# Expression of interest

## Contact details

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| Country | TURKEY |
| Name of the organisation | Istanbul Kültür University Technology Transfer Office |
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## Short description of the organisation

*Provide a short description of the equipment available, the relations with the industry, the profile of the main researchers*

Alparslan Güzey works in İstanbul Kültür University Technology Transfer Office as deputy director. He is PhD. Candidate of operational research In Istanbul University. PhD thesis about Concept of operations in urban air space and route optimization algortihms.

Within the scope of the EIT Urban Mobility BP 2021-2022 call period, the "Urban Air Traffic Management Development (UATMDEV)" project will be completed by the end of December, under the coordination of Istanbul Kultur University Technology Transfer Office. Project partners are given below:

Project partners:

1. Istanbul Kültür University,
2. ISBAK (Istanbul It and Smart City Technologies Inc.),
3. The Technical University of Catalonia (UPC),
4. Belgrade University Faculty of Traffic and Transport Engineering,
5. Fixar Aero Inc,
6. Belgrade City,
7. Ada Güzey Engineering,

## Specific skills related to the project

***Aspect 2:***
Assessing and simulating the effects on multimodal network and traffic management of new forms of mobility (e.g. zero-emission, connected and automated vehicles and vessels, car sharing/pooling, active-/micro-mobility, sustainable land/air transport modes and drones), as well as of innovative services (e.g. Mobility/Logistics as a Service), in different urban and rural environments, considering the socio-economic acceptability and different user needs (including vulnerable and gender groups).

As urban air space concept of operation scenarios, UAVs will be tested in a simulation environment by trying different scenarios related to traffic management topics such as re-balancing/ re-scheduling/ route selection. It will be studied on how much the operational activities to be carried out in the urban

airspace will reduce land traffic and how much it will reduce carbon emissions. Real-time test flights will be conducted in the simulation environment according to SESAR CORUS Urban Air space regulations (U1, U2, U3, U4).

## Proposed activities for the project

*Indicate which activities you would like to implement during the project*

It is aimed to optimize the route by assigning the tasks determined in the urban airspace to the existing drones. It is assumed that there are n missions, m drones and d skyports, and initially all drones will be located in the same port. Each task will be performed by a drone and a weight coefficient will be assigned to the tasks. The standby and flight time of each drone and the fuel consumed by each drone will form the total cost function. The effect of waiting times on the total cost function will be calculated by multiplying by the criticality coefficient of the task. The flight speed of the drone will also be calculated by the algorithm to minimize the total cost function. Thus, the algorithm will reduce the waiting time of missions with high criticality level, increase the flight speed of the drone, and keep the waiting time longer in missions with low criticality level and allow it to fly at a slow speed. When the drone completes its mission, it will return to the central port. Multi-purpose optimization methods will be used for route optimization. The formula in which the amount of energy the drone will consume according to its flight speed is calculated will also be taken into account in the optimization algorithm. There will be 3 different scanarious; Static environment, dynamic environment(online routing) and collision avoidance system(CAS) test.

## References

*Previous research project*

| Project acronym / starting date | Main objectives | Main activities | Role in the project |
|---|---|---|---|
| UATMDEVDEM Jan 2022- Sep 2022 | Air Traffic Management | Droneport, GSM Based Communication Device, UATM sub-systems. | Project Coordinator |
| TUBITAK 3005 Project | Application that creates historical routes with artificial intelligence routing algorithms | Field Study, route optimization, application development | Researcher |
| Smart Agriculture with Autonomous Ground and Air Vehicles: An Application on to Harvest Optimization | | | |
| Optimal Energy Consuming on Spraying an Agricultural Field by Using Multiple UAVs | | | |

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| Smart Agriculture with Autonomous Ground and Air Vehicles: Approaches to Calculating Optimal Number of Launch Location on to Harvest Optimization | | | |
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