# Elliott Wise

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## Education

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| 2018 | **Ph.D. in Numerical Analysis** | University College London |
| 2012 | **B.Eng. (Hons), Mechatronics** | Australian National University |
| 2012 | **B.Sc., Mathematics** | Australian National University |

- Expert in **applied mathematics**, **high-performance computing/simulation**, **acoustics**
- Studies also included **computer science**, **environmental science**, **electronics**
- Focus within mathematics was on **scientific and industrial modelling**

## Scholarships

- Dean's Prize (£88,000), Faculty of Engineering, University College London.
- Summer Research Scholarship (AU$4,000), Math. Sci. Inst., Australian National University.

## Work history

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| 2018– | **Research Associate** | Mechanical Engineering, Imperial College London |
| 2015–2018 | **Teaching Assistant** | Med. Phys. & Biomed. Eng. University College London |
| 2013–2014 | **Mathematician** | Commonwealth Sci. & Ind. Res. Org. (CSIRO), Australia |
| 2010–2012 | **Consulting Engineer** | Eggler Consulting Engineers, Canberra, Australia |

- Experience working in **industry**, the **civil service**, and the **university** sector
- Completed a prestigious two-year **graduate program** with Australia's chief science agency
- Highly adaptable, having worked on projects spanning:
  - Engineering—**Aerospace materials**, **ultrasonic inspection**, **industrial chemistry**
  - Natural sciences—**Cancer therapy**, **environmental science**, **biochemistry**
  - Humanities—**Natural language processing**

## Data science projects

1. **Video processing with deep learning:**
   - Segmented defects from ultrasonic inspection data. These are time-series' in which defects are intermittently visible. Applications include nuclear energy and petrochemicals.
   - Improved identification of deep and occluded defects.
   - Built and applied a **convolutional autoencoder** (neural network) using **PyTorch**.
2. **Topic modelling in journalism:**
   - Designed an experiment to measure changes in the content of AfterEllen—a queer pop-culture news site—following its acquisition by MTV.
   - Discovered a reduction in community engagement and political commentary, and an increase in superficial coverage of television and music.
   - Validated findings through close reading of archived versions of the webpage.
   - Used **BeautifulSoup** to scrape articles/metadata, unsupervised learning (**latent Dirichlet allocation**) to extract topics/keywords from the corpus, examined topic prevalence over time using **kernel density estimation**.
3. **Hydrologic modelling:**
   - Investigated the IHACRES hybrid physical/empirical rainfall–runoff model (R package hydromad) for improving catchment management and farmland productivity.
   - Developed a **regression method** for **inferring model parameters** in catchments which lack calibration data (rainfall–runoff measurements). This was based on **catchment features** such as size, vegetation, and location.

## Skills

### Mathematics

- **Numerical analysis:** Algorithmic development for high-performance computing, accurately solving differential equations, solving inverse problems.
- **Machine learning:** Deep neural networks, regression, feature selection, latent Dirichlet allocation, kernel density estimation.
- **Modelling and simulation:** Development of simulation codes, selection and application of modelling tools, derivation of physics-based models.

### Programming/computing

- Extensive experience with **MATLAB** as a developer of the *k*-Wave medical ultrasound simulation toolbox. This has over 10,000 registered users and more than 700 citations.
- Proficient in **Python** for **data science** (e.g. **pandas**, **scikit-learn**), **web-scraping** (**BeautifulSoup**), **general-purpose scripting**.
- Familiar with **Julia**, **SQL**, some experience with **R**, **C**, and **Java** through undergraduate studies.
- Well-versed in software version control and issue tracking (**Git, GitHub/GitLab**).
- Can design, document, and maintain clear, extensible code bases.
- Confident running large-scale, lengthy simulations using supercomputing resources.
- Proficient in using Unix-based operating systems.

### Communication

- **High-quality writing**, as evidenced by many peer-reviewed journal papers, academic theses.
- **Can present work clearly** in a variety of contexts, including international conferences, client meetings, and departmental seminars.
- **Can confidently and convincingly construct arguments**, as I've demonstrated by defending my work to the academic community.
- **Effectively teach** complex material to graduate and undergraduate students
  - Teaching assistant at University College London (lab technique, coursework evaluation).
  - Head Engineering tutor at John XXIII residential hall, Australian National University.
  - Designed teaching material for the Australian Defence Force Academy.
  - Demonstrated ultrasound imaging to aspiring scientists at open days.

### Personal effectiveness

- I am **enthusiastic** and **intellectually curious**, with a passion for new technologies.
- My work demonstrates **integrity**: I aim to conduct projects with a positive societal impact.
- I can work effectively with colleagues, clients, and stakeholders from different backgrounds. This is demonstrated through the consulting work I conducted at the CSIRO.
- I am experienced in **scoping, planning and executing** complex and ambitious research projects, and have **contributed deep insights** to many scientific problems.
- I am able to conduct thorough **literature reviews**, and identify knowledge gaps. This is an integral part of the scoping and planning stages in scientific research.
- I am a **skilled analyst**, and can **critically evaluate** and apply new algorithms to problems.
- I am able to **synthesise knowledge** across domain boundaries. This is demonstrated by the wide range of my past research experiences.

## Professional memberships

- United Kingdom Research Software Engineers
- United Kingdom Acoustics Network