

## Ciconia

### Ciconia's Vision

**To open the low altitude skies for safe and dense aerial operations of drones and manned aircraft operating simultaneously.**

### Overview

**Drones are safe and easy to operate and are ready to be fielded on a much larger scale than today.** However:

- Wherever crewed airplanes are in use, drones are limited, since there is no efficient Collision Avoidance System (CAS) that allows them to operate safely and freely in a single airspace, sometimes in poor visibility conditions.
- Often drones need to operate in heavily populated urban areas. A midair collision between two drones may become a risk for pedestrians. Thus, to prevent crewed aerial vehicles from colliding with crewed or uncrewed drones, their operations need to be limited.

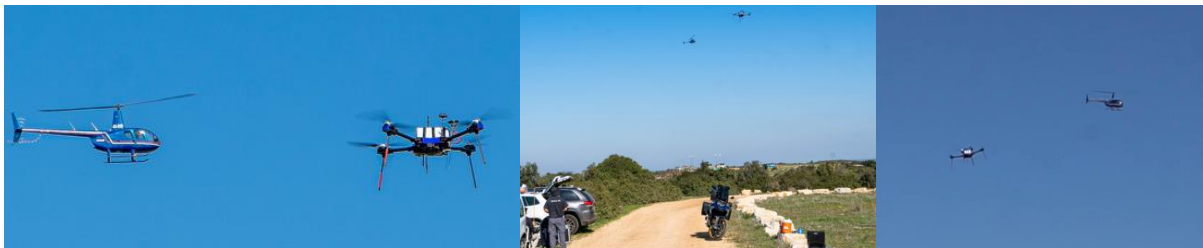
**Most of the airspace is devoted to safety margins to reduce the risk of mid-air collisions.** Ciconia's **C&CAS (Coordination & Collision Avoidance System)**, allows to significantly shorten those safety margins while reducing the risk of midair collisions!

The limiting factor for the growth of the drone industry is the lack of a reliable DAA (Detect and Avoid) system to prevent midair collisions in dense aerial traffic of uncrewed and crewed aerial vehicles. A proper DAA system would **allow to reduce safety buffers** and thus to increase the number of airspace users at a given time.

Ciconia's flight-tested proven **C&CAS (Coordination & Collision Avoidance System)**, **will prevent midair collisions between** all kinds of aerial platforms including helicopters, light planes and UAS. **The C&CAS will open the current bottleneck**, enabling dense airspace activity of uncrewed and crewed air platforms, operating simultaneously and in close proximity.

### Ciconia's business model

Ciconia's C&CAS potential users are drones and crewed aircraft operators. Millions of aircraft will occupy the skies within a few years, mostly small drones. Each drone will be required to have a DAA system to prevent drones from risking passengers in aerial vehicles. Each user will pay a monthly licensing fee. Quick math leads to a sum of Billions \$ a year!



A drone and a helicopter equipped with C&CAS; C&CAS flight test, Jan. 18<sup>th</sup> 2023, Israel.  
The C&CAS automatically steers the drone away whenever the drone is risking the helicopter.

<https://www.youtube.com/watch?v=84YLBVRwDJc>



## The C&CAS basic system architecture

Each aerial vehicle is equipped with the C&CAS. C&CAS onboard drones will be a software only application, while the C&CAS onboard crewed aircraft is a small, lightweight, low power unit.

Each C&CAS unit onboard each aerial vehicle:

- transmits its ID and location on a direct, low power, narrow bandwidth radio network
- receives its neighboring platforms IDs and locations
- creates a “map of the sky” around the ownship platform
- analyzes the risk of a midair collision
- when at high risk:
  - introduces steering commands to the ownship pilot onboard / remote pilot
  - takes control of the ownship drone and steers it away

**The C&CAS was successfully tested by the Israeli Flight Test Center  
onboard helicopters and drones.**

## Competitive Advantages and Key Competitive Highlights

- The C&CAS is the only DAA (Detect And Avoid) system that is characterized by combination of:
  - very high detection rate
  - very low false alarm rate
  - low AWAP (Size, Weight And Power)
  - low price
- The **C&CAS** allows first responders to fly airplanes, drones and helicopters safely, in close proximity, in a confined area, even when visibility is limited
- The **C&CAS** allows militaries to utilize their helicopters and drones freely in the same airspace
- An aerial platform (crewed and uncrewed) that is equipped with C&CAS would be able to escape collisions with non-C&CAS aerial platforms
- The C&CAS prevents midair collisions between drones even when flying very close to each other
- The C&CAS allows secret service aerial activity without electromagnetic radiation, and can still provide protection against midair collisions
- The C&CAS was selected by the Israeli R&D center to be the best system to manage mid-air conflicts in low altitude airspace
- Ciconia is a member in the RTCA, ASTM and other FAA/NASA working groups aimed at UAS integration into the NAS (National Air Space)
- Two patents in the US, one is registered and the second is confirmed



C&CAS flight test onboard 2 helicopters. Dec 2023 Israel. The rare helicopter must turn left and climb to evade a collision.



