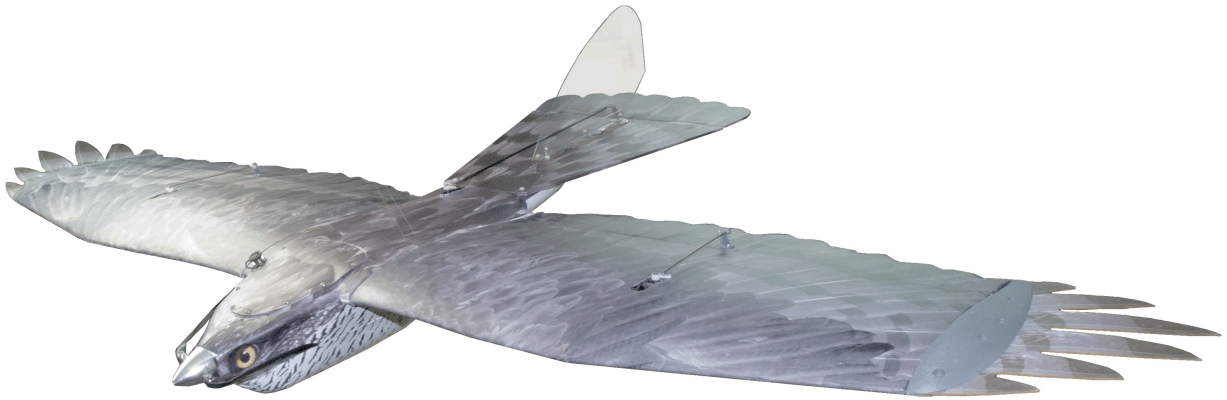
ARQUIMEA



WBA 2022 CONFERENCE

November 29th, 2022

ROBOTIC FALCONRY

Bird Hazard Prevention

Manuel Martín Flórez

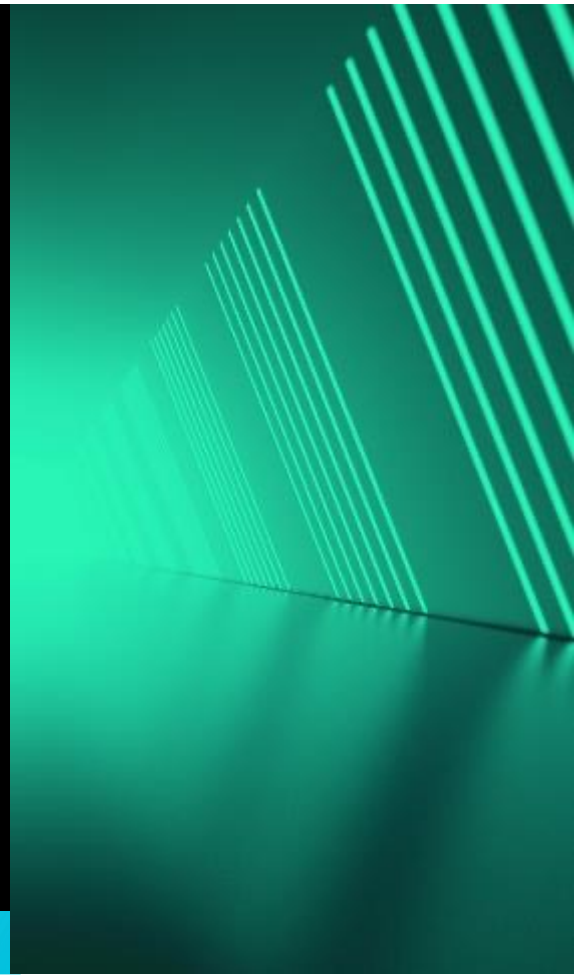
ARQUIMEA

We believe in technology as the engine of development and progress of society. We carry R&D and innovation in our DNA.

Our continuous activity in R&D+i allows us to create innovative solutions and products based on our own technologies, for the sectors in which we operate.

ARQUIMEA is a technological company that operates worldwide in highly demanding sectors.

A cross-sectoral tech corporation supplier of cutting-edge products and services.



