Andrew Mitchell, PhD

Machine Learning and Soundscape Researcher

andrew.mitchell.18@ucl.ac.uk | +44 7428 222414 | Central House, London, WC1H 0NN
0000-0003-0978-5046 | Andrew-Mitchell-18 | https://andrew-mitchell.netlify.app

Education

Sep 2018 – Sep 2022 | **Institute for Environmental Design & Engineering, University College London, UK**
PhD in Soundscapes & Machine Learning
Thesis title: *Predictive Modelling of Complex Urban Soundscapes – Enabling an engineering approach to soundscape design* (Available for download from ResearchGate
Thesis supervisors: Prof Jian Kang & Dr Phil Symonds

Sep 2012 – June 2015 | **Cardiff University, Wales, UK**
BSc. (Hons.) Physics & Music
Dissertation title: *The Physics of the Trombone Mouthpiece*
Supervisor: Prof Bernard Richardson

Research Experience

June 2022 - Present | **Soundscape Indices (SSID)**, Research Fellow
University College London, Institute for Environmental Design & Engineering

Sep 2018 - June 2022 | **Soundscape Indices (SSID)**, Doctoral Researcher
University College London, Institute for Environmental Design & Engineering
The SSID project aims at providing new perception-oriented indices to complement the existing set of decibel-based metrics, for a better characterization, design and management of urban soundscapes. Following the completion of my PhD, I remained at the SSID team to complete my work building a generalisable and useful predictive model of urban soundscapes. My primary research responsibility is to investigate machine learning modelling of soundscape perception based on acoustical and non-acoustical factors and promote the use of these models in engineering and design contexts. As a team member on the SSID project group, my practical responsibilities include:

- Supervise Masters research dissertations and other SSID researchers.
- Published 14 co-authored papers on soundscape, predictive machine learning modelling, and psychoacoustic analysis in peer-reviewed journals
- Coordinated collaboration with industrial and international research partners to promote the implementation of Soundscape in practice
- Designed and implemented a methodology framework for conducting soundscape assessments for use in research across the world
- Collect, manage, and publish large-scale acoustic datasets, including acting as the project lead on The International Soundscape Database.
- Developed the International Soundscape Database, data structure, and analysis package (soundscapy) for the storage and publication of a large-scale soundscape assessment database
- Developed and implemented a novel predictive soundscape model, making use of unique soundscape visualisation methods

May 2022 - Jan 2023

Alan Turing Institute Data Study Group, Academic PI and Challenge Owner
The Alan Turing Institute, British Library, London, UK
Funded by a UCL Health of the Public small grant, the DeLTA project aims to develop deep learning methods (specifically, a Temporal Convolutional Neural Network) for predicting annoyance perception of various urban sounds. The Turing Data Study Group is an extension to this project carried out in partnership with the Alan Turing Institute.

- Coordinating an 5-day intensive collaborative hackathon hosted by the Turing Institute
- Prepare two large-scale datasets and define an open-ended challenge for the AI and data science experts recruited to participate in the DSG
- Lead the DSG and supervise the preparation of an openly-published report and prototype model for real-world application

Mar 2021 - Nov 2021

DeLTA (Deep Learning Techniques for noise Annoyance detection), Research Assistant
University College London, Institute for Environmental Design & Engineering
Funded by a UCL Health of the Public small grant, the DeLTA project aims to develop deep learning methods (specifically, a Temporal Convolutional Neural Network) for predicting annoyance perception of various urban sounds. It is based on an online survey of annoyance ratings and complex sound labelling of a large-scale database of binaural recordings. My responsibilities for this project are project coordination, programming and model development, and signal processing expertise.