Ciconia Ltd: registered in Israel

Ciconia North America: a US subsidiary of Ciconia

<https://www.ciconia.flights/>

<https://www.youtube.com/watch?v=5KRQOEXCzho>

A highly professional, ambitious team has invested 18 man-years in the C&CAS:

- CEO: Moshe Cohen, Col. (ret) former IAF Cobra & Apache squadrons commander, 24 years of industry management
- VP BD: Gil Yannai, Lt. Col. (ret) former IAF Flight Test Center Commander, 787 airline captain, 15 years of industry experience in varied roles
- CTO: Ilan Zohar, PhD, Lt. Col. (ret) former IDF elite technology unit commander. Electrical engineer and drones' expert
- Software: Misha Poyarkov, senior software architecture engineer
- Algorithm & Flight tests: Eran Bar-on, Lt. Col. (ret) IAF Experimental Test Pilot, flight tests manager and algorithm expert
- Ronen Stoffman, aeronautical & computer science engineer, IAF Flight Test Engineer, system engineer



## Testimonials:

Israel Flight Test Center:

April 30, 2024

### Ciconia's C&CAS 2021 flight test

In 2021, the Israeli Flight Test Center (IFTC) tested Ciconia's C&CAS (Coordination and Collision Avoidance System) onboard a helicopter and a drone. The purpose was to prove the system's concept and test its functionality .

At that time, 2021, I was the Chief Flight Test Engineer of the IFTC.

Ciconia developed the "Live In Harmony" (LIA) concept. According to the LIA, crewed and uncrewed aircraft, with C&CAS onboard, can safely operate together in close proximity.

The C&CAS units onboard both vehicles communicate with each other. Each unit analyzes the risk of a midair collision. According the level of risk, the C&CAS units notify pilots that there is a risk of midair collision, and what actions must be taken to evade the midair collision.

The flight test verified the LIA concept and the C&CAS functionality:

- The C&CAS identified all the cases where there was a risk of midair collision
- No false alarms were indicated
- Whenever the risk was high, the C&CAS resolved the conflict, either by providing steering commands to the pilots, or by injecting steering commands to the drone's autopilot

Most importantly, the helicopter pilots felt safe and comfortable to fly in close proximity to a small drone that can't be seen from the helicopter's cockpit.

Signed: Tuvia Kogan  
IFTC Chief Flight Test Engineer (Ret.)

## NASA ConOps (Concept Of Operation)

The C&CAS concept was adopted by NASA for wildland aerial fire fighting

<https://ntrs.nasa.gov/citations/20240002399>

March 2024

Paragraph 5.9.3.7, P/ 63 of the ConOps: *"Similarly, V2V2I equipment could be mandated for all wildland firefighting aircraft. In the desired future state, development of the C&CAS capability supported by the V2V2I communications system would include providing recommended course and/or altitude changes to operators of two aircraft approaching an advisory level proximity gate and within certain collision warning parameters, automatically initiating those actions to mitigate a collision."*

[https://ntrs.nasa.gov/api/citations/20240002399/downloads/20240002399\\_Wildland%20ACERO%20ConOps.pdf](https://ntrs.nasa.gov/api/citations/20240002399/downloads/20240002399_Wildland%20ACERO%20ConOps.pdf)



## Aerolane's CTO

April 23, 2024

Press release: Ciconia's C&CAS is operating onboard Aerolane's aircraft

Ness Ziona, Israel.

On March 2024, two of Ciconia's C&CAS (Coordination & Collision Avoidance System) were integrated into Aerolane's aircraft. The C&CAS monitored the flight paths of the aircraft. The systems performed very well during several flight tests conducted in March. The C&CAS indications were exactly as planned, no false alarms, positive or negative were indicated.

Ciconia (<https://www.ciconia.flights/>) specializes in autonomous, decentralized midair conflict management. Ciconia developed the C&CAS, a low latency, decentralized CAS (Collision Avoidance System), to allow safe and dense aerial operations by all types of aircraft.

With C&CAS onboard, crewed and uncrewed of different types of aircraft can operate freely in a dense airborne environment. The C&CAS will resolve all midair conflicts. In case of crewed aircraft, the C&CAS will introduce evading steering commands to the pilots. In case of uncrewed aircraft, the C&CAS will either introduce to the operator steering commands or inject the evading steering commands directly to the autopilot. C&CAS's prototypes were successfully flight-tested onboard helicopters and drones.

Doron Appelboim, Aerolane's CTO said that the C&CAS functioned just as expected. "The C&CAS onboard Aerolane's aircraft is another safety layer independent of all other existing safety features. The C&CAS integration into our aircraft was a straight forward job. We didn't need much help from Ciconia's supportive team. We are looking forward to use the C&CAS in our next flights in the coming months".

Gil Yannai, co-founder and Ciconia's VP BD, an experimental test pilot and a Boeing 787 Captain, said that Ciconia's vision is to open the airspace for safe and free usage by all. "With C&CAS onboard, crewed and uncrewed, drones of all types, helicopters and fixed wing could safely operate together, in a confined area, even in limited visibility. The C&CAS will resolve all midair conflicts," he explained.

Ilan Zohar, PhD, co-founder and CTO said that the C&CAS is the only system capable of preventing midair collisions in complex and dense environments. "We are excited to cooperate with Aerolane and let Aerolane use our C&CAS".