nvisionist in cooperation with

9th HAEE Energy Transition Symposium

22/05/2024

nvisionist – Innovative Solutions for ICT and Green Energy Market

by
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Business Development Manager

nvisionist in cooperation with ΔΕΗ

- **nvisionist was established in 2021**
- An innovative Greek I.T. start-up company focusing on applied digital solutions which are based on **Artificial Intelligence** and **Machine Learning** adding value to the renewable energy sector.
- The company's expertise and know-how also cover the areas of **ICT** including development & maintenance of IT and Communications projects.
- Its **management team** has a long history of successful projects, mainly in IT and renewable sources industry in Greece and abroad.
- It has an experienced **R&D team** consisting of AI, Machine Learning and vision expert scientists.
- **The PPC Group** (ΔΕΗ) has invested in nvisionist. (+βραβεία)

WITSA
World Innovation, Technology and Services Alliance

Future Unicorn Award
an award by DIGITALEUROPE

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nvisionist advanced technological solutions for protecting the environment and supporting sustainability with AI and computer vision

nvbird adds value to the green energy

powered by ΔEH

Bird detection & monitoring solution for protecting bird and bats from colliding with Wind Turbine Generators blades

nvFirePro

Autonomous fire detection system which can detect and locate wildfires during the first minutes of their breakout and broadcast the event to the appropriate Agency in order to extinguish it before it spreads.

nv3Dmap

Creation of highly detailed 3D maps for environmental projects utilizing Lidar, HD cameras and advanced GIS systems.

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nvbird® bird detection & monitoring system

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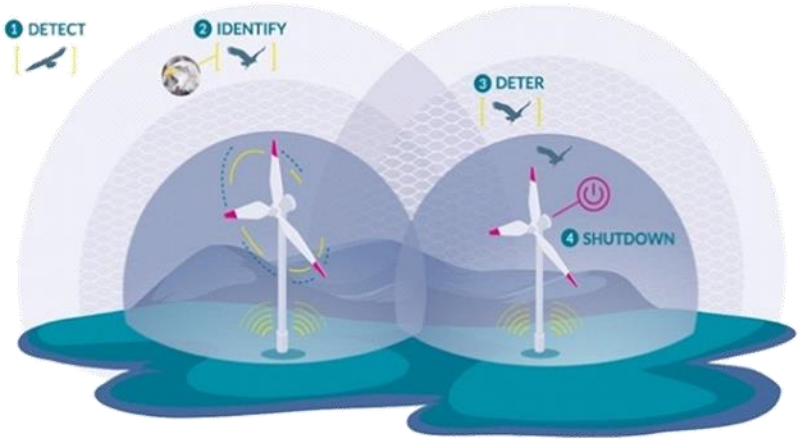

THE PROBLEM

- The rapid expansion of renewable energy sources, more specifically wind power, has led to increased concerns about their impact on wildlife, particularly birds and bats.

THE SOLUTION

- **nvbird®** an innovative, state-of-the-art bird & bat detection and monitoring system which prevents collisions of birds & bats with wind turbine blades.
- Its core is based on **advanced AI and machine learning algorithms** which in collaboration with the latest HD cameras, 3D radar and powerful servers can:
  - ✓ detect birds
  - ✓ analyze their flight path
  - ✓ deter them with special sounds to make them change their flight direction or even slow down or shut the wind generator, if necessary, until the birds fly away.
- The nvbird® Bird Detection & Monitoring System is a game-changer in environmental protection and biodiversity. Utilizing AI and Machine Learning, nvbird® safeguards rare bird species while optimizing turbine productivity.
- nvbird® with its innovation and efficiency serves the protection of birds and the development of wind energy leading the way towards decarbonization and net zero emissions.

