A future of 'flying cars' may be closer than you think

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Anyone who's ever watched the classic 1960s cartoon "The Jetsons" will recall the flying cars everyone used. Ever since, people have wondered when the day might come that flying cars could become reality.

New research published in *Manufacturing & Service Operations Management* proves it could be closer than we think—and the multibillion-dollar industry needed to make flying cars a reality has massive potential to solve societal problems and develop a new revenue stream for the U.S. and other economies.

The researchers say it's one thing to have vehicles capable of Urban Aerial Mobility (UAM), and quite another to make the societal changes needed for normal use of UAMs.

The study, "Vertiport Planning for Urban Aerial Mobility: An Adaptive Discretization Approach," was conducted by Alexandre Jacquillat of Massachusetts Institute of Technology (MIT), Vikrant Vaze of Dartmouth College and Kai Wang of the School of Vehicle and Mobility at Tsinghua University.

"Technologies already exist to build and fly the kinds of vehicles that could ferry people throughout urban areas as part of a normal routine," says Vaze, a professor in the Thayer School of Engineering at Dartmouth. "But the big challenges center on conceiving and creating the kind of transportation infrastructure, systems and protocols that would enable the safe and smooth transition to urban aerial mobility."

"It's all dependent on analytics, new technologies and platforms," Vaze added. "The foundation for everything will start with solving problems and addressing them at the planning level through sophisticated analytics, and some out-of-the-box thinking, literally."

The study authors pointed to cities, operators and agencies—such as New Zealand, Singapore, NASA and several airlines—that are already investing heavily in UAM for the development of electric vertical-takeoff-and-landing vehicles (eVTOL) or flying cars, UAM systems and networks.

"The challenge will be to create dedicated infrastructure for vehicles to take off and land," says Vaze. "We will need to establish flying lanes and 'roads' not far different from today's transportation systems built around paved roads on land, shipping lanes in the ocean, or air corridors used by aircraft."

How might this look? "You're more likely to see UAM networks centered on a few centralized vertiports, as opposed to many scattered ones," says Vaze.

The researchers found that UAM operations will benefit from consolidation to facilitate vehicle routing and passenger pooling. UAM will be most pragmatic and competitive on long-distance markets (as opposed to short commutes), and will provide a more natural alternative to commuter rail and self-driving rather than taxi and ridesharing.

"We also found that UAM profitability is highly sensitive to network planning optimization and to customer expectations, perhaps even more so than to vehicle and battery specifications," says Vaze. "To be successful long-term, UAM operators will not only require more research and development in eVTOL technologies, but they also will need to invest today in tailored analytics-based capabilities to optimize strategic planning and market-based initiatives to drive customer demand."

"In the end, we've found that it is possible to realistically consider a future that may only be 10 years away, which features UAM vehicles and the infrastructure that goes with it, advancing society and improving our quality of life," says Vaze.

More information: Wang Kai et al, Vertiport Planning for Urban Aerial Mobility: An Adaptive Discretization Approach, *Manufacturing & Service Operations Management* (2022). DOI:

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