Dr Adam R. **Symington**

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Developing an international research and leadership profile in data science, software development, scientific communication and geospatial intelligence through fundamental research and collaborations. Interested in developing sophisticated analytical techniques and improving the understanding of the world using data-driven methods. Driven by a collaborative approach to research. Experienced scientist and developer of open-source software, passionate about engaging others in scientific research and practice.

Career Summary

Lead Data Scientist

Washington, DC

Fraym

Oct 2022 - ONGOING

- I am the data science lead at Fraym, responsible for overseeing and advancing the development of the companies machine learning methodology.

Lead Data Scientist / Data Scientist

Bristol, UK

Geollect

Dec 2021 - ONGOING / Oct 2020 - Dec 2021

- I am the data science lead at Geollect. I manage a team of 3 data scientists and 2 data engineers. I am responsible for growing and managing this team, developing existing products, designing new research projects and implementing the companie's data strategy
- I build and maintain the data pipelines that are used in Geollects main products. This involves building solutions to take large volumes of data from data suppliers APIs, parse and repackage it, pass it to AWS kinesis streams, and load it into our postgresql database on AWS RDS (and also save zipped csvs to AWS deep storage for backup). Furthermore I also designed and built our database, API and API endpoints.
- I am the companie's main data science consultant and have provided data science expertise to the UK special forces, the royal navy and the world bank. This work involved web scraping, the construction of nosql databases, using machine learning to detect anomalies from acoustic data and designing algorithms to indentify specific instances of vessel behaviour from AIS data. I led all of these projects, in one instance this involved a team of Geollect data scientists and in another I led a team of data scientists from a partner organisation. I performed all liaisons with the clients, delivered updates and delivered the final products. Furthermore I was responsible for allocating resources and calculating the cost of services.
- I apply machine learning to AIS data (vessel location broadcasts) in order to both classify different types of marine activity (e.g., fishing, anchoring etc.) as well as identifying patterns. I have researched, built and deployed gaussian mixture models and used clustering algorithms to achieve this.
- I am leading an ongoing project to combine AIS data with satellite imagery to build a database of AIS enriched vessel images. As part of this project I have been applying neural networks to satellite imagery to identify vessels within an image.
- I have also engaged in more traditional data analysis. I have developed a 'digital port assessment' using AIS data, that for a given port provides statistics regarding vessel traffic into and out of that port. I employ my data visualisation skills to display this information statically in the form of graphs and tables, but also dynamically in the form of a dashboard.
- I conduct data led intelligence investigations in conjunction with the geospatial intelligence team. This involves identifying and analysing data to support the hypotheses of the investigations team.
- I am responsible for finding and assessing new data sources that could feature in our products. In a recent example of this I combined AIS data with weather data to understand cargo loss in the Pacific Ocean.
- I am responsible for producing technical articles or posts for marketing purposes.
- I take part in client meetings as the technical lead and my role is to provide technical explanations of our products as well as understand the technical requirements of client requests.
- I have represented the company at conferences where I have given talks about how Geollect is innovating in the tech space.

Postdoctoral Research Associate

Bath, UK

Universtiy of Bath

January 2020 - October 2020

- I developed computational simulation and analysis techniques to aid in the prediction and discovery of new Li-ion battery materials.
- I Utilised machine learning models to predict the properties of theoretical battery materials. This work was in collaboration with other computational researchers at Bath university as well as researchers at the Universities of Oxford and Liverpool who were conducting the experimental side of the project.
- I am an advocate of research software engineering and open source software. During my academic career I developed and published two pieces of research software. I was also involved in the development of open source teaching material for computational chemistry and also for teaching software engineering practices to postgraduate students.
- I took part in the Faraday Institutes summer studentship scheme and secured £4000 of funding to hire an undergraduate student who worked on a short projected that I designed for the summer. I was responsible for writing the hiring advert, selecting candidates for interview and conducting the interviews. I then onboarded the successful candidate, taught them the programming skills required to complete the project and then oversaw the project as it progressed.
- During this time, I published four research papers, delivered presentations to both internal and external audiences and worked to and met deadlines set by my supervisors.