ARQUIMEA

Our Vision

To be a technological ecosystem where ideas are transformed into disruptive solutions for the progress of the world.

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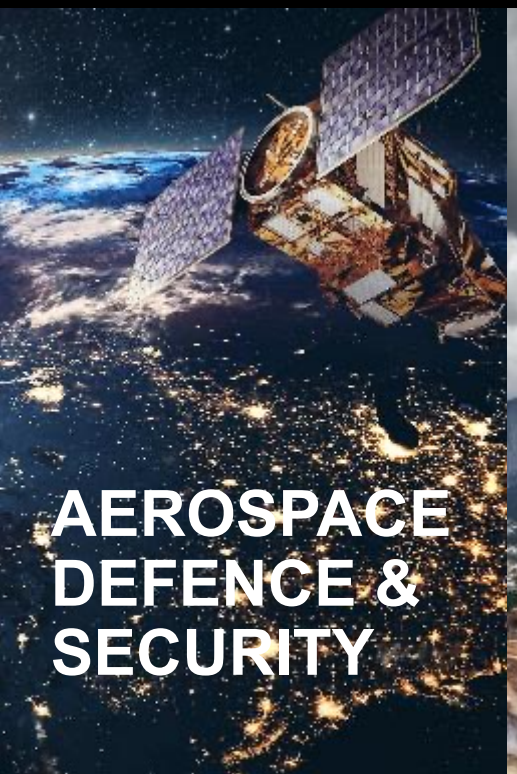
BUSINESS UNITS



