



*Innovative Technology as a Response to
the Bird Strike Risk*

WBA



Michał Skakuj

ekoaviation@michalskakuj.com

CTO



Dawid Gradolewski

dawid.gradolewski@bioseco.com



Solution



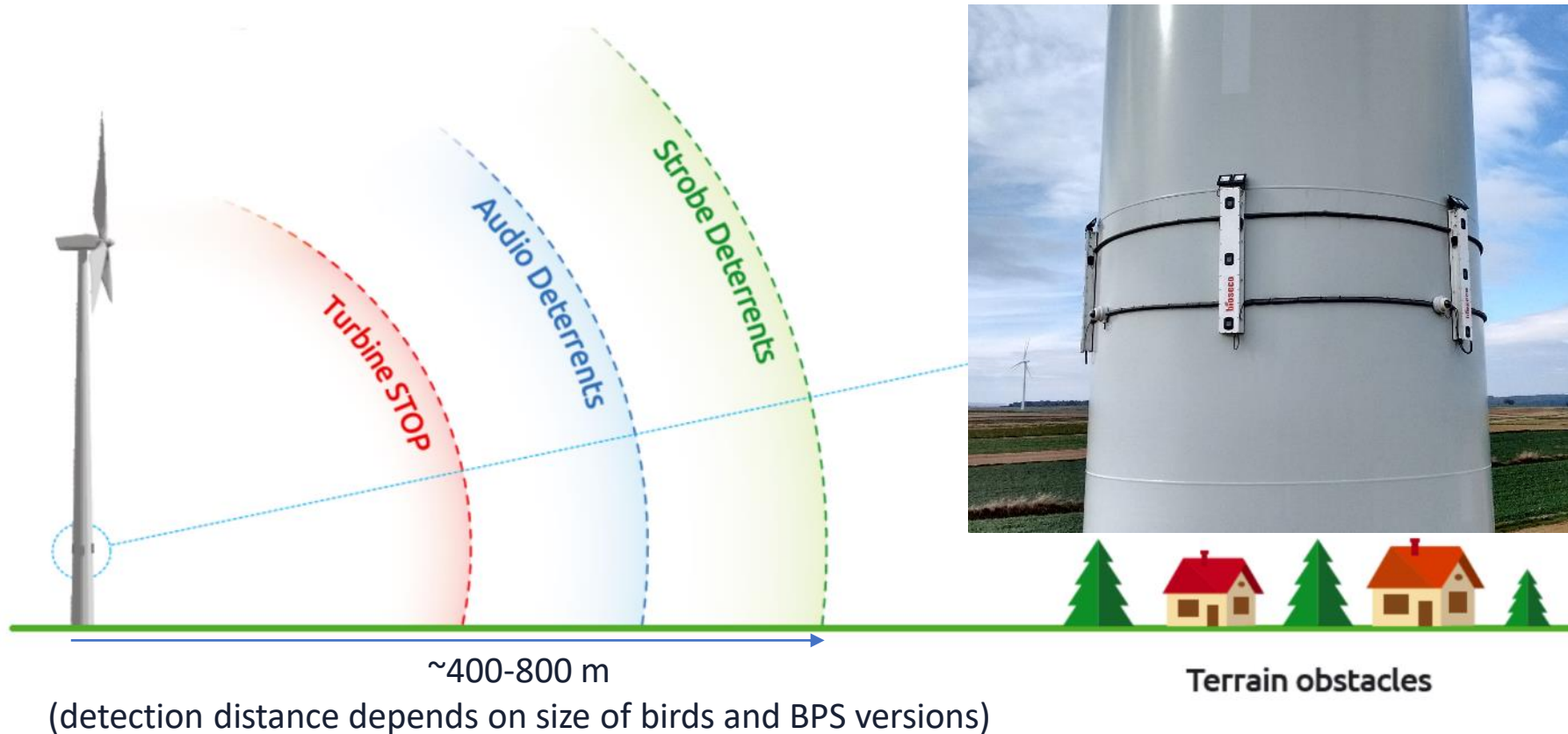
Challenges of birds protection on wind farms:

- Reduction of negative impact to environment.**
- Authorities expecting viable solution to bird mortality risk.**
- Increased public awareness makes pressure on operators.**
- Risk of financial penalties or turbine shutdowns.**

