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Osaka Expo: The legal issues of flying cars

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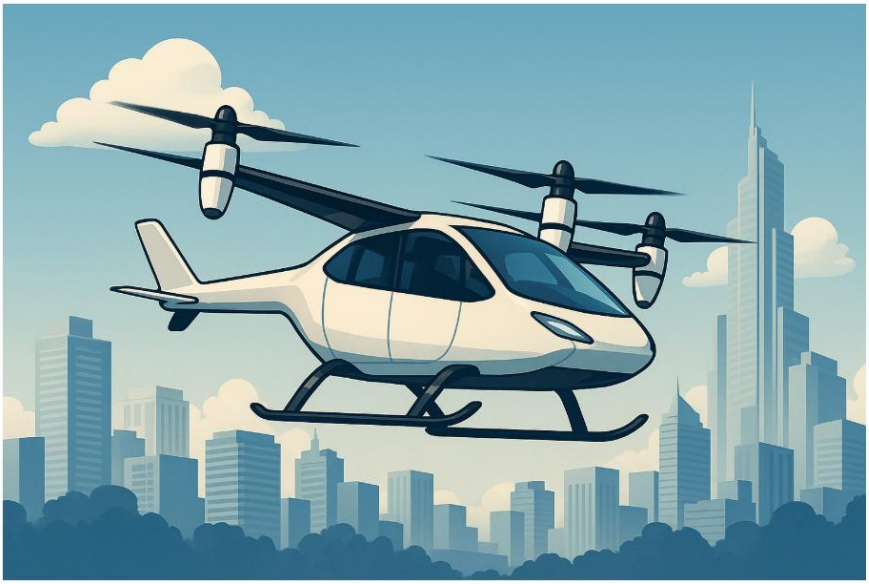
I. Introduction

Recently, I visited the "Flying Car Station" at the Osaka Kansai Expo and experienced the flying car exhibits. (Reference: https://www.expo2025.or.jp/future-index/smart-mobility/advanced-air-mobility /)

Figure 1: A realistic flying car



While the pavilion is open to visitors without reservations, those who make a reservation in advance can board a parked flying car and experience a video of the car flying like a taxi from Yumeshima to Mount Koya or Awaji Island. Additionally, on certain mornings, a flight demonstration of the actual car is also held in a separate location within the venue (when I visited, in addition to the demonstration flight, there was also a Q&A session with the president of Skydrive explaining the car). Even before
the event, there were many negative comments about flying cars, such as "it doesn't seem realistic," "it's a waste of tax money," and "this isn't a car," but the exhibits were very easy to understand and provided a concrete image of what future society might be like. At the very

least, it was an experience that made me feel like "this isn't a dream, it could be a reality in the near future."

Although the exhibition's catchphrase was "There's no traffic jam in the sky," the reality is not so simple. Under the Aviation Act and the Drone Act, many airspaces, such as densely populated areas (DID districts), around airports, and near important facilities, are generally prohibited or severely restricted. Therefore, under the current system, "freely flyable airspace" is extremely limited, and in fact, "usable airspace" is also quite limited. Furthermore, air traffic control exists in the airspace, and traffic control by controllers is essential for the safe flight of commercial aircraft, helicopters, eVTOLs, and drones. In fact, "holds" frequently occur over Haneda Airport during peak hours, and air traffic is subject to physical and institutional limitations. In the future, the development of dedicated routes and unmanned aircraft traffic management systems (UTMs) will be essential for low-altitude operations within cities.

While the technology is becoming a reality, there are many institutional challenges to truly bring flying cars to fruition, such as airworthiness certification under the Aviation Act, operator liability, and standards for installing vertiports in urban areas.
In recent years, the Ministry of Land, Infrastructure, Transport and Tourism has been making successive revisions to government ordinances and technical standards, including the 2023 amendment to the Enforcement Regulations of the Aviation Act, the vertiport maintenance guidelines, and the publication of the Next Generation Air Mobility Operation Guidelines in 2025.

However, a fundamental system design has yet to be reached, and many areas remain legally uncertain and gray areas.
In this article, we will organize and examine flying cars by comparing them with the future visions we all imagine and science fiction works, and current laws.

This article is part of a series in which I consider future systems from the perspective of a lawyer, inspired by the exhibitions at the Osaka Expo.

Previous articles:

Is the Android ‘Me’ the Same Person?- Future Legal Systems Contemplated at Osaka Kansai Expo 2025

ADD LINKS EMBEDDED

Who would be the judge of a murder were to to occur in an orbital elevator?

II. The world of flying cars in science fiction

Flying cars have long been a familiar feature in science fiction works, but their appearance varies, with each work depicting a different vision of society and technology.