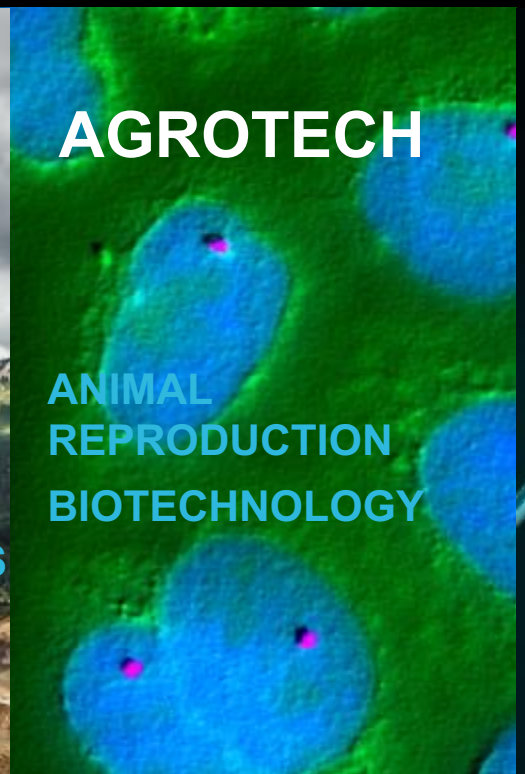
AEROSPACE DEFENCE & SECURITY

INDUSTRIAL SERVICES

GEOENGINEERING

SYSTEMS & ROBOTICS

MINING SYSTEMS



AGROTECH

ANIMAL REPRODUCTION

BIOTECHNOLOGY

HEALTHCARE

FIGHT AGAINST COVID19

FINTECH

PRIVATE FINANCING R&D

ARQUIMEA

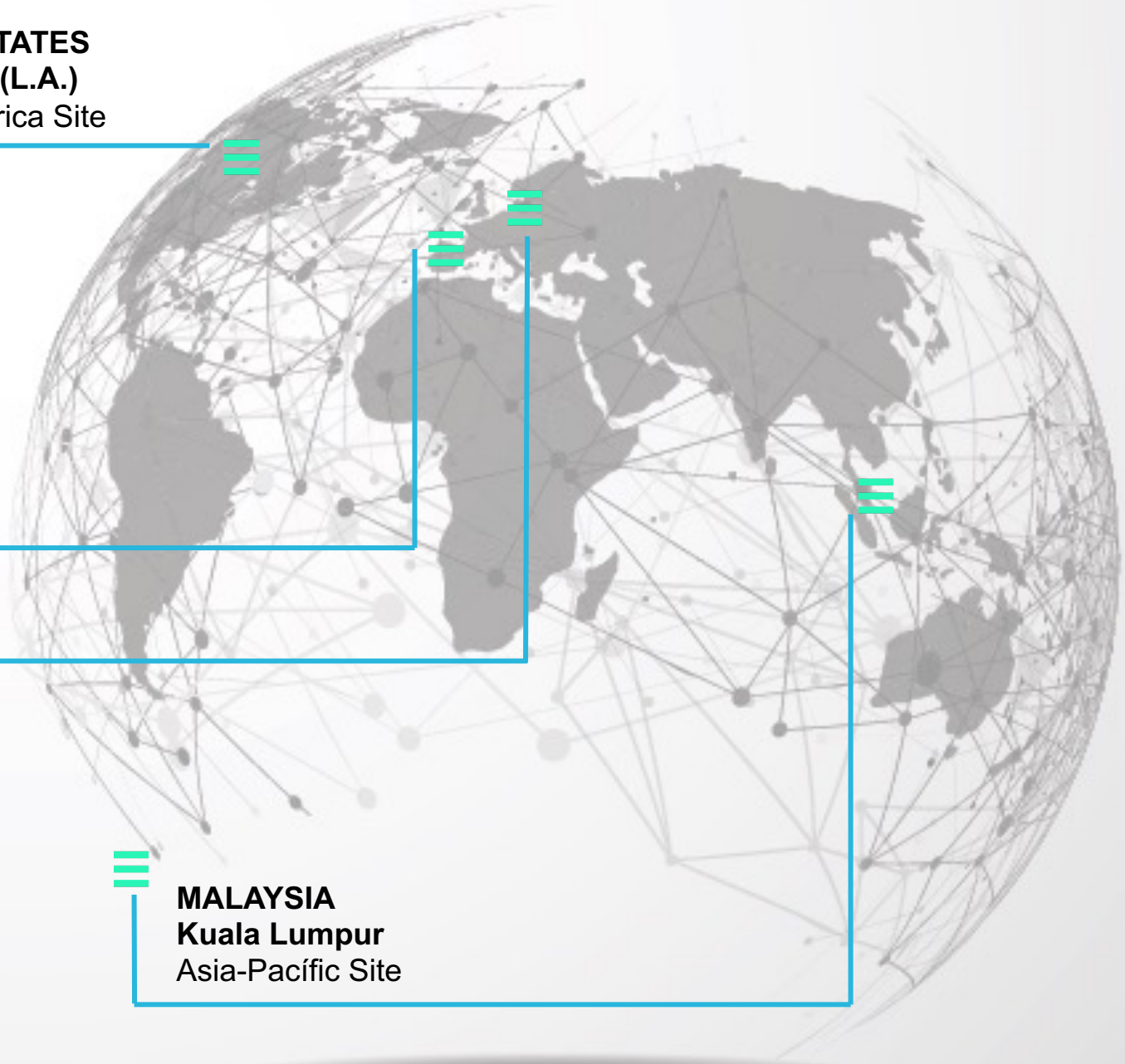
GLOBAL PRESENCE

UNITED STATES
California (L.A.)
North America Site

SPAIN
Madrid
Tenerife
Alicante
Valencia
Central Offices

GERMANY
Frankfurt (Oder)
Central Europe Site

MALAYSIA
Kuala Lumpur
Asia-Pacífic Site



FIGURES FY22

ARQUIMEA

Turnover
117 M€

Professionals
500+

EBIT
15 M€

Operations
25+ countries

ROBOTIC FALCONRY
Bird Hazard Prevention

INDEX

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Bird Strike prevention Traditional methods

- Proven non-effective
- High Cost
- Short Lifespan
- High Maintenance
- Seasonal/Weather Restrictive
- Time Consuming
- Disruptive to Air Traffic
- Not Wildlife/Eco-Friendly

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Our solution: Robotic Falconry

We've successfully taken Falconry, the most effective method of bird control, one step further.

Enhanced the positive

- Absolute flight control
- Increased endurance
- Piloted or automated flight

Eliminated the negative

- Not affected by illness
- Indefinite lifespan
- Independent of human factors
- No care or feeding

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Bringing innovation into Avian Control

Our **SOLUTION** provides positive control over all species of birds on and surrounding the airport.

