
Hands-on scientist and technology leader who leads AWS's work with Healthcare and Life Sciences startups across EMEA, has delivered data engineering, ML models, and real-time inference serving tens of millions of patients at the largest US hospital network, searched for Malaysian Airways flight 370 by developing ML to control autonomous underwater vehicles, built quant research platforms for hedge funds in the cloud, and constructed computational heart models in academia. Worked in the UK, US, France, and the Middle East.

Deep knowledge of ML, AWS, data engineering, quantitative research environments, software engineering (especially Python), combined with knowledge of systematic trading strategies (especially equities). Bayesian at heart.

EXPERIENCE

Amazon Web Services

LONDON, ENGLAND

EMEA Lead - Healthcare and Life Science Startups

March 2021 – Present

Lead AWS's work with HCLS startups, VCs, and accelerators across EMEA. This involves mentoring startups building complex scientific, clinical, and ML products from a technical and strategic perspective, and working cross-org to ensure AWS develops the services and expertise startups need. Specialities include ML, HPC, medical imaging, healthcare interoperability, data lakes, drug discovery, genomics, and synthetic biology.

- Highest HCLS technical authority in EMEA; acts a trusted advisor on cutting-edge scientific research, mathematics, and technology, to the most technically complex and highest-potential startups (early-stage to IPO/enterprise exit). Mentorship on their product and market positioning, and their business strategy.
- Deep AWS technical knowledge, focusing on research workloads often including tens of thousands of GPUs and petabytes of data. Designs HPC clusters, data pipelines, data lakes, ML research environments, and interoperability.
- Manages a team of HCLS specialists and generalists, training them in HCLS and managing their customer relationships. Defined EMEA technical content backlog, co-created reference architectures for strategic workloads such as genomic sequencing, medical imaging, ML, and computational drug discovery.
- Created and led an EMEA-wide cross-org initiative on regulatory compliance in response to the GDPR EU-US Privacy Shield invalidation for internal and external audiences. Led technical response to German data regulators on DiGAV.

Wellcome Sanger Institute

CAMBRIDGE, ENGLAND

Visiting Scientist

March 2022 - February 2023

Machine learning to predict cancer immunotherapy response from genomic sequencing of the microbiome, at a world leading genome research institute.

Mass General Brigham

BOSTON, MA, USA

Director of Data Science Technology

June 2018 - July 2020

Founding Director at the Center for Clinical Data Science. Delivered data engineering, ML models, and real-time inference using open-source first, across tens of millions of patients and 2,000 researchers at 14 hospitals in the largest US hospital network, Mass General Brigham (\$16bn revenue). Grew and led tech teams, helped raise \$100 million in commercial and internal funding, and provided tech leadership in a \$600 million digital transformation initiative. Projects covered in *Wall Street Journal*, *Forbes*, *HealthTech Magazine*, and others.

- Led development of an end-to-end ML platform from data source to clinical viewer.
- Launched the second largest academic GPU supercomputer in North America for researchers across MGB, Harvard, MIT, and commercial partners.
- Supervised industry collaboration initiatives, including Federated Learning and a Healthcare AI Platform, raising \$60 million in commercial funding.
- Mentored and collaborated on research and software development with my team of ML Scientists, Data Engineers, Software Engineers, and DevOps Engineers.
- ML pillar lead for a \$500 million partnership with a cloud vendor to migrate the infrastructure powering fourteen hospitals into the cloud.

Principal ML Scientist

June 2017 - Sept 2017

Developed a recurrent neural network to assist planning heart surgery and two convolutional neural networks to detect stroke in brain scans. These models have now been deployed and are being used to treat patients.

Segment Consulting

LONDON, ENGLAND

Quant Developer / Principal ML Scientist

July 2014 – June 2018

- Designed and built cloud-based quantitative research systems for hedge-funds to store, index, and process both tick and alternative data.
- Built cloud-based route-planning and image classification systems for autonomous submarines searching the seabed for Malaysian Airways flight 370 using variational inference, Gaussian processes, and CNNs.

VideoLAN (VLC Media Player)	PARIS, FRANCE
Senior Software Engineer	June 2013 – August 2013
Created a recommendation system for VLC Media Player in Golang and Python.	
Inria (French Institute for Research in Computer Science and Automation)	PARIS, FRANCE
Visiting Scientist	April 2013 – June 2013
A brief interlude researching cryptographic protocols for electronic voting and auctions.	
Nerasys	DUBAI, UAE
Director of Technology	June 2011 – April 2013
Led pre-sales and technology for projects such as internet filtering and caching for a national UAE ISP, load balancing of carrier cell call billing, and web application security for the King of Jordan.	
InterSystems	DUBAI, UAE
Systems Management Specialist	August 2009 – June 2011
Electronic healthcare records and HL7 integration engines in the Middle East and at NHS Scotland.	

