Bansilal Ramnath Agarwal Charitable Trust's
Vishwakarma Institute of Technology
(An Autonomous Institute affiliated to Savitribai Phule Pune University)

Department of Information Technology

IT-Bulletin

April-2022

'Flying, self-driving cars? OK, but make it safe'
15th Mar 2022

HIGHLIGHTS

Flying cars have long been the stuff of science fiction, here are the companies working to make it science fact.

For an entire generation, the 1989 sequel to Back to the Future help to spark the idea that flying cars would one day exist. Of course, the future portrayed in that movie – the year 2015 – has come and gone.

Current technologies, however, are beginning to catch up with those crazy ideas of the past. While a flying time machine may not be on the horizon anytime soon, a flying car is a very real possibility.

Let's take a look at where development stands and how close we might be to the long-held promise of a car taking flight.

What is a Flying Car?

Yes, that question begs an obvious answer, but the modern flying car is not at all reminiscent of those from Hollywood fiction. In other words, very few of them look like a car.

Flying cars, of course, must pull double-duty. They require lift and propulsion to fly through the air, wheels and suspension to handle city streets, and the controls necessary to manage both.

Many of the current concepts and prototypes bear greater resemblance to either a small plane or a helicopter or large scale drone. These are VTOLs, which is short for vertical takeoff and landing.

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Less car and more drone, VTOLs aim to disrupt traditional transportation, making short work of commutes or urban area travel.

More traditional (if there is such a thing in this area) flying cars have the dual challenge of drive plus fly. Concepts are showing up in increasing numbers thanks to the technology finally allowing practical and more cost-effective applications of air and land worthy vehicles.

Further complicating development is that flying cars must meet two vastly different levels of qualification. While being road legal to where any licensed driver can operate it, the taller task is adhering to air traffic safety and operation. VTOLs need only meet FFA approval.

In either case, it’s why you shouldn’t expect a flying anything in your garage anytime soon.

It’s more likely that the actual future of airborne motor vehicles will be automated. Until that time, however, several startups are staking an early claim in both markets.

Flying cars could be in our future, but the work to make it happen safely is just beginning.

That includes a project expected to start this summer at the University of Nevada, Reno.

Researchers from the University’s College of Engineering are part of a team recently selected for NASA’s University Leadership Initiative (ULI), a program developed to support NASA’s aeronautical research goals.

Petros Voulgaris, chair of the Mechanical Engineering department and Aerospace Program director, and Christos Papachristos, Computer Science and Engineering assistant professor, will work with colleagues from the team’s lead institution, the University of Illinois, Urbana-Champaign and additional team members from Georgia Tech, Massachusetts Institute of Technology, North Carolina A&T State University as well as industry partners Sierra Nevada Corporation (SNC) and Lockheed Martin. That team is one of four in the ULI program.

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“The big vision, of course, is you want to have flying cars,” Voulgaris said. And of course, you want flying cars to fly safely and efficiently.

Developing, verifying, testing…

Voulgaris said the team will be developing and testing algorithms that govern how an unmanned aerial vehicle recognizes a less-than-optimal situation and how it reacts, whether that is returning to its original position or finding and landing in a safe place. In particular, the team proposal is to develop a robust and resilient autonomy (RRA) framework with principled and verifiable architectures to deal with uncertainties and off -nominal situations to enable safe and efficient advanced air mobility. Voulgaris’ team includes research associate Hyung Jin Yoon, an expert on artificial intelligence for autonomous vehicles.

Papachristos, and his Robotics Workers Lab, which specializes in autonomous systems and field robotics in Unmanned Aerial Systems, says the project will deploy and validate a number of autonomy and resilience functionalities for autonomous aerial vehicles.

“It’s through a combination of technologies that we aim to enable the vision for a new generation of aerial personal transportation systems, safely and reliably integrated in the airspace and the urban (aerial) mobility infrastructure,” Papachristos said.

SNC will bring further expertise to the project, particularly by providing the team access to an applicable real-world scenario and simulation model for manned and unmanned airborne systems. This simulation environment will leverage SNC’s fielded enhanced vision system for assisting helicopter pilots to develop high-fidelity sensor input, model dynamics and environments. This simulation capability will allow the team’s algorithms to be developed and tested in real-world scenarios and provide a pathway to putting the final capabilities to use on real systems beyond the laboratory.

Working with industry and other academic institutions on this NASA project is an achievement.

“It is a point of pride for the University of Nevada, Reno to be part of the University Leadership Initiative and work toward NASA’s goals to encourage innovation and industry collaboration while also developing quality and relevant experiences

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for our students,” Brian Sandoval, president of the University of Nevada, Reno, said.

Student opportunities in aerospace projects

Since the ULI team formed, Carson City-based company Resolute ISR also has joined the effort: the company, which manufacturers Resolute Eagle, an unmanned aircraft system platform, will select four University engineering students as interns to train as drone pilots, with plans to add another four by the end of 2022. That development helps to expand the opportunities available to students through the College of Engineering.

“The College of Engineering is committed to the development of an aerospace engineering program and is advancing its accomplished robotics program,” Manos Maragakis, College of Engineering dean, said. “Our selection to ULI will provide our faculty and students with new nationally collaborative opportunities for research and broader education, and I am grateful to our team for this major accomplishment.”