Bird Protection System - Concept

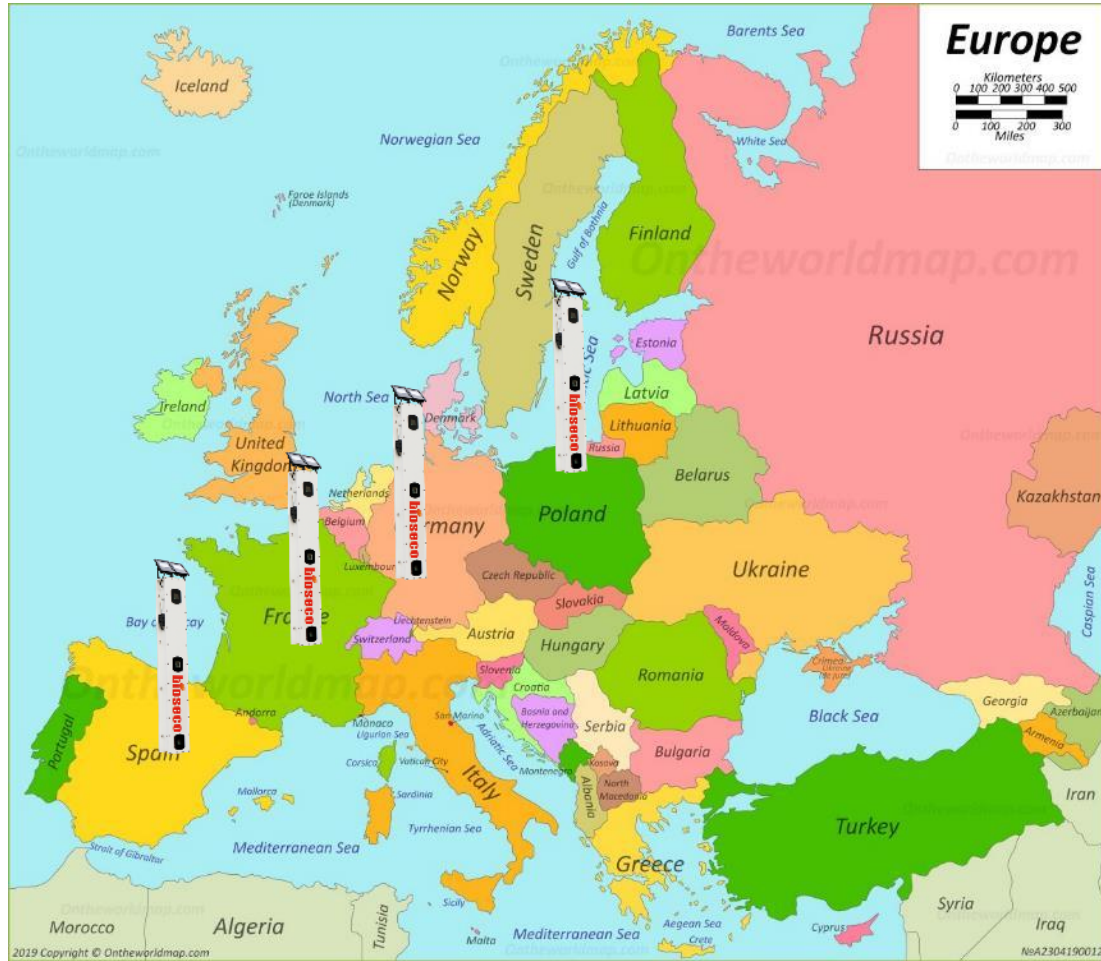
Thanks to the use of stereovision Bioseco system allows to estimate the distance to the system and autonomously undertake various action depending on the bird distance and its flight path

Protection area



Bird Protection System - Implementations

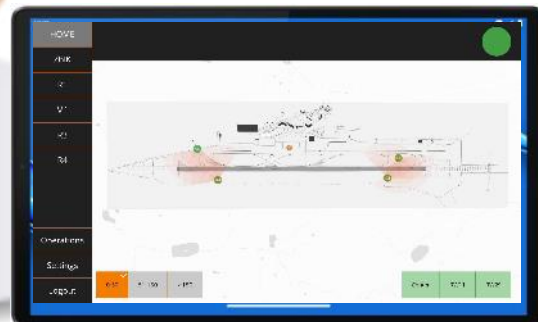
Efficiency proved



Fauna activity monitoring system



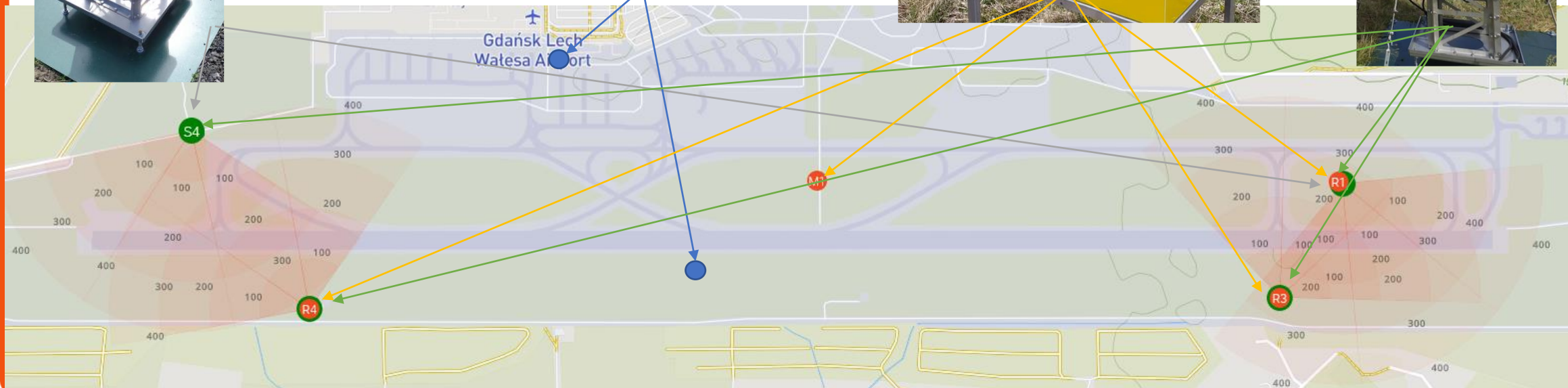
Rel-view and monitoring application



Deterrence System
Manual/semi-manual



Bird activity monitoring system



user

- Dashboard
- BPS
- Controls
- Deterrence
- Thermovision
- Reports
- Contact
- Account