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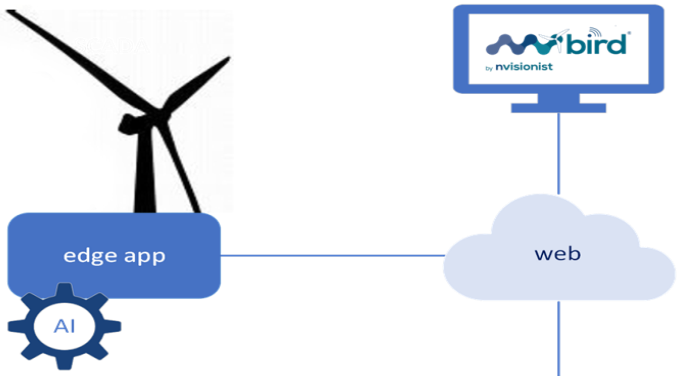
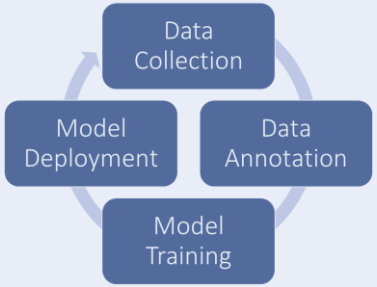
nvbird®: system architecture



- Our solution is based on the **Edge AI** paradigm: computations are performed at the point of data collection, i.e. the wing turbines
- We deploy powerful servers as **edge devices** with dedicated GPUs for 4 up to 12 cameras
- **SCADA** integration (we have developed our own OPC UA client/server for two-way communication with the Wind Turbine)
- **nvNOC** (network operations center) for monitoring & maintaining nthe entire system health. Processes over 100.000 data point every 5”
- **DARP** (Data Analysis Reporting Platform) for integrating, analysing and visualising data.
  - Two-way authentication
  - Various access levels depending on authorisation.
- Continuous system improvement through training of the AI algorithm with a **Multiclass Detector** (blades, insects, airplanes, clouds etc.)



- System Modules: **Detection** - localizing birds in the video frames
  Tracking – estimate bird trajectory
  Recognition – identify birds of interest

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nvbird®: rapid development


PO.025

Advanced bird detection and monitoring system: Innovative approach for distance estimation with a monocular camera

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PO.007

Preventing Bird Collisions using Artificial Intelligence, Machine Learning, radars and cameras while maximizing wind turbine availability

Tassos Alefantos

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Abstract

Objectives

Methods

Results

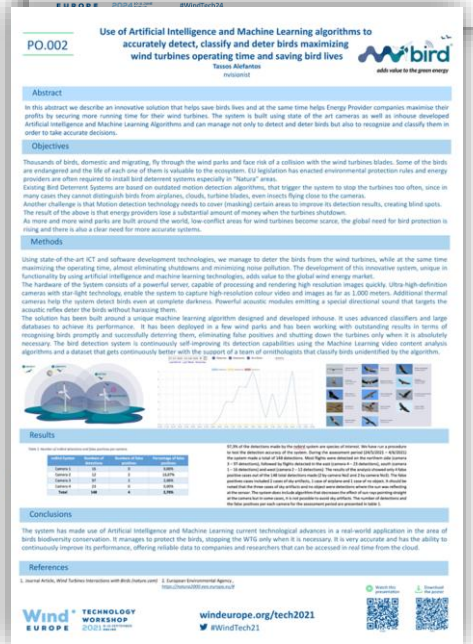
Conclusions

References

MEET US AT (INSERT BOOTH NUMBER)

windeurope.org/tech2022

#WindTech2022


PO.002

Use of Artificial Intelligence and Machine Learning algorithms to accurately detect, classify and deter birds maximizing wind turbines operating time and saving bird lives

Tassos Alefantos

nvisionist

Abstract

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References

windeurope.org/tech2021

#WindTech21

- ✓ In-house R&D team with AI and Machine Vision experts. (for our system innovations we have obtained 5 patents 3 of which are form the International PCT)
- ✓ We work closely with WindEurope – actively participate in the WEDS project (Wind Energy Data Standard) which includes:
  - cyber security
  - data exchange
  - universal metrics & knowledge sharing platforms
  - universal wind data standard
- ✓ Work with the PPC (ΔΕΗ) Innovation Hub in areas of research and quality assurance.
- ✓ Collaborate with various Universities in Greece and abroad on research projects to develop new innovative solutions.
- ✓ Work with Environmentalist and Ornithologist Institutes for understanding bird & bat behavior in order to advance our solution.

