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PITCH DECK

DRONE UAV PRESENTATION

TEAM 25

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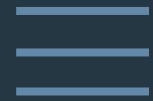
OBJECTIVE

- Build an anomaly-detection & predictive-maintenance pipeline for commercial drones using the DronePropA dataset.

- Detect faults, identify probable origin, and assess severity to guide maintenance actions.

- Expected impact: improved availability, safety and lifespan of drones.

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OUR DATASET

Files Format

MATLAB (.mat) files loadable via scipy.io

Volume of the Dataset

130 files, 3 main categories, include healthy (F0) and 3 fault types (F1, F2, F3).

Goals and Deliverables

- GitHub repo
- Pitch deck (.pdf)
- Demo video (≤ 5 min)

DATA PIPELINE

- Ingest .mat files → normalized Pandas DataFrames.

- Per-flight cleaning (null values...).

- Feature extraction (statistical summaries per signal).

- Scaling, dimensionality reduction (PCA for EDA).

- Supervised models (Random Forest + hyperparameter search).

- Evaluation, feature importance.
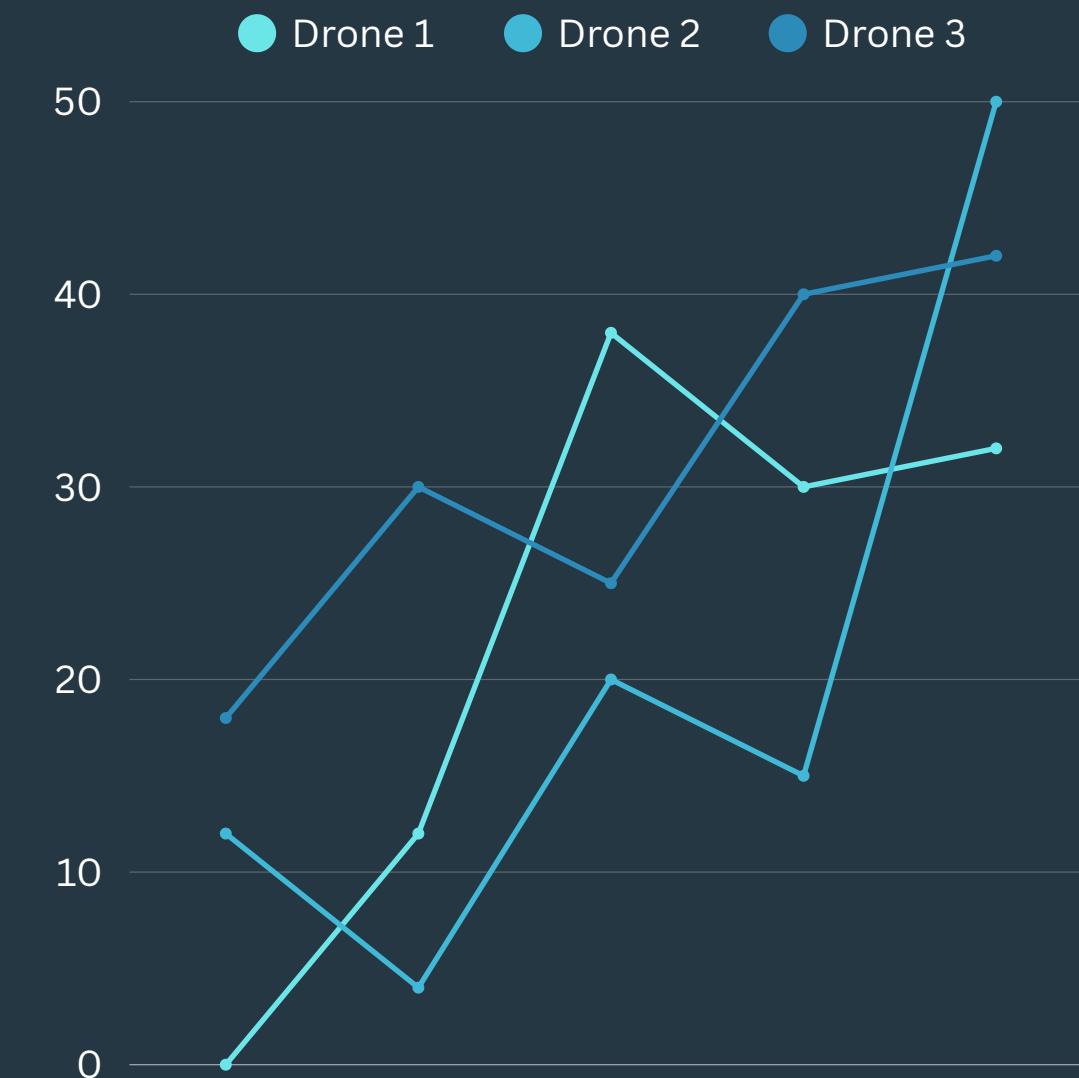
FEATURE ENGINEERING

Total features ≈ 114 × 11 = 1254 per flight

Per-flight statistical features per signal (114 signals):
- mean, median, std, min, max
- q25, q75, IQR
- skewness, kurtosis
- range

Drone 1 ● Drone 2 ● Drone 3

EXPLORATORY DATA ANALYSIS (EDA)

Class Balance

Fault classes moderately imbalanced

PCA Analysis

Visual separation of fault groups confirms feature relevance

Flight Statistics

Average duration ~45s, sampled at 1 kHz.

MODELING APPROACH

Baseline Model
★★★★★

Random Forest Classifier : interpretable, fast, robust.

Optimization
★★★★★

RandomizedSearch CV with 50 iterations, 5-fold CV

Targets Modeled
★★★★★
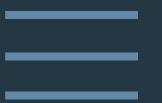
Fault Group, Severity, and Speed

Metrics Used
★★★★★

Accuracy, F1-score, confusion matrices, CV mean ± std.

NEXT STEPS & EXTENSIONS

Alternative

01. Extract advanced temporal features and test deep learning models (CNN/LSTM)

Improvement
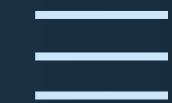
02. Implement online monitoring dashboard s (alerts, thresholds...)

THANK YOU
FOR YOUR ATTENTION