Aug 2021 - Ongoing

Catalogue of Soundscape Interventions, Research Assistant
University College London, Institute of Environmental Design & Engineering
Soundscape interventions are novel designs to create better soundscape experiences which go beyond a focus on reducing noise levels and instead promote the quality of the soundscape as a whole. This project aims to provide a public catalogue of innovative approaches to designing urban environments. My responsibilities in this project include:

- Copy editing and contributing text for the website
- Contribute to the development of a description framework for soundscape interventions
- Identify candidate examples to include in the catalogue

Mar 2021 - Ongoing

Soundscape Attributes Translation Project (SATP), Research Assistant
University College London, Institute for Environmental Design & Engineering
The SATP aims to provide validated translations of the currently accepted perceptual attributes of soundscape in order to enable rigorous soundscape assessments in languages other than English. My role in this project includes:

- Organise and analyse data from various international collaborators
- Provide guidance and advice to the English translation team
- Guest edit a journal special issue in which the research outputs from collaborators will be published

Sep 2020 - Mar 2022

Enrichment Placement and autSPACEs Project, Placement Student
The Alan Turing Institute, British Library, London, UK
The Turing Enrichment Scheme is a highly competitive placement scheme drawing from PhD students across the UK and bringing them to the UK's national institute for AI and data science. Outcomes:

- Published the International Soundscape Database and solely developed a Python package called Soundscapy for the analysis and visualisation of soundscape data.
- Contributor to AutSPACEs, a citizen science project in collaboration with the autism research charity Autistica: Provided expert insight on sonic perceptino and guidance from the perspective of an urban space researcher.

Work Experience

Jun 2019 - Mar 2021

Soundscape Consultant / Acoustics Engineer
Hoare Lea, LLC, London, UK
As part of an extensive industry collaboration conducted during my PhD, I provided leading edge insights from modern research on soundscapes and sound perception to better inform the design of the built environment in addition to providing more standard acoustics consulting services. I also lead the preliminary development of a unique and innovative method for assessing the sound experience of building occupants and designing a comprehensive soundscape rating metric. This project required:

- Concept development and integration with Hoare Lea's existing Living Lab system
- Development of a bespoke occupant survey app and custom acoustic analysis tools and software using Python
- Independent project management and technical service package development

Jun 2016 - Sep 2018

Acoustical Consultant
Newson Brown Acoustics, Santa Monica, CA

- Provided comprehensive technical reports on over 50 projects to architects, engineers, and contractors detailing acoustical recommendations throughout the process of building design
- Conducted extensive environmental noise surveys and performed detailed building envelope noise intrusion calculations
- Reviewed architectural, mechanical, electrical, and plumbing drawings to identify and address potential noise issues

Jul 2015 - Apr 2016

Junior Acoustical Consultant
Hayes McKenzie Partnership, Ltd., Machynlleth, Wales

- Utilised Cadna-A to carry out environmental noise impact assessments for more than 15 operational wind turbine projects and projects under development across Great Britain and Ireland
- Provided advice to clients on wind turbine development and operational noise issues as they arise and the application of current guidance, legislation, standards, and best practice in environmental noise
- Designed, adapted, and used bespoke noise analysis and processing programs in Python and Matlab

Supervision Experience

2022 **Shiqi Huang** Masters student in Environmental Design & Engineering, University College London
Dissertation title: *A predictive model for soundscape perception based on landscape type.*

2021 **Zhoushu Sun** Masters student in Smart Buildings and Digital Engineering, University College London
Dissertation title: *Comparison of non-linear machine learning algorithms for predictive modeling of Soundscape Pleasantness and Eventfulness*

2019 **Veronica Rugeles Allen** Masters student in Environmental Design and Engineering, University College London
Dissertation title: *Effects of vegetation on soundscape perception: A case study in London*

Teaching Experience

2022/23 **Senior Teaching Assistant**, Machine Learning for Smart Buildings
Masters course BENV0119, University College London
Environmental Tutor, Noise Control in Buildings
BARC0161 Design Practice 2, University College London
Dissertation Supervisor, Environmental Design & Engineering
Masters course, University College London

2021/22 and 2020/21 **Environmental Tutor**, Noise Control in Buildings
BARC0161 Design Practice 2, University College London
Senior Teaching Assistant, Machine Learning for Smart Buildings
Masters course BENV0119, University College London
Senior Teaching Assistant, Building Systems Physics
Masters course BENV0094, University College London