Personal mobility: "Back to the Future"

In the 1985 film "Back to the Future Part II," there is a memorable scene in which a DeLorean flies through the sky in the future of 2015. In this scene, the flying car is depicted as a personal vehicle, presenting an ideal future in which anyone can travel freely through the sky.

Flying cars as symbols of power: "Blade Runner"

In the 1982 film Blade Runner, a flying car is depicted as a police vehicle, and there is a memorable scene in which it flies between skyscrapers. In this scene, the sky is not a public space, but functions as a domain controlled by power.

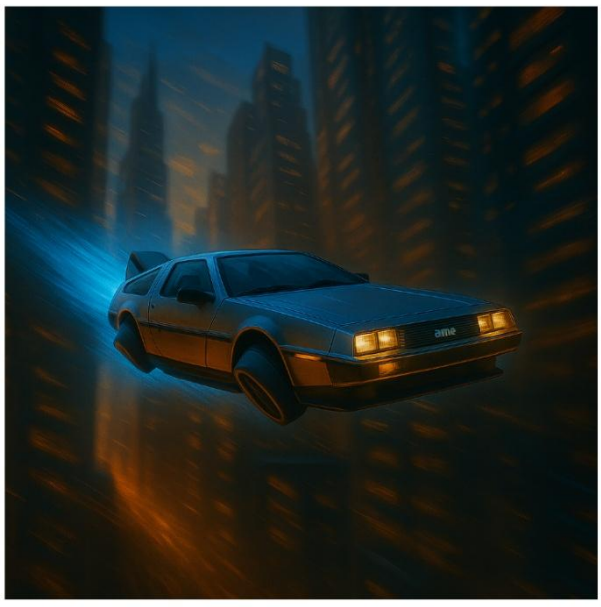
Popularizing Sky Congestion: "The Fifth Element"

In the 1997 film The Fifth Element, flying cars are commonplace among civilians, urban spaces have multi-dimensional transportation systems, there are even traffic lights in the sky, and "air traffic jams" are a part of everyday life.

The Sky as Urban Surveillance Infrastructure: "Ghost in the Shell"

In the 1995 film Ghost in the Shell, a helicopter-type hovercar appears as a means of transportation for Public Security Section 9. Flying cars are not just a means of transportation but are positioned as part of the city surveillance infrastructure.

Figure 2: A sci-fi flying car



The common thread: the absence of a legal system

What is interesting is that these works all barely address issues such as "who controls the skies" or "what legal rules govern flight." While the
"free movement in the skies" depicted in science fiction works is appealing, but in reality, strict airspace management and aviation legislation exist. Rather, the question of "who owns the skies" is at the forefront of institutional design in modern society.

III. What is a flying car?

The term "flying car" catches your eye, but the aircraft currently being developed are not like the ones you might imagine in science fiction, like the DeLorean from Back to the Future Part II. They have no wheels and do not drive on roads, but the familiar term "car" is used because the aim is to provide an "everyday transportation service that anyone can reserve on demand."
What exactly constitutes a flying car has not been finalized, but in documents from the Ministry of Land, Infrastructure, Transport and Tourism, flying cars are often defined as "electric, automated vertical take-off and landing aircraft (eVTOL)" and have the following characteristics:

- Electric: Battery-powered or hybrid electric propulsion mechanisms that do not emit exhaust gases
- Autonomous: Autonomous driving will be possible in the future (however, at present, it is assumed that the vehicle will be operated by a human).
- Vertical take-off and landing (VTOL): No runway is required, and take-off and landing can be done in limited spaces.
- Urban Air Mobility: A short-distance means of transportation intended for travel within and around cities

These characteristics make flying cars different from conventional helicopters and drones.

Comparison with similar technologies

Classification	Propulsion method	Control	Take-off and Landing	Main uses	Legal system
Flying car (eVTOL)	Electric	Future automation	Vertical takeoff and landing	Intra-city transportation and aerial taxis	The application of aviation law is also currently under design
Helicopter	Internal combustion engine	Manned pilot	Vertical takeoff and landing	Government agencies, news, and emergency services	Regulated by Aviation Law
Drone	Electric	Unmanned (remote)	Vertical takeoff and landing	Photography, logistics, surveying	Unmanned Aerial Vehicle

Flying cars are vehicles that are small and lightweight, like drones, and capable of vertical takeoff and landing, but also have the ability to transport people like helicopters. In that sense, they can be described as a "hybrid entity" that cannot be captured by traditional classifications.

Ambiguous definition from the legal perspective

Technically, the term eVTOL (electric Vertical Take-Off and Landing aircraft) is sometimes used, but there are currently no definitions of "flying cars" or "eVTOL" in Japan's Aviation Act.
Also, although the word "car" is used, it is not a car, so it is not subject to the Road Transport Vehicle Act, and the automobile license and vehicle inspection systems do not apply. Conversely, because it is different from airplanes and helicopters, it does not fit completely within the framework of the existing Aviation Act.

