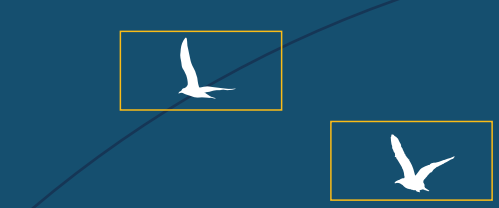
DIGISEC

Bird Monitoring System

PRESENTATION



digisec.gr/bird-monitoring-system/

About us

At Digisec we are experts at designing applied Artificial Intelligence and Machine Learning solutions.

We provide applied solutions based on advanced Machine Learning algorithms that work and return the initial investment quickly.

We have a thorough knowledge of the Renewable Energy market and we work with Energy providers.

We understand their needs and we design solutions that help them protect the environment and at the same time increase their profits.

The Challenge

Wind Parks are often installed in locations, where wildlife flourishes.

Thousands of birds, both domestic and migrating fly through the wind parks and some of them collide on the blades of the turbines and die. Many of them are endangered and each one of them is valuable to the ecosystem.

EU legislation has enacted environmental protection rules that all energy providers are required to adopt. Energy providers when installing wind parks in areas designated as Natura 2000, are obliged to install systems that monitor the skies around the parks for birds and deter them by emitting a special sound when they are on a collision course with the blades. If for some reason birds keep their collision course, the system must shut down the Wind Turbine Generator. Once the turbine is shut, it stops producing energy. Moreover, once it starts again, it takes time to reach full capacity. As a result, energy providers lose a substantial amount of money when the turbine is off.

BIRD
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The other bird deterrent systems in the market, are based on outdated motion detection algorithms, produce a lot of “false positives” that trigger the system to stop the turbines far too often, since they cannot accurately distinguish birds from other moving oblects as airplanes, clouds, the blades of nearby turbines, even insects that fly close to the cameras. That has a significant cost to the total amount of energy each turbine is producing.

The Solution

The need for an effective bird deterrent is important in many of today's industries and in the past, there have been many attempts to develop a successful system with few achieving adequate results.

Digisec has developed an innovative Bird Monitoring System for wind parks, in order to protect birds that fly dangerously close to the wind turbine blades. Using state-of-the-art security and software development technologies, we manage to deter the protected birds from the wind turbines, protecting them from death or serious injury, while at the same time maximizing the operating time of the turbines, almost eliminating their shut down time and minimizing noise pollution. The development of this innovative product, unique in functionality with state-of-the-art artificial intelligence and machine learning technologies, adds value to the global wind energy market.

