National Aeronautics and Space Administration

Identifying, Simulating and Visualizing Highways in the Sky

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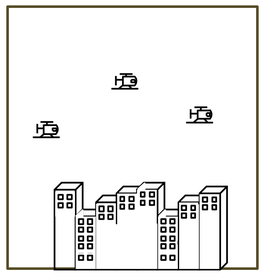
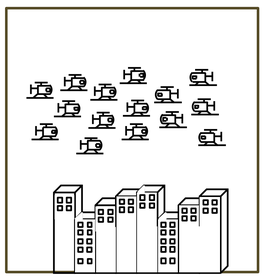
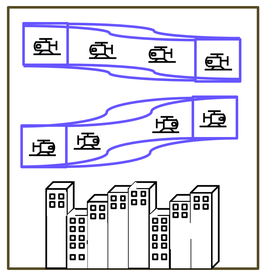
Introduction



Increasing traffic congestion and advances in Urban Air Mobility led to new aerial modes of transportation opportunities.

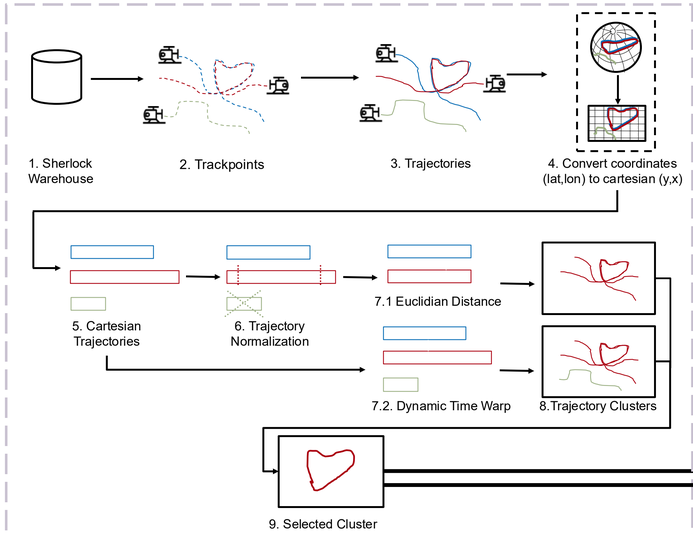


The emergence of Urban Air Mobility, however, introduces new aviation safety hazards due to increased airspace congestion.



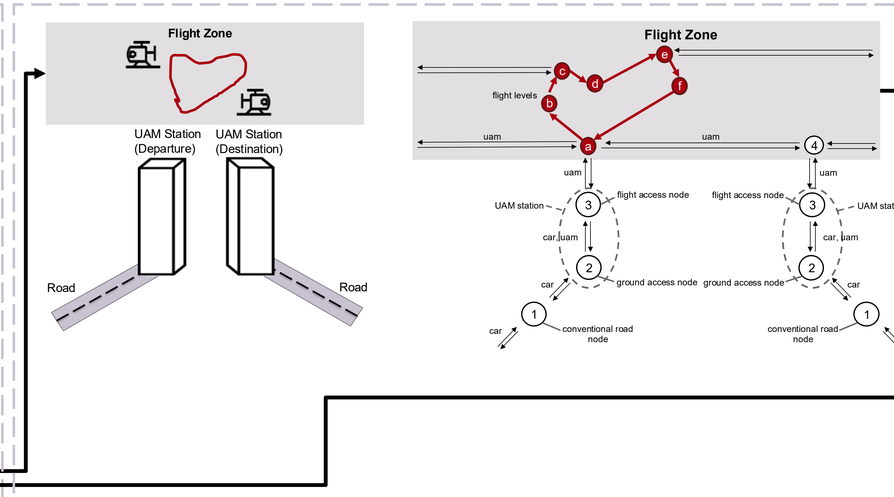
To increase safety in urban air mobility operations, concept of operations propose the use of corridors.

Method



(a) UAM Corridor Detection

(a) To aid in defining geometry and candidate location of urban air mobility corridors and vertiports, we cluster existing air traffic in congested areas to identify corridors.

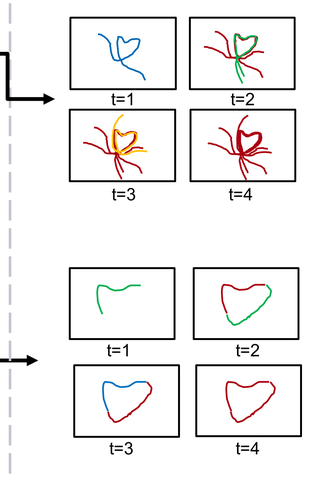


(b) Simulation Physical Representation

(b) Both the identified corridor air traffic (rotorcrafts) and surrounding ground traffic (car, public transportation) are considered as part of two simulation scenarios: (b.1) with and (b.2) without the presence of urban air mobility (corridor) and its associated vertiports.

(c) MatSIM Network Model

(c) The trajectories and ground traffic are discretized as a geo-referenced network, where additional link attributes of the roads and the corridor such as capacity and speed are mapped to the network links so simulated traffic congestion can be measured with and without the presence of urban air mobility in a given region of interest.



(d) Trajectory Visualization and Replay

(d) Both the identified and simulated trajectories can be "replayed", one at a time, to identify how closely the trajectories reconstruct the full corridor. This can be used for manual inspection of trajectory overlap.

References

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Auna

The capability to identify, simulate and replay existing corridors is part of a larger ecosystem of tools to better understand emerging modes of transportation, defined in the tool, Auna. Further references can be found in NTRS:

- **Interpretability and Geometry of Trajectory Corridors:** https://ntrs.nasa.gov/citations/20240009440
- **Auna: A Geospatial System for Assessing Multimodal Mobility**: https://ntrs.nasa.gov/citations/20240016154

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