Postgraduate Teaching Assistant / Maths for Chemists Lecturer

Bath, UK

University of Bath

October 2016 - January 2020

- Throughout the duration of my PhD I taught undergraduate chemists how to program, specifically focusing on high level programming in Python and low level programming in fortran.
- I developed a new masters level course focusing on using Python programming to better understand and make predictions about the behaviour of materials.
- Part of a project to develop a new masters course focusing on teaching students how to use Python in data analysis.
- Delivery of workshops in fundamental mathematical concepts for chemists, ensuring that all chemistry first year students had a consistent mathematical background.

Computational Skills

Programming fluency & Software familiarity

Languages Python (Scikit-Learn, Boto3, Numpy, Scipy, Pandas, Geopandas, Matplotlib, SQLAlchemy), PostgreSQL, PostGIS, FORTRAN90, HTML/CSS, Julia, Shell

Software AWS (EC2, ECS, S3, Glacier, Cloudwatch, Dynamodb, RDS, Kinesis), Docker, Git, Jupyter-Framework, Continuous Integration (Jenkins, Travis), MongoDB

Skills Unix, Bash scripting and basic system administration. Experience running parallel codes on HPC clusters of various architectures.

Research Expert user of computational chemistry research software such as VASP, DLPOLY, LAMMPS, and DLMONTE.

Other Holder of valid UK security clearance (SC)

Open source software development

python-maps pythonmaps is a project to produce eye catching geospatial data visualisations using python. I have 21,600 followers on twitter, where I share these visualisations and articles outlining how to generate these visualisations. I will be delivering a workshop at the scipy conference in Austin this year where I will outline how to correctly visualise geospatial data. I have also recently partnered with Locate Press LLC to produce a geospatial data visualisation book.

surfinpy surfinpy is an open-source Python library to facilitate the analysis and visualisation of large scale simulation data. surfinpy was originally published in the Journal of Open Source Software (Symington et al., J. Open. Source Soft. 4, 1210, 2019) and a followup paper outlining recent developments was published recently (Tse et al. J. Open. Source Soft. 7, 4014, 2022). The code has been used in five pieces of peer reviewed research.

polypy polypy is an open-source Python library designed to analyse molecular dynamics simulation data. polypy is built to read large datasets associated with molecular dynamics trajectories and from these produce insightful statistical information. polypy has been published in the Journal of Open Source Software (Symington, J. Open. Source Soft. 6, 59, 2021) and has been used in five pieces of peer reviewed research.

Selected Publications

Despite leaving academia I have maintained many research collaborations and continue to publish research. During my career I have authored 17 research papers in software development, energy materials and physics. All are available to view on my google scholar profile however I have included three below, published in the journal of open source software which I feel highlight my software engineering skills.

1. **A. Symington** 2021 *Journal of Open Source Software* **6**(59), 2824, polypy-Analysis Tools for Solid State Molecular Dynamics and Monte Carlo Trajectories
2. **A. Symington**, J. Tse, M. Molinari, A. Marmier, S. Parker 2019 *Journal of Open Source Software* **4**(34), 1210, surfinpy: A surface phase diagram generator
3. J. Tse, M. Molinari, S.Parker, **A. Symington** 2022 *Journal of Open Source Software* **7**(71), 4014, SurfinPy 2.0: A Phase Diagram Generator for Surfaces and Bulk Phases

Education

PhD - Computational Chemistry / Physics

Bath, UK

University of Bath & Atomic Weapons Establishment — *October. 2016 - January 2020*

- Undertook a PhD supervised by Prof. Steve Parker on computational studies of interfaces in materials.
- Implemented high-performance optimisation & sampling algorithms to rationalise simulation data. Developed new open source analysis software, which I used to discover trends in large datasets.
- Highly successful project which produced 10 published research papers, 6 awards and presentations in the UK, Europe and the USA.

MChem - Chemistry with Drug Discovery

Bath, UK

University of Bath — *October 2012 - June 2016*

- Degree Classification: **II:I**

Interests

- I run a twitter page called PythonMaps where I share interesting maps that I have generated from open source geospatial data.
- In my spare time I like to write about various aspects of data science which I publish in Towards Data Science. I have recently partnered with LocatePress LLC to produce a book on geospatial data visualisation.
- I have played cricket as a member of several clubs since the age of 8. I was the captain of my local club and a coach for the junior divisions.
- I am a keen cyclist in my spare time and in 2018 I participated in a charity cycle between Lands end and Bristol, raising £4000 for the MS society.
- I play golf and worked as a senior golf caddy throughout secondary school and university.
- Gold Duke of Edinburgh award winner.