Technology developed by Ornithologists & Engineers, then field tested by Airport Operators.

75% bird removal at Key Infrastructures

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Research at Key Infrastructures

- **Landfill - Ibiza, Spain:** Yellow-legged and Lesser black-backed Gulls (*Larus michahellis and Larus fuscus*).
- **Fish Farm - Vigo, Spain**: Great Cormorant (Phalacrocorax carbo).
- **Port of Vigo, Spain:** Yellow-legged (*Larus michahellis)*.

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The Shepherd

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Shepherd Specifications

- Goshawk or Eagle camouflage
- Water & wind resistant:
  - Constant wind: up to 32 Km/h (17 knots)
  - Gusts wind > 46Km/h (25 knots)
- Average removal time: < 2 min
- Operation: Day/Night
- Maximum Operational radius: 10 Km (6,2 Miles)
- Endurance: 55 min (rechargeable batteries)

- Length: 0,85m (2,8 ft)
- Wingspan: 1,65m (5,4 ft)
- Weight: 2,9Kg (6,4 lbs)
- Speed: 30-42 knots
- Range: 10 km
- Deployment time: <6 min
- Typical operating altitude: 65-985 ft AGL

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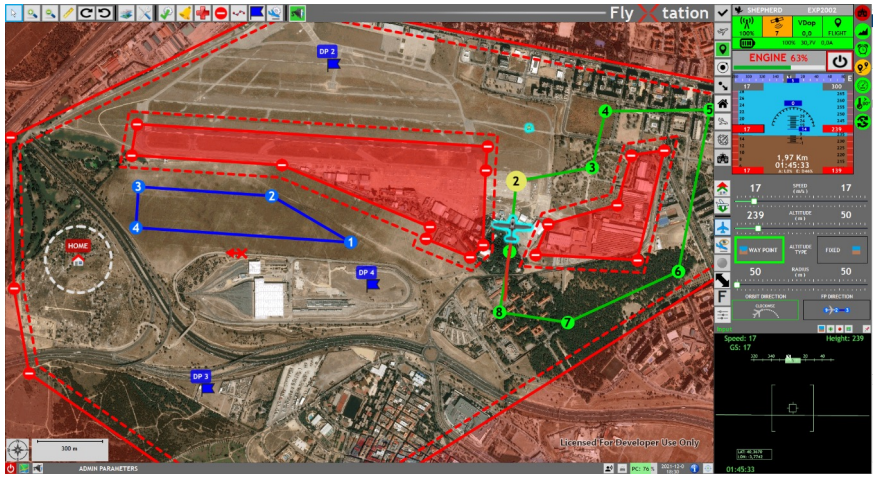
Shepherd Components



Autopilot SW

Datalink Antenna

Ground Control Station (GCS)

Bird-Shaped Aircraft

Joystick

Batteries

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Shepherd
Safety features

- Autopilot (way points, automatic flight plan)
- Fail-safe
- ADS-B Transponder transmitter/receiver
- Sense-and-avoid
- Front Camera
- Lateral camera
- No-fly Zones
- Emergency Modes
- Encrypted Communications

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Shepherd Emergency modes

Loss of GPS signal

- Orbit until GPS is recovered. Pilot may disconnect the autopilot and fly it manually Home.

Loss of Communication

Following Options to be set before the flight:

- Established Flight Plan / Emergency Flight Plan and land Home.
- Fly Home and Land, avoiding Prohibited Zone (runways, etc.).
- Our UAS Orbits until Communications are recovered.

Joystick fail

- Established Flight Plan and land Home.
- Land Home.

Low Battery and Loss of Communications

- Avoid Prohibited Zone and land Home.

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Shepherd
EVLOS Operation

- Extended Visual Line of Sight.
- The Airport Personnel and the ATC Personnel will be in touch with the UAV operator whenever it is necessary.
- The pilot will be able to see all aircraft at and near the aircraft (to be configured as desired) on his screen, as the transponder is able to receive the signal from other transponders, as well as transmit.

