Ever since there has been flight, people had this vision.

And I think you and I had this vision.

You're on the highway, you're going like two miles an hour and you just

desperately want to push the button to go vertical and take off over this.

It's just an irresistible fantasy that all drivers have had.

Hey, doc, we better back up.

We don't have enough road to get up to 88.

Roads, where we're going we don't need, roads!

These visionary scenes depicted in "Back to the Future" and "Blade Runner" did

not exactly pan out.

Instead, we continue to waste hours stuck in traffic, fantasizing about flying

cars. Yet, we don't have them, even though the potential market is huge.

The market for urban air mobility is expected to reach $1.5

trillion by 2040. Companies like Boeing, Airbus, Toyota and Uber are

recognizing the need for more efficient travel and injecting millions into

developing VTOLs, or vertical takeoff and landing vehicles.

Though these operate more like massive drones or helicopters than they do cars,

VTOLs have the potential to fundamentally change the way we commute in cities.

So what's taking so long?

And will we ever be able to push a button and zoom over traffic with our

car/plane hybrid? The biggest challenge, according to engineers,

in creating a flying car is to create a machine that is robust, rugged and

probably heavy enough to withstand the rigors of the road.

The bumps and the occasional fender benders, and at the same time, a machine

that is light enough and aerodynamic enough to be safe in the air.

Most engineers claim that although it was an interesting problem, it was not a

solvable one.

The balance would always be wrong, or the weight would be wrong, and you could

never do better than creating an inferior car that would also be an inferior

airplane, and that you were much better off making an airplane and making a car

and keeping them separate. Andrew Glass is an author and illustrator who spent

years researching flying cars for his book.

He says that initially, the notion of roads seemed far more far-fetched than

flying cars. Even though there were sort of rudimentary cars and rudimentary

planes, t here were no roads to speak of.

And so there was this fascinating kind of archaeology of a period where

people couldn't even imagine a complex, comfortable highway system.

But what they could imagine was bolting the wings of a rudimentary airplane to

the top of a rudimentary car and flying over the countryside until they got to

a landing strip where they would land, disengage the wings and drive to where

they were actually going.

People have been trying to build car/plane hybrids since the early nineteen

hundreds. In 1917, the Curtiss Autoplane debuted at the Pan-American Aeronautic

Exposition in New York.

The Autoplane had a removable fuselage, wings and tail and actually looked like

a car when it travelled down the road.

But with World War I in full swing, priorities quickly shifted from building a

flying car to building military planes, and the Autoplane was eventually

dismantled for parts.

In the mid 40s, public interest in flying cars was re-sparked after Robert

Fulton flew his Airphibian prototype.

The Airphibian used the same controls for flying and driving and required that

drivers leave their airplane parts behind, when you drove it like a car.

Three years after its first flight, the Airphibian became the first flying car

to receive certification from the Civic Aeronautics Authority, predecessor to

the FAA. But in the end, the Airphibian's high production, cost meant it was

never made on a wide scale.

Still, the Airphibian became the inspiration for Molt Taylor's Aerocar a few

years later. The Aerocar too earned the green light from aviation authorities

and complied with all road vehicle codes that existed at the time.

It was everything that people hoped it would be.

It was safe. It was versatile.

It was an actual good looking car that was comfortable and easy to drive.

It was also a plane that was functional and would take you three to

five hundred miles, but he just could not find backers for it.

Ford was curious about the Aerocar, and in 1970, even commissioned a study to

gauge the market interest in such a vehicle.

Ford predicted they could sell about 25,000 Aerocars, but the company

eventually decided to pass on the project after engineers and lawmakers raised

concerns. When the Department of Transportation heard about it, t hey went a

little crazy with the idea that Ford was getting ready to put a lot of drivers

flying over suburban areas.

And the engineers at Ford came back with the usual

criticism that to make this car safe enough to meet all the safety standards,

it would become too heavy to be an effective airplane.

And so the technology there just took a dip.

It's revived, I think, with the notion of self-driving cars.

Flying cars have kind of become this byword where people say, 'they promise me

flying cars and all I got was...'

you know, fill in the blank. Yeah.

