



Sources: (1) Eve Air Mobility; (2) Airbus; (3) Archer Aviation; (4) ASKA Fly; (5) Joby Aviation; (6) Bellwether Industries; (7) BETA Technologies; (8) EHang; (9) Eve Air Mobility; (10) Jaunt; (11) Jetson; (12) Joby Aviation; (13) LIFT Aircraft; (14) Lilium; (15) Opener; (16) Overair; (17) RYSE Aero; (18) SkyDrive; (19) Skyfly Technologies; (20) Supernal; (21) Vaeridion; (22) Vertical Aerospace; (23) Volocopter; (24) Wisk Aero.

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Full Paper

A comprehensive overview of global start-ups for Advanced Air Mobility (AAM)

Christian Scheidler | www.ev-portal.net

Advanced Automotive Battery Conference 2026 Europe
Mainz May 19 – 21.

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ev-portal.net

AAM – Advanced Air Mobility

NASA definition

- **"Safe, sustainable, ... aviation for ... local and intra-regional missions"**
- Focus on **short distances** in urban and rural areas
 - Local: up to 75 miles (~120 km)
 - Regional: up to 500 miles (~800 km)
- **Low altitudes** up to 3000 meters

Missions

- Passenger transport
- Cargo transport
- Emergency Operations
- Aerial work: photography, fire fighting, etc.



https://ntrs.nasa.gov/api/citations/20220006225/downloads/Aviation2022_AAM_Taxonomy_Final.pdf

A Proposed Taxonomy for Advanced Air Mobility

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National Aeronautics and Space Administration, U.S.A.

There has been a large growth in interest of utilizing new technologies—most notably electrified propulsion and automation—as well as new business models to bring aviation services into the daily lives of a greater segment of society. Generally, these services are envisioned to augment existing ground modes of transportation or to enable new operating capabilities for shorter-range aviation missions. These services, which have become known as advanced air mobility (AAM), include passenger transportation, cargo transportation, and aerial work missions, such as aerial photography. In this paper we describe advanced air mobility and provide a framework based on demand and supply concepts that can be used for developing a taxonomy for AAM with a focus on passenger applications. This taxonomy is intended to facilitate the nascent AAM stakeholder community in adopting a common terminology and to enable better coordination among disparate AAM research and development activities.

I. Introduction

In recent years there has been a growing interest in regularly transporting passengers and cargo in small aircraft over distances that have historically been served by ground transportation modes. Although the general concept of flying a small aircraft for transportation is not new, over approximately the past decade there have been advancements in technologies and societal changes that may make these operations become a practical part of the average person's typical experience. Notably, the convergence of new technologies, such as electric propulsion and autonomy, as well as new business models, such as mobile application-based ride sharing and network-enabled on-demand services, are generating the potential for new aviation markets to emerge. These new aviation markets are becoming collectively known as advanced air mobility (AAM).

AAM aims to reinvent the idea of air travel. While the current commercial air transportation system is distinct from other modes of transportation because it has a monopoly on long-distance, high-speed journeys, AAM systems

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⁴ Emerging Applications & Technologies Group Lead, Aeronautics Systems Analysis Branch, NASA Langley Research Center, 1 N. Dryden St., MS 442, AIAA Senior Member.