English

AIRI

64.373516,18.470178

780

BPS reports

- uSmall - 207
- Small - 390
- Medium - 85
- Large - 27
- xLarge - 71

11

Wind Speed
Unit: km/h

N ↓

6

Deterrences

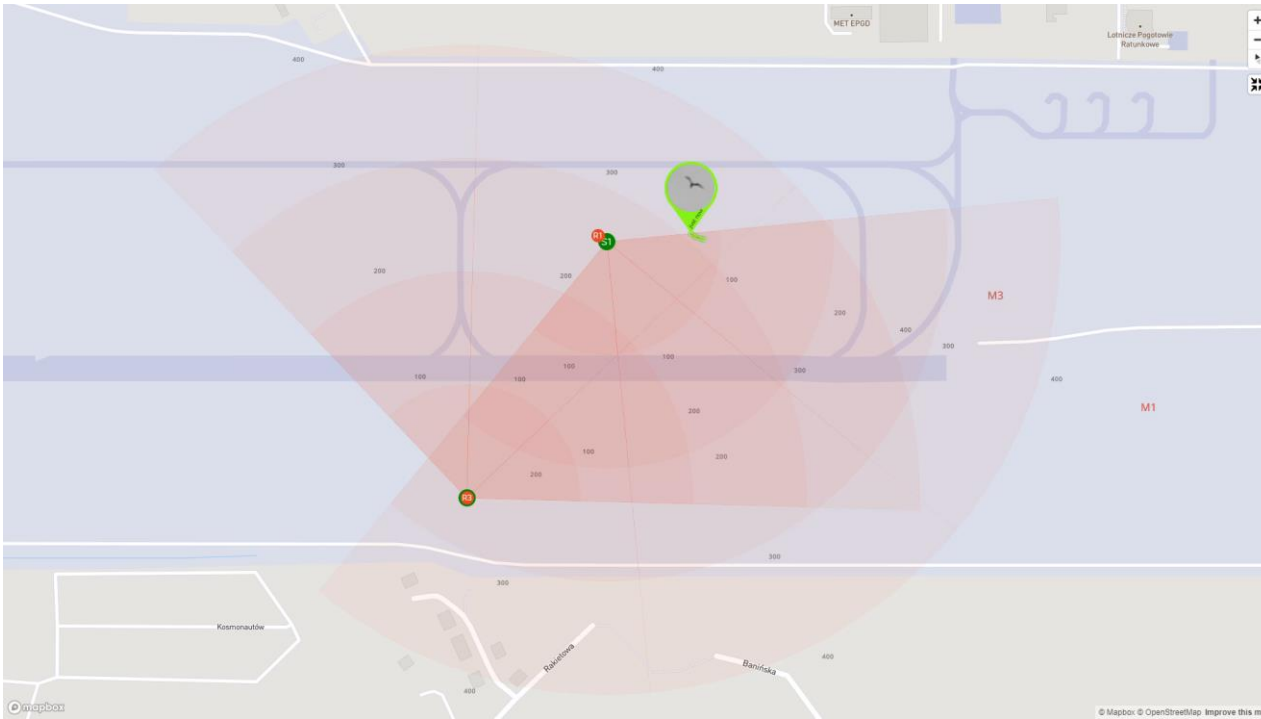
R1 MI

R3 R4

5

Controls

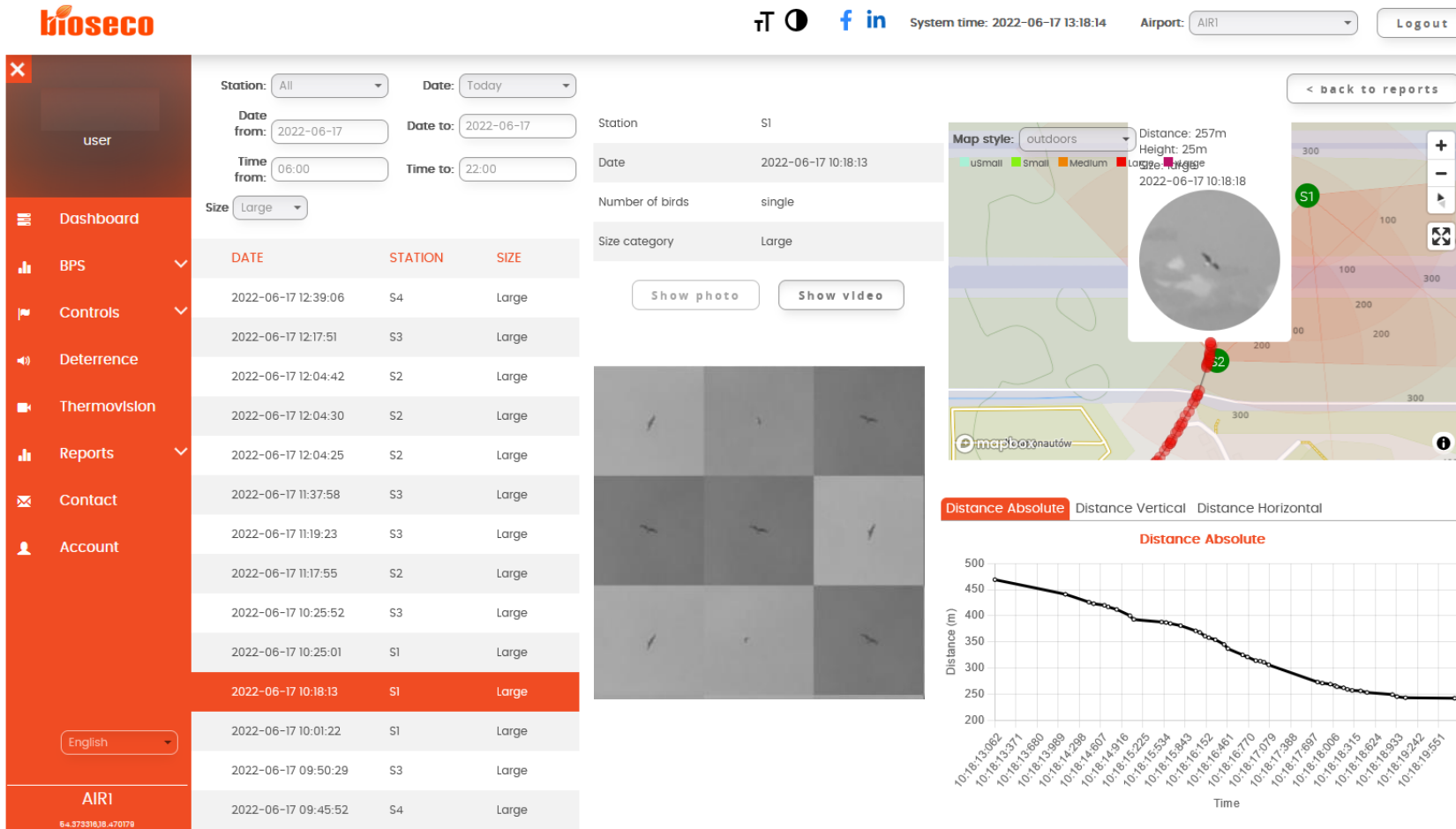
- Bang: 33
- Acoustic: 33
- Visual: 0
- Flash: 0
- No action: 0



