

# Matthew Stewart, PhD

## EDUCATION

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### Harvard University, United States

Ph.D. in Engineering and Data Science  
M.S. in Engineering Sciences; GPA: 3.83/4.0

August 2017 – January 2023

### Imperial College London, United Kingdom

Integrated BEng/MEng in Mechanical Engineering; First Class Honors

October 2013 – June 2017

## PROFESSIONAL EXPERIENCE

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### Harvard University, Boston, United States

*Postdoctoral Researcher*

January 2023 – Present

*Doctoral Student*

August 2017 – January 2023

- Managed and mentored projects in reinforcement learning, computer vision, benchmarking, and on-device ML
- Published and peer-reviewed articles in tier-one ML venues including FAccT, CACM, and NeurIPS
- Spearheaded the ML sensor architecture to achieve more secure and privacy-focused ML systems
- Applied graph-based neural networks and other advanced architectures to enhance quantum chemical methods, achieving superior performance on chemical property prediction tasks
- Pioneered integration of embedded ML in drone-based chemical sensing for efficient environmental monitoring
- Contributed to the development of key industry benchmarks, advancing robotics acceleration, neuromorphic computing, autonomous agents, and computer vision domains

### edX Inc., Cambridge, United States

*Course Developer (Part Time)*

June 2020 – June 2022

- For the HarvardX Professional Certificate in TinyML [[Course 1-3 Link](#) [Course 4 Link](#)]
- Co-designed a professional certificate in TinyML, comprising four 6-week courses on the edX platform
- Enrolled 100,000 students from 175 countries; course development published in a peer-reviewed journal [[link](#)]

### Medium, Cambridge, United States

*Machine Learning Blogger (Part Time)*

September 2018 – Present

- Published over 40 articles related to data science, artificial intelligence, and machine learning [[link](#)]
- Cultivated a robust Medium readership of 6,500 followers on Medium, garnering 2 million reads and 100 citations
- Acknowledged as one of the top authors in data science according to the publication editor and viewing metrics

### Critical Future, London, United Kingdom

*Machine Learning Consultant (Contract; Remote)*

December 2019 – December 2023

- Developed state-of-the-art ML solutions for real estate, fintech, e-commerce, and engineering organizations
- Engineered MLOps infrastructures for seamless integration of ML models into business intelligence frameworks
- Pioneered compositional learning for ML-based business intelligence, with funding from Innovate UK [[link](#)]

## SKILLS, AWARDS, AND ACTIVITIES

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**Technical Skills:** Python, R, C++; TensorFlow, PyTorch, and Keras; Git, Ansible, and Docker; SQL and MongoDB; AWS, Google Cloud, and Azure; expertise in NLP, CV, and on-device ML