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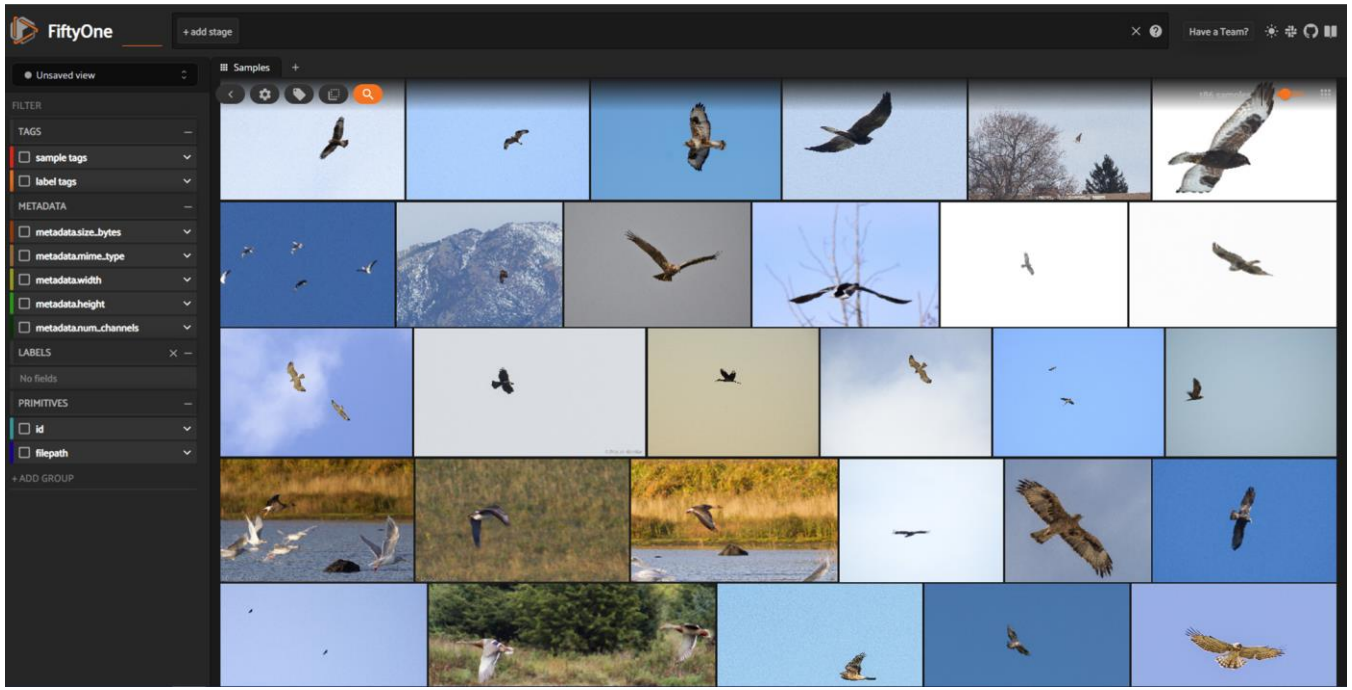
nvbird®: recognition module (next step)



18 protected species, 250K high resolution images

- This module has dual purpose:
  - Filter-out false detections by the detector
  - Identify the birds of interest, that should trigger some action by the system
- Trained with a private dataset, that we obtained through our collaboration with a renowned research institute.