New detection:

- Station 2
- Height: 35m
- Distance: 54m

Bird Protection System – Data Collected



The screenshot displays the bioseco web application interface. On the left is a navigation menu with options: Dashboard, BPS, Controls, Deterrence, Thermovision, Reports, Contact, and Account. The main content area shows a table of bird sightings with columns for DATE, STATION, and SIZE. A detailed view of a sighting is shown, including a map with a flight path, a distance graph, and a photo of the bird.

DATE	STATION	SIZE
2022-06-17 12:39:06	S4	Large
2022-06-17 12:17:51	S3	Large
2022-06-17 12:04:42	S2	Large
2022-06-17 12:04:30	S2	Large
2022-06-17 12:04:25	S2	Large
2022-06-17 11:37:58	S3	Large
2022-06-17 11:19:23	S3	Large
2022-06-17 11:17:55	S2	Large
2022-06-17 10:25:52	S3	Large
2022-06-17 10:25:01	S1	Large
2022-06-17 10:18:13	S1	Large
2022-06-17 10:01:22	S1	Large
2022-06-17 09:50:29	S3	Large
2022-06-17 09:45:52	S4	Large

Station: S1
Date: 2022-06-17 10:18:13
Number of birds: single
Size category: Large

Map style: outdoors
Distance: 257m
Height: 25m
Size: Large

Distance Absolute
Distance Vertical
Distance Horizontal

Distance (m)
Time

The system is continuously recording data:

- ✓ Timestamp
- ✓ Location
- ✓ Distance estimation
- ✓ Height estimation
- ✓ Size classification
- ✓ Approximated flightpath
- ✓ Weather conditions
- ✓ Action taken (deterrences)
- ✓ Pictures B&W
- ✓ Color 4k Movie

All data is reviewed by online webapplication and used to determine the species.

