AI for Air Traffic Management and Large Scale Urban Mobility

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Chair Topics

- AI for ground segment automation (Air Traffic Management)
- AI for on board decision support tools (SPO)
- AI for unmanned aircraft system traffic management (UTM)
- AI in infinite dimension space (trajectories)
Optimization of the structure and activation functions of deep neural networks with application to the prediction and minimization of congestion in passenger flows in airports. NTU-ENAC-KAUST (Alexis Brun)

Collective perception, optimization of the V2X channel with IA IMT-ENAC-NXP (Dinh Thinh Hoang)

Large Scale Trajectory Planning NTU-ENAC (Paveen Juntama)

Optimization strategies for reducing radar interference ENAC-IMT-NXP (Sylvain Roudière)

Optimal Emergency Trajectory design for Airliners ENAC-KAUST (Andreas Guitart).

Dynamic optimization of multimodal passenger mobility ENAC-TuDelft-SOPRA (Jean-Claude Lebegue)

Large Scale Strategic planning of UAV trajectories in cities ENAC-ONERA (Zhengyi Wang).

Detection and Mitigation of Hot Spots in Airspace by Artificial Intelligence ROWAN-ENAC-FAA (Loïc SHI-GARRIER)

Analysis and detection of atypical aircraft approach trajectories using functional data analysis and machine learning ENAC-KAUST-GT (Gabriel Jarry)

Passengers : customers, actors and sensors of air transport (Philippe Monmousseau)

Multipath Parameters Estimation in Physically Based Synthetic Environment Using Deep Neural Regression ENAC Thomas Gonzalez

Noise Abatement Minimization for STAR AIRBUS (Helicopter)-ENAC-MIT (Pierre Dieumégard)

AI Algorithms for ATM Feature Estimation and Prediction ENAC-Technion (Amir Abecassis)
Optimization of airport operations during access mode disruptions to improve passengers' experience (Geoffrey Scozzaro)

Optimization for improving the reliability of multimodal door-to-door journeys (Clara Buire)

Optimization of aircraft sequencing in En-Route and terminal areas (Philippe Notry)

AI Diploidic Optimization Applied Air Traffic and Airspace joint Optimization (Alexis Bregeon)

Optimization of airliner trajectories with minimization of climate impact as a new objective ENAC-AIRBUS-UC3M (Rémi Chevalier)

Alternative drone trajectories for the acceptance of urban air mobility (Antoine Henri)

Optimal design of UAV safe emergency trajectories ENAC-Thales (Maeva Ongale-Obeyi)

Optimization of arriving air traffic in the terminal area and extended airspace (Ying Huo)

Applications of machine learning to the resolution of recurring problems in combinatorial optimization (Luca Mossina)

Design of the Optimal Profile of an Aircraft in the Descent and Approach Phases ENAC-Airbus (Ramon Andreu Altava)

Optimization-simulation implementations for the harmonization of operations in large airports (Paolo Scala)

Distances between distributions : Application to Medical Imaging and Aeronautics ENAC-CERCO (Sana Rebbah)

Optimization of air traffic in large airports ENAC-CAUC (Ma Ji)

Correction and Optimization of 4D aircraft trajectories by sharing wind and temperature information (Karim Legrand)
Non Stabilized Approaches Detection

Gabriel Jarry

45° Maximum Procedure Radial Final Approach Fix Interception Chevrons 30s level-off flight

Stabilized Approach 1000ft 500ft

ENAC

La référence aéronautique

KAUST

dgac

ANITI

Pr D. Delahaye (delahaye@recherche.enac.fr) AI for Air Traffic Management and Large Sca
Probabilistic Methods for Real-time Unsupervised Anomalous Trajectory Detection

Thinh Hoang-dinh
Mathematical Distance Between Aircraft Trajectories

Stéphane Puechmorel

\[ E(\Phi) = \int_0^1 \left( \left\| \frac{\partial v_0}{\partial u} \right\|^2 + \int_0^1 \left( \frac{\partial v_0}{\partial u} \right)^2 \, ds \right) \, du \]

\[ d(\gamma_1, \gamma_2) = \min \text{ Energy to shift from } \gamma_1 \text{ to } \gamma_2 \]
Emergency Trajectory Design

Andreas Guitart

Optimized FMT* algorithm (50 ms for generating one trajectory)
Automatic SID-STAR Design

Andreas Guitart

Obstacles
Major Entry–Exit Flows
Airport(s) RWYs directions
Prohibited Areas
Population Density (noise)
RWY configurations dependences

SID–STARs
Automatic Design

SID–STAR
Optimal Shapes

Meta-heuristic+
FMT*

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DST for ACC Configuration Optimization

Andrija Vidosavljevic

4CAST is now deployed in the five French ACCs
Meta-heuristic+DP+NN
Large-Scale trajectory planning

Paveen Juntama, Julien Lavandier

10 minutes computing for 32000 flights (CPU); 80% congestion reduction
Large-Scale trajectory planning for UAV (Singapore)

Zhengy Wang

Meta-heuristic+Dafermos
Radar Interference Mitigation With V2X and A.I

Sylvain Roudiere

Meta-Heuristic+DP

ENAC
UNIVERSITÉ TOULOUSE III PAUL SABATIER
NMP

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Design and Optimization of Noise Abatement Procedures for Rotary-wing Aircraft

Pierre Dieumegard

Surrogate model

Black-Box

Optimization method

Prediction error for a full trajectory

FMT*+DFO (BlackBox)
AI for Airport Passengers Flows Optimization
AI for Robust Airline Routing Network

Jean-Claude Lebegue
Optimization of airport operations during access mode disruptions to improve passengers’ experience

Geoffrey Scozzaro
Air Rail Synchronization

Clara Buire

Figure 1: Illustration of air-rail multimodal network: 4-city example.
AI for Smart and Sustainable Air Traffic Management and Air Mobility

AI4ATM

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