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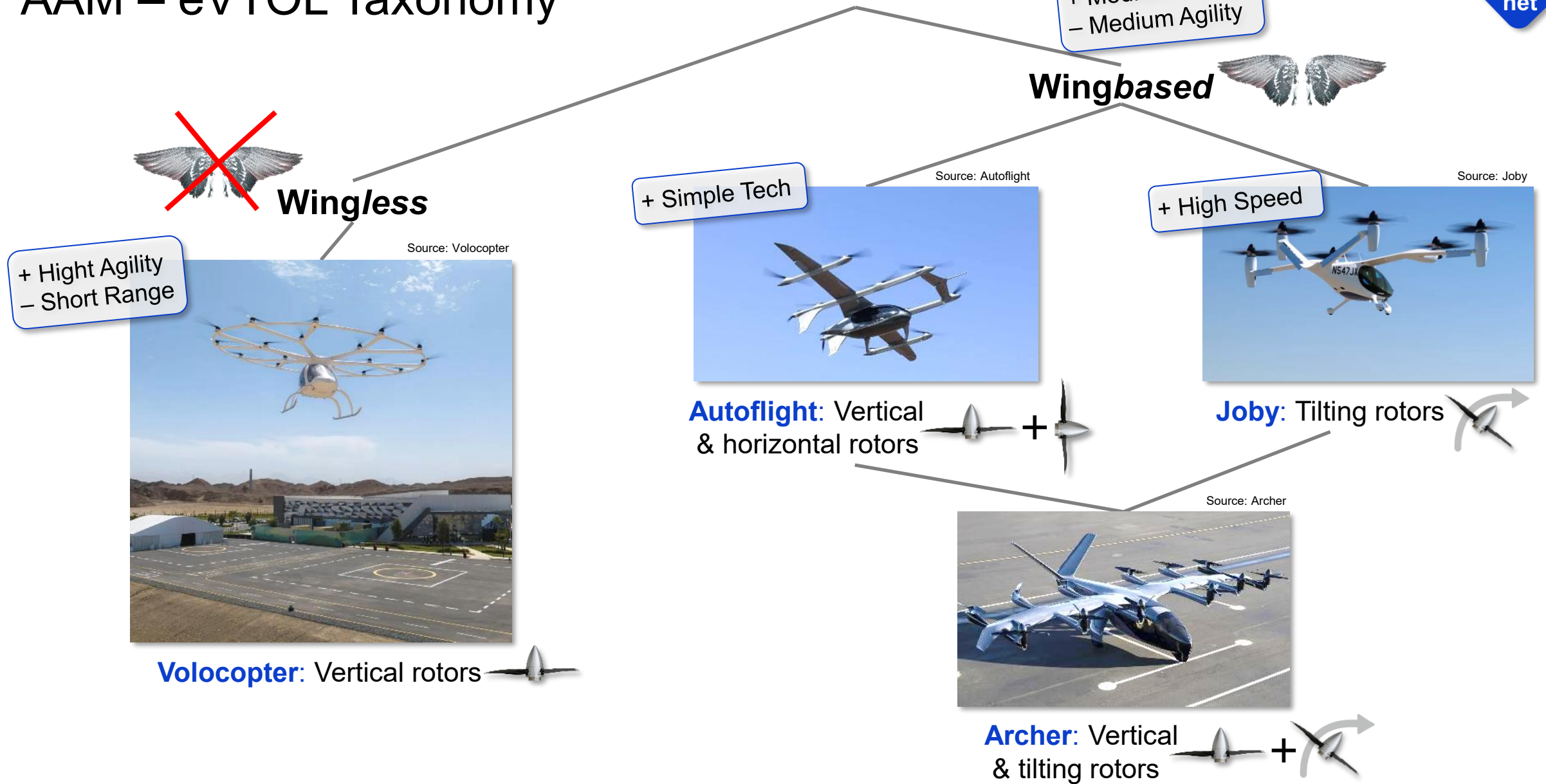
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Source: NASA

AAM – eVTOL Taxonomy



AAM – Aircraft Properties

*Including Pilot

eVTOL – electric Vertical Takeoff and Landing
eCTOL – electric Conventional Takeoff and Landing
eSTOL – electric Short Takeoff and Landing