EDUCATION

University of Oxford	OXFORD, ENGLAND
Enrolled in PhD Program, Computational Cardiovascular Science, All But Dissertation	2016 – 2018
Built multi-scale finite element models of heart electrophysiology and developed ML techniques to fit them to patient ECGs using variational inference. <i>Supervisors: Blanca Rodriguez (Oxford), Ana Minchale (Oxford), and Nando de Freitas (Oxford/Deepmind).</i>	
Awarded EPSRC Studentship, Azure ML Research Award, and Amazon ML Research Award.	
University of Edinburgh	EDINBURGH, SCOTLAND
MSc Informatics (Major: Machine Learning)	2015 – 2016
Dissertation: Multivariate ICU Time-series Classification (78%). <i>Supervisor: Chris K.I. Williams</i>	
Built an ML model on multivariate time series for bedside alarms in the Neuro ICU at Glasgow Royal Infirmary.	
King's College London	LONDON, ENGLAND
Enrolled in MBBS Medicine, Accelerated Graduate Entry	2013 – 2014
Completed two years of content in one year. Withdrew to apply technology to medicine.	
University of Birmingham	BIRMINGHAM, ENGLAND
BSc Computer Science	2006 – 2009
Thesis: Reinforcement Learning in Continuous State and Action Spaces. <i>Supervisor: Jeremy L. Wyatt</i>	

THOUGHT LEADERSHIP

HL7 Standards Authority	
Voting Member, Imaging Integration and Learning Health Systems Working Groups	November 2022 – Present
Voting on new ISO and ANSI standards.	
MICCAI Conference	
Reviewer	2023
Reviewing academic papers on ML applied to medical imaging submitted to the MICCAI conference.	

PRESS COVERAGE

BioSpace	Novel Alliance Responds to Big Pharma's Most Pressing AI/ML Needs	February 2023
Healthcare in Europe	Federated learning brings AI with privacy to hospitals	December 2019
Boston Business Journal	Partners, GE say they've developed a better artificial intelligence	November 2019
HealthTech Magazine	Researchers Leverage AI to Transform the Delivery of Patient Care	December 2018
Forbes	Revolutionizing Radiology with Deep Learning	November 2017
Wall Street Journal	AI Holds Promise of Improving Doctors' Diagnoses	September 2017

AWARDS AND CERTIFICATIONS

- 2022 AWS Solutions Architect Professional, AWS ML Speciality
 - 2018 Amazon ML Research Award (\$100,000)
 - 2017 Microsoft Azure ML Research Award (\$20,000)
 - 2016 EPSRC Studentship
 - 2011 f5 Certified BIG-IP Load Balancing, Web Application Firewall, Global Load Balancing
 - 2010 InterSystems Certified Caché Database Expert
 - 2009 University of Birmingham CS Award for Best Undergraduate Research
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PUBLICATIONS

- [1] A. Gunjur *et al.*, “Defining the relationship between the gut microbiome, host factors, and response to immune checkpoint inhibitors across diverse rare cancer types,” in *Microbiome Interactions in Health and Disease*, 2022.
- [2] H. Roth *et al.*, “Federated learning for breast density classification: A real-world implementation,” in *DART/DCL*, 2020.
- [3] K. Chang *et al.*, “Federated Deep Learning Among Multiple Institutions for Automated Classification of Breast Density,” in *Society for Imaging Informatics in Medicine*, 2020.
- [4] K. Magudia *et al.*, “The Trials and Tribulations of Assembling Large Datasets for Machine Learning Applications,” in *Society for Imaging Informatics in Medicine*, 2019.
- [5] B. C. Bizzo *et al.*, “Deep Learning for Acute Ischemic Stroke on Diffusion-Weighted MR Imaging,” in *Radiological Society of North America*, 2018.
- [6] S. Pedemonte *et al.*, “Detection and Delineation of Acute Cerebral Infarct on DWI using Weakly Supervised Machine Learning,” in *Medical Image Computing and Computer Assisted Intervention*, 2018.
- [7] J. Camps, A. McCarthy, B. Rodriguez, and A. Mincholé, “Deep Learning based QRS Multilead Delineator for Electrocardiogram Signals,” in *Biomedical Informatics with Optimization and Machine Learning*, 2018.
- [8] J. Camps, A. McCarthy, B. Rodriguez, and A. Mincholé, “ConvNet based QRS Multilead Delineator in Electrocardiogram Signal,” in *International Joint Conference on Artificial Intelligence*, 2018.
- [9] A. McCarthy, B. Rodriguez, and A. Mincholé, “Variational Inference over Non-Differentiable Simulators using Bayesian Optimization,” in *ML for Health and Deep Learning for Physical Sciences Workshops, Neural Information Processing Systems*, 2017.
- [10] N. A. Tenenholtz *et al.*, “Developing Deep-Learning Models in the Hospital: A Case Study on the Center for Clinical Data Science,” in *Mass General Brigham / NVIDIA Technical Report*, 2017.
- [11] A. McCarthy and C. K. I. Williams, “Predicting Patient State-of-Health using Sliding Window and Recurrent Classifiers,” in *Machine Learning for Health Workshop, Neural Information Processing Systems*, 2016.
- [12] A. McCarthy, B. Smyth, and E. A. Quaglia, “Hawk and Aucitas: e-auction schemes from the Helios and Civitas e-voting schemes,” in *Financial Cryptography*, 2014.