

MOBILITY

INDUSTRY

INSIDER

# Q2 2019 | Pulse Vertical Mobility

UBER

FutureBridge



# WHAT'S INSIDE!

The document contains two emerging trends related to Vertical Mobility. It provides an insight about the trends that were captured during Q2 2019

As part of our continuous product enhancement, with this version of the Pulse we introduce two new sections of analysis:

- The patent Analysis for the last one year on Vertical Mobility. Along with a study of a scientific paper on Vertical Mobility.
- This document has a detailed analysis of the Startup Activity in Vertical Mobility

## 01

### Pulse themes:

- Vertical Mobility players are using existing aircrafts to initiate Mobility as a Service (MaaS)
- UAM players are now focusing on low-altitude Air Traffic Management
- Infrastructure developers and UAM players are collaborating to develop sky ports

## 02

### Quarterly review of early-stage research

- Study of Vertical Mobility (Urban Air Mobility)
- IP Activity Scenario in Vertical Mobility



## 03

### Startup Tracker highlights

- A snapshot of our Startup Tracker in Q2'19 with segmentation by technology, region & commercialization
- Regional hubs of innovation in Vertical Mobility
- Insights on the 10 new startups we've included in Q2'19
- Startup highlight – Kitty Hawk Corporation focus on Vertical Mobility



# 01

# Emerging trends

# Vertical Mobility players are using existing aircrafts to initiate Mobility as a Service (MaaS)

## CONTEXT



Due to lack of certified air vehicles and under developmental norms for Urban Air Mobility, OEMs and startups are starting the air mobility services with existing helicopters and choppers. To built a firm foundation in UAM business players are eager to provide services with existing certified aircrafts as well as developing the new light weighted e-VTOL, those are more suitable for long term Vertical Mobility.



## Recent Developments

- Blade is expanding it's air transportation services in Urban Air Mobility
- Ascent joins Urban Air Mobility as air transportation service provider by launching helicopter ride sharing platform
- Airbus expanding it's MaaS (Mobility as a Service) by providing point-to-point services
- Uber starts its helicopter ride services under Urban Air Mobility



DEVELOPMENTS  
Emerging trend



- **Airbus** and **Blade** are expanding there air transportation services. Blade includes new points for flight and Airbus is focusing on city integration by providing point to point air transportation services



- **Ascent** and **Uber** are having there own helicopter ride sharing platform. They are offering there air transportation services by using conventional helicopters. As well as working on e-VTOL

FutureBridge Insight & What should you investigate ?



**→ FutureBridge Insight on initiated Mobility as a Service (MaaS)**

- Though the deployment of UAM is started with existing aircrafts, it will not going to sustain for long term. As the noise & pollution level will increases respective governments will make restrictions on the number of frequencies of flights. **So UAM players needs to get unique & novel certified aircraft to leverage Vertical Mobility**
- **Software development gets into demand** for avionics, weather monitoring, booking flight applications, pollution monitoring and many more
- Suppliers of aircrafts and OEMs those are having own aircrafts will be leading at starting phase of deployment





**What should you investigate?**

↓

Details of On Demand air transportation services ?

↓

What are the strategies of Vertical Mobility player to get a good position in UAM ?

Player	Type of Service	Used Aircrafts	About Services
	Point to Point	<b>Bell 206L-4</b> (Helicopter)	Application based booking service at \$195 per seat
	Point to Point	<b>CHOP-CHOP</b> (Uber's new helicopter)	Uber's Manhattan-JFK flights will take eight minutes and cost between \$200 and \$225 per person
	Point to Point	<b>Helicopters</b>	Scaling up of Voom – application based on-demand helicopter service
	City to City	<b>Choppers</b>	Transport up to five passengers per flight and complete up to 30 flights per day

# UAM players are now focusing on low-altitude Air Traffic Management

## CONTEXT



In Urban Air Mobility the finalization of rules and criteria yet not happened. Governments and major OEMs are working together to built the norms and regulatory part. From conducting test flights to make a full fledge business of air taxi, 'Air Space Management' is a key part needs to be consider.

As considering point to point and city to city air transportation low altitude Air Traffic Management become necessary.



