

Making drones suitable for cities

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With technology for drones far advanced, the next step is to ensure they can fly safely in cities. Credit: CC0 via Unsplash

Unmanned aerial vehicles will make their way into urban skies only if the safety of people below can be ensured.

The Spanish resort town of Benidorm is known for its sandy beaches

with clear waters, a skyline dominated by towering hotels and tourists from northern Europe. But one day in February, it also served as a testing ground for European society's future with drones.

Since the local economy depends on tourism during the summer, Benidorm is relatively empty in winter—and that's a plus when it comes to safety while testing unmanned aerial vehicles (UAVs). The tall buildings that dominate the skyline also stand in nicely for those of a big city.

Sun, sea and...satellite signals

In sum, it's an ideal place to try out new [drone](#) technology. And an EU-funded project called [DELOREAN](#) has done just that—testing new types of satellite tracking for drones on 9 February.

'Benidorm's skyline is quite similar to what you would find in larger cities like, say, New York,' said Santiago Soley, the project coordinator who is also chief executive officer of Spanish aeronautics-engineering company Pildo Labs. 'Generally, regulations limit drone flights over dense urban areas. It's the first time in Europe we did these intense tests in a challenging city environment.'

Drones have been a hyped technology for years, during which the media popularised predictions that such aircraft would soon be used for all kinds of daily services including delivering packages to people's doorsteps. Yet so far, widespread civilian use has failed to take off.

The bottleneck is safety and the need to demonstrate to city governments that drones can be operated in large numbers in populated areas without being a hazard. If a UAV crashes onto a busy street or into a plane that's landing or taking off, the result could be severe damage or even deaths.

Scientists and companies are now addressing these concerns—and the experiments in Benidorm might hold the key to the future success of drones.

'Drone technology is getting there—it's the least of our problems,' said Soley. 'What's more important is to demonstrate how drones would safely be deployed over cities.'

DELOREAN is wrapping up after three years. The main goal was to develop navigation and positioning requirements for urban air services and show how the European Global Navigation Satellite System, or EGNSS, can help.

Non-GPS options

Drones need to know exactly where they are at all times. For that, UAVs currently rely on satellites, mostly the US Global Positioning System, or GPS. Another alternative to GPS is Europe's Galileo network.

DELOREAN is also testing Galileo's potential for drones. While led by Pildo Labs, the project has featured an [international consortium](#) whose members include France-based aircraft manufacturer Airbus, Spanish postal-servicer provider Correos and the European Organisation for the Safety of Air Navigation, or Eurocontrol, in Belgium.

A challenge for satellite tracking in urban areas is that signals might be deflected or otherwise hindered by buildings. Galileo will help avoid such disruptions because of the waveform and structure of its signals, according to Soley.

In addition, Galileo is pioneering new services that could pinpoint drones' locations with higher accuracy—something DELOREAN tested in Benidorm.

Furthermore, Galileo adds a layer of security. An authentication service that allows the drone to verify whether the satellite signal is real would counter any future efforts by criminal groups to misdirect UAVs and steal their contents through fake signals, according to Soley.



An ARQUIMEA drone being tested in Marugán, Segovia, Spain. Credit: Labyrinth, 2023

Airborne parcel deliveries

If experiments of the kinds conducted by DELOREAN prove successful,

many applications could open up.

While drones are already in use over cities, it is often in small-scale operations by local authorities. Police departments, for one, use them to monitor crowds or track speeding cars.

'There are limitations on drone flights and you need to close the area,' said Soley. 'At the technical level, however, the flights are quite easy to handle.'

The next step could be mass urban air delivery. No more vans zigzagging through city streets with all the congestion and pollution.

Instead, fleets of drones would drop off packages across town. Companies like [Amazon](#) are already rolling out these services in limited areas.

'Logistics will, I think, be one of the most promising uses of drones,' said Soley.

Self-flying craft

An EU-funded project called [LABYRINTH](#) is tackling the challenge of ensuring that autonomous drones keep track of each other.

Autonomous drones require no ground-based human pilots, who are generally needed for the current generation of UAVs.

'In the future, those drones will be operated autonomously—they will fly themselves,' said Luis Moreno Lorente, the project coordinator and a professor of systems engineering and automation at the University Carlos III of Madrid in Spain. 'But if you want to do that safely, you need to know exactly where each one of them is located.'

LABYRINTH, which is due to end in May after three years, is developing software that acts as an air traffic control system for drones. The 3D position of each is tracked and the aircraft then relays this information to other drones in the vicinity so they don't crash into each other. Similarly, if a drone faces technical troubles—say one of its motors fails—it needs to be able to direct other UAVs away from it.

'Before businesses like urban air delivery can develop, we first need safety,' said Moreno Lorente. 'That's what we're building now.'

Together, LABYRINTH and DELOREAN are helping to clear the way for a future in which large numbers of [drones](#) fly over cities.

'It's just a matter of time before they do,' said Moreno Lorente.

More information: [DELOREAN](#)
[LABYRINTH](#)
[EU-funded industrial research and innovation](#)

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