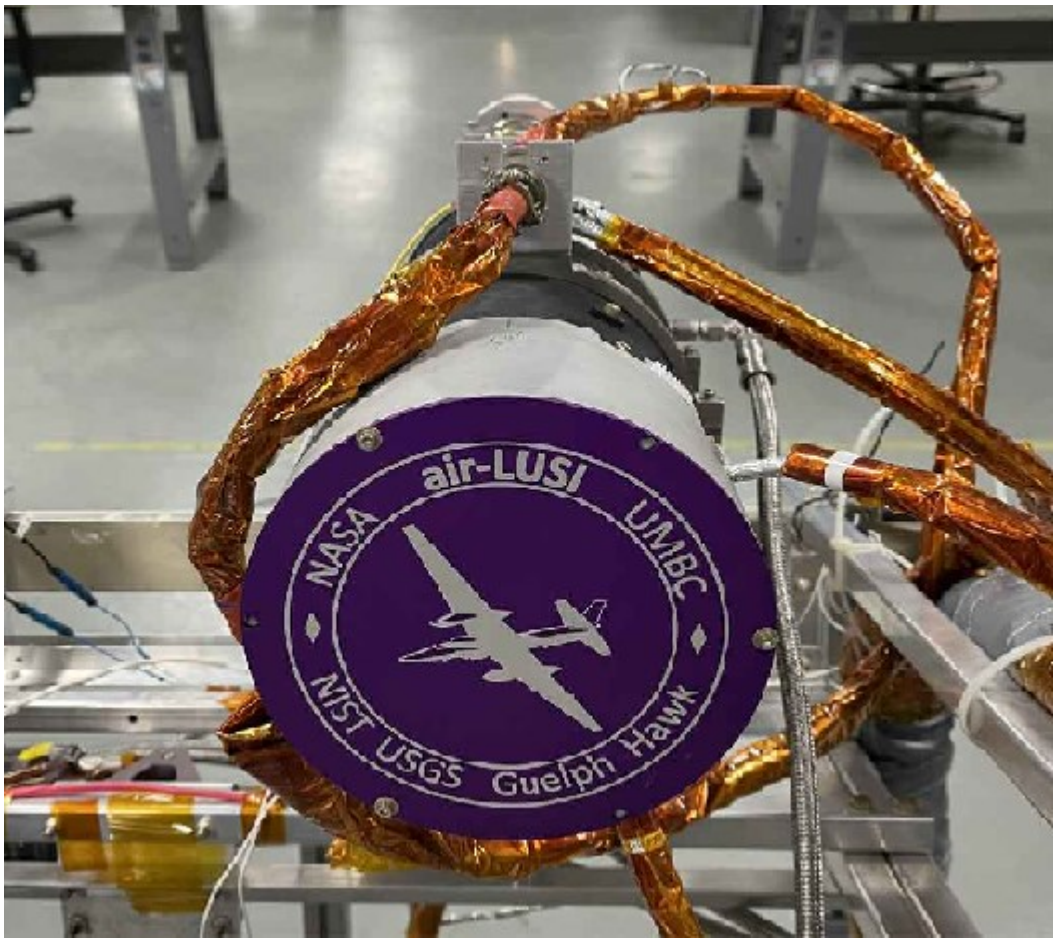
The University is positioned advantageously to do this type of research. Nevada is one of seven states designated by NASA as a center for the development of unmanned aerial vehicles and outdoor testing of unmanned autonomous systems. The project also has the support of the Nevada Governor’s Office of Economic Development (GOED), which helped facilitate development of the project proposal and the involvement of Resolute ISR.

Additionally, the College of Engineering in 2021 introduced a minor degree in aerospace engineering to support the region’s aerospace industry by producing well-trained employees and interns and developing research programs in aerospace engineering.

Source: University of Nevada, Reno

NASA telescope uses moonlight to enhance accuracy of satellites

Tuesday, 05 April 2022



NASA has sent a telescope in space that will measure the amount of light reflected off the Moon in order to improve the accuracy and consistency of measurements among Earth-observing satellites.

The airborne Lunar Spectral Irradiance, or air-LUSI, flew aboard NASA's ER-2 aircraft to accurately measure reflected moonlight.

By using the Moon as a "tuning fork," scientists can more easily compare data from different satellites to look at global changes over long periods of time, the US space agency said in a statement late on Monday.

"The Moon is extremely stable and not influenced by factors on Earth like climate to any large degree. It becomes a very good calibration reference, an independent benchmark, by which we can set our instruments and see what's happening with our planet,"

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said air-LUSI's principal investigator, Kevin Turpie from the University of Maryland in the US.

NASA has more than 20 Earth-observing satellites that give researchers a global perspective on the interconnected Earth system.

The air-LUSI is a telescope that measures how much light is reflected off the lunar surface to assess the amount of energy Earth-observing satellites receive from moonlight.

In order to improve the accuracy of lunar reflectance models, air-LUSI measurements are accurate with less than 1 per cent uncertainty.

This airborne approach has the advantage of studying moonlight during different phases of the Moon while being able to bring the instrument back between flights for evaluation, maintenance, and, if necessary, repair, according to NASA.

"Once air-LUSI measurements are used to improve the accuracy of the total amount of light coming from the Moon, we can take extensively more accurate measurements of Earth using current and future space-borne observatories," said Turpie.

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