

Hackathon Case Study 2: AI Eagle Detection and Turbine Curtailment

IdentiFlight. Student Version.

The Scenario

Offshore and onshore wind farms alike have a wildlife problem: turbine blades can kill birds, and golden and bald eagles are a particular concern in the US, since they are protected by federal law. For years, the main defence was human observers stationed near turbines, watching for eagles and radioing operators to shut turbines down manually. It was slow, expensive, and depended entirely on a person spotting a bird in time.

IdentiFlight, a computer vision system, was built to do this automatically. Cameras scan the sky around a wind farm and use a neural network to detect birds up to a kilometre away, working out each one's position, speed and flight path within seconds, and classifying whether it is a protected species. If the system judges that an eagle is on a collision course, it curtails the nearest turbine, slowing or stopping it, without a person needing to intervene.

Researchers from the US Geological Survey, The Peregrine Fund and Western EcoSystems Technology tested the system at Duke Energy's Top of the World wind facility in Wyoming. Eagle fatalities at the site fell by 82% once IdentiFlight was installed, while fatalities at a nearby control site without the system rose by 113% over the same period. A later multi-year study covering 2018 to 2021 found the reduction held at around 85%. The system now holds a database of more than 47 million images of protected species, and it is marketed to wind operators as a way to keep energy losses from curtailment to a minimum while meeting legal protections for eagles.

It's a rare case where an AI system's job is explicitly to protect wildlife rather than to make money faster, but that doesn't mean it comes without difficult questions.

Further Reading

- Electrek, *This AI optical technology cuts wind turbine eagle deaths by 82%*: electrek.co
- PLOS One, *Effectiveness of an artificial intelligence-based system to curtail wind turbines to reduce eagle collisions*: journals.plos.org
- The Peregrine Fund, *Research shows IdentiFlight camera technology greatly reduces wind turbine eagle fatalities*: peregrinefund.org

RRI Discussion Questions

Work through these following six questions as a team.

1. Anticipate

IdentiFlight has to balance two costs: every false negative, missing a real eagle, risks a protected bird's life and the operator's legal exposure, while every false positive, curtailing for a bird that wasn't actually at risk, costs the operator lost energy production. When the system was designed, whose risk tolerance do you think shaped where that balance was set, and what happens to that balance as the vendor tries to sell the system to more wind farms?

2. Reflect

The company that built and sells IdentiFlight also controls the training data, the detection thresholds, and the definition of what counts as a collision course. Wind operators and regulators are relying on those judgements without being able to fully see inside them. What would it take for you to trust a system like this to make an eagle's life-or-death decision, and is that different from what regulators currently require?

3. Engage

Conservation groups, wind developers, federal wildlife regulators and local communities all have a stake in how well this technology works, but very different reasons for caring. Who do you think had the most influence over how IdentiFlight was designed and deployed, and whose interests do you think were considered last?

4. Act

If a wind farm's compliance with eagle protection law increasingly depends on a single vendor's proprietary AI system, what happens if that vendor goes out of business, changes its pricing, or updates its model in a way that changes performance? What should the wind industry, or regulators, do now to avoid becoming dependent on one company's technology for something this consequential?

5. Scoring It

Using ORBIT's own tools, score this case study: what Technology Readiness Level (TRL) would you assign it, which Sustainable Development Goals does it affect, and what RRI Intensity Level (RIL) does that combination suggest? Be ready to explain your reasoning, since two teams might reasonably score this differently.

6. Your Proposal

You've been asked to write guidance for a UK offshore wind developer that wants to install an AI-based bird detection and curtailment system as part of an environmental permit application. As a team, draft a short (3-5 point) proposal covering:

- What evidence you'd want to see about the system's real-world accuracy before recommending it
- What ongoing monitoring or reporting you'd want built into the permit conditions
- How you'd explain to a sceptical conservation group why an AI system, rather than a person, is making these decisions

Presentation Task

In your team, prepare a 15-minute presentation covering your answers to all six questions above, with at least one slide per question. You should all participate in both the development and delivery of your presentation.