1

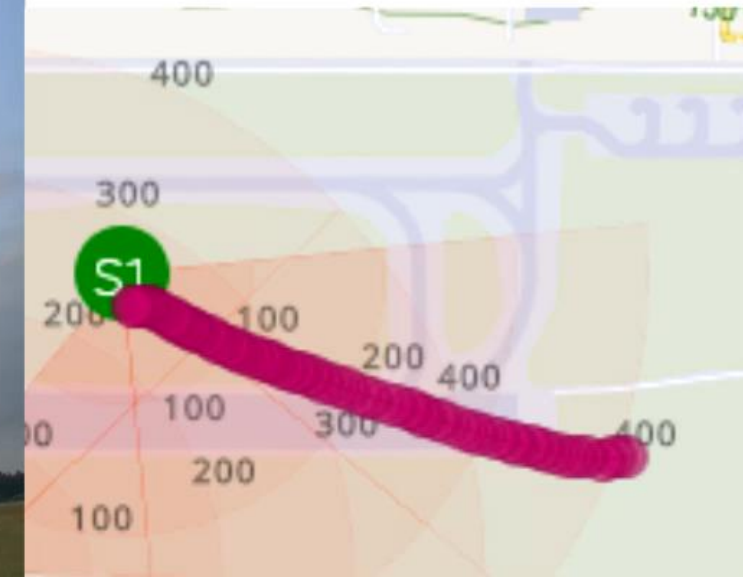
2021-07-22 06:04:11

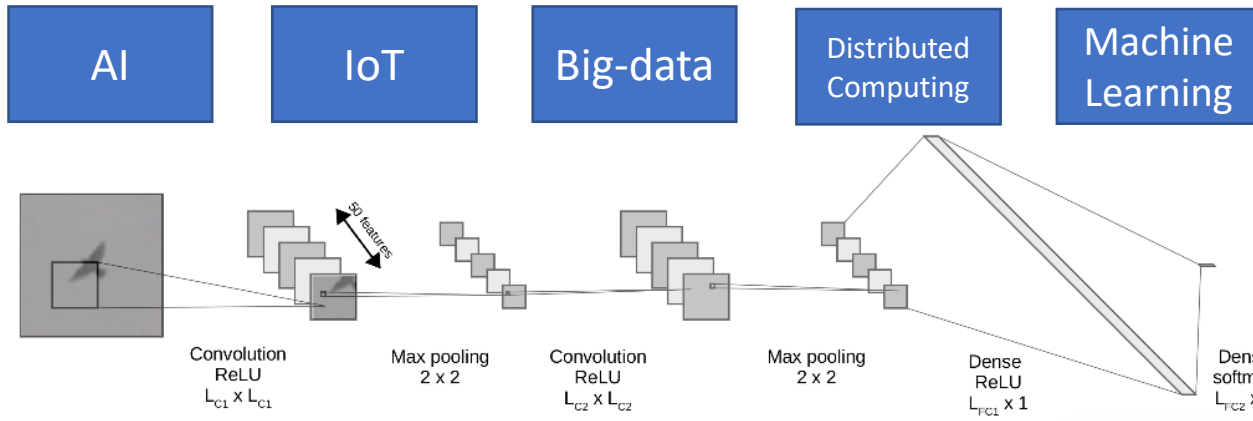
Module: 1

Station: AIR



Real Monitoring Detection Example - Gdańsk Airport -





Size Classification

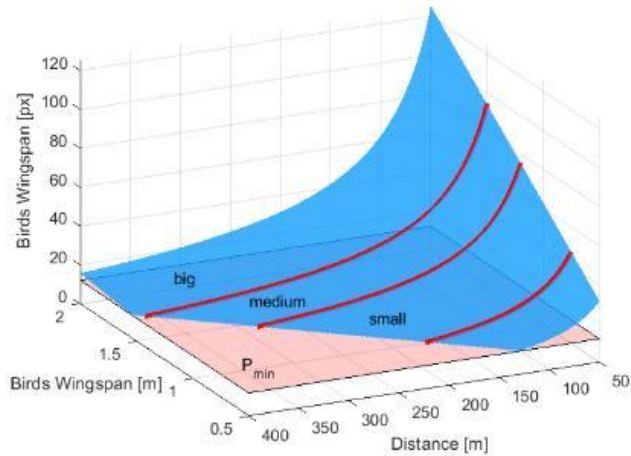


Figure 5. Projection of the bird on an image [px] as a function of bird wingspan [m] and its distance from the baseline, for C1 camera and lens of $f = 3$ mm.

AI

IoT

Big-data

Distributed Computing

Machine Learning

Test of the automatic bird detection system Bioseco on the test field of WindFor5 in the context of nature conservation research (NatForWINSENT)

Eprobung des automatischen Vogelerkennensystems Bioseco auf dem Testfeld des WindFor5 im Rahmen der Naturschutzbegleitforschung (NatForWINSENT)

David Gózdowski^{1,2*}, Damian Dziak^{3,4}, Michał Melrose¹, Damian Kordecki¹, Aleksandra Suroch-Kalinowska¹, Adam Jęrowski¹ and Wiesław J. Kubiś⁵

ABSTRACT

Currently, different technologies, environmental sensors, and camera systems are used for bird detection in wind farms. The aim of this research is to evaluate the effectiveness of the automatic bird detection system Bioseco in terms of detection efficiency and localization accuracy in a real-world environment.

Keywords: bird detection, wind farms, distributed computing, nature conservation, safety, localization, sensors, environmental sensors, camera systems, wind farms, wind turbines.

1. Introduction

The first collision of a bird with an aircraft, so-called bird strike, was reported in 1945, and there is 1982 the first fatality case noted [1]. Since then, the number of cases has been increasing significantly. In 2020, globally, there were 1,100 bird strikes on aircraft, with 100 fatalities [2]. In 2020, globally, there were 1,100 bird strikes on aircraft, with 100 fatalities [2]. In 2020, globally, there were 1,100 bird strikes on aircraft, with 100 fatalities [2].

SUSTAINABLE DEVELOPMENT OF GREEN ENERGY - AUTOMATED BIRDS PROTECTION AT WIND FARMS -

Aleksandra Suroch-Kalinowska
Faculty of Energy and Technology
of Lublin
akalin@poczta.um.lublin.pl

Lucyna A. Florka
Faculty of Energy and Technology
of Lublin
lflorka@poczta.um.lublin.pl

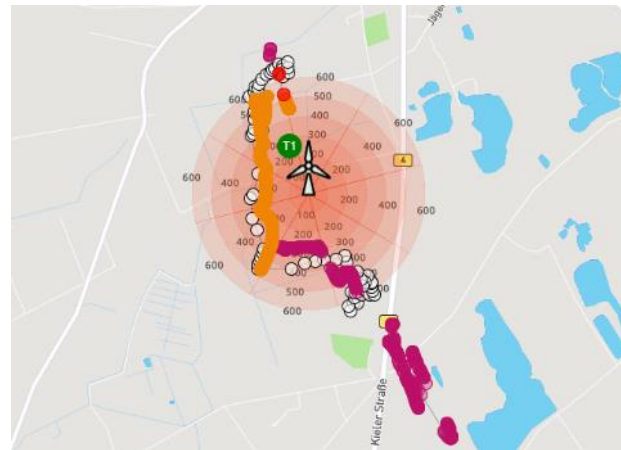
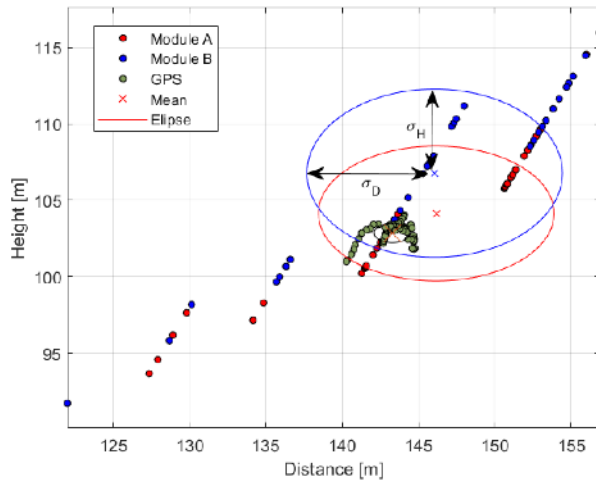
ABSTRACT

Currently, different technologies, environmental sensors, and camera systems are used for bird detection in wind farms. The aim of this research is to evaluate the effectiveness of the automatic bird detection system Bioseco in terms of detection efficiency and localization accuracy in a real-world environment.

Keywords: bird detection, wind farms, distributed computing, nature conservation, safety, localization, sensors, environmental sensors, camera systems, wind farms, wind turbines.