VFR – Visual Flight Regulation
IFR – Instrument Flight Regulation

Type	Multicopter	Wingbased eVTOL			E-Plane
Propeller Configuration	Vertical rotors, wingless	Horizontal and vertical rotors	Vertical and tilting rotors	Tilting rotors	Horizontal rotors, BEV or hybrid powertrain
Takeoff / Landing	eVTOL	eVTOL	eVTOL	eVTOL	eCTOL, eSTOL
Agility	+++ Very high	++ High	+ Medium	+ Medium	0 Normal
Capacity [#Passengers]	2 - 3*	4 - 6*	4 - 6*	4 - 6*	4 - 30
Range	~50 km	~200 km	~200 km	~200 km range	~400 to 800 km
Flight Regulation	VFR	VFR + IFR	VFR + IFR	VFR + IFR	IFR
Manufacturer	Ehang , SkyDrive , Volocopter  Source Volocopter	Airbus , Autoflight , Beta Tech. , ERC , EVE Air , Horizon Air , Jaunt Air  Source Volocopter	Archer Aviation , Vertical Aero , Wisk Aero  Source Archer Aviation	Joby Aviation , Supernal Aero  Source Joby Aviation	Beta Tech. , Electra , Heart Aero. , Vaeridion  Source Vaeridion
Roots	Toy drones  Source Volocopter	Helicopter/Plane  Source Nicholas Hall / U.S. Navy / Wikimedia Commons, Public Domain Ross Fearn / Wikimedia Commons, CC BY-SA 4.0, cropped	V-22 Osprey  Source U.S. Navy / Wikimedia Commons, Public Domain, cropped	V-22 Osprey  Source U.S. Navy / Wikimedia Commons, Public Domain, cropped	Plane  Source Ross Fearn / Wikimedia Commons, CC BY-SA 4.0, cropped

AAM Business Cases – Urban Missions

Sao Paulo

Capital of urban aviation
Home market **Eve Air**



- Helicopter flight every 45s
- Over 260 helipads
- 430 helicopters licensed

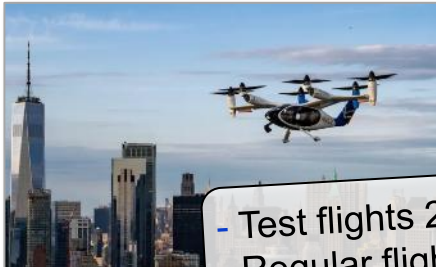
Source: Henrique Boney, via
Wikimedia Commons, CC BY-SA 3.0, cropped

Urban aviation in New York ...

... 1967 by Pan Am ... 2026 by **Joby Aviation**



Source: John Atherton, via
Wikimedia Commons, CC BY-SA 2.0



Source: Joby Aviation

- Test flights 2026
- Regular flights 2027

Dubai

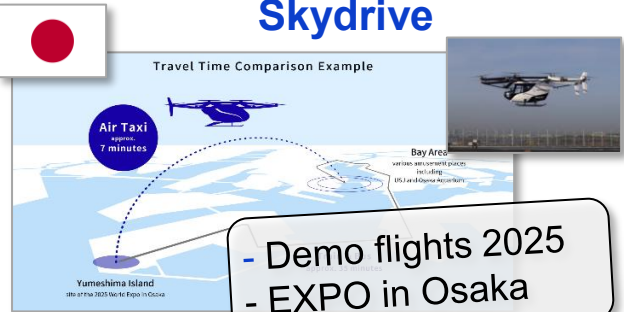


- April 17th, 2026

The world's first flying taxi station is now complete in Dubai

Source: timeoutdubai

Skydrive



- Demo flights 2025
- EXPO in Osaka

Source: Skydrive

Archer Aviation



- Launch planned for 2028
- Olympics in LA

Source: Archer Aviation

Volocopter



- Over 2500 test flights worldwide
- Singapore, Saudi Arabian, China, France, USA, etc.
- Most widely flown multicopter

Source: Volocopter

AAM Business Cases – Regional Missions

AAM start-up Vaeridion



- Regional transport as use-case
 - Rural regions badly connected
 - ~80% of people in Germany live within 20 km of an airfield
- E-plane with 9 passenger seats for ~400 km range
 - Replacement of turboprop's – 19,000 in operation globally
 - Supplementation of helicopter services

Today
24 airports –
55 connections



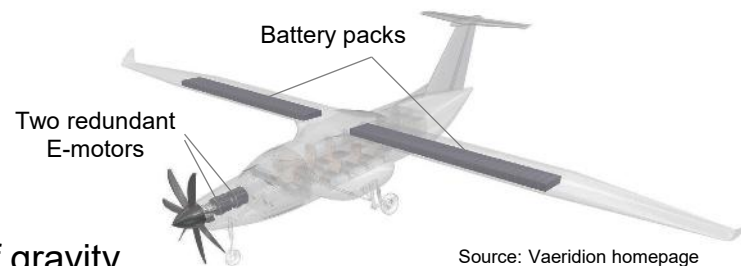
Tomorrow
209 airports –
2087 connections



