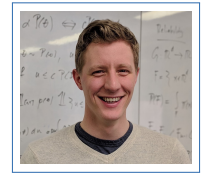


Ashley Scillitoe

PhD

Researcher using data-driven methods to tackle problems in fluid dynamics, computational simulation, and engineering design.

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For detailed project descriptions, demonstration apps, and a list of publications, please visit ascillitoe.com.

Key Skills

Programming	HPC in Fortran with MPI/OpenMP/Coarrays, C++, Python, Matlab.	Development	HTML/CSS, Git version control, CI and unit testing.
Theory	Computational PDE's, Linear algebra, supervised learning, dimension reduction, parallel computing, uncertainty quantification, feature engineering, black-box model interpretation.	Other	Python data stack (e.g. Numpy, Scipy, Pandas, Scikit-learn, Matplotlib, PyTorch, PyMC3), Web apps (Dash/Plotly/Streamlit), Cloud computing (Azure and Heroku), L ^A T _E X.

Experience

Research

- 2018-present **Research Associate**, *Data-Centric Aeronautics, The Alan Turing Institute*, UK.
Researching novel data-centric techniques for tackling challenges in the aeronautical industry, with a focus on interpretability and uncertainty quantification. Projects include:
- Introduced polynomial regression trees; a new class of supervised machine learning models offering high interpretability, explainability, and accuracy.
 - Used Mondrian forests to augment complex physical models with flow physics learnt from high fidelity simulations.
 - Developed data-driven dimension reduction techniques for aerospace design tasks.
 - Created rapid flowfield estimation frameworks using deep learning and dimension reduction.
- 2019-present **Developer**, *Effective Quadratures*, UK.
Developing machine learning capabilities in *equadratures*; an open source python library using polynomials for surrogate modelling, sensitivity analysis, and uncertainty quantification.
- 2019-present **Workshop Leader**, *Effective Quadratures*, UK.
Prepare and run workshops on statistics and machine learning for engineers at the Culham Centre for Fusion Energy, Rolls-Royce, NPL, McLaren Automotive, Siemens, R² Data Labs and others.
- 2019-present **Mentor**, *Google Summer of Code*, Worldwide.
Mentor students on open source projects as part of GSoC, with previous projects including:
- Implementation of polynomial regression trees in *equadratures*.
 - Building a web app for uncertainty quantification of physical systems.
- 2017-2018 **Research Associate**, *University of Cambridge/Rolls Royce plc*, UK.
- Worked with Rolls-Royce to bring PhD work into their production CFD code.
 - Implemented a turbulence modelling uncertainty quantification framework in the code.
- 2011 **Research Assistant**, *University of Manchester*, UK.
Built upon MEng dissertation work, designing a propulsion system for a Hexrotor MAV. Designed a static thrust test rig and DAQ system. Frequently used CAD and rapid prototyping (SLA).

Conference Organisation

- 2020, 2021 **Programme Committee**, *CFDML Workshop at ISC 2020 and 2021*, Virtual.
2015 **Deputy Coordinator**, *Fluids Energy Turbo Expo 2015*, Cambridge, UK.

Industry

- 2011-2012 **Aerodynamics Intern**, *AgustaWestland Ltd*, Yeovil, UK.
A one year internship split between the Wind Tunnel Test and Fuselage aerodynamics departments. Responsible for all aspects of a drag reduction test regime for the AW159 helicopter, and performed CFD analyses to design a new exhaust system.
- 2010 **Systems Engineering Summer Intern**, *Thales Air Defence Ltd*, Belfast, UK.
Created a Matlab/Simulink identification platform to identify black-box mathematical models of dynamical systems. This was then used to analyse and pre-process flight trial data.

Education

- 2013-2017 **PhD - Computational Fluid Dynamics**, *University of Cambridge*, UK.
Supervised by Professor Paul Tucker and supported by Rolls-Royce Aerospace.
 - Examined the application of Large Eddy Simulation (LES) to modern gas turbine compressors.
 - High fidelity LES used to study the complex flow physics in compressors, with findings informing compressor-specific turbulence modelling strategies.
- 2008-2013 **MEng (Hons) Aerospace Engineering - 1st Class**, *University of Manchester*, UK.
Graduated top of class with an 84% average. Elected student representative.
- 2001-2008 **Fortismere School**, London, UK.

Interests and Hobbies

- Societies Active Affiliate of RAeS and AIAA.
Sport Competitive road cyclist, ski mountaineer, and qualified swimming teacher.

Publications

A selection of recent publications are shown below. For a complete list, please see ascillitoe.com.

- 2021 Scillitoe, A., Seshadri, P., Girolami, M. "Uncertainty Quantification for Data-Driven Turbulence Modelling with Mondrian Forests". *J. Comput. Phys.* DOI.
- 2021 Scillitoe, A., Wong, C., Seshadri, P., Duncan, A. "Polynomial Ridge Flowfield Estimation". *Phys. Fluids*. Under review. PDF.
- 2021 Scillitoe, A., Wong, C., Hill, B., Seshadri, P. "Polynomial Regression Trees". *JMLR*. Under review.
- 2021 Scillitoe, A., Seshadri, P., Wong, C. "Instantaneous Flowfield Estimation with Gaussian Ridges". *AIAA SciTech*. DOI.
- 2020 Scillitoe, A., Ubald, B., Seshadri, P., Shahpar, S. "Design space exploration of stagnation temperature probes through dimension reducing subspaces". *ASME Turbo Expo*. DOI.
- 2019 Scillitoe, A., Tucker, P. G., Adami, P. "Large Eddy Simulation of Boundary Layer Transition Mechanisms in Gas-Turbine Compressor Cascades". *J. Turbomach*. DOI.