Detection capabilities

Birds Size	BPS Version	0-100m	100-200m	200-300m	300-400m	400-500m	500-600m	600-700m	700-800m	Source
Small	Standard	92%	50%							[1-3]
	Premium	100%	100%	80%						[4]
	Long Range	data during analysis								
Medium	Standard	66%**	83%	38%						[1-3]
	Premium	100%	92%	100%	90%					[4]
	Long Range	data during analysis (average > 85%)								
Large	Standard	91%	100%	68%	-	-				[1-3]
	Premium	100%	100%	100%	100%	75%				[4]
	Long Range	-	100%	91%	98%	95%	86%	83%	85%	



Laser rangefinder



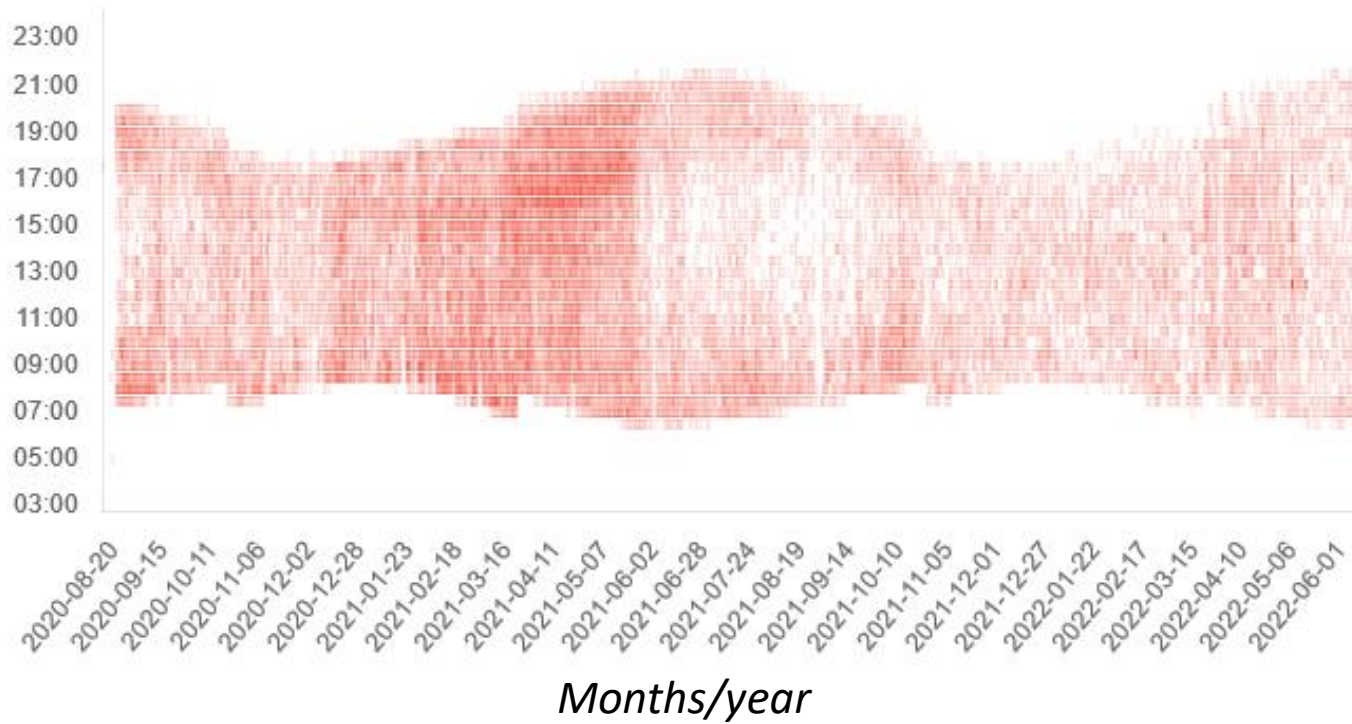
Fixed – wing drone



(b)