Airports and airbases

Ports

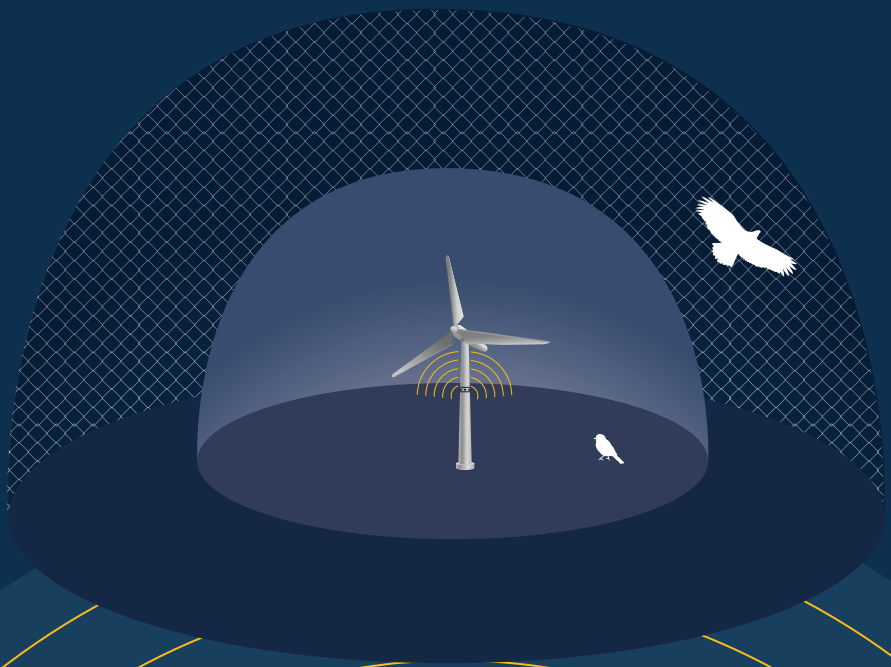
Industries

Agriculture

BIRD MONITORING SYSTEM

As more and more wind parks are installed around the world, the global need for bird protection is rising. We are already in contact with multinational energy providers and some of our customers that build wind farms around the globe and they have expressed their intention to cooperate with Digisec in other parts of the world. We expect to start exporting our solution by the end of the year.

DIGISEC's Bird Monitoring System consists of state-of-the-art hardware, software that uses our unique monitoring machine learning algorithm and a Business Intelligence platform for monitoring and reporting.



The Hardware

The hardware of the Bird Monitoring System consists of a **very powerful control center**, capable of processing and rendering high resolution images quickly.

Four **ultra-high definition cameras** with super star light technology enable us to capture high resolution colour video and images even in almost absolute darkness.

Four **thermal cameras** help our system detect birds as far as 1.500 meters in absolute darkness, through a cloudy sky or fog.

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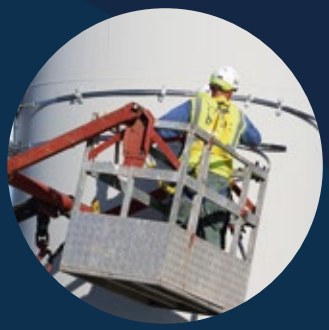
The Software

Our software is built around **a unique machine learning algorithm** that we have developed, capable of detecting birds and distinguishing them from other moving objects. After detecting them it measures their course and speed to calculate whether they are on a collision course towards the turbine. At the same time, it classifies them depending on their type.



The platform

Our platform is **internet based and can be accessed by a single browser.** Once the user logs into the system, he can access useful information, reports and KPI's for the wind park where our Bird Monitoring System is installed.

At the main screen, the user can see a dashboard displaying all the systems that are active in the Wind Turbine Generators, todays detections, deterrences, and shutdowns. The dashboard is configurable, and the user can adjust it to his preference.

Live view of the cameras is available to the user as well as remote reboot to the control center in case it is needed.
The platform has a strong report generator engine, which can produce customizable reports by selecting various criteria.

These reports can include the time stoppage triggers per Wind turbine, the most active birds in the area, how many are detected and how many are deterred. Useful information like wind speed, Nacelle position and rotor speed are also being recorded to the database, while being connected to the SCADA system of the wind turbine.

The Bird Monitoring System has the capability to recognise the protected rare birds of the area and operate to pretect them only.

Finally, one of the most advanced features of the platform, is that when a bird is detected by the system and is not recognized, it is reported as unclassified in our database. After the review of our ornithologist team the bird is classified and the system is starting to recognize it, using our unique deep learning technology. This flow ends by delivering the updated algorithm capabilities throughout all the installed systems around the world!

Operation Principle

Surveillance Phase

The high-tech cameras are continuously scanning the covered area for birds. The bird detection system uses our advanced artificial intelligence and Machine Learning algorithms to identify birds. We can distinguish between birds and other objects very accurately. The bird detection system has the ability to continuously improve its detection capabilities using Machine Learning video content analysis algorithms. It uses advanced classifiers and large databases to achieve its performance. Images and video sequences can also be recorded.

Collision Avoidance Phase

Detected birds that are flying in the high-risk collision area are getting acoustic warnings through special sounds. The behaviour of the birds is being monitored during and after the warning, and if the direction of the flight has not been deflected in a sufficient order, the sound is applied again until the birds leave the protected area.