**Qualifications:** CompTIA A+; TensorFlow Developer Certificate; ML Engineer Professional Certificate

**Awards:** Kennedy Research Scholarship (2021); Imperial College Dean's List (2013-2017)

## JOURNAL ARTICLES

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- Prakash, S., **Stewart, M.**, Banbury, C., Mazumder, M., Warden, P., and Janapa Reddi, V., 2023. Is TinyML Sustainable? Assessing the Environmental Impacts of ML on Microcontrollers. *Communications of the ACM*. [\[link\]](#)
- Warden, P., **Stewart, M.**, Plancher, B., Sachin, K., and Janapa Reddi, V., 2023. Machine Learning Sensors: A Design Paradigm for the Future of Intelligent Sensors. *Communications of the ACM*. [\[link\]](#)
- Uchendu, I., Jabbour, J., **Stewart, M.**, Krishnan, S., Huang, A., Gur, I., Bishop, C., Guadarrama, S., Tan, J., Faust, A. and Reddi, V.J., 2024. *Transactions of Machine Learning Research (TMLR)*. Submitted.
- Warden, P., **Stewart, M.**, Plancher, B., Sachin, K., and Janapa Reddi, V., 2023. Machine Learning Sensors: A Design Paradigm for the Future of Intelligent Sensors. *Communications of the ACM*. [\[link\]](#)
- Uchendu, I., Jabbour, J., **Stewart, M.**, Krishnan, S., Huang, A., Gur, I., Bishop, C., Guadarrama, S., Tan, J., Faust, A. and Reddi, V.J., 2024. *Transactions of Machine Learning Research (TMLR)*. Submitted.
- **Stewart, M.**, and S. Martin, 2023. Machine Learning for Ionization Potential and Photoionization Cross-Section of Volatile Organic Compounds. *ACS Earth and Space Chemistry*. [\[link\]](#)
- **Stewart, M.**, McKinney, K. and Martin, S.T., 2023. Prediction of the Response of a PID to a Complex Gaseous Mixture of Volatile Organic Compounds Produced by  $\alpha$ -Pinene Oxidation. *ACS Earth and Space Chemistry*. [\[link\]](#)
- Aruffo, E., Wang, J., Ye, J., Ohno, P., Qin, Y., **Stewart, M.**, McKinney, K., Di Carlo, P. and Martin, S.T., 2022. Partitioning of Organonitrates in the Production of Secondary Organic Aerosols from  $\alpha$ -Pinene Photo-Oxidation. *Environmental Science & Technology*. [\[link\]](#)
- Levy, B. and **Stewart, M.**, 2021. The Evolving Ecosystem of COVID-19 Contact Tracing Applications. *Harvard Data Science Review*. [\[link\]](#)
- Janapa Reddi, V., Plancher, B., Kennedy, S., Moroney, L., Warden, P., Agarwal, A., Banbury, C., Banzi, M., Bennett, M., Brown, B., Chitlangia, S., Ghosal, R., Grafman, S., Jaeger, R., Krishnan, S., Lam, M., Leiker, D., Mann, C., Mazumder, M., Pajak, D., Ramaprasad, D., Smith, J. E., **Stewart, M.**, Tingley, D., 2021. Widening Access to Applied Machine Learning with TinyML. *Harvard Data Science Review*. [\[link\]](#)
- Krittanawong, C., Virk, H.U.H., Kumar, A., Aydar, M., Wang, Z., **Stewart, M.** and Halperin, J.L., 2021. Machine learning and deep learning to predict mortality in patients with spontaneous coronary artery dissection. *Scientific Reports*. [\[link\]](#)
- Zhao, T., Ye, J., Ribeiro, I., Ma, Y., Hung, H., Batista, C., **Stewart, M.**, Guimarães, P., Vilà-Guerau de Arellano, J., de Souza, R., Guenther, A. and Martin, S., 2021. River winds and pollutant recirculation near the Manaus city in the central Amazon. *Communications Earth & Environment*. [\[link\]](#)
- Ye, J., Batista, C.E., Zhao, T., Campos, J., Ma, Y., Guimarães, P., Ribeiro, I.O., Medeiros, A.S., **Stewart, M.**, Vilà-Guerau de Arellano, J. and Guenther, A.B., 2022. River Winds and Transport of Forest Volatiles in the Amazonian Riparian Ecoregion. *Environmental Science & Technology*. [\[link\]](#)
- Jason Yik et al., 2023. NeuroBench: A Framework for Benchmarking Neuromorphic Computing Algorithms and Systems. *Nature Communications*. Submitted. [\[arXiv\]](#)

## BOOK CHAPTERS

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- **Stewart, M.**, and Martin, S., 2020. "Unmanned Aerial Vehicles: Fundamentals, Components, Mechanics, and Regulations." In *Unmanned Aerial Vehicles*. Hauppauge, New York: Nova Science Publishers. [\[link\]](#)
- **Stewart, M.**, and Martin, S., 2020. "Atmospheric Chemical Sensing by Unmanned Aerial Vehicles." In *Unmanned Aerial Vehicles*. Hauppauge, New York: Nova Science Publishers. [\[link\]](#)

## INVITED TALKS AND SEMINARS

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- *Intelligent Gas Sensing with Embedded ML*, ICTP-21: International Centre for Theoretical Physics, Oct 2021.
- *Machine Learning Sensors*, ICTP-23: International Centre for Theoretical Physics, Remote, April 2023.
- *Datasheets for Machine Learning Sensors*, tinyML Talks: tinyML Foundation, Remote, July 2023.
- *Balancing Privacy and Connectivity in the Digital Age*, South American Business Forum, Argentina, July 2023.
- *Confronting the Sensorpocalypse: Reshaping the Future of Pervasive AI Sensors*, Ai4, Las Vegas, August 2024.