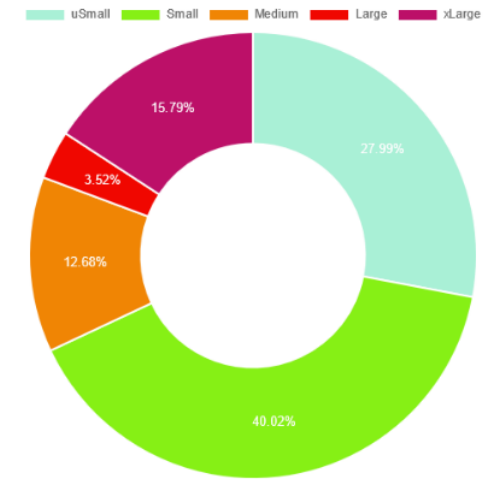
Hot-Spots of Birds Activity

Long-term analysis



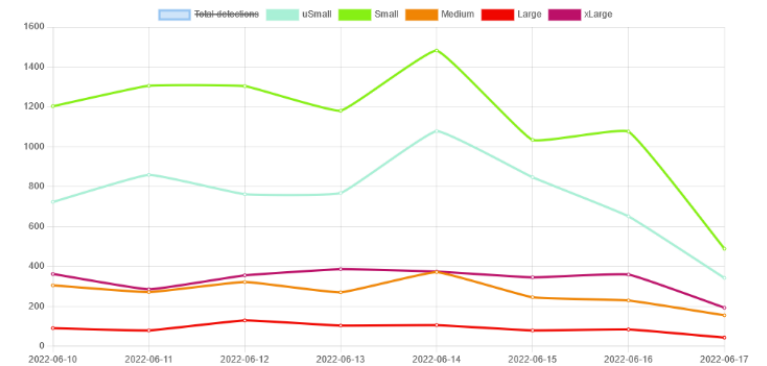
Short-term analysis

Day



Mid-term analysis

Week

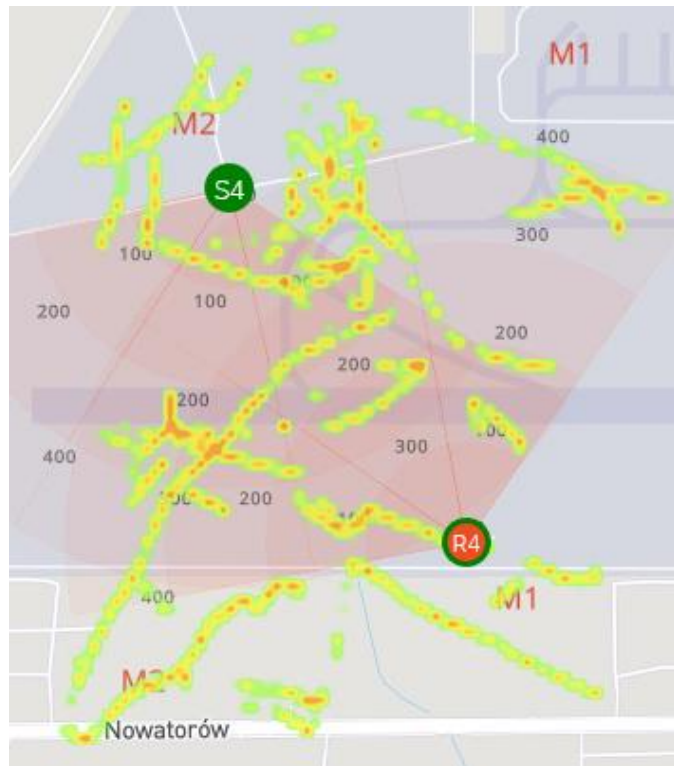


Hot-Spots of Birds Activity

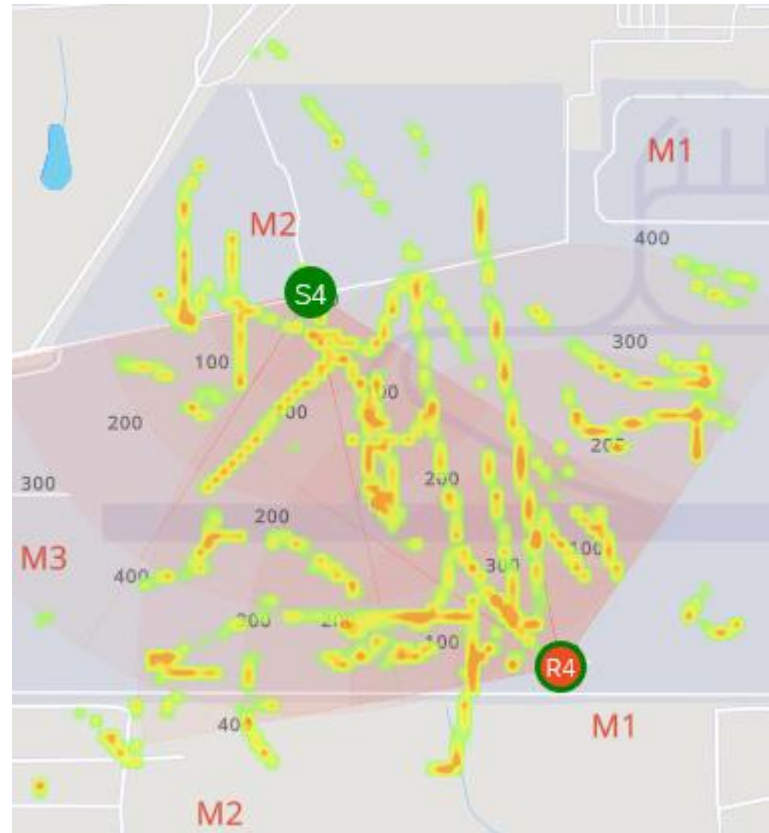


Hot-Spots of Birds Activity

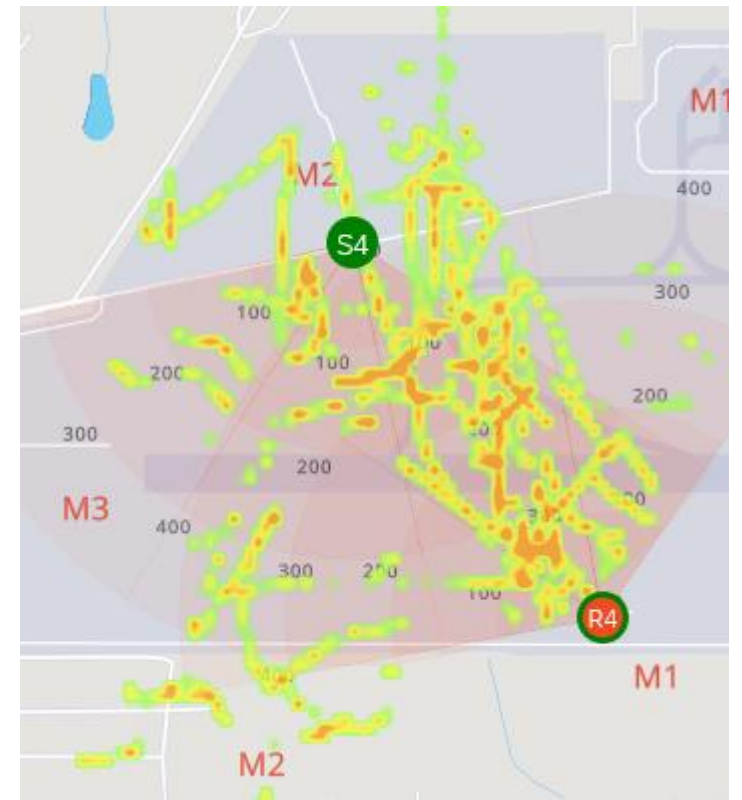