2019/20 **Teaching Assistant** Building Physics & Environment
Masters course BACE1002, University College London
Teaching Assistant Urban Physics
Masters course BENV0098, University College London

Contributions to Open Source Software and Data

Open Data **The International Soundscape Database (ISD)** [Zenodo repo]
The ISD was developed as part of the SSID project and represents the first and largest publicly available soundscape assessment database. It both makes available the datasets used throughout the SSID-related publications and is also designed to incorporate contributions from other researchers to form a large, cohesive, and ever-growing database of soundscape assessment. As of November 2021, this dataset has been viewed 287 times and downloaded 102 times.

Software **soundscapy** [Github repo]

soundscapy is an open-source python package for analysing and visualising soundscape data. Soundscapy provides a wide swath of acoustic and psychoacoustic analyses for binaural recordings, optimised for large-scale batch processing. Originally developed as just a visualisation tool for my own PhD research, Soundscapy is now a full-fledged python package, published on PyPI.

Academic Service

Science Outreach & Communication	**The Rest Is Just Noise Podcast**, Host The Rest Is Just Noise is a monthly podcast exploring the relationship between sound and our cities. As the primary host, each episode I interview an expert guest from fields such as acoustics, architecture, and environmental psychology, to discuss their latest work and introduce our audience to the science, beauty, and noise of urban sound.
	The Pandemic Sensory Archive, Expert Guest
Editing	**Applied Acoustics Special Issue**, Guest Editor Entitled “Soundscape Attributes Translation: Current Projects and Challenges” **De Gruyter Noise Mapping Special Issue**, Guest Editor Entitled "Living with the Pandemic: Reflections on the Urban Sound Consequences of 2 years of the COVID-10 Pandemic"
Reviewing	**IEEE Transactions on Affective Computing**, 1 Review **Journal of Acoustical Society of America**, 1 Review **International Journal of Environmental Research and Public Health**, 2 Reviews **Urban Forestry and Urban Greening**, 1 Review **People and Nature**, 2 Reviews **Building Acoustics**, 2 Reviews **Frontiers in Built Environment**, Review Editor for Urban Science

Grants & Awards

Oct 2022	**John Connell Award - Soundscape (Short-listed)**, Noise Abatement Society, UK Shortlisted for the Soundscape Attributes Translation Project (SATP). Final awards still to be announced.
May 2022 - Jan 2023	**Post Doctoral Enrichment Award**, The Alan Turing Institute, British Library, London, UK
Sep 2021 - Mar 2022	**Enrichment Scheme placement**, The Alan Turing Institute, British Library, London, UK Highly competitive 6-month placement drawing from PhD students across the UK applying AI or machine learning in original research.
Jan - Sept 2021	**Engagement Scheme placement**, The Alan Turing Institute, British Library, London, UK Virtual placement version of the Turing Enrichment Scheme, developed in response to COVID-19 conditions.
Nov 2020	**Early Careers Group Support Funding**, UK Acoustics Network+ £2,000 support funding to develop, host, and produce *The Rest Is Just Noise* podcast.
June 2020	**Research Capital Investment Fund (RCIF)**, UKRI Research England Co-author on a successful £50,469 funding application for an Integrated Modular Environmental Monitoring Suite (LivEnviro).
Dec 2019	**Best Paper Award**, ASA San Diego TC-Noise Awarded for the presentation ’Making cities smarter with new soundscape indices’
	ECR Travel Grant, UK Acoustics Network
2018 - 2022	**PhD Studentship**, ERC Advanced Grant no. 740696: Soundscape Indices–SSID Fully-funded 3-year (+6-month extension) PhD Studentship at University College London
2019 - 2020	**Monolith Seed Funding**, UCL Culture Performance Lab