## Recent Developments

- Involi and AirMap collaborate to integrate comprehensive air traffic awareness
- Airbus team up with, Groupe ADP and the RATP Group
- Fortem Technologies makes partnership with Unifly for air space and safety solution
- Blueprint of Embraer X for Urban Air Mobility traffic management system
- Honeywell And Volocopter comes together to research and develop navigation solutions for Urban Air Mobility



DEVELOPMENTS  
Emerging trend



- Airbus with other UAM players and Airmap are working to gather low-altitude air traffic data and real-time air traffic data analysis. Embraer is willing become Urban Airspace Service Provider (UASP) by managing Urban Air Traffic



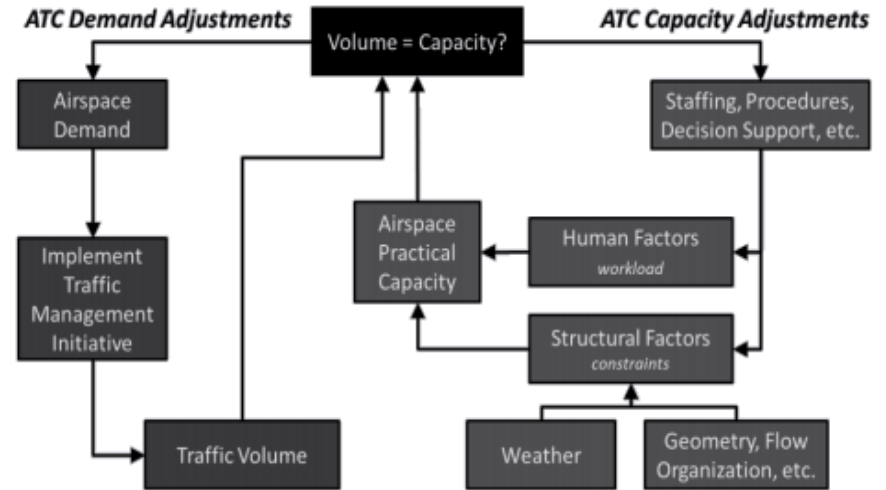
- Fortem and Unifly are working on Unmanned Traffic Management (UTM) by offering low altitude heading reference solutions for safe operation of air vehicles within geofences.

FutureBridge Insight & What should you investigate ?



## FutureBridge Insight on Air Traffic Management of Urban Air Mobility

- Air Traffic Management is a very important issue which needs to be sort out at initial phase of Urban Air Mobility deployment.
- Service providers and suppliers of management software systems are having **great opportunity to fulfill the great demand of analytical tools**
- **Respective governments need a action plan** to actively work on build regulatory aspects of air space safety and integration



>>Source

## What should you investigate?



Details of Air Traffic Management systems ?



Government initiatives for Air space safety and integration?

### ATC (Air Traffic Control ) Challenges from UAM operations:

1. Increased Number of Operations
2. Increased Density of Operations
3. Lower Altitude Operations (<3000ft)
4. Heterogeneity in Pilots, Automation, and Aircraft



# Infrastructure developers and UAM players are collaborating to develop sky ports

## CONTEXT



An e-VTOL is the center of Urban Air Mobility, due to vertical take off and landing capabilities the space constraint get eliminated for landing and take off. Still new verti-ports / sky-ports are required and many OEMs as well as startups are coming forward to integrate existing infrastructure to new sky-ports.



## Recent Developments

- Foster + Partners' working on skyport proposal
- Joint Venture between Transcend Air and Lily Helipads to built vertipads for e-VTOL
- Volocopter and skyports make partnership for developing the infrastructure for Urban Air mobility (UAM)
- Joint Venture of Vertical Aerospace and Atkins - Revolutionise Urban Travel

Foster + Partners



VOLOCOPTER



DEVELOPMENTS  
Emerging trend



- Atkins, Vertical Aerospace and Foster + Partners are working on the blueprint of aviation infrastructure, operating model, intelligent mobility. Safety and environmentally – friendly infra creation is a main goal of Vertical Mobility players



- Infrastructure providers are working together with the UAM players to develop verti-ports as Lily helipads and skyports are developing infrastructure for Volocopter and Transcend Air

FutureBridge Insight & What should you investigate ?