IV. Current technological development status

Flying cars may still give the impression of being a futuristic vehicle, but the technology is already at a practical stage, with companies both in Japan and overseas already developing actual vehicles, conducting test flights, and conducting pre-commercial operations.

Overseas: Acceleration of the eVTOL market

In the United States and Europe, efforts are accelerating toward the practical application of urban air mobility (UAM) based on eVTOL (electric vertical take-off and landing) aircraft.

- Joby Aviation (USA) : Based in California, the company is conducting demonstration flights in collaboration with NASA and aims to obtain type certification from the FAA (Federal Aviation Administration).
- Volocopter (Germany) : A German startup that is in the final stages of obtaining type certification from EASA (European Union Aviation Safety Agency), aiming to begin commercial operations in 2025.
- Archer Aviation (US) : Partnering with United Airlines to build an inter-city air mobility network.

Japan: Efforts to commercialize technology using the Expo as an opportunity

In Japan, efforts are underway to commercialize flying cars, spurred by the Osaka-Kansai Expo.

- SkyDrive (Japan): A startup based in Toyota City, Aichi Prefecture, has already completed a demonstration flight. Plans include exhibiting the aircraft and conducting paid flights at the Expo.
- Airlines such as ANA and JAL: They have shown interest in introducing flying cars and are exploring their use as a form of mobility to connect to airports.
- Ministry of Land, Infrastructure, Transport and Tourism's "Roadmap for the Air Mobility Revolution" (revised in 2023): The plan outlines a process in which limited operations will begin in specific airspace in 2025, with general commercialization in the 2030s.

System design comes before technology.

The biggest obstacle to flying cars is not technology, but systems. As they are aircraft that fly in the air, they require a wide range of legal infrastructure, including aviation laws, aircraft manufacturing standards, safety certification, operation management, pilot qualifications, and standards for the establishment of takeoff and landing sites.

V. Gaps and challenges in the legal system

The Aviation Act encompasses conventional aviation, including fixed-wing and rotary-wing aircraft, but there is no regulatory design in place to accommodate eVTOLs, which operate frequently at low altitudes in cities, or automated/remotely piloted aircraft, leaving a gap in current legislation.

Unexpected in the Aviation Law: The contradiction of "taxi-like cars"

The central law that regulates Japan's skies is the Aviation Act. However, the Aviation Act

was originally designed to accommodate fixed-wing aircraft that take off from runways and fly at high altitudes, and helicopters with limited uses, creating a mismatch with low-altitude, short-distance, and frequent flying vehicles like flying cars (eVTOL). Currently, flying cars are classified as "aircraft" under the Aviation Act and require permission from the Ministry of Land, Infrastructure, Transport and Tourism, but the system has yet to catch up on the following points:

- Regarding takeoff and landing sites suitable for vertical takeoff and landing (vertiports: takeoff and landing sites dedicated to flying cars), provisional maintenance guidelines were published in December 2023, but full legal standards have not yet been established.
- Airspace operation rules (such as sharing and priority) for low-altitude airspace have not yet been established, and further development is required.
- There is also no piloting qualification system in place that assumes autonomous driving or remote control, so a new qualification system needs to be created.

The crucial difference with drones

Some may wonder, "Flying in the sky means it will be regulated in the same way as drones?"
Drones are also subject to strict controls, including registration, remote ID, permits and approvals. However, the focus of the system design is on "unmanned transport of goods," while flying cars, which "transport people with pilots," have fundamentally different requirements and scope for type/airworthiness, crew qualifications, and airspace capacity management.

VI. Self and Responsibility: Who Pays?

In the development of flying cars, one unavoidable issue is the question of "Who is responsible if an accident occurs?" This is a core issue that is directly linked to the construction of the entire legal system, including where responsibility lies, the licensing system, and the insurance system.

Who is responsible for autonomous driving?

Many of the eVTOL aircraft currently being developed are intended to be autonomously or remotely piloted in the future, but in the initial stages, they are primarily intended to be piloted by humans.