Why don't we have flying cars?

So, we're close, actually.

We're closer than we've ever been.

So I think that it's a hard problem.

They have be be certified in order to be commercially relevant.

And that's that's really the key.

And the other thing from a technology standpoint, it just wasn't there, even 10

years ago it was barely there. And the batteries, the motors, to make these

things affordable and reliable, electric propulsion is kind of a key enabler.

And so that's really the differentiator that that's making it possible.

There have been a number of innovations through hardware, software,

telecommunications and infrastructure that have led to this acceleration of

both capital and early commerciality and proto-commerciality of urban air

mobility. A few of these things are weight reduction, carbon fiber composites,

more dense and higher energy density batteries, which improve the power to

weight. Smaller, lighter, electric motors, more powerful micro motors, for what

they call, DEP or distributed electronic propulsion.

An electric motor also has the ability to, you can control torque, right?

That's sort of the power that the motor throws off and you can control rotation

speed very effectively.

And so for something like a vertical takeoff and landing vehicle, where you

need a lot of power to get the vehicle in the air, you don't need a lot of

power in what you call cruise, right.

As the vehicle transports through the air.

And then you need a fair amount of power to get the vehicles back safely on the

ground. An electric propulsion system and really high-technology motors and

motor controllers are perfect for that mission.

These were technologies that really only existed in a military application

until recently. And we're now seeing it come out of the DOD and DARPA and the

military field into the commercial market.

Adding to that then, lower priced and higher capability for sensing compute.

So all the things that you would see in an autonomous car prototype can be

applied in an urban air mobility vehicle.

And autonomous operation?

Experts don't see this as too much of a challenge for VTOLs, since these

vehicles will be doing a lot of repetitive tasks.

Autonomous control technology has matured to a stage where we can put it to

goos use. The mission is very simple.

Just take off, carry some people safely and then land.

And so for a simple mission, flying the aircraft should be simple.

And so we think that it is ripe for application of autonomy.

This level of autonomy is not any, it's not too far-fetched anymore.

All these advancements in key technologies have led to a number of flying car

prototypes. Massachusetts-based Terrafugia has managed to get road and FAA

approval for its Transition model, though it's not yet commercially available.

Slovakia-based AeroMobil too has not sold any vehicles and is awaiting approval

from the European Aviation Safety Agency for its Aero Mobile 4.0

car. However, both of these companies seem to be turning their focus to VTOLs.

Terrafugia's newest model, the T F-2, will have removable pods that can be

docked to either an air vehicle or car wheels.

Meanwhile, a rendering of AeroMobil's latest model, the AeroMobile 5.0,

shows a car that drives to a helipad before it takes off vertically.

Experts say engineering a hybrid car/plane is really difficult because the two

vehicles are designed for opposing goals.

When you design cars, your objective is to find friction with torque.

When you design airplanes, your objective is to fight gravity with lift.

This leads to different kinds of solution.

Sticking wings into a car doesn't make them good airplanes, anymore than

sticking wheels onto airplanes.

In addition, a hybrid air and road vehicle in the U.S.

would require certification from both the FAA and the National Highway Traffic

Safety Administration, which can be hard to achieve.

That's why many companies have turned to VTOLs.

The Vertical Flight Society, a trade association for the advancement of

vertical flight, has been tracking electric VTOL designs since 2016.

Its website lists over 250 different designs for eVTOLs.

One well-known company working with eVTOLs is Uber.

The idea is that with the new technology that's been applied to cars, that have

made electric cars possible, like powertrains, batteries, electric motors, we

can make a new class of aircraft that can take off and land vertically like a

helicopter, but uses multiple different rotors instead of one large one that

allows it to have kind of built-in, inherent redundancies that actually make it

both safer to operate and cheaper to operate at the same time.

Uber is not building any of the vehicles itself.

Instead, the company is collaborating with established manufacturers, including

Boeing and Hyundai, to bring Uber's ride-sharing platform to electric flying

vehicles. Uber says it hopes to have its eVTOLs up and running by 2023.

Another big name in the space is Airbus.