## → FutureBridge Insight on development of Sky ports or Verti - Ports

- OEMs are taking help of architectures to built the infrastructure. By estimating the parameters like passenger capacity, flight frequencies, design of e-VTOLs with there loading capabilities design proposals are building up
- *Because of the infrastructure providers Urban Air Mobility's time to market gets 50% reduced*
- Now respective governments will play a vital role to give the green signal for new infrastructure development as well as integrating older airports

### 1. Privately owned verti-ports:

- Buy / lease space on existing underutilized infrastructure, buildings, parking lots, etc.
- Contract with operators on a fee-for-usage basis or subscription model
- Relatively low acquisition and build out costs
- Best suited for small verti-ports and verti-stations

### 2. OEM / MRO owned verti-ports:

- Designed, built, and operated for and by OEMs or MRO providers
- Available for a fee to other OEMs or MRO providers for use
- Midrange acquisition and build out costs
- Best suited for smaller to midsized sky ports

### 3. Public-private partnership (PPP):

- Designed, built, operated, and maintained by a PPP
- Contract with builders, operators, and maintainers on a fee-for usage basis (e.g., toll road)
- Mid-to high-range acquisition and build out costs
- Best suited for larger sky-ports and hubs

## What should you investigate?



What are the geographical locations for Sky-ports or Verti-ports?



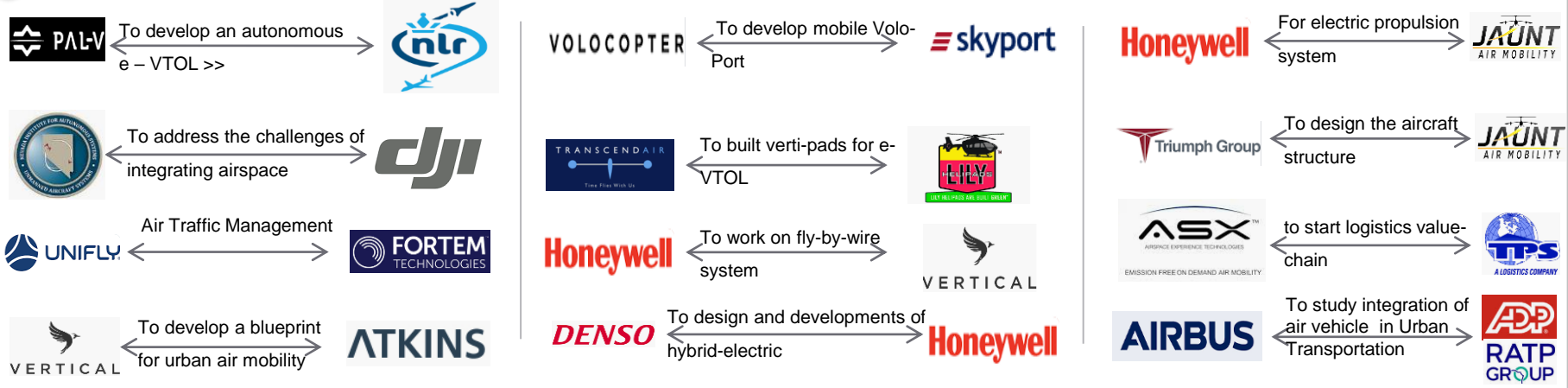
Which are the major players and there strategies with infrastructure developers?



