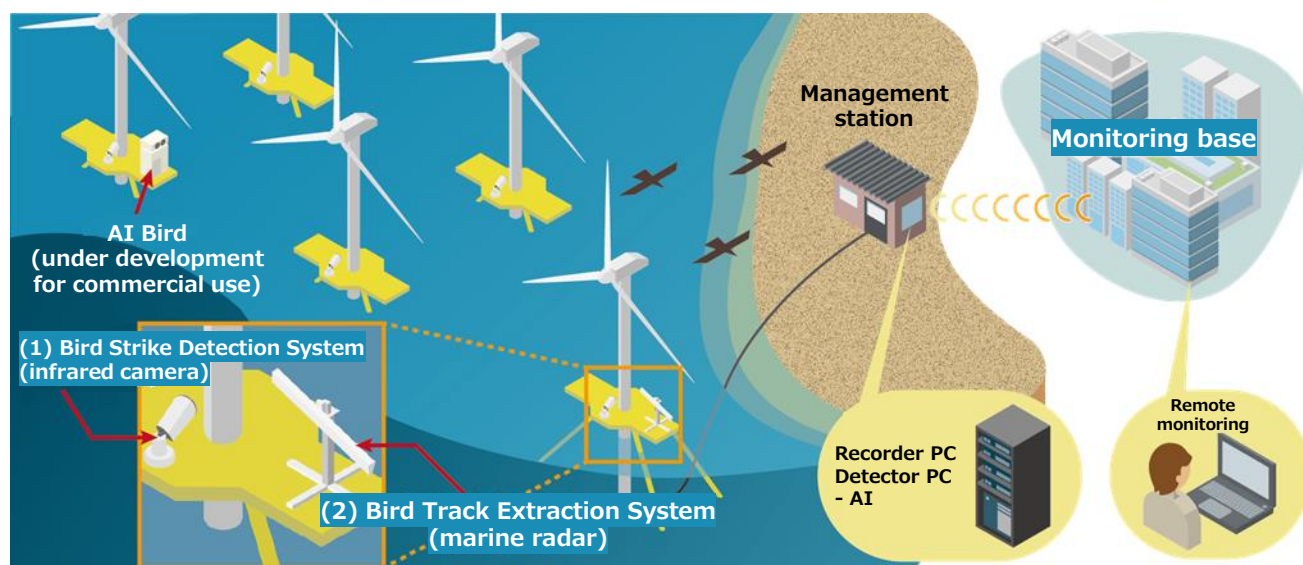# Bird Monitoring System

For use in preliminary and post-study surveys of wind power projects

The bird monitoring system allows 24-hour continuous remote monitoring of birds flying in the vicinity of wind turbines. It consists of:

(1) Bird Track Extraction System

(2) Bird Strike Detection System

In offshore wind farm management, this system will play an active role as a method for post-survey and environmental monitoring.

▲Illustration of Bird Monitoring System

Monitoring onshore and offshore bird strikes

Conventional bird strike surveys for onshore wind power mainly consist of habitat surveys i.e., visual surveys in the vicinity of wind turbines, and carcass surveys by tramping the wind turbine foundations. On the other hand, surveys of offshore wind turbines require approaching the wind turbines by boat, which is less accessible and difficult in strong winds and stormy weather, and the carcasses are usually washed away.

Therefore, a bird monitoring system using radar and/or the combination of camera and AI would allow remote monitoring and solves issues specific to both onshore and offshore wind turbines.
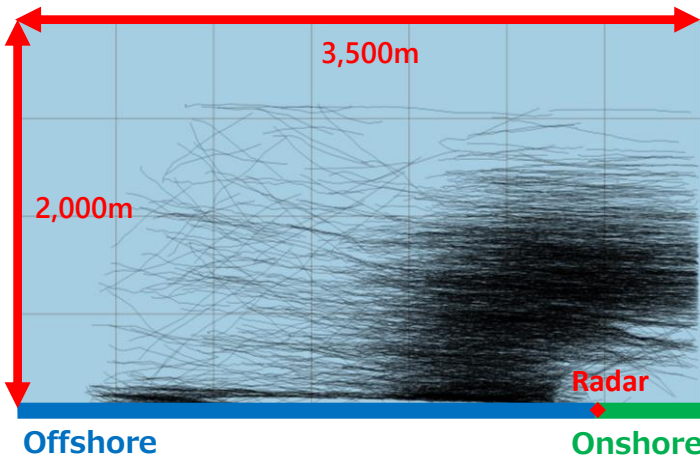

▲Marine radar

▲Infrared camera

Bird Track Extraction System using marine radar

▲ Example of bird flight trajectories

3,500m
2,000m
Radar
Offshore　**Onshore**

Two types of marine radar (S-band and X-band) may be used to quantitatively determine the direction and altitude of birds in flight. Each radar can observe within a radius of 16 km (horizontal observation) and 2 km (vertical observation) **to monitor constantly the habitat conditions and migratory routes of birds**.
- 24/7 monitoring and nighttime surveys are possible for long periods and wide-area offshore observations where visual surveys are difficult to implement.
- Extraction of flight direction and altitude from the flight trajectory is possible.
- Quantitative understanding of flight routes and peak times is reported.

Bird Strike Detection System coupled with infrared cameras and AI
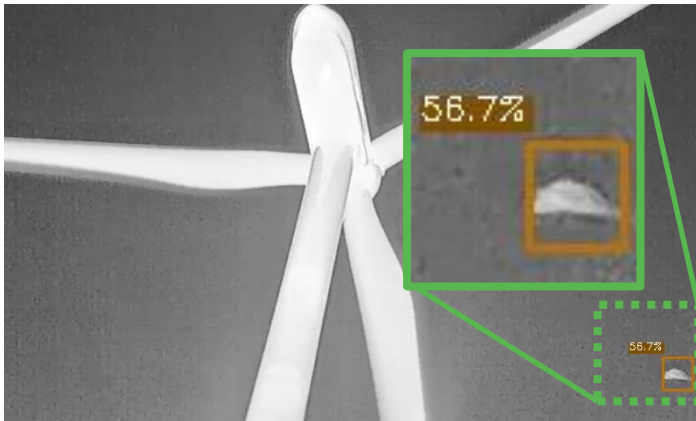
▲ AI detects flying objects

56.7%

The system monitors and automatically detects approaching birds in the vicinity of wind turbines by capturing videos from an infrared camera and detecting flying objects using AI. It provides **constant monitoring of bird strike occurrence in offshore wind farms**, where it is difficult to survey carcasses.
- The use of 24/7 monitoring and nighttime survey is possible.
- Prompt reporting of bird strike occurrence.
- AI-based automatic detection improves the efficiency of monitoring operations.
- Re-learning by AI improves accuracy.

"AI Bird" identification system (under development for commercial use)

"AI Bird" is the first system in Japan to use AI to identify specific bird species from footage captured by 4K cameras. The system can improve the accuracy of identification by repeatedly learning from footage taken at the same location. In cases where the system has been verified with the rare bird species; White-tailed and Steller's sea eagles, the reproduction rate* was 94%.

*Percentage of images in which the AI correctly detects the target.