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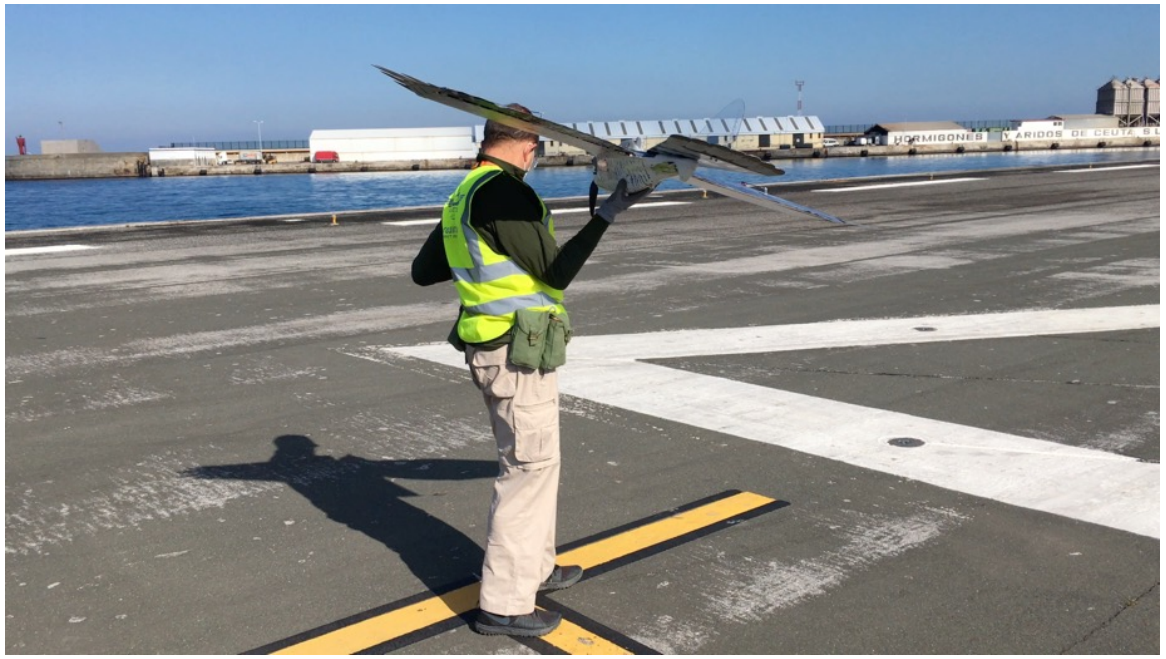
Shepherd
Current Operating Locations and Experiences

- Sevilla Airport – AENA, Spain.
- Ceuta Heliport – AENA, Spain.
- Jose Martí, La Habana and Varadero International Airports, CUBA.
- Jorge Chavez International Airport, Lima, PERU.
- DEMO for Seattle Tacoma Airport – SEA, US.
- DEMO in Baltimore, US, at WBA North American Conference.
- DEMO in Rota and Moron – USN and SAF Bases in Spain.
- DEMO in Panama – PTY.

Case Study: Ceuta Heliport - Spain.



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Case Study: Ceuta Heliport – Spain.
Problem Description.

Great amount of birds in the approach routes.

Special attention to the Audouin's gull mating season

Local ecologist organizations do not allow shot guns or noise to be applied.

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Case Study: Ceuta Heliport - Spain. Operation Details.

Approximately 6 flights a day, 45 minutes per flight, assuring 10 minutes extra endurance just in case an emergency occurs.

6 weeks operation and 1 week bird census

Our team: Arquimea Project Safety Manager, 3 pilots, 2 ornithologists.

