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## Flying cars: A flight of fancy or not?

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Even before George Jetson entranced kids with his cartoon flying car, people dreamed of soaring above traffic congestion. Inventors and entrepreneurs have long tried and failed to make the dream a reality, but that may be changing.

Nearly a dozen companies around the globe, including some with deep pockets such as European aircraft maker Airbus, are competing to be the first to develop a new kind of aircraft that will enable commuters to glide above crowded roadways. A few of the aircraft under development are cars with wings that unfold for flight, but most aren't cars at all. Typically they take off and land vertically like helicopters. Rather than a single, large main rotor, they have multiple small rotors. Each rotor is operated by a battery-powered electric motor instead of a conventional aircraft piston engine.

It's no sure bet that flying-car dreams will turn into reality. There are many obstacles, including convincing regulators that the aircraft are safe, figuring out how to handle thousands of new low-flying aircraft over cities without collisions and developing batteries that will keep them aloft long enough to be useful.

But entrepreneurs are moving forward. They see a vast potential market for "air taxis" and personally owned small aircraft to transport people from the fringes of metropolitan areas to city centers as urban areas grow more congested and people spend more time stuck in traffic. They envision tens of thousands of one or two-person flying taxis delivering passengers to the rooftops of office buildings in city centers and other landing pads during rush hours.

"In as little as 10 years, products could be on the market that revolutionize urban travel for millions of people," said Zach Lovering, the leader of Airbus' project to develop an autonomous flying taxi called the Vahana. The name means the mount or vehicle of a Hindu deity.

Uber released a 98-page report in October making the business case for air taxis, which the company sees as the future of on-demand transportation. Uber doesn't have any plans to develop a flying car itself, but the online transportation network is advising several companies that have aircraft in the works.

"The role we want to play is as a catalyst for the entire industry," said Nikhil Goel, an

Uber project manager for advanced programs.

Some of the aircraft are drones that passengers will be able to program for flight using a smartphone. Others will be operated from the ground or a command center, and some are designed for human pilots.

It's unclear yet how much the aircraft will cost, although prices are likely to vary significantly. Some of the aircraft are designed to be individually owned, while others are envisioned more for commercial use. Designers hope that if demand is high, prices can be kept affordable through economies of mass production.

Several recent developments could make these aircraft possible. Advances in computing power mean the rotors on multi-copter drones can be adjusted many times per second, making the aircraft easy to control. Drones have also benefited from advances in battery and electric motor technology. Some companies, like Chinese dronemaker EHang, are scaling-up drones so that they can carry people.

Another aircraft under development, Santa Cruz, California-based Joby Aviation's S2, looks more like a conventional plane except that there are 12 tiltrotors spread along the wings and tail. And some, like the Vahana, a cockpit mounted on a sled and flanked by propellers in front and back, don't really look like any aircraft in the skies today.

"In terms of what you can make fly in a reliable manner, the solution speed gateway that (computer) chips have gone through recently have literally opened the door to a whole new world of flying machine possibilities," said Charles Eastlake, an Embry-Riddle Aeronautical University professor emeritus of aerospace engineering.

But he also cautioned: "My best engineering guess is that people actually using autonomous air taxis in the next 10 or 15 years is possible but definitely not certain. The challenges are big."

Key for many of the designs will be the development of longer-lasting lightweight batteries. Currently available batteries could probably keep an air taxi aloft about 15 to 30 minutes before it would have to land, experts said. Depending on how fast the aircraft flies, that probably isn't quite enough to transport passengers between nearby cities or across metropolitan areas, experts said.

Another hurdle will be winning Federal Aviation Administration certification for any radical new kind of aircraft when approval of even small changes in aviation technology can take years.

The FAA said in a statement that it is taking a "flexible, open-minded, and risk-based approach" to flying cars. FAA officials have discussed with several manufacturers the

certification of aircraft that will be flown with a pilot in the beginning, and later converted to an autonomous passenger aircraft.

While further research is needed to ensure that autonomous aircraft are safe, “we believe automation technology already being prototyped in low-risk unmanned aircraft missions, when fully mature, could have a positive effect” on aviation safety, the agency said.

Reducing noise is another challenge since air taxis will be taking off and landing in densely populated areas. So is creating enough landing pads to handle lots of aircraft at the same time. A new air traffic control system would also likely be needed.

“It’s pretty clear that the existing air traffic control system won’t scale to the kind of density at low altitudes that people are talking about,” said John Hansman, a Massachusetts Institute of Technology professor who chairs the FAA’s research and engineering advisory committee.

NASA is developing an air traffic control system for small drones that perhaps could be expanded to include flying cars.

“There’s no question we can build the vehicle,” Hansman said. “The big challenge is whether we can build a vehicle that would be allowed to operate in the places where people want to use it.”

**(By Joan Lowy, Associated Press)**