Michael J. Smith's resume

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I apply deep learning (particularly foundational, self-supervised, unsupervised, and generative learning methods) to x-disciplinary problems in astrophysics, earth observation, medical diagnosis and imagery, and other fields. I especially enjoy applying these methods to out-of-domain problems where deep learning "shouldn't work"

2024:   Visiting researcher at the Instituto de Astrofísica de Canarias
Working with Marc Huertas-Company's group on hypermodal foundation models for astronomy.

2023 → Now: UniverseTBD member
Working as part of a collaborative grassroots effort to develop an open foundation model for science.

2022 → Now: Director of AI at Aspia Space
Responsible for the development of the company's AI products including: ClearSky, a patented generative deep learning-based cloud removal algorithm for satellite imagery; GrassMax, a grass/crop height and mass estimation algorithm that only needs satellite imagery as input; and EarthPT, the first open time series foundation model, and first causal transformer EO foundation model.

2021 → Now: Co-founder and Managing Partner at Aspia Space
Built Aspia Space alongside co-founders from inception to a team of 6, and developed Aspia's first products.

Education

2018 → 2022:   PhD Astrophysics at the University of Hertfordshire, Hatfield, UK
Thesis title: 'Deep Learning to Explore Ultra-Large Scale Astronomical Datasets' · *Advisor:* James Geach
I published one review paper, four method papers, and one patent during my PhD on the application of deep learning to large astronomical and remote sensing datasets. I also spent two years at the Alan Turing Institute in London as part of their enrichment scheme scholarship, and two years at Queen's University, Canada as part of Stéphane Courteau's group.

2013 → 2017:   First class MPhys and BSc in Physics at Leeds Uni, UK with intl. year at Queen's Uni, Canada
Thesis title: 'Machine Learning with CNNs in Medical Diagnosis' · *Advisors:* John Mooney and Ben Varcoe
Developed a convolutional neural network to diagnose heart disease from electrocardiograms and magneto-cardiograms. The network achieved state-of-the-art accuracies for both ECG and MCG prompted diagnosis.

Selected awards and scholarships

2023:   Enterprise Ireland Innovation Arena Awards winner. GrassMax won 'Overall Innovator of the Year'.
2022:   International Astronomical Union (IAU) PhD Prize. My thesis was awarded second place in its category.
2020, 2021:   Alan Turing Institute Enrichment Scholarship. Awarded in 2020 and 2021. £3,958 per year.

Selected publications, full list available on ORCID

[1] **EarthPT: a time series foundation model for earth observation.**
Michael J. Smith, Luke Fleming, James E. Geach. `https://doi.org/10.48550/arXiv.2309.07207`. 2023-09. This is the world's first causal EO foundation model, and the first transformer time series foundation model. Presented as a spotlight oral at CCAI NeurIPS 2023.

[2] **Astronomia Ex Machina: a history, primer, and outlook on neural networks in astronomy.**
Michael J. Smith, James E. Geach. `https://doi.org/10.1098/rsos.221454`. RSOS. 2023-05. This work predicted and advocated for the current explosion in open science for scientific foundation models.

[3] **Realistic galaxy image simulation via score-based generative models.**
Michael J. Smith, James E. Geach, Ryan A. Jackson, Nikhil Arora, Connor Stone, Stéphane Courteau. `https://doi.org/10.1093/mnras/stac130`. MNRAS. 2022-01. This was the first application of diffusion modelling to an astronomical problem. This work was featured by NASA's Astronomy Picture Of The Day, in Astronomy Magazine, and in the Daily Mail.

[4] **Predicting visible/IR band images using radar reflectance/backscatter images of a terrestrial region.**
Michael J. Smith, James E. Geach. `https://patentscope.wipo.int/search/en/detail.jsf?docId=GB34` `2277434`. 2021-11. UK patent. Patented or patent pending in Australia, Brazil, Canada, Europe, and the USA. This work has been spun out into a start up company (Aspia Space).