4.00-10.00



10.00-16.00

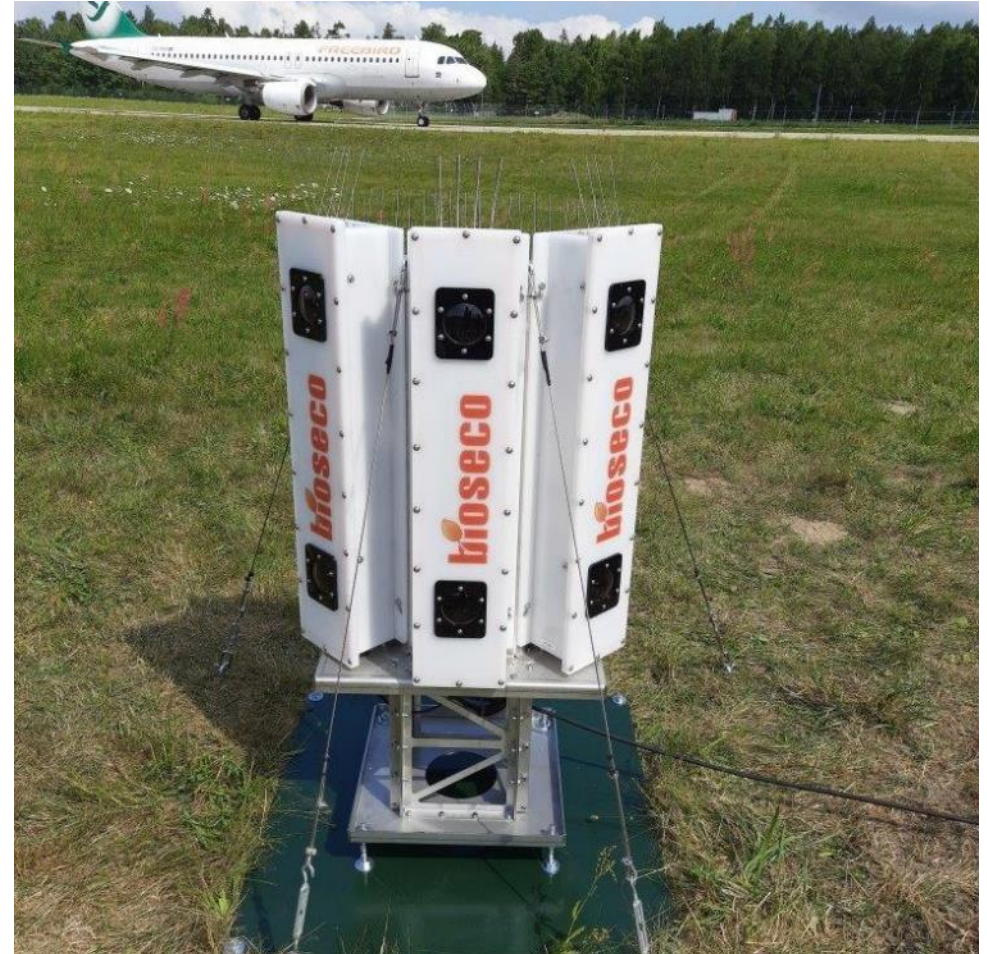
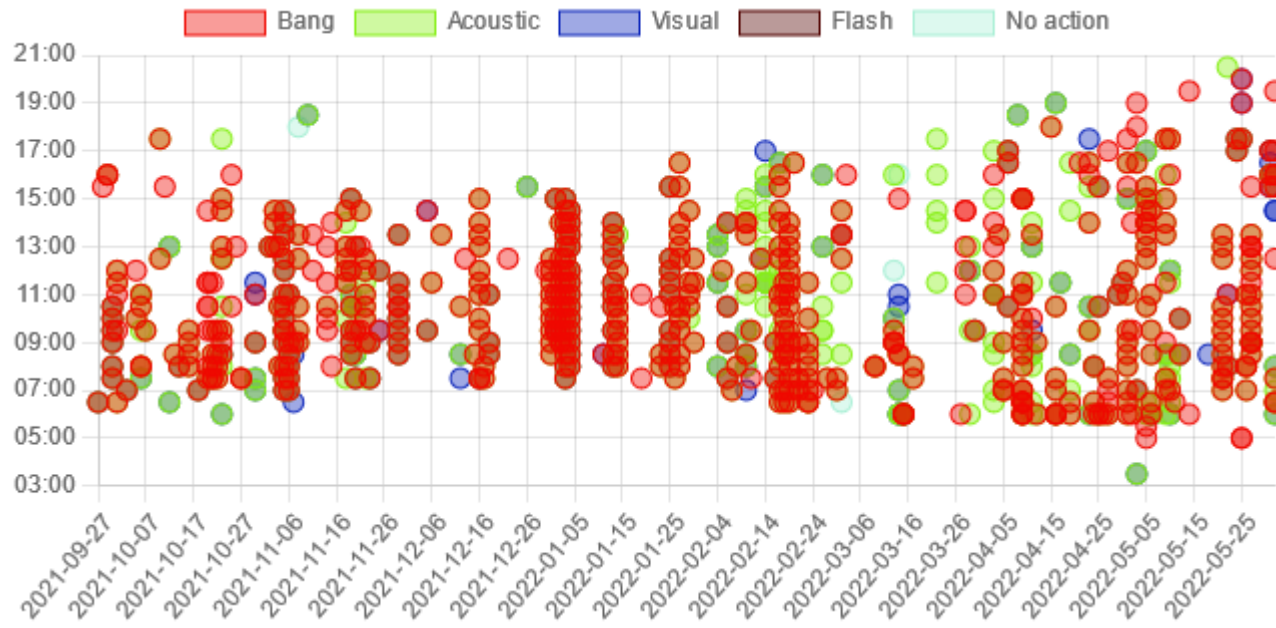


16.00-22.00



Hot-Spots of Birds Activity

Deterrence



Contact details

Interested in testing bioseco AFMS SYSTEM?

contact me:



Dawid Gradolewski, CTO

Phone number

+ 48 665 802 125

E-mail

dawid.gradolewski@bioseco.com



2019



2020



2021

