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Newsletter #01

In this document we summarize the latest news about the development and results of each WP and we suggest some contents for the FIRST newsletter.

Message from coordinator

Dear all,

Firstly on behalf of all RefMap partners, I would like to thank you all for supporting RefMap and I hope you will continue supporting the project for its entire duration.

As the Project Manager, I am truly enthusiastic about the progress we've made and the incredible collaboration among our partners. Our partners have brought unique expertise, different perspectives, and a shared dedication to the aim of the project such as quantifying the environmental footprints of air mobility from micro- to large-scale.

In the next months many challenges will follow regarding the coordination of the working packages and the publication of the first results. The recent global environmental crisis and the increasing use of unmanned vehicles in urban areas brough me and my collaborators to devote our time and energy in order to promote innovation in using artificial intelligence in environmental applications. We hope that our efforts will make a long lasting impact on the wellness of people living in urban areas.

For this purpose, we would like to present a brief summary of the most interesting results in the first six months of the project, divided by areas of interest.

As we move forward, please stay tuned for more updates. Your support and enthusiasm for our project will help us to reach as much public as possible and we are grateful for your continued interest in RefMap.

Warm regards,

Gerardo Zampino
Project Manager
RefMap

WP2

A strategy for non-CO_2 emissions indices modeling of sustainable aviation fuels (SAFs) has been investigated in our process to adapt the Boeing fuel flow method 2 (BFFM2) to SAFs. Emissions indices of

SAFs have been derived based on relevant literature data using different approaches. Some of the models will be soon validated with respect to experimental data on a specific engine and SAF at different blending ratios.

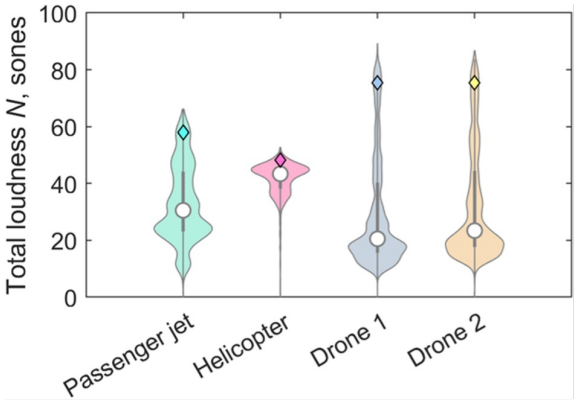
WP3

The goal of KTH is to develop a strategy to apply Deep Reinforcement Learning (DRL) to enhance the autonomous navigation of Unmanned Aerial Systems (UAS) in the cities. This task is particularly challenging because of the complex environment represented by buildings, and the related problems to UAS navigation, such as acoustic noise produced by the flight. The goal of the work package is to develop an algorithm which can provide autonomous navigation together with the optimization of the trajectory of an unmanned aerial vehicle (UAV) which can avoid the negative impact of such vehicles when flying in a urban environment. The investigation will be made based on the results of CFD simulations of WP2, which represents the environment for the UAV navigation. This will start from a two-dimensional flow field with two-dimensional obstacles, to aim at the end of the project towards a three-dimensional representation of the problem and so to a Deep Reinforcement Learning algorithm which could potentially be able to deal with more degrees of freedom representing the motion of the UAV.

WP4

TU Delft team have successfully conducted two days of acoustic measurements of a series of Unmanned Aerial Systems (UAS) of different type and size at the Unmanned Valley, Netherlands. Using these data, the next step is for to develop a common database of UAS at different operating conditions. In parallel, aiming to identify relevant acoustic features and to build the predictive noise models, the team are starting to analyse the acoustic data for specific flights. One of the immediate challenges is the identification of relevant and general acoustic hallmarks from data with much variability, arising from the different UAS types that were used and flight paths that were performed. At the same time, one of the interesting opportunities this brings is that of developing robust observables representative of realistic operational conditions and across the different UAS types.

USAL team is carrying out a comprehensive evidence review on human response to UAS noise. State-of-the-art will be established, and research gaps identified. This will inform the development of the extensive psychoacoustic experiments where research will be conducted towards the optimisation of UAS trajectories for minimum community noise impact. Comparative sound quality analysis for drone and conventional aircraft flyovers at equal sound levels (dBA) indicates that peak perceptual loudness is higher for drones, which may be one important #acoustic factor in determining subjective responses. Predicting responses to UAS sound will enhance flight path routing to mitigate adverse effects.



WP5

The AgentFly Technologies and UC3M team have prepared a reference scenario of the airspace used for the simulations. The UC3M researchers propose environmentally and economically improved aircraft trajectories. AgentFly Technologies evaluate the trajectories and impact of air traffic controllers' behavior changes. The reference scenario covers the whole European airspace using a representative sample of air traffic. Comparison of multiple scenarios will help to understand the impact of trajectory changes on air traffic management and further improve the optimization.

WP6

In WP6, the RefMap project focuses on two key goals:

- Validating the potential of RefMap analytics, simulations, and platforms based on user needs.
- Defining new business models enabled by RefMap analytics.

To achieve these goals, FN and ISCTE plan to involve potential users to shape the Minimum Viable Product (MVP) and identify the value proposition of future aviation services. The work aspires to assess user priorities, potential scenarios, and environmental impacts, aiming to enhance aviation sustainability and competitiveness. Finally, end users will provide feedback on the technology to ensure optimal performance and a wide range of applications.

Partners











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