## CONFERENCE PAPERS

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- **Stewart, M.**, Warden, P., Omri, Y., Prakash, S., Santos, J., Hymel, S., Brown, B., MacArthur, J., Jeffries, N., Plancher, B. and Reddi, V.J., 2024. Datasheets for Machine Learning Sensors. *2024 Conference of Fairness, Accountability, and Transparency (FAccT)*. Submitted. [[arXiv](#)]
- **Stewart, M.**, Warden, P., Moss, E., Kennedy, S., Sloane, M., Plancher, B. and Reddi, V.J., 2024. Datasheets for Machine Learning Sensors: Towards Transparency, Auditability, and Responsibility for Intelligent Sensing. *2024 Conference of Fairness, Accountability, and Transparency (FAccT)*. Submitted. [[arXiv](#)]
- Mayoral-Vilches, V., Jabbour, J., Hsiao, Y., Wan, Z., Martinez-Farina, A., Crespo-Alvarez, M., **Stewart, M.**, Reina-Munoz, J. M., Nagras, P., Vikhe, G., Neuman, S., Plancher, B., Reddi, V.J., Pinzger, M., and Rass, S., 2023. RobotPerf Benchmarks: An Open, Vendor-Agnostic Benchmarking Suite to Evaluate Robotics Computing Performance. *International Conference on Robotics and Automation (ICRA) 2023*. Accepted. [[arXiv](#)]
- Banbury, C., Njor, E., **Stewart, M.**, Warden, P., Jeffries, N., and Reddi, V.J., 2024. Wake Vision: A Diverse Person Detection Dataset for TinyML. *European Conference on Computer Vision (ECCV) 2024*. Submitted.

## PROFESSIONAL SERVICE

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### *Organizing Committee*

- Radcliffe Institute Seminar on “Safeguarding User Privacy in the Era of Sensor Intelligence.” July 2023. [[link](#)]
- Sixth Conference of Machine Learning and Systems, 3<sup>rd</sup> On-Device Intelligence Workshop. June 2023. [[link](#)]
- Machine Learning and Systems Rising Stars Workshop. August 2023. [[link](#)]

### *Reviewer*

- National Science Center, Poland: Grant Proposal for "Sustainable computer vision for autonomous machines", SONATA BIS-13 funding scheme, Panel ST6 (Computer Science and Informatics), December 2023.
- Thirty-Seventh Conference on Neural Information Processing Systems: Datasets and Benchmarks Track, 2023.
- Institute of Electrical and Electronics Engineers (IEEE) Micro Special Issue on “tinyML”, August 2023.
- Sixth Conference on Machine Learning and Systems (MLSys), June 2023.

### *Member*

- IMechE Special Interest Group’s on Energy, Environment and Sustainability (IMechE-EESG).
- British Computer Society Specialist Group’s on Green IT (BCS-GIT) and Artificial Intelligence (BCS-SGAI).
- The Society for the Study of Artificial Intelligence and Simulation of Behaviour (AISB).
- ACM Special Interest Group’s on Artificial Intelligence (SIGAI) and Embedded Systems (SIGBED).

### *Interviews*

- What is TinyML? An Interview with Matthew Stewart. Elektor Magazine, 45(12), pp. 62-65. March 2021. [[link](#)]
- Data privacy and machine learning in environmental science. Towards Data Science Podcast. June 2020. [[link](#)]
- Tiny ML and the future of on-device AI. Towards Data Science Podcast. November 2021. [[link](#)]
- The emerging world of ML sensors. Towards Data Science Podcast. September 2022. [[link](#)]

### *Panel Moderator*

- Advanced NLP Use Cases: Data Ops, Models, and Strategies. Ai4 2023. Las Vegas, USA.
- Computer Vision: Data Labeling, Training and Platforms for Machines That See. Ai4 2023. Las Vegas, USA.

## REFERENCES

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**Vijay Janapa Reddi:** Associate Professor of Electrical Engineering, Harvard University  
[vj@eecs.harvard.edu](mailto:vj@eecs.harvard.edu)

**Pete Warden:** Technical Lead for Mobile and Embedded TensorFlow, Google  
[pete@petewarden.com](mailto:pete@petewarden.com)

**Adam Riccoboni:** Chief Executive Officer, Critical Future  
[adam@criticalfuture.co.uk](mailto:adam@criticalfuture.co.uk)