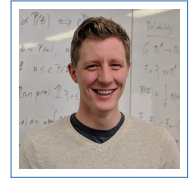# Ashley Scillitoe

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

⌂ *London, UK*
▢ *+44 (0)7926 251 138*
✉ *ashleyscillitoe@googlemail.com*
🔗 *ascillitoe.com*

---
## Key Skills

| | |
|---|---|
| **Data Science** | ML monitoring and explainability, deep learning, uncertainty quantification, dimension reduction, surrogate modelling. |
| **CFD** | Data-driven CFD, hi-fidelity methods, turbulence/transition modelling, pre/post-processing. |
| **Other** | Software engineering (Git, CI/CD, API design), HPC in Python & Fortran, fluid dynamics. |

---
## Experience

**2021-present** — **Research Engineer**, *Seldon Technologies*, UK

Data Science Research Engineer at Seldon, a leading MLOps company. Responsible for:
○ Research in ML explainability and monitoring for text, image and tabular data.
○ Development of the open-source Python libraries Alibi:Explain and Alibi:Detect. Involves frequent use of deep-learning frameworks including PyTorch, TensorFlow, Numba and PyKeOps.
○ Creation of MLOps tooling for deployment of data science components, involving the use of Docker, Kubernetes, and the Seldon-Core and MLServer libraries.

**2018-2021** — **Research Associate**, *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:
○ Used machine learning to augment CFD 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.

**2019-2021** — **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.

**2017-2018** — **Research Associate**, *University of Cambridge/Rolls-Royce plc*, UK

○ Worked with Rolls-Royce plc to extend their high fidelity CFD capability for gas turbine design.
○ Developed capability for compressible Large Eddy Simulations.
○ Implemented a turbulence modelling uncertainty quantification framework.

**2013-2017** — **PhD - Towards Predictive Eddy Resolving Simulations for Gas Turbine Compressors**, *University of Cambridge*, UK

Supervised by Professor Paul Tucker, awarded December 2017.
○ Examined the application of Large Eddy Simulation to modern gas turbine compressors.
○ Implemented a number of extensions for high-fidelity CFD in the Rolls-Royce CFD toolset.
○ Ran large-scale high-fidelity simulations to study the complex flow physics in compressors.
○ Results were used to inform the development of compressor-specific turbulence models.

**2011-2012** — **Aerodynamics Internship**, *AgustaWestland Ltd*, 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.
○ Performed CFD analyses to design a new exhaust system.

# Teaching

| | |
|---|---|
| 2019-present | **Mentor**, *Google Summer of Code*, Worldwide |
| | Mentor students on open-source projects as part of GSoC, with projects including: |
| | ○ Implementation of polynomial regression trees in equadratures. |
| | ○ Building a web app for uncertainty quantification of physical systems. |
| 2019-2021 | **Workshop Leader**, *Effective Quadratures*, UK |
| | Prepared and ran workshops on statistics and machine learning for engineers at the Culham Centre for Fusion Energy, Rolls-Royce, NPL, McLaren Automotive, Siemens, and $R^2$ Data Labs. |
| 2016-2018 | **Undergraduate Supervisor**, *University of Cambridge*, UK |
| | Supervised (tutored) 2nd year ThermoFluids tutorial classes. |
| 2014-2018 | **Undergraduate Lab Senior Demonstrator**, *University of Cambridge*, UK |
| | Assisted in running 4th year CFD course and 3rd year Flow Visualisation laboratory sessions. |

# Education

| | |
|---|---|
| 2008-2013 | **MEng (Hons) Aerospace Engineering - 1st Class**, *University of Manchester*, UK |
| | Graduated top of class with an 84% average. |
| 2001-2008 | **Fortismere School**, London, UK |

# Publications

A selection of recent publications is 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.* DOI. |
| 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. |
| 2016 | Scillitoe, A. D., Tucker, P. G., Adami, P. "Numerical Investigation of Three-Dimensional Separation in an Axial Flow Compressor..." *J. Turbomach.*. DOI. |
| 2015 | Scillitoe, A. D., Tucker, P. G., Adami, P. "Evaluation of RANS and ZDES Methods for the Prediction of Three-Dimensional Separation in Axial Flow Compressors." *Proc. of ASME Turbo Expo.*. DOI. |