The local wildlife in Ceuta is:

- Yellow-legged Gulls (Larus michahellis)
- Lesser black-backed Gulls (Larus fuscus).
- Great Cormorant (Phalacrocorax carbo).
- Audouin's gull (Larus audouinii)
- Black kite (Milvus migrans)
- Heron (Ardea cinerea)
- Gannet (Morus bassanus)
- Passerine species

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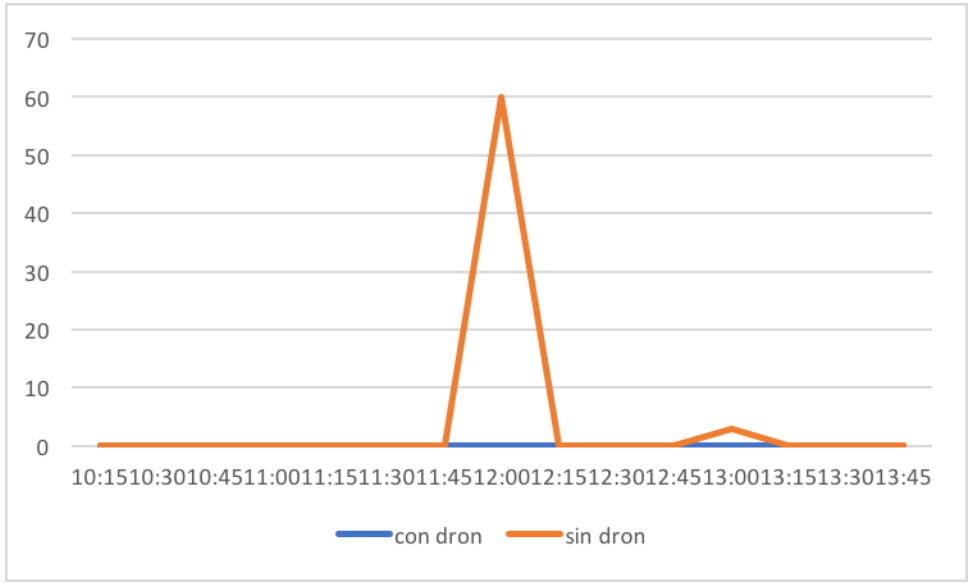
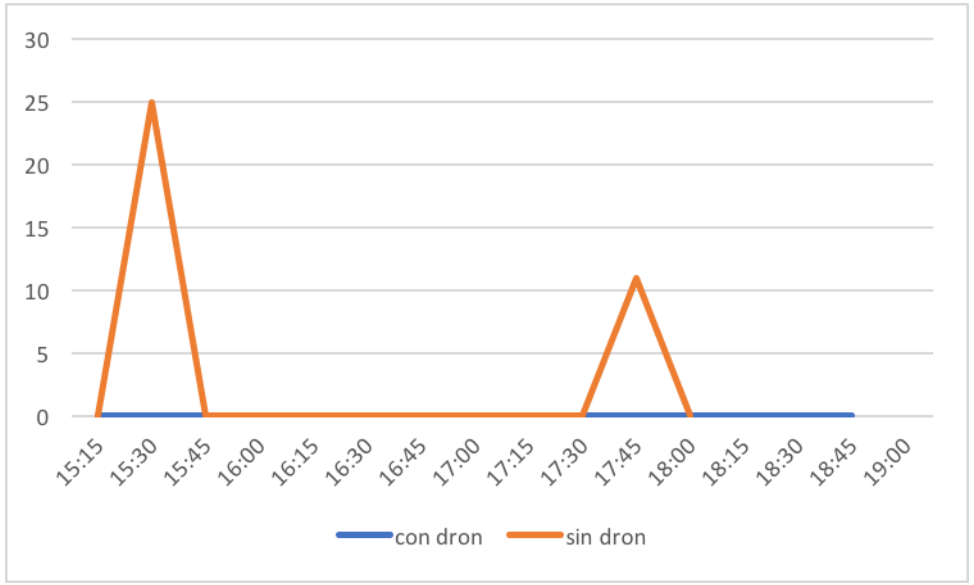
Case Study: Ceuta Heliport – Spain. Results. Birds at Final Approach and take-off Area.





