# Elliott Wise

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## Education

2018 **Ph.D., 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 was on **scientific and industrial modelling**.
- Dean's Prize: Scholarship (£88,000), Faculty of Engineering, University College London.
- Summer Research Scholarship (AU$4,000), Math. Sci. Inst., Australian National University.

## Experience

1 year **Senior Consultant** Amey Strategic Consulting 2019–Present

- Amey Strategic Consulting specialises in **data science** for **asset management** and **infrastructure engineering** projects.
- I work as a **data science consultant** and **software developer**.
- Projects/clients have included:
  - **Kent County Council**: Development of a web-app to help manage road operations (**React Bootstrap + Plotly + PostgreSQL**). My focus is on identifying and communicating road accident risk to planners, and developing a **causal machine learning model** of this risk to help direct interventions.
  - **Ofgem**: **Development of regulatory policy** to ensure energy network companies plan asset maintenance/improvements to minimise monetised risk to consumers. This involved extensive data analysis, workshopping, development a scenario exploration tool (**Plotly Dash**), **quality-assurance checks** on, and subsequent refactor of the pipeline for setting risk-targets (**VBA + Power Query**).
  - **Network Rail**: Development of a dashboard for improved train delay quantification and allocation/communication of responsibility to station managers (**Power BI + PostgreSQL**). This involved development of an analytics pipeline and database.
  - **New York Metropolitan Transportation Authority**: Development of a web-app to facilitate data-driven asset investment decisions (**Power BI + SQL**). I was the **lead developer**, and my analytics work focussed on elevator and escalator investment prioritisation.
  - **Ferrovial Centre of Excellence for Asset Management**: Development of a web-app to simulate the effect of new EU regulation on recycling contracts (**R-Shiny**).

1 year **Research Associate** Imperial College London 2018–2019

- Mathematician within the Non-Destructive Evaluation group, which develops **ultrasonic measurement** techniques for detecting flaws in mechanical components.
- Development of **ultrasonic imaging algorithms** for pipe inspections (corrosion in difficult-to-inspect locations). This included software development in **Matlab**, and the design of deep learning algorithms for image processing (a **convolutional autoencoder** built with **Pytorch**).
- Simulation of **metamaterials**, a hypothesised mechanism for sound damping in moth wings that is thought to aid them in avoiding predation by echolocating bats (joint work with the Mathematics department).

4 years **Ph.D. Researcher** University College London 2014-2018

- I was a member of the Biomedical Ultrasound Group, which develops new **ultrasonic therapies** (e.g. **cancer ablation**, **neuro-stimulation**) and associated modelling and simulation tools. I also collaborated with computer science researchers at Brno University of Technology.

- I contributed to the development of the *k*-Wave **Matlab** toolbox for medical ultrasound simulation. This has over **10,000 registered users** and more than **700 citations**.
- My research included four projects, which tackled different aspects of the computational efficiency of the mathematics (**Fourier collocation**) underlying the toolbox's acoustic model.
- I authored **7 journal papers** and **2 conference papers** based on work conducted here.

2 years **Mathematician** Commonwealth Scientific & Industrial Research Organisation 2013–2014

- This is Australia's national science agency, whose chief role is to improve the economic and social performance of Australian industry.
- My role was within Mathematics, Statistics, and Informatics, primarily applying modelling and numerical simulations to **materials science** problems, including:
  - Designing a polymer filter to bind and capture proteins for use as an antimicrobial agent. This innvolved **molecular dynamics** and **metadynamics** simulations (**NAMD**, **LAAMPS**).
  - Improving the lifespan of ion thrusters—a form of **spacecraft propulsion**—though careful choice of materials. This was informed by simulations of sputtering.
  - Modelling transverse deformation in **carbon fibres** to develop a methodology for characterising their elastic properties. This involved **finite-element modelling (COMSOL)**.
- I also conducted one project in collaboration with a gender studies scholar: Investigating changes to the content of AfterEllen—a queer pop-culture news site—before and after its acquisition by MTV. This involved **web-scraping** and **topic modelling**.

2 years **Consultant** Eggler Consulting Engineers 2010–2012

- Eggler Consulting Engineers provides **systems engineering** management for military vehicle projects, as well as related **teaching services** to both industry and academia.
- Worked as a consultant to **Rheinmetall MAN Military Vehicles** on a response to a Defence tender for a fleet of modular logistics vehicles.
- **Prepared teaching material** on vehicle design for the Australian Defence Force Academy.
- Administrated and created website content on military vehicle history.

## Skills/tools

### Software, computing

- **Languages**: Python, Julia, Matlab, R, Javascript, SQL, Cypher
- **Web-app development**: Plotly Dash, R-Shiny, Flask, React-Bootstrap
- **Deployment**: Amazon ECS/ECR, EC2, docker-compose
- **Version control, issue tracking**: Git, GitHub/GitLab
- **Microsoft enterprise tools**: Power BI, Power Apps, Power Query/M, DAX

### Data science, mathematics

- **Libraries**: Pandas, Plotly, scikit-learn, Pytorch, Kedro, networkx, BeautifulSoup, D3
- **Classical machine learning**: Regression, classification (random forests), LightGBM, clustering (DBSCAN), NLP (topic modelling via LDA)
- **Deep learning**: Convolutional autoencoders, TabNet (attention, encoding categorical variables)
- **Databases**: PostgreSQL, Neo4j
- **Applied mathematics**: Numerical methods for differential equations, optimal transport

### Communication

- **Can present work clearly** in a variety of contexts, including client meetings, departmental seminars, and international conferences.
- **High-quality writing**, as evidenced in industry by successful bid-writing, and in academia by numerous peer-reviewed journal papers and my PhD thesis.
- **Can confidently and convincingly construct arguments**, as I've demonstrated over seven years defending my contributions to scientific research within the academic community.
- **Effectively teach complex material** to graduate and undergraduate students