Source: Vaeridion presentation at German eVTOL Forum 2024

Battery system

- Li-Io cells from Molicel
- Battery pack in the wings
 - Optimal with respect to center of gravity
 - Challenging with respect to safety/thermal runaway
- Battery lifetime expected to be one year



Source: Vaeridion homepage

19,000 passengers in 2030



**COPENHAGEN
HELICOPTER**



Source: Vaeridion presentation at German eVTOL Forum 2024

AAM Business Cases – Emergency Missions

Volocopter with ADAC Air Rescue



Source: ADAC Homepage

Use case

- Transport **emergency physician** to accident location
 - First aid at accident location
 - At 60%, the **most common use** for rescue helicopters*
- Blood/Organ transport Hospital2Hospital

*Source: Presentation ADAC Air Rescue 2024 eVTOL Forum Germany

ERC System



Source: ERC System Homepage

Use case

- Transport **injured patient** in supine position to hospital
 - eVTOL specially designed for this use case
 - Consultation with physicians on medical equipment
- Up to 70% lower operation cost than helicopter**

**Source: ERC System Homepage

AAM Business Cases – Tourism

Tourism as an economic factor

- Nearly \$850 billion in global revenue in 2024
- *"The global ... tourism market is experiencing ... a trend toward ... protection of the environment ... "*

AAM potential in tourism

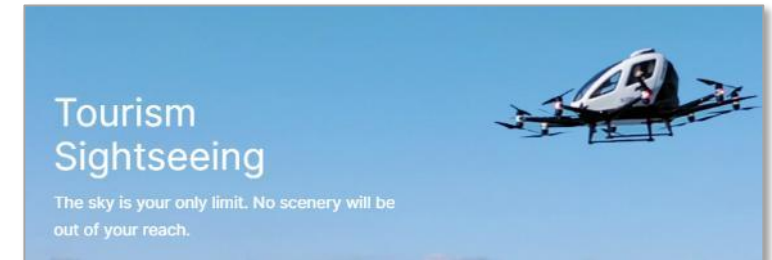
- Sightseeing flights at tourist hot spots
- Additional areas of application
 - Ecotourism, e.g., safaris, whale watching
 - Sports, e.g., eVTOL skiing
 - Leisure events, e.g., music festivals
 - ...



Source: Booking.com



Source: Getyourguide.com



Source: Ehang



Source: www.bwana.de



Source: Getyourguide.com

*<https://de.statista.com/outlook/mmo/reisen-tourismus/weltweit>

AAM Manufactures – Preorders, Partners and Suppliers

Manufacturer	Country	Pre-orders	Investors, Partners	Suppliers	Type
Eve Air Mobility		2,850	Embraer, United Airlines, SkyWest Airlines, Helisul Aviation	BAe Systems, <u>Diehl Aviation</u> , Honeywell	Wing-based eVTOL
Vertical Aerospace		1,500	American Airlines, Japan Airlines,	Dassault, GKN Aerospace, Honeywell, Molicel	Wing-based eVTOL
Archer Aviation		1,300	United Airlines, Stellantis	Honeywell, Toray	Wing-based eVTOL
Ehang		1,200	JAC Motors, CCIT	JAC Motors	Multicopter
Autoflight		1,100	CATL, NIO Capital, GIC	CATL	Wing-based eVTOL
Beta Technologies		890	UPS, Amazon (Climate Fund), BLADE Urban Air Mobility	Garmin, Cuberg	Wing-based eVTOL & cTOL
Joby Aviation		unknown	Delta Airlines, Toyota	Garmin, Honeywell, Toray, Toyota	Wing-based eVTOL
Volocopter		Unknown	Diamond Aircraft, Wangfeng	<u>Diehl Aviation</u>	Multicopter

AAM – Li-Io Cell, Module & TMS

Li-Io Cells

- **Molicel:** [Archer Aviation](#), [Vertical Aerospace](#), [Vaeridion](#)
- **CATL:** [Autoflight](#)
- **Gotion:** [Ehang](#)
- **Automotive pouch cell supplier:** [Joby](#)