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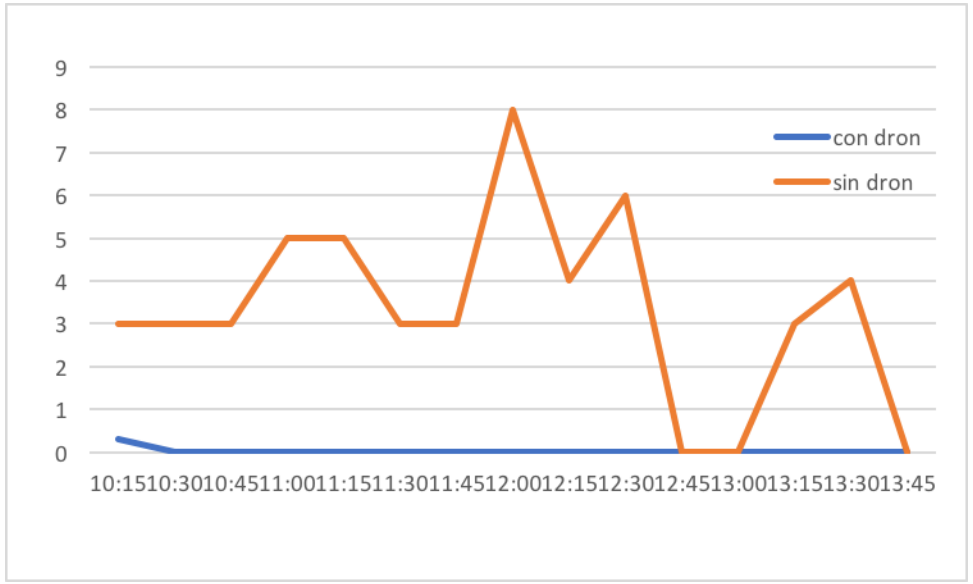
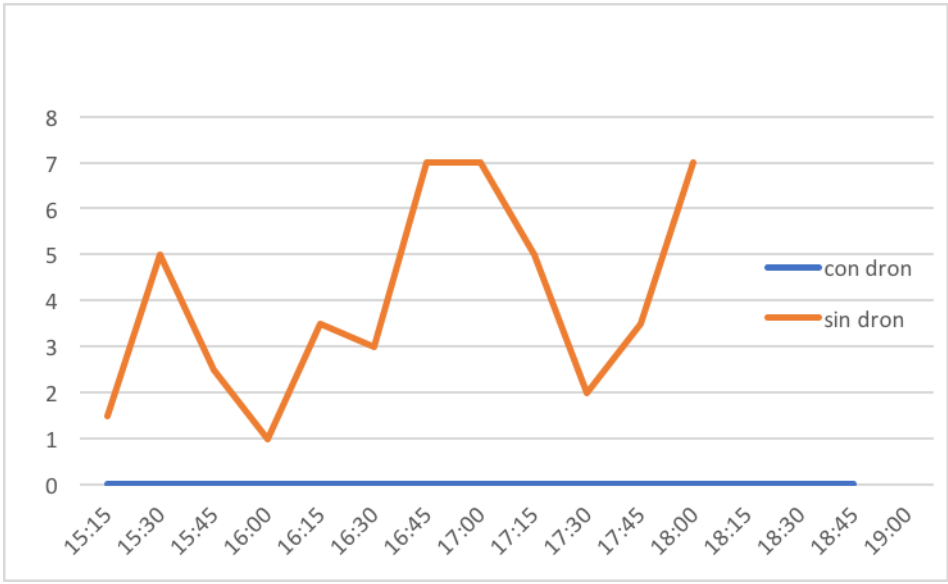
Case Study: Ceuta Heliport – Spain. Results. Birds at runway after SHEPHERD flight.



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AIRPORT SERVICES
THE WORLD´S FIRST EFFECTIVE ROBOTIC FALCONRY
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Our Service: Main Features

- Airport Avian Wildlife Analysis.
- Recruitment, Evaluation and Training of Drone Operators.
- Bird Control Service 24/7 or as required.
- Provide Airport Authorities with Regular Reports and Updates IAW SOPs.
- Assured Flight Readiness of Drones.
- Regular and Recurrent Training of Operators and Maintainers.
- Technical Upgrades.
- Other services as required.

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Conclusions

- **Proven Technology**
- **Proven Effective Performance**
- **Safer**
- **Innovative**
- **Cheaper:** less accidents, lower insurance rates, etc.
- **Animal friendly**

ARQUIMEA

Passion for Technology

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