# Major developments Summary H1 2019 – Vertical Mobility



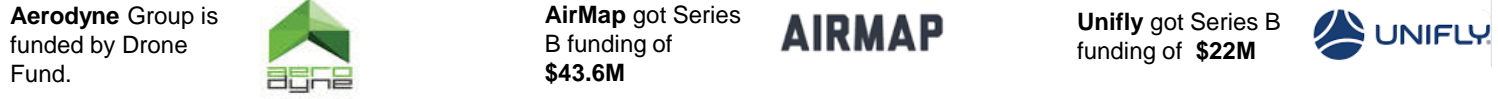
## Collaborations / Partnerships



## Test Flights / Launches



## Funding:



02

# Quarterly academic review

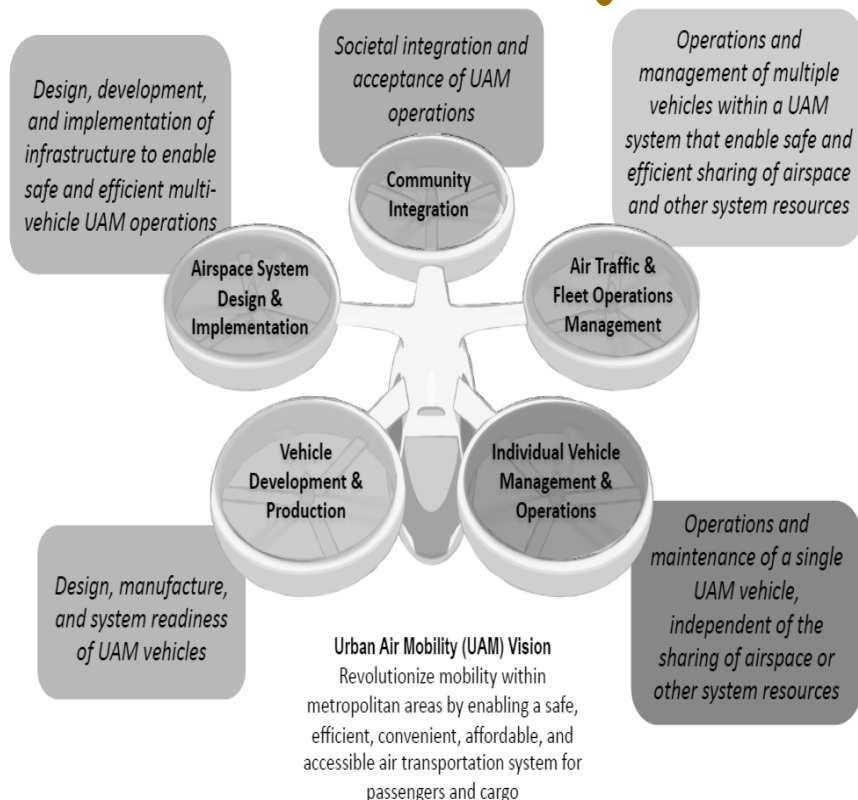
## Study of Vertical Mobility (Urban Air Mobility)

### Introduction of Vertical Mobility

Vertical Mobility is also known as Urban Air Mobility (UAM) in industry terms. Vertical Mobility is a system that enables on-demand, highly automated, passenger or cargo-carrying air transportation services within and around a metropolitan environment. Regulations and airspace management are crucial things for unlocking the potential of UAM disruptive market.

### Framework for Assessing Technology Contributions to Urban Air Mobility Viability

Technologies	Barriers	Conditions
<ul style="list-style-type: none"> <li>Autonomy</li> <li>Sensing</li> <li>Cybersecurity</li> <li>Propulsion</li> <li>Energy storage</li> <li>Emissions</li> <li>Structures</li> <li>Safety</li> <li>Pilot training</li> <li>Certification</li> <li>Communications</li> <li>Controls</li> <li>Operations</li> <li>Traffic management</li> <li>Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Regulation and certification</li> <li>Cybersecurity</li> <li>Air traffic management</li> <li>Infrastructure investment</li> <li>Affordability</li> <li>Competitive modes</li> <li>Willingness to pay</li> <li>Perceived safety</li> <li>Environment</li> </ul>	<ul style="list-style-type: none"> <li>Safety and security</li> <li>Economics</li> <li>Demand for transportation</li> <li>Public acceptance</li> </ul>



Major developments needs to be done in air traffic management, vehicle developments, airspace system design and management for flight operations

[>> Source](#)



## IP Activity Scenario in Vertical Mobility

### Highlights of e-VTOL and Urban Air Mobility related IPs

- Kitty Hawk Corp is leading in filling e-VTOL related patents. Kitty Hawk is formally known as Zee. Aero.
- Most of the patents are filled for fixed-wings those are modified in nature
- Most of the Startups are filling there design patents for e-VTOL

Players	Multi-copter	Fixed-Wing	Tilt - X	Safety mechanism	Lifting / Landing Mechanism	Other
Kitty Hawk Corp	2	3		2	6	1
Karem Aircraft Inc.	1	1				1
Neoptera Ltd.			1			1
Terrafugia Inc.			1			
Boeing Co		3			1	
Joby Aero Inc.		1	4			
Korea Aerospace Research Institute ( KARI)	1	3	1			
Sikorsky Aircraft Corp		2				2