The company is testing CityAirbus, an all-electric, four-seat, remotely piloted

flying taxi, which has so far performed more than 100 test flights.

Toyota also recently invested $394 million in electric air taxi startup Joby

Aviation. And Porsche has announced that they are exploring creating a luxury,

electric, flying vehicle with U.S.

plane-maker, Boeing. Startups Opener and Kitty Hawk have come up with their own

versions of VTOLs.

Both startups are backed by Google co-founder, Larry Page, and promise a

personal flying vehicle that doesn't require a pilot's license.

Companies see enormous opportunity here.

People are conscious about environmental impact.

They're tired of congestion.

They want to travel faster, quicker.

And they're more receptive to ride-sharing.

Even with all the buzz, experts agree that there are many challenges that

manufacturers must face before they can bring an urban air mobility vehicle to

market. In order to have longer distances and faster charging times to keep

that utilization up, w e're gonna need pretty significant improvements in power

to weight of the battery. Another one that doesn't get a lot of attention, but

should, is noise.

You don't want to fill the air with these whizzing, buzzing, high-frequency

vehicles. The third one is privacy.

While many in the public might be comfortable with autonomous vehicles covered

with sensors that could facially recognize pedestrians, the thought of

something being in the air at night, flying around your home or in your

neighborhood or, you know, between businesses may introduce a new genre of

privacy and safety-related nuances that are yet to be explored and will

ultimately go into the courts and the regulatory bodies.

Then there's the question of safety and regulation.

Airplane safety is two or three orders of magnitude more than car safety.

A car engine may not be reliable, like my first car.

It may break down.

But it's safe because you can just, you know, pull over and wait for emergency

services. But not in airplanes.

If something goes wrong, that's it.

That's the end. It's a life-threatening event.

Not only for people inside, but those on the ground.

Even futurist, Elon Musk, seems to be hesitant about the idea of flying

vehicles. There is a challenge with flying cars in that they'll be quite noisy,

the the wind force generated to be very high.

Let's just say that if something's flying over your head, if there are a whole

bunch of flying cars going all over the place, that is not an anxiety reducing

situation. You're thinking like, did they service their hubcap or is it going

to come off and guillotine me as they are flying past?

Our dream is that this will help solve the worldwide transportation crisis.

Where, you know, it's impossible to get from here to San Francisco in rush hour

traffic right now.

And the regulatory system is basically setup so this aircraft can't meet that

need right now. But it's not because of capabilities.

This aircraft is capable, right now, of actually flying to San Francisco,

landing and recharging and coming back or even landing and coming back based on

the distances. But the problem right now, is the regulatory environment has not

caught up with the capabilities of this kind of aircraft.

Because honestly, this type of aircraft was just invented.

But regulation seems to be catching up.

I want to close with some thoughts on the next very, very innovative piece of

technology that we see emerging, and that's urban air mobility.

As I mentioned, these are aircraft that fill that void from 30 miles to 300

miles between the small drones and the commercial aircraft we know today.

And probably the biggest question I get on this is, 'is this real?

Are they really happening?'

Yes, this is more than just hype.

This is more than just promotional videos.

We have at least six aircraft well along in their type certification, which is

the first step in introducing the new aircraft into operation.

In 2019, the European Union Aviation Safety Agency released a special condition

certification for VTOL aircraft.

The condition applies to vehicles with nine passengers or less and a max

certified takeoff mass of 7,000 pounds or less.

As for if flying cars will ever fill our skies?

Right now, that seems unlikely.

I don't imagine that this is ever going to happen where people actually

accomplish this dream of a flying car in every garage.

It was a kind of self-contained fantasy that wasn't going to be a reality for

very many people. It seems as if trying to design a dual purpose road car and

flying car is just not economical and not the optimal technological solution.

So if you look out 10, 20, 20, 30 years, the future of transportation is a mesh

of high-speed, automated, efficient, electronic and sustainable terrestrial

transport and then working as a mesh with electronic, automated urban air

mobility for various applications.

With so many big name companies invested in developing VTOLs, there's a really

good chance that commuting over traffic will become a reality, even if flying

cars remain a fantasy.