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CREATING GLOBAL DIGITAL TWINS TO MODEL URBAN AIR MOBILITY

Abstract

How will transportation evolve and what role does space regulations, technology, and cities play in the future? NASA and the City of Los Angeles are working to understand the intersection of health issues (with a focus on air quality) and transportation, particularly the new operational planning for urban air mobility. This is a critical issue for cities around the world as companies are already starting to operate drones for deliveries within cities but without coordination or understanding of the impact of such operations. As urban air mobility expands to autonomous vehicles that carry people and cargo, the need to model the vertical environment and the effect on human health is critical.

Data from government and urban air manufacturers let us run scenarios on the impact of moving traffic to a three dimensional space. The effect on air quality will be important.

Visualizations and models for these have a net positive impact on air quality, stress, and other health issues. This is very timely for other cities around the world as they look at this new transit option. LA is one of the first cities to pilot these technologies this year and to do so in coordination with built infrastructure, a world class airport, and to create data models and standards across NASA, FAA, DOT, and city data.

This digital twin is the first instance for Los Angeles (and one of the first globally) that creates a digital representation of a complex city of 4,000,000 in terms of two aspects: air quality and transportation. Through this work we are able to model and visualize what-if scenarios showing the impact of changing modes of transportation on air quality. Through the digital twin we can model what would happen if traditional public transportation use increased or a new Metro train line were added. However, we will more interestingly focus on what will occur with the addition of urban air mobility (both autonomous and piloted airborne vehicles for intra-city travel). We are creating this model in a reproducible fashion so the digital twin methodology can be reused by other cities. This will be showcased in a workshop with other cities and demonstrate a proof of concept at several cities. This digital twinning allows one city to quickly learn from another and to find similar attributes that pair cities in one or more characteristics. This project is funded through NASA's Advanced Information Systems Technology Program.