Above representation is based on relevant IP published in last 12 months; for additional information please refer to [Appendix >>](#)  
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# 03

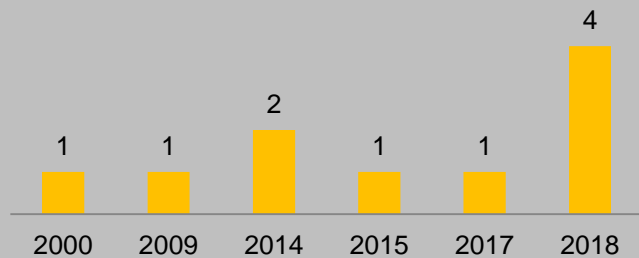
## Startup Tracker highlights

## Startup Tracker summary Q2 2019

Segmentation of major startups active during Q2 2019. Q2 analysis shows that UK leads the race in number of startups followed by Singapore and US

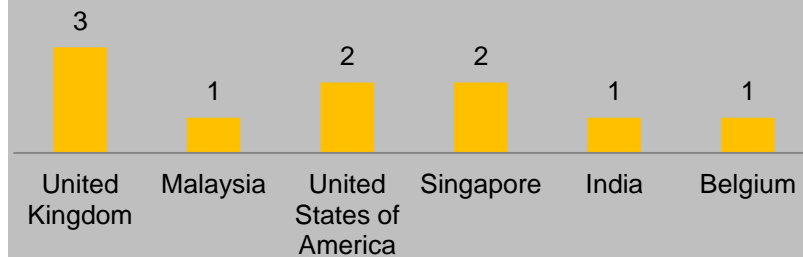
### Year wise startups

■ No. of Startups



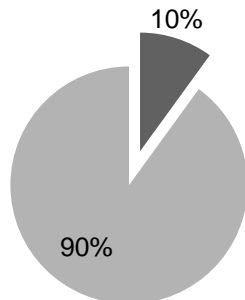
### Country wise startups

■ No. of Startups



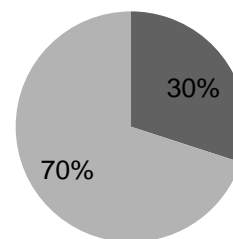
### Companies with Commercialized Product or Service

■ Commercialized Products OR Service  
■ Pipeline Products



### Startups Funding Status

■ Funding Received  
■ Funding Not Received







# Hub of startups for Vertical Mobility

## Europe:

### • Aviaereo Ltd.:

- Aviaereo is developing e-VTOL named as Aereo -bee.
- Aviaereo is targeting GoFly competition which is sponsored by Boeing.

### • Unifly:

- Unifly is pioneer in aviation software development.
- Unifly is aiming to safely integrate of drones and aircrafts into the airspace

### • Skyport:

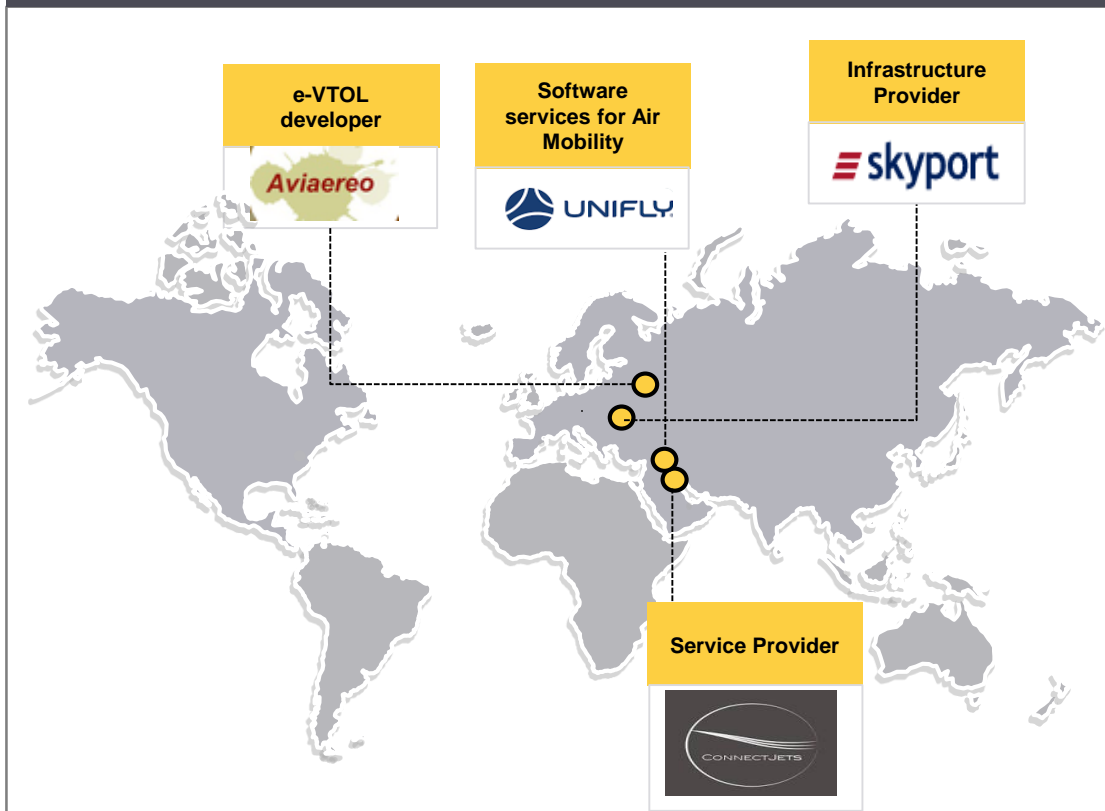
- Skyport is designing, building and owning passenger and cargo verti-ports in the major cities.
- Skyport is also developing a drone solution and drone services