Skills & Programming Languages

Advanced	Soundscape assessments, Python, scikit-learn, Seaborn & matplotlib, R, Excel, ArtemiS SUITE, LaTeX
Intermediate	CadnaA, SPSS, git/Github, Stan/brms, Linux
Basic	Tensorflow, Docker

Associations

2018 - Current | **International Misophonia Research Network (IMRN)**
Researcher and Advisory Board Member

2016 - Current | **Acoustical Society of America**
Associate Member
Technical Committee: Architectural Acoustics

2015 - Current | **Institute of Acoustics, UK**
Student Member

2018 - Current | **UK Acoustics Network (UKAN+)**
Member

Publications

2022

1. Kang, J., Aletta, F., Oberman, T., **Mitchell, A.**, Erfanian, M., Tong, H., Torresin, S., Xu, C., Yang, T. & Chen, X. Supportive Soundscapes Are Crucial for Sustainable Environments. *Science of The Total Environment* **855,** 158868 (2022).
2. **Mitchell, A.**, Aletta, F. & Kang, J. How to Analyse and Represent Quantitative Soundscape Data. *JASA Express Letters* **2,** 037201. eprint: `https://doi.org/10.1121/10.0009794` (2022).
3. Papadakis, N. M., Aletta, F., Kang, J., Oberman, T., **Mitchell, A.** & Stavroulakis, G. E. Translation and Cross-Cultural Adaptation Methodology for Soundscape Attributes – A Study with Independent Translation Groups from English to Greek. *Applied Acoustics* **200,** 109031 (Nov. 2022).

2021

4. Erfanian, M., **Mitchell, A.**, Aletta, F. & Kang, J. Psychological well-being and demographic factors can mediate soundscape pleasantness and eventfulness: A large sample study. *Journal of Environmental Psychology* **77,** 101660 (July 2021).
5. Lionello, M., Aletta, F., **Mitchell, A.** & Kang, J. Introducing a Method for Intervals Correction on Multiple Likert Scales: A Case Study on an Urban Soundscape Data Collection Instrument. *Frontiers in Psychology* **11,** 3943 (2021).
6. **Mitchell, A.**, Oberman, T., Aletta, F., Kachlicka, M., Lionello, M., Erfanian, M. & Kang, J. Investigating urban soundscapes of the COVID-19 lockdown: A predictive soundscape modeling approach. *The Journal of the Acoustical Society of America* **150,** 4474–4488 (Dec. 2021).
7. Orga, F., **Mitchell, A.**, Freixes, M., Aletta, F., Alsina-Pagès, R. M. & Foraster, M. Multilevel Annoyance Modelling of Short Environmental Sound Recordings. *Sustainability* **13** (Jan. 2021).
8. Tong, H., Aletta, F., **Mitchell, A.**, Oberman, T. & Kang, J. Increases in noise complaints during the COVID-19 lockdown in Spring 2020: A case study in Greater London, UK. *Science of The Total Environment* **785,** 147213 (2021).
9. Vida, J., Almagro, J. A., García-Quesada, R., Aletta, F., Oberman, T., **Mitchell, A.** & Kang, J. Urban Soundscape Assessment by Visually Impaired People: First Methodological Approach in Granada (Spain). *Sustainability* **13,** 13867 (Dec. 15, 2021).
10. Vida Manzano, J., Almagro Pastor, J. A., Garcia Quesada, R., Aletta, F., Oberman, T., **Mitchell, A.** & Kang, J. The "sound of silence" in Granada during the COVID-19 lockdown. *Noise Mapping* **8,** 16–31 (2021).

2020

11. Aletta, F., Oberman, T., **Mitchell, A.**, Tong, H. & Kang, J. Assessing the changing urban sound environment during the COVID-19 lockdown period using short-term acoustic measurements. *Noise Mapping* **7,** 123–134 (2020).
12. **Mitchell, A.**, Oberman, T., Aletta, F., Erfanian, M., Kachlicka, M., Lionello, M. & Kang, J. The Soundscape Indices (SSID) Protocol: A Method for Urban Soundscape Surveys–Questionnaires with Acoustical and Contextual Information. *Applied Sciences* **10,** 2397 (Apr. 2020).