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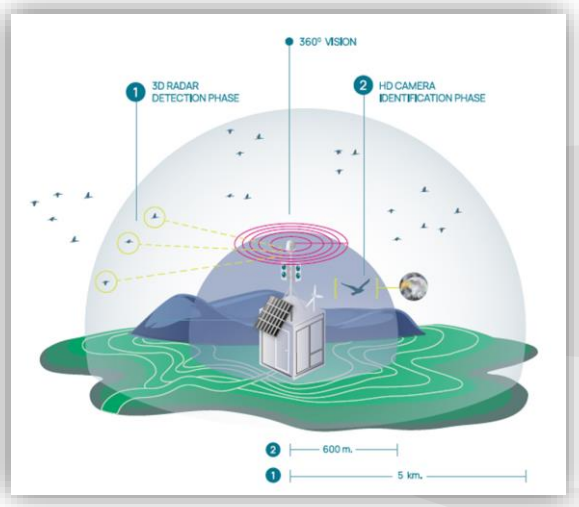
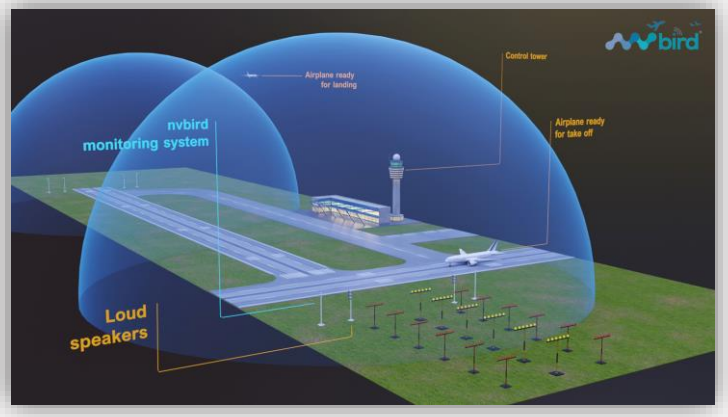
nvbird®: applications



