Challenge 1: Shannon SoundScape — AI Listening for Biodiversity Health

Pitch Title: *"Shannon SoundScape: Listening to Life"*

Overview:
The Shannon River Basin is alive with sound—from birds and bats to frogs and insects—but much of this biodiversity goes unrecorded. Our project aims to create an **AI-powered acoustic monitoring network** that continuously listens to the river's ecosystems, identifies species, and visualizes biodiversity trends.

Background Context

The Shannon River Basin hums with the sounds of life — from dawn birdsong and frog calls to the gentle buzz of pollinators and the soft hum of human activity. This invisible "soundscape" is a vital ecological signal: it reveals how healthy an environment truly is.
However, biodiversity monitoring today relies on field surveys that are expensive, infrequent, and limited in scope. Many species go unrecorded, especially at night or in remote areas.
Eco-acoustic monitoring — recording and analyzing environmental sounds — offers a transformative, non-invasive way to measure biodiversity continuously. Advances in AI-powered sound recognition now make it possible to identify species, track ecological shifts, and detect human noise pollution automatically.
This challenge invites innovators to turn the Shannon Basin into one of Europe's first acoustic observatories, where sound meets science to protect nature.

Problem Framing

How might we create an AI-powered acoustic monitoring network that continuously "listens" to the Shannon's ecosystems, analyzing sounds to track biodiversity changes, identify species, and engage communities in protecting their natural sound heritage.

Expected Outcomes

A network of eco-acoustic sensors or mobile-based recorders placed strategically across the Shannon Basin's habitats.
AI/ML models that analyze recordings to detect bird, bat, amphibian, or insect species — and quantify biodiversity richness.
A public "Shannon SoundMap" — a live web platform showing where natural sound activity is increasing or declining.
Citizen participation via mobile recording apps or school engagement kits.
Educational storytelling through interactive sound exhibits or VR experiences of the Shannon's soundscape.

Open datasets and policy insights for environmental agencies and biodiversity research.

Difficulty

Intermediate → Advanced
This challenge blends data science, ecology, and design thinking. It's ideal for interdisciplinary teams of AI developers, ecologists, educators, and community groups.

Scope
Your team will design an AI-powered acoustic monitoring system for the Shannon River Basin that can:
Collect & Stream Data: Capture environmental sounds (birds, bats, frogs, insects, and human noise) using sensors or mobile devices.
Analyze & Identify: Use AI/ML models to detect species, measure biodiversity richness, and track ecological changes over time.
Visualize & Engage: Build an interactive platform (web or mobile) to show real-time soundscapes, trends, and biodiversity hotspots.
Community Participation: Enable citizen scientists and schools to contribute recordings and explore local biodiversity.
Impact Goal: Create a living soundmap of the Shannon Basin that informs conservation, inspires environmental education, and fosters community engagement.

Datasets & Tools:

- **BirdCLEF dataset** for training bird identification AI models.
- **Shannon River biodiversity records** (Biodiversity Ireland) for ecological context.
- Tools: TensorFlow/PyTorch, Librosa for audio analysis, and web dashboards for visualization.

Challenge 2: Ghosts of the Shannon — Revealing Hidden Heritage Beneath the River

Pitch Title: *“Shannon’s Hidden Heritage: AI Meets Archaeology”*

Overview:
Beneath the Shannon River lie submerged bridges, mills, and villages, invisible yet rich in history. Our project uses **AI and remote sensing** to detect these hidden sites and bring them back to life through digital reconstructions.

Background Context

The Shannon River has shaped Ireland’s identity for millennia — as a trade route, spiritual site, and industrial artery. But beneath its waters lie lost bridges, mills, quays, and villages, many submerged or forgotten through centuries of flooding, hydroelectric expansion, and natural erosion.
These underwater heritage sites hold stories of adaptation, craftsmanship, and community life that could illuminate Ireland’s cultural evolution.
With today’s space-based radar, LIDAR, and sonar imaging, we can rediscover this hidden world without excavation. Using AI pattern recognition, subtle traces — such as linear structures or soil disturbances — can reveal archaeological sites invisible to the eye.
This challenge calls for blending history, data, and creativity to digitally resurrect the Shannon’s buried past for education, research, and tourism.

Problem Framing

How might we use satellite, sonar, and AI-based imaging to detect, map, and visualize submerged heritage along the Shannon River Basin — transforming invisible archaeology into immersive digital experiences?

Expected Outcomes
AI models capable of recognizing archaeological patterns in radar or sonar data.
A “Shannon Heritage Atlas” combining Copernicus SAR imagery, LIDAR elevation data, and old maps.
3D or AR/VR reconstructions of submerged bridges, villages, or mills — enabling virtual tours.
Collaboration with historians, archaeologists, and local communities to interpret discoveries.
Integration into educational curricula and digital tourism experiences along the Shannon.
An open-access archive for researchers and heritage organizations.

Difficulty

Intermediate → Advanced

Requires skills in geospatial analytics, AI imaging, history, and storytelling. Ideal for teams that combine technical innovation with cultural research.

Hackathon Scope:

Your team will develop a digital heritage discovery system that uncovers and visualizes submerged or hidden sites along the Shannon River Basin by:
Data Integration: Combine satellite imagery, LIDAR, sonar data, and historical maps to identify potential archaeological features.
AI Pattern Recognition: Build models to detect anomalies indicating bridges, mills, quays, or settlements under water or vegetation.
Digital Reconstruction: Create interactive 3D, AR, or VR visualizations of rediscovered heritage sites.
Community & Educational Storytelling: Share findings through engaging digital experiences for schools, tourists, and local history groups.
Impact Goal: Transform invisible archaeological history into immersive experiences that preserve heritage, educate the public, and support research without disturbing the sites.

Dataset That can be used:

Geological Survey Ireland (GSI) LIDAR Datasets

- High-resolution elevation data to identify topographical anomalies indicating heritage sites.
- Useful for mapping and reconstructing submerged or hidden features.

  https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx

Shannon Waterway Corridor Study 2006

- Description: An interactive GIS-based study detailing the heritage and landscape features along the Shannon and sections of the Grand and Royal Canals.
- Usefulness: Provides historical and spatial context for identifying potential submerged heritage sites.

  https://www.heritagecouncil.ie/content/files/shannon_waterway_corridor_study_2006_summary__2mb.pdf