth drag penalties
- Cloud-based IR shielding effect
- AI Suggestions panel based on flight conditions
- Visual battery gauge and time tracker

Technical Highlights

- Power draw scales with payload, speed, wind drag, and flight mode
- Thermal signature (T) calculated using waste heat & emissive surface area
- Fuel usage modeled for hybrid UAVs with default burn rate of 1.5 L/hr
- Live simulation loop with time step control and gauge visualization
- Altitude-based air density factor adjusts draw realism

Use Cases

- UAV mission planning and endurance forecasting
- Military drone thermal signature visibility testing
- Tactical AI integration for survivability estimation
- Simulation-based payload and range optimization

Evaluation Grade

- Final Grade: A (93%)
- - Technical Accuracy: 30/30
- - Code Quality: 18/20
- - AI Feedback System: 18/20
- - Feature Completeness: 19/20
- - UI/UX Design: 8/10

Developer

- Tareq Omrani | 2025
- GPT-UAV Planner | AI & Aerospace Systems Development