Source: Beta Technologies

Modules & Packs

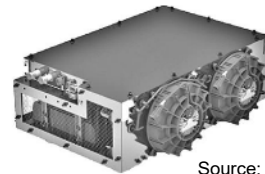
- **BAe Systems:** [Eve Air](#), [Heart Aerospace](#)
- **EP Systems:** [Skydrive](#), [Supernal](#)
- **In-house:** [Joby](#)



Source: EP Systems

Thermal Management System (TMS)

- **Honeywell:** [Archer Aviation](#)
- **Intergalactic:** [Eve Air](#)
- **In-house:** [Beta Technologies](#), [Joby](#), [Vertical Aerospace](#)



Source: Intergalactic

Beta Technologies

- Inhouse on- and off-board energy system
- 5 Modules á **45 kWh**, 255 kg → ~176 Wh/kg
 - **255 kWh**, 1,275 kg
 - 2,720 kg MTOW* → **~46%** of weight for battery system
- Long-haul tractor Daimler Truck: **621 kWh**
- Thermal Management Systems
 - No active cooling during flight!
 - Pre-chilling of battery modules during charging

*MTOW – Maximum Take-Off Weight

AAM – Private Aviation

- Non-scheduled flights
- Private or chartered aircraft
- Personal, business, or recreational use

Type	Multicopter						Wing-based eVTOL			
Start-up	Jetson	Ryse Aero?	LIFT	Volocopter	Bellwether	Alef Aero	Pivotal	Air	Skyfly	Aska Fly
										
URL	jetson.com/	ryseaerotech.com ?	www.liftaircraft.com/	www.volocopter.com	www.bellwether-industries.com	alef.aero	pivotal.aero	https://www.airev.aero/	skyflytech.com	www.askafly.com
Country										
#Seats	1	1	1	2	3	2	1	2	2	2
Target market	Leisure	Farmers	Tourism (rental)	Leisure, Business, Tourism, Air Taxi	Leisure	Leisure	Leisure	Leisure, Business	Leisure, Business	Leisure
SOP	2025	2026?	2023	2026	2028	2028	2026	2026	2026	2027
Price	148,000 \$	150,000 \$	\$349 per flight	490,000 €	?	299,999 \$	190,000 \$	150,000 \$	180,000 \$	789,000 \$
Flying Prototype?	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes (fixed)
Ultra-light vehicle? (ULV)	Yes*	Yes*	Yes*	Yes**	No	No	Yes*	No	No	No
Other	655 orders	Farmers as target market	Hourly rental at tourist hot spots	Low noise emission due to 18-rotor ring. Key to public acceptance.	Encapsulated rotors, eye-catching design	Flying car, 3,400 pre-orders	No disclose of sales figures, order backlog 9–12 months	3,200 pre-orders	20 pre-orders	Flying car

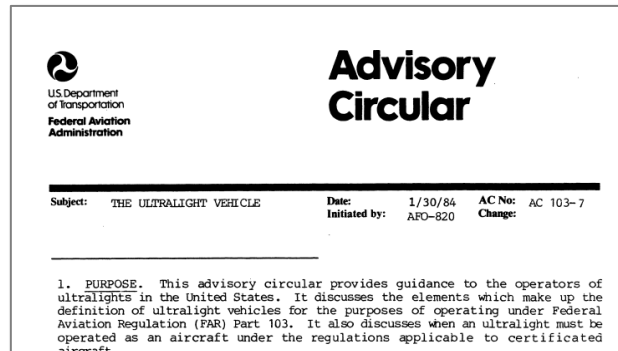
*US ULV – FAR Part 103 Max Empty Weight 115 kg 

**German/EU ULV – Max Take-Off Weight 600 kg  

AAM – Jetson & Lift Aircraft

FAA regulation Part 103

- Single person
- No pilot license
- Max empty weight: 254 lbs (115 kg)
- Max speed: 55 knots (~102 km/h)
- Daytime operations only (VFR)
- No flights over densely populated areas