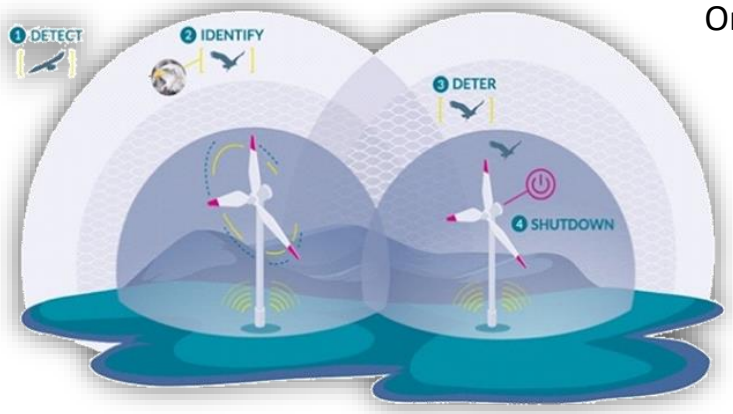
Pre-Construction

Autonomous system integrated 3D Radar with HD cameras

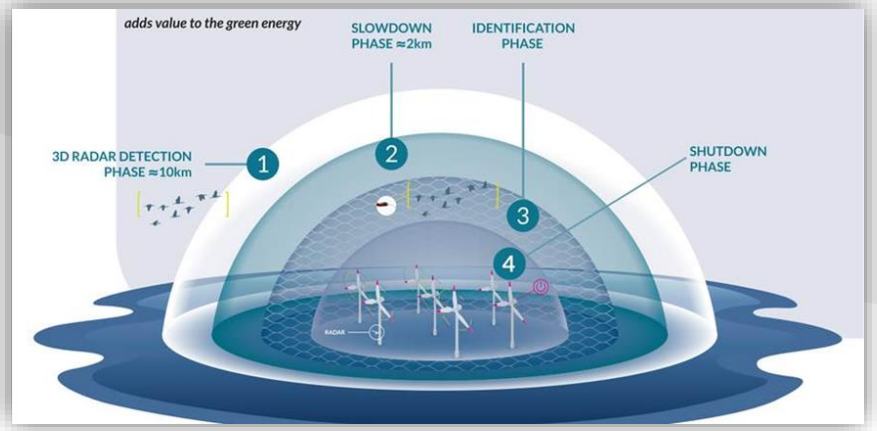
Airport System



On-Shore System

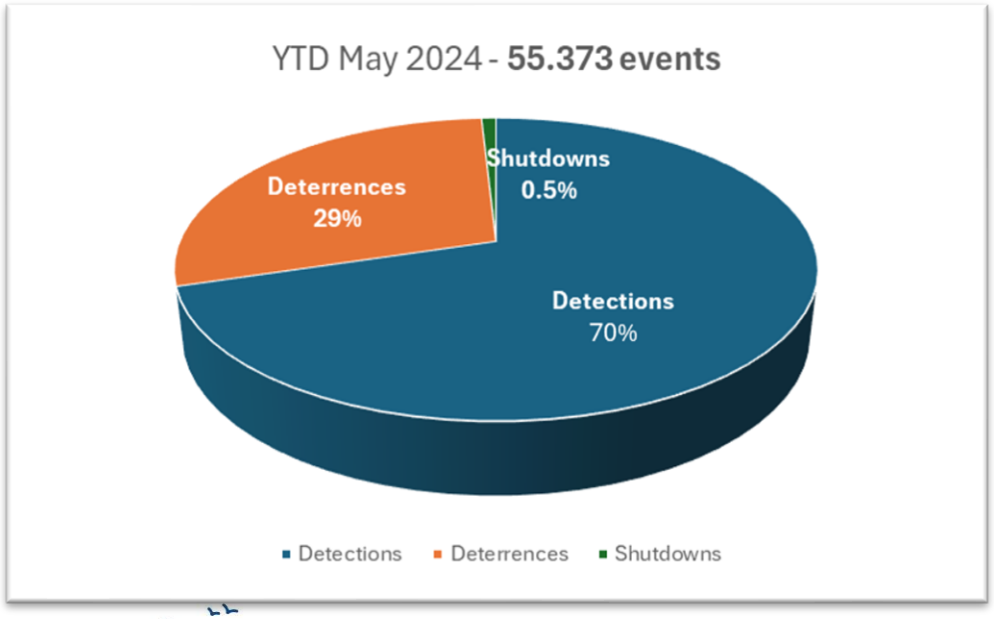


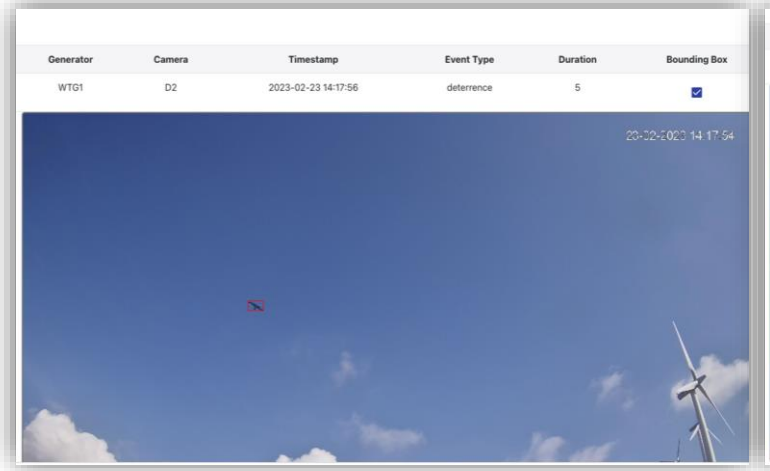
Off-Shore System

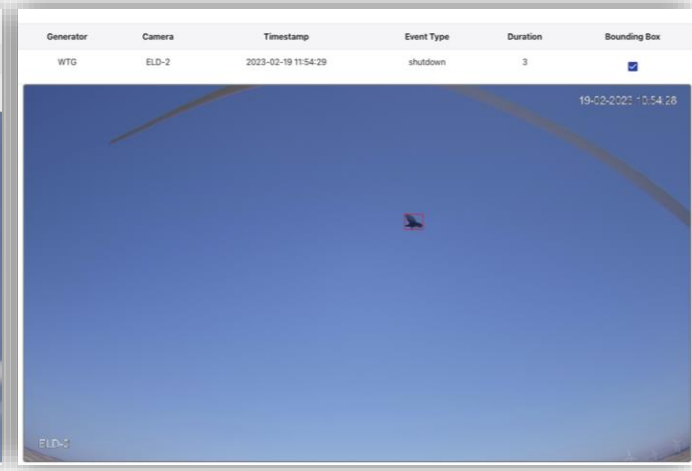


nvbird®: results

- 158 deployed nvbird® systems
- 26 Wind Parks
- System installations throughout Europe
- Installed on various WTG manufacturers (Enercon, GE, Goldwind, Nordex, SG, Vestas etc.)







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thank you

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