If flying cars become autonomous in the future, the possible responsible parties are as follows:

(i) Aircraft manufacturer (Product Liability Act and Product Liability Act apply)
(ii) Autonomous driving system developers (liability for software defects)
(iii) Flight operations manager (remote control center, etc.)
(iv) Aircraft owner (equivalent to automobile owner liability)
(v) The passenger themself (if a human gives final approval before boarding)

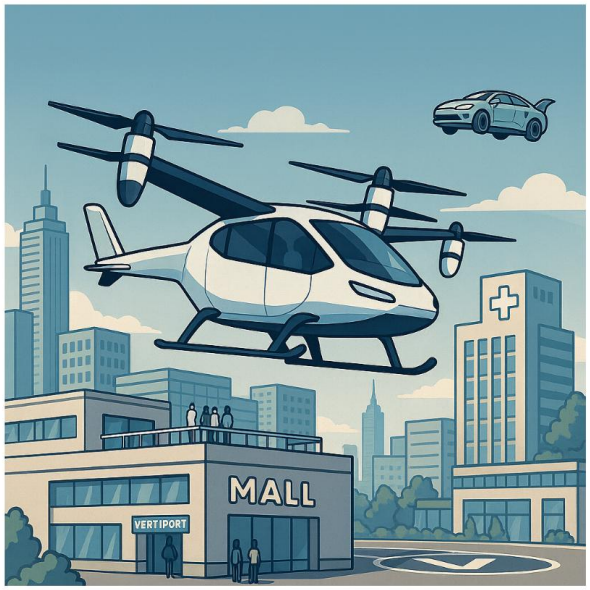
For example, if an AI system makes a mistake in route selection during autonomous driving and crashes, the manufacturer, software developer, air traffic control system, and/or aircraft owner may be held liable. This is a complex issue that is fundamentally different from the driver's liability of a car.

Let's imagine something more concrete. If a flying car flying over Shinjuku suddenly crashes due to a system failure, causing damage to buildings and pedestrians on the ground, compensation could run into the billions or even tens of billions of yen. Would the manufacturer, the operator, or multiple parties be held responsible? There is no clear answer under the current legal system.

VII. Social Impact: The Day the Rooftop Becomes a Station

If flying cars become commonplace, the arteries of cities will shift from the ground to the sky. Instead of train stations, vertiports will be installed on the rooftops of high-rise buildings and shopping malls, creating a new common sense that "rooftops = entrances." Air route nodes will also be established in large suburban facilities and hospitals, rewriting the very value map of cities.

Figure 3: The rooftop will become a station



Who can use this vehicle?

The first use for this technology is expected to be short-distance travel within cities. At a Skydrive Q&A session that I attended, it was explained that "current flight time is about 10 minutes, with the goal of 15-20 minutes in the future. The range will be 30-40km, and the fare will be 10,000-20,000 yen one way from Yumeshima to Shin-Osaka, with the ultimate goal being about three times faster and about twice the price of a taxi.
" If it's "three times faster than a taxi, but about twice the price," it certainly sounds appealing. As a new means of transportation unconstrained by traffic jams, it could potentially expand the possibilities of urban life.

On the other hand, in the early stages of introduction, the costs of aircraft, batteries, insurance, and takeoff and landing sites will likely increase, leading to higher fares. The number of flights will also be limited, and reservations will be required. Furthermore, surge pricing (fare increases) will occur during peak times, raising concerns that this will ultimately become a means of transportation that only the wealthy can use to buy time.

Urban redesign and the future of inequality

Vertiports require multiple standards, including evacuation routes and noise control. As the value of areas in front of stations weakens, urban planning to utilize rooftops as "sky station areas" becomes more realistic. We can see a future in which the rooftops of high-rise apartment buildings become departure and arrival points, changing the very structure of cities.

However, who can enjoy these benefits depends on the system's design. If fares remain high, a new mobility gap will emerge between those who can use the air and those who cannot. Conversely, if it is incorporated into a public transportation system, it may develop into an infrastructure that allows for more equitable sharing of time. We are at a crossroads in the future, between "division" and "sharing."

VIII. Who will decide the future of the skies? Three options

Flying cars are becoming a technological reality, but the legal system has yet to catch up. The path we can choose from can be broadly divided into three categories.

(i) **Private sector-led model**: Minimizing regulations and leaving it up to companies to develop their own technologies and market principles (utilizing regulatory sandboxes)
(ii) **Public-private collaboration model**: Ensure safety through a strict qualification system while promoting gradual adoption (opening up of restricted airspace and a specific license system).

(iii) **Public-led model**: Led by the national or local government, it is developed as a public service (including fare regulations and mandatory third-party liability insurance).

The key challenges we face are clear.

- Responsibility in the era of autonomous driving and remote control
- Correcting mobility disparities caused by high fares
- Airspace management rules and priority determination
- Consistency with international systems

Will flying cars become "highways for the wealthy only," or "public spaces that anyone can use"? The shape of the future will change dramatically depending on how the system is designed.

And this system will not be "decided by someone," but will be shaped by the accumulation of consensus building across society. Just as trains and automobiles have done, flying cars may one day completely change our lives.

How would you design this future?