Dr. Aoife Hughes, MBCS, BS.c., Ph.D.

RESEARCH DATA SCIENTIST | SOFTWARE ENGINEER

London, UK

✉ aoife1hughes@gmail.com | 🎂 May 5th, 1994 | 🏠 aoifehughes.github.io/ | 🐙 github.com/AoifeHughes | 🎓 Scholar

Personal Profile

Dedicated and collaborative professional with a strong foundation in AI and a profound commitment to Equality, Diversity, and Inclusivity (EDI). With a penchant for tackling complex problems, I excel in adopting innovative solutions and methodologies. My expertise extends beyond technical prowess, as I emphasize clear communication, facilitating understanding and fostering inclusive environments. Passionate about leveraging AI for ethical and transformative purposes, I continually seek opportunities to advance knowledge and collaborate on impactful initiatives.

Education

John Innes Centre — *England, UK*

Ph.D. in Computational Modelling of Cellular Information Transfer — *Sept 2018 - 2022*

- Conducted forefront research on plant cell signalling in a multidisciplinary team.
- Mentored M.Sc. and undergraduate students, enhancing their academic progression.
- Published in prestigious academic journals and championed open-source software projects.

Aberystwyth University — *Wales, UK*

B.Sc. in Computer Science, First Class Honours — *May 2014 - May 2018*

- Dissertation led to two notable research publications, highlighting academic prowess.

Work Experience

The Alan Turing Institute — *England, UK*

Principal Investigator — *August 2023 - Current*

- Directed collaborations with health sector industry partners.
- Facilitated research into toxicity prediction in drug discovery
- Extensive use of Machine Learning and AI to develop novel solutions to industry problems.

The Alan Turing Institute — *England, UK*

Research Data Scientist — *July 2022 - Current*

- Managed projects ranging from climate simulations to AI-guided pandemic policies.
- Offered consultation to academic collaborators and mentored staff through Turing's development program.
- Developed reproducible pipelines for climate change projections and contributed to open-source software education.
- Championed EDI initiatives and fostered partnerships to further diversity goals.
- **Technical Skills:** C/C++, Python, Linux, Azure, Scripting, Git.
- **Soft Skills:** Teamwork, Time Management, Communication, Mentoring, Collaboration.

Journal of Open Source Software (JOSS) — *Online*

Editor — *September 2022 - Current*

- Volunteer position; reviewed submissions and coordinated publication processes.
- Enhanced and debugged the JOSS web portal for article submissions.
- **Technical Skills:** Git, Code Reviewing.
- **Soft Skills:** Leadership, Time Management, Communication.

Doonan Lab — *Wales, UK*

Research Software Engineer (X-ray Image Analyst) — *2017 - 2018*

- Pioneered novel methods for x-raying wheat to study morphometric traits, employing cutting-edge AI techniques.
- Developed automated systems for high-throughput x-ray image data extraction, crucial for understanding crop response to climate change variables like drought and temperature conditions.
- Facilitated research that contributed to significant findings on the domestication and evolution of crops, with results and developed methodologies made open-source.
- Worked collaboratively to address challenges in semantic segmentation and statistical analysis of large-scale 3-D image datasets.
- **Technical Skills:** Data Analysis, AI Solutions, Semantic Segmentation, Statistical Analysis.
- **Soft Skills:** Teamwork, Problem-solving, Interdisciplinary Collaboration.

National Plant Phenomics Centre — *Wales, UK*

Research Scientist — *2016 - 2017*

- Analyzed biological data for research studies.

Computer Science Department, Aberystwyth University   *Wales, UK*

Teaching Assistant   *2015 - 2018*

- Instructed undergraduates in programming practices.

Belfast Metropolitan College   *Ireland*

Systems Developer   *2013 - 2014*

- Led a comprehensive system upgrade across the college.

Salto National Gymnastics Centre   *Ireland*

Gymnastics Coach   *2012 - 2014*

- Trained elite gymnasts to achieve international recognition.

Highlighted Software Projects

AhLingo   *Online*

Delta Solutions   *2023*

- Innovative platform harnessing LLMs and AI to facilitate language learning for users.
- Integrates advanced algorithms to provide intuitive and adaptive language lessons.
- `https://github.com/aoifehughes/ahlingo`

PoliwhiRL   *Online*

Delta Solutions   *2024*

- Machine learning library using reinforcement learning to optimise pathing in comptuer games
- Uses computer vision and Deep-Q-Networks to train agents to navigate complex environments
- `https://github.com/aoifehughes/PoliwhiRL`

Ethical Assurance Platform   *England, UK*

The Alan Turing Institute   *2023*

- Platform designed to evaluate the ethical implications of AI systems.
- Employs Django and React frameworks for seamless assurance case creations by non-technical users.
- `https://github.com/alan-turing-institute/AssurancePlatform`