### • ConnectJets:

- ConnectJets is providing private aviation services including private jet charter, helicopter charter and private jet and helicopter.
- Connect Jets are promoting VRCO e-VTOL which is available by 2020

**Europe is leading in Urban Air Mobility and success rate is very high for Vertical Mobility deployment at Europe**

Key startups from major hubs for Vertical Mobility



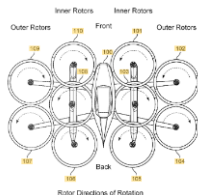
## Startup highlight – Kitty Hawk Corporation focus on Vertical Mobility

### PATENTS

#### US10081422B1

#### Multicopter with wide span rotor configuration and protective fuselage

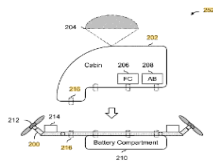
Patent discloses the novel design of e-VTOL. Multi-copters with a fuselage which includes an unenclosed cockpit are described herein



#### US10322817B2

#### Impact velocity reduction by mass ejection

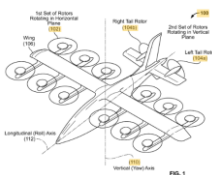
Patent talks about deploying method of ballistic parachute associated with an aircraft, two parts are detachably coupled to each other when the ballistic parachute is deployed



#### US10011348B1

#### Vertical thrust lever

Patent describes a aircraft system in which working of vertical thrust lever which will controlling the direction of rotors and at a time allow a horizontal or vertical lift to aircraft



### Kitty Hawk Aircrafts

#### ▪ CORA

- Power: All-electric
- Capacity: Designed for two passengers
- Altitude: Operates between 500 feet to 3000 feet above the ground.
- Wingspan: 36 feet/about 11 meters



Cora is powered by 12 independent lift fans, which enable her to take off and land vertically like a helicopter. Therefore, Cora has no need for a runway. >>>

#### ▪ FLYER

- Power: All-electric
- Capacity: Designed for one participant
- Height Limit: Operates between 3-10 feet off the surface of water



Flyer is an electric Vertical Take-Off and Landing (VTOL) vehicle.

The aircraft qualifies under the US Federal Aviation Administration (FAA) Part 103 Ultralight Aircraft category, since it weighs less than 254 lb (115 kg) >>>

### ACTIVITIES



#### Collaborations



- Cora's Zephyr Airworks, the operator of Cora get into an agreement with Air New Zealand



- Boeing and Kitty Hawk Form Strategic Partnership for developing Kitty Hawk Cora division



#### News

- Larry Page - Google executive, has invested more than \$100 M in Kitty Hawk's project which was formally known as Zee.Aero >>>
- Kitty Hawk's intent is to have the aircraft certified for fully autonomous operation by 2021 >>>

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