2019

13. Aletta, F., Oberman, T., **Mitchell, A.**, Erfanian, M., Lionello, M., Kachlicka, M. & Kang, J. Associations between soundscape experience and self-reported wellbeing in open public urban spaces: A field study. *The Lancet* **394,** S17 (2019).
14. Erfanian, M., **Mitchell, A.**, Kang, J. & Aletta, F. The Psychophysiological Implications of Soundscape: A Systematic Review of Empirical Literature and a Research Agenda. *International Journal of Environmental Research and Public Health* **16,** 3533 (2019).
15. Kang, J., Aletta, F., Oberman, T., Erfanian, M., Kachlicka, M., Lionello, M. & **Mitchell, A.** *Towards soundscape indices* in *Proceedings of the 23rd International Congress on Acoustics* (Aachen, 2019), 2488–2495.

Conference Presentations & Invited Lectures

2022

1. **Mitchell, A.** *Python (or R) for Open and Reproducible Science* (Invited Lecture). Department of Psychology, Stockholm University.
2. **Mitchell, A.** *Soundscapy: An Introductory Workshop* (Invited Lecture). Soundscape: Applied Acoustics Group, Dept of Energy, Politecnico di Torino.

2021

4. **Mitchell, A.**, Oberman, T., Aletta, F., & Kang, J. *Development of a multi-level predictive soundscape model to assess the soundscapes of public spaces during the COVID-19 lockdowns* in *181st Meeting of the Acoustical Society of America* (Seattle, Dec 2021).
5. **Mitchell, A.** *Using regression models to predict urban soundscape perception* for *UCL IEDE Research Webinars* (Invited virtual webinar, Oct 2021).
6. **Mitchell, A.** *Industry and Research Collaboration in Soundscapes* in *Acoustics 2021* (Invited panel talk, Oct 2021).
7. Kang, J., Aletta, F., Oberman, T., **Mitchell, A.**, & Tong, H. *Acoustic environments and Soundscapes in London during the Spring 2020 Lockdown* in *Acoustics in Focus – 180th Meeting of the Acoustical Society of America* (Virtual, June 2021).
8. **Mitchell, A.** *Measuring and Reproducing Urban Soundscapes* for *Chicago Audio Engineering Society* (Invited virtual lecture, Feb 2021)
9. Erfanian, M., **Mitchell, A.**, Aletta, F. & Kang, J. *Soundscape Pleasantness and Eventfulness can be mediated by Psychological Well-being and Demographic factors* in *The 32nd International Conference of Psychology (ICP)* (Prague, Jan 2021).

2020

10. **Mitchell, A.** *The Soundscape Indices (SSID) Protocol – A method for practical soundscape assessments in the city* in *Acoustics 2020* (Virtual, Oct 2020).
11. Alsina-Pagès, R.M., Orga, F., Freixes, M., Mallol, R., Aletta, F., **Mitchell, A.**, Kang, J. & Foraster, M. *Urban environment soundscape evaluation: Milan Case study of noise events perceptions by citizens* in *Internoise 2020 Conference* (Seoul, Aug 2021).

2019

9. **Mitchell, A.**, Aletta, F., Oberman, T., Erfanian, M., Kachlicka, M., Lionello, M., & Kang, J. *Making cities smarter with new soundscape indices* in *178th Meeting of the Acoustical Society of America* (San Diego, Dec 2019).
10. **Mitchell, A.** & Kang, J. *The spectral structure of acoustic time series can predict the perceptual assessment of urban soundscapes* in *178th Meeting of the Acoustical Society of America* (San Diego, Dec 2019).
11. Erfanian, M., **Mitchell, A.** & Kang, J. *The neurophysiology and physiology of soundscape: A review of the empirical literature* in *6th European Conference on Psychology & the Behavioral Sciences (ECP2019)* (Brighton, Feb 2019).