Source: FAA

Jetson

Source: YouTube, Jetson



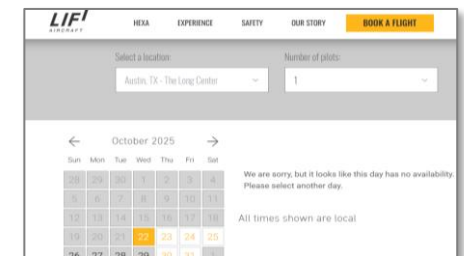
- Private Ownership
- 148,000 \$, more than **650 orders**
- FAA regulation part 103

Source: Lift Aircraft



Lift Aircraft

- Pay per fly
- 249 \$, VR-Training
- FAA regulation part 103



AAM – Back to the future: the Flying Car

Drives on the road and flies in the air!



AI-generated image inspired by the movie *Back to the Future*

Aska Fly – wingbased eVTOL



Source: Aska Fly

Other interpretations

Doroni – Fits into a standard US double garage



Source: Doroni

Alef Aeronautics – Multicopter



Source: Alef Aeronautics

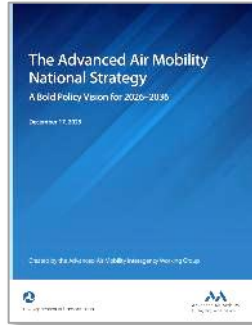
Xpeng Aeroht – Multicopter with carrier vehicle



Source: Aeroht

Outlook AAM — the next tech race Europe is losing?

Source: Department of Transportation



USA

- **National AAM Strategy**, Dec. 2025
- Whole-of-government approach:
Coordination across 19+ federal agencies (DOT, FAA, NASA, etc.)
- Pilot programs such as eIPP*:
Demonstrations and early operations
- R&D funding:
NASA research, airport/vertiport funding, and state-level initiatives

*eIPP Emerging Aviation Technologies Integration Pilot Program

China

- “Low-altitude economy” embedded in 14th & 15th **Five-Year Plan**
- Direct support for OEMs, infrastructure, ecosystem development
- Fast-track certification
- Early approvals and operational use cases (e.g., logistics, tourism)
- Large pilot zones and real-world operations
- Infrastructure development

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Backup

CV – Christian Scheidler

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Christian Scheidler
Graduate computer scientist

Summary

- After many years of working in various R&D areas of the automotive industry, I now offer my freelance services in the fields of continuing education, training, and consulting.

Work History

- Freelance work as an editor**
Present
www.ev-portal.net, Berlin
Design and implementation of a
April 2022 – present, Berlin
• Design and implementation of a focus on key technologies such as:
• Application of AI technologies for generation.
• Lectures on selected topics, e.g. 07/2022 – present
- Parallel embedded computing, TRAPPER system.**
• Time-triggered bus systems & systems engineering for X-by-wire systems, TTA and SETTA projects.
• Validation of driver assistance systems, VALSE project.
- Selected publications**
• F. Heinz, L. Schäfers, C. Scheidler, W. Oberbauer: *Trapper: eliminating performance bottlenecks in a parallel embedded application.* IEEE Concurrency 5(3): 28-37 (1997).
• C. Scheidler, P. Puschner, S. Boutin, E. Fuchs, G. Grunstedt, Y. Papadopoulos, J. Reinhardt, U. Verricht: *Systems Engineering of Time-Triggered Architectures - The SETTA*

Processing

- GMD - Society for Mathematics and Data Processing (now Fraunhofer IZB), Birlinghoven-Sankt Augustin, Germany
• Collaboration on the SUPRENUM project in the field of simulation of MIMD-based parallel computer systems.

Coordinator Mercedes-Benz AIF

2007 – Dec. 2020 - 13.5 years, Bf

Time-triggered bus systems & systems engineering for X-by-wire systems, TTA and SETTA projects.

Specialist for HV systems in motor vehicles

Daimler AG, Sindelfingen

ISTQB Certified Tester - Foundation Level

SQS Certified Tester Training

Computer scientist

University of Bonn, Bonn
GPA: 1,0

High school diploma

Maximilian-Kolbe-Gymnasium, Köln-Porz
GPA: 1,8



Advanced Control Systems for Airbus A380



Nord Micro's TTP Based Cabin Pressure Control System

... until 03/2022



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All about Electromobility

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