BEN MCEWEN

POSTDOCTORAL RESEARCHER

SUMMARY

I am a postdoctoral researcher specialising in audio machine learning, with a focus on building scalable and data efficient models for analysing real-world acoustic data. My work sits at the intersection of machine learning, signal processing, biodiversity and conservation. I have hands-on experience with few-shot learning, active learning and uncertainty quantification, particularly in challenging large-scale monitoring settings with limited labeled data.

CONTACT

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EDUCATION

PHD

Computer Science and Software Engineering, University of Canterbury

2020 - 2024

BACHELOR OF ENGINEERING (HON)

First Class Honours
Mechatronics Engineering, University of Canterbury

2016 - 2019

INTERESTS

Audio Deep Learning (Python, PyTorch, HuggingFace)
Few-shot learning and active learning
Web Development (ReactJS, FastAPI)
Signal Processing
Computer Vision

EXPERIENCE

POSTDOCTORAL RESEARCHER

Tilburg University, Netherlands

2024 - current

TABMON transnational biodiversity monitoring from the top of Norway to Spain, implementing audio machine learning and bioacoustics methods at a transnational scale.

- **Developed data pipeline** (*PyTorch*) for analysis of 24/7 continuous data collection at a transnational scale. Developed novel methods related to active learning, and uncertainty quantification for data efficient inference.
- **Implemented database** (*ReactJS*, *FastAPI*, *SQLite*) for querying model predictions and viewing data
- **Collaboration within a multi-disciplinary team** of machine learning and bioacoustics researchers and ecologists.

Check out the open-source repository here

PHD CANDIDATE

Canterbury University, New Zealand

2020 - 2024

I developed active few-shot learning methods for detecting rare, at-risk and invasive species that are typically challenging to monitor.

- Developed and implemented active few-shot learning approaches for improved data efficiency.
- Developed open-source audio analysis software, aiding researchers in the analysis of raw field data containing rare acoustic features (Python, JavaScript, Docker).
- Published a bioacoustics dataset of an invasive species in New Zealand (Kaggle).

EXPERIENCE (CONT.)

LISTENING LAB

2023 - current

I am the founder and co-lead of the Listening Lab, which is a multidisciplinary ecoacoustic research group investigating the use of computational bioacoustics for conservation. We promote and advise on the use of computational methods for conservation.
More information here.

PROJECT SUPERVISON

2021 - current

I have supervised multiple research projects including summer projects and a final year software engineering and masters project.

- Wavelet-based segmentation of rare acoustic features (2021) - summer project
- Listening Lab analysis tool software development (2022) - summer project
- Efficient Annotation of Sparse Vocalisations for Bioacoustic Monitoring (2023) - final year project
- Temporal Context for Multi-Length Birdsong Classification (2025) - MSc Project

OTHER

- Co-organiser of **BioDCASE** and web-chair - BioDCASE is an annual set of challenges and benchmarks related to bioacoustics. I aid in the organisation of the BioDCASE challenge and develop and maintain the website. Check out the website here.
- Co-organiser and contributor to the **Full-Stack Bioacoustics Workshop.** This workshop takes participants from hardware and data collection to machine learning models and analysis.

INDUSTRY

RESEARCH ENGINEER

ŪWAI Robotics (2024)

I worked as a research engineer at ŪWAI Robotics developing software for their website and customer data portal - integrating data from underwater scans of mussel farms so that customers can view images and measurements (Google maps API, Firebase, ReactJS)

RESEARCH AND DEVELOPMENT ENGINEER

Robotics Plus | Summer Internship (2018, 2019)

Engineering internships for two consecutive summers. I assisted in the development of the Robotics Plus apple packing robot, improving computer vision software related to the identification and orientation of apples. I also contributed to the development of printed circuit boards (PCBs) for interfacing with cameras and lights on a log grading robot (Computer vision, PCB design).

PUBLICATIONS

[1] McEwen, B., Soltero, K., Gutschmidt, S., Bainbridge-Smith, A., Atlas, J., & Green, R. (2024). *Active Few-Shot Learning for Rare Bioacoustic Feature Annotation*. Ecological Informatics 82: 102734..

[2] McEwen, B., Bainbridge-Smith, A., Atlas, J., Gutschmidt, S., & Green, R. *The Effects of Noise Reduction on Bioacoustic Segmentation and Classification*. (Pre-print) Available at SSRN 4767160.

[3] McEwen, B. J., Soltero, K., Cone, I., Gutschmidt, S., Bainbridge-Smith, A., Atlas, J., & Green, R. (2024). *An Invasive Species Model and Dataset for Bioacoustic Monitoring of Common Brushtail Possum*, The New Zealand Journal of Ecology.

[4] McEwen, B. J., Soltero, K., Cone, I., Gutschmidt, S., Bainbridge-Smith, A., Atlas, J., & Green, R. (2023). *An improved computational bioacoustic monitoring approach for detecting sparse features*. The Journal of the Acoustical Society of America.

[5] McEwen, B., Soltero, K., Gutschmidt, S., Bainbridge-Smith, A., Atlas, J., & Green, R. (2023). *Automatic noise reduction of extremely sparse vocalisations for bioacoustic monitoring*. Ecological Informatics, 77, 102280.

[6] McEwen, B., Green, R., Gutschmidt, S., & Ryan, G. (2021, December). *Predictive State Estimation of Invasive Predators using Low-Resolution Thermal Cameras*. In 2021 36th International Conference on Image and Vision Computing New Zealand (IVCNZ) (pp. 1-6). IEEE.

Dissertation: *Computational Bioacoustics for Detection of Rare Acoustic Features*, 2024 - available here.

View publications on Google Scholar here.

CONFERENCES

- International Conference on Image and Vision Computing New Zealand (IVCNZ), 2020
- International Congress on Biological Invasions (ICBI), 2023
- Acoustic 2023 Conference, Acoustical Society of America, Sydney, 2023
- Artificial Intelligence Researchers Association, New Zealand, 2024
- World Ecoacoustics Congress, Madrid Spain, 2024
- International Bioacoustics Society (IBAC) congress, Denmark, 2025 (upcoming)

Other public speaking events:

- Predator Free 2050 Limited Landscape Project Hui, Capabilities Development Research, 2023 [link]
- University of Canterbury Biosecurity Innovation Public Seminar, 2023 [link]
- Forest and Bird New Zealand, Public Seminar, 2024
- Naturalis Biodiversity Center, Public Seminar, 2024

REFEREES

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