Shutdown Phase

Further actions are taken (in case of a wind turbine installation) and the system automatically shuts down the wind generator in order to protect the birds from a prospective fatal collision. Our advanced detection technology minimizes the shutdown incidents of the Wind Turbine Generator.

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How it works

We use state of the art Artificial Intelligence algorithms to detect birds in risk zones.

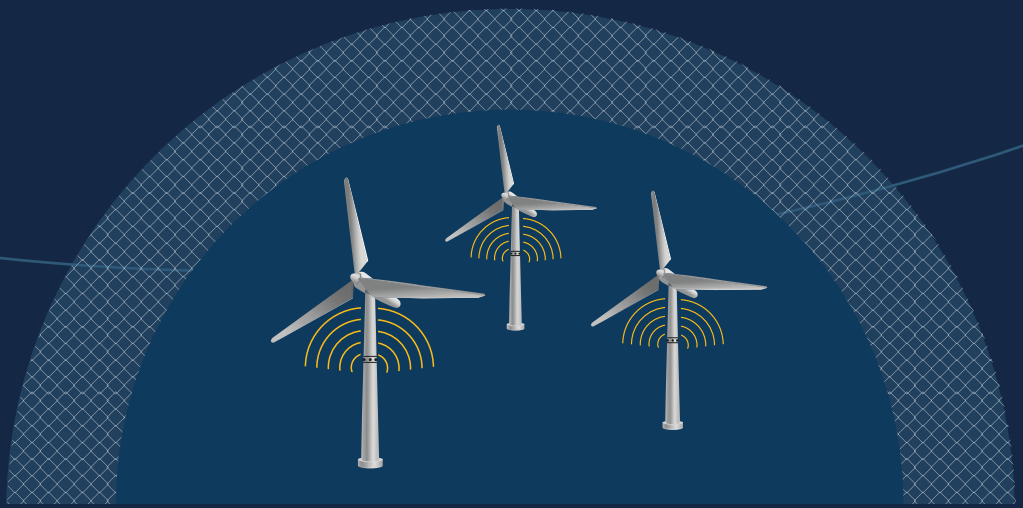
Our system can continuously improve its detection capabilities using Machine Learning technology.
With our Ultra High Definition cameras of 8 megapixel in combination with Thermal vision technology to achieve 24 hours, all weather detection and operation, our system can detect and classify flying objects from up to 1Km distances.



BIRD MONITORING SYSTEM

Bird Monitoring System is modular and scalable. Depending on the angle one wants to monitor and whether it should monitor at night as well, the system can be built to order with one to four optical cameras as well as thermal cameras respectively. Furthermore it can be built with or without the option of stopping the turbine when birds are not deflected.

Based on the process of detection and classification, we use state of the art acoustic driver modules to deter birds entering the turbine risk zone with adjustable volume. Our system uses directional sound emission, minimizing sound pollution. The special sound emitted, is evoking the Acoustic Startle Response of the birds, making them change course. The sound does not harass the birds and they do not get used to it.
In the extreme scenario that a bird enters the critical zone, the turbine can receive signals in various formats, in order to stop its operation and prevent collision.



Projects

Digisec has installed its unique Bird Monitoring System to many wind parks already with outstanding results in terms of recognising birds promptly and successfully deterring them, eliminating false positives and shutting down the turbines only when it is absolutely necessary.

How we differ

- **Advanced Deep Learning Algorithm** can identify birds' types, sizes, direction, speed
- **Significantly less false positives**, more running time for the turbines, less noise pollution, less strain to the generators caused by unnecessary shutdowns that cause extreme loads
- **Tailor-made design for each Park**, our team of engineers and ornithologists surveys the Park and designs the solution considering legal environmental requirements, the landscape, height, winds direction etc
- **Ideal Hardware setup,** we use state of the art cameras, state-of-the-art powerful control center, targeted sound deterrence
- **Online cloud reporting**, you can access our cloud platform anytime and see the reports, you can have a report sent on a daily, weekly monthly basis
- **7/24/365 service desk**, we are always online

Bird Monitoring System

adds value to the global wind energy market

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