Pandemia   *England, UK*

The Alan Turing Institute   *2022*

- Framework for pandemic modeling using C and Python.
- Collaborated with Imperial University researchers to bolster software engineering practices, emphasizing openness and adaptability.
- `https://github.com/PandemiaProject/pandemia`

Narrow Escape Simulator   *England, UK*

John Innes Centre   *2021*

- Developed during Ph.D, this stochastic simulation offers numerical solutions to the narrow escape problem using efficient coding.
- `https://github.com/AoifeHughes/PyEscape`

Data Science Course   *England, UK*

The Alan Turing Institute   *2022*

- Open source initiative offering structured coursework and self-study resources for research data science.
- Contributed in collaboration with the Turing research engineering team.
- `https://github.com/alan-turing-institute/rds-course`

X-ray Analysis Software for Wheat Grains   *Wales, UK*

National Plant Phenomics Centre   *2018*

- Open-source toolkit to automate morphometric data extraction from 3-D x-ray plant imagery.
- `https://github.com/NPPC-UK/microCT_grain_analyser`

Skills

Languages	Python, R, C/C++, Java, JavaScript, C#, PHP, MATLAB, Haskell, Ruby, Lisp, HTML/CSS.
Frameworks & Libraries	React, Django, Llama, Flask, TensorFlow, PyTorch.
AI & LLMs	ChatGPT API Development, Large Language Models, Machine Learning, Neural Networks.
Computational	Microsoft Azure, High Performance Computing, Docker, iOS/Android Development, Databases, Git, Image Analysis.
Research	Genomics, Transcriptomics, Stochastic Methods, Biological Systems, Statistics.
Soft Skills	Project Management, Time Management, Communication, Teaching, Teamwork.

Achievements

2023	**Software Sustainability Institute Fellowship**, Awardee	*England, UK*
2022	**DigiEduHack Climate Change Contest**, Finalist	*England, UK*
2019	**UK Open Source Awards**, Winner	*Wales, UK*
2018	**Biotechnology and Biological Sciences Research Council**, Fully Funded Ph.D.	*England, UK*
2017	**Genetics Society Research Grant**, Awardee	*Wales, UK*
2016	**UK-RAS Field Robotics Contest**, 2nd Place	*England, UK*
2014	**Aberystywth University Excellence Scholarship**, Awardee	*Wales, UK*

Charity and Volunteer Work

Events Coordinator *England, UK*

Special Effect *2023 - Current*

- Led outreach events and promoted charity at conferences.

Podcast Organizer & Gender Equality Network Chair *England, UK*

The Alan Turing Institute *2022 - 2024*

- Managed podcast schedules, recordings, and research for interviews.
- Advanced gender equality; bridged communication between network members and management.

Advocate for Equality, Diversity, and Inclusivity *England, UK*

Various *2020 - Current*

- Analyzed Turing recruitment data; conducted STEMM-diversity workshops and panel discussions.

Teacher *England, UK*

The Brilliant Club *2019 - Current*

- Developed courses, taught 11-18 age groups, and provided academic evaluations.

Science Communicator & Open Source Contributor *UK & Online*

Various *2018 - Current*

- Delivered talks at events like Pint of Science and FOSDEM; engaged with audiences on podcasts and social media.
- Enhanced Wikipedia equality, contributed to open projects, and provided community support on forums like Stack Overflow.

Publications

[1] Frederick Cook et al. "Barley lys3 mutants are unique amongst shrunken-endosperm mutants in having abnormally large embryos". In: *Journal of Cereal Science* (2018).

[2] **Aoife Hughes**, Christine Faulkner, Richard J. Morris, and Melissa Tomkins. "Intercellular Communication as a Series of Narrow Escape Problems". In: *IEEE Transactions on Molecular, Biological and Multi-Scale Communications* (2021). DOI: 10.1109/TMBMC.2021.3083719.

[3] **Aoife Hughes**, Richard J Morris, and Melissa Tomkins. "PyEscape: A narrow-escape problem simulation implementation". In: *Journal of Open Source Software* (2020).

[4] **Aoife Hughes** et al. "Grain depth increases during early domestication in small grain cereals". In: *The Plant Journal* (2019).

[5] **Aoife Hughes** et al. "Non-Destructive, High-Content Analysis of Wheat Grain Traits Using X-Ray Micro Computed Tomography". In: *Plant Methods* (2017). DOI: 10.1186/s13007-017-0229-8.

[6] Mina Ohtsu et al. "Colletotrichum Higginsianum Effectors Exhibit Cell to Cell Hypermobility in Plant Tissues and Modulate Intercellular Connectivity amongst a Variety of Cellular Processes". In: (2021). DOI: 10.1101/2021.01.13.426415.

[7] Melissa Tomkins, **Aoife Hughes**, and Richard J Morris. "An Update on Passive Transport in and out of Plant Cells". In: *Plant Physiology* (2021). DOI: 10.1093/plphys/kiab406.

References available upon request.