

# Catherine Tong

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## Contact Details

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## Education

2017–2021 **Doctor of Philosophy (DPhil)**, *University of Oxford, Computer Science.*

Supervised by Associate Prof. Nicholas D. Lane.

Thesis: Machine Learning on Human Behavioural Data.

2013–2017 **Master of Physics (MPhys)**, *University of Oxford, Physics.*

Focus: Theoretical Physics and Atmospheric Physics.

Graduated with First Class Honours.

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## Research Interests

Ubiquitous Sensing · ML for health · Multi-modal deep learning · Wearable cameras

My current research focuses on developing machine learning methods which model varieties of behavioural data collected through everyday sensing devices. I am particularly interested in developing solutions to the sparse data problem in human activity recognition, through leveraging multiple modalities and domain knowledge.

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## Journal and Conference Papers

\*Equal Contributions

- 2020 Christian Schroeder de Witt\*, **Catherine Tong\***, Valentina Zantedeschi, Daniele De Martini, Alfredo Kalaitzis, Matthew Chantry, Duncan Watson-Parris and Piotr Biliński. RainBench: Towards Data-Driven Global Precipitation Forecasting from Satellite Imagery. To appear in *the 35th AAAI Conference on Artificial Intelligence*.
- 2020 Hyeokhyen Kwon\*, **Catherine Tong\***, Harish Haresamudram, Yan Gao, Gregory D. Abowd, Nicholas D. Lane, and Thomas Plötz. IMUTube: Automatic Extraction of Virtual on-body Accelerometry from Video for Human Activity Recognition. In *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)*, Volume 4 Issue 4.
- 2019 **Catherine Tong**, Matthew Craner, Matthieu Vegreville, and Nicholas D. Lane. Tracking Fatigue and Health State in Multiple Sclerosis Patients Using Connected Wellness Devices. In *IMWUT*, Volume 3 Issue 3. Also in *MobiUK '19*.
- 2018 Valentin Radu, **Catherine Tong**, Sourav Bhattacharya, Nicholas D. Lane, Cecilia Mascolo, Mahesh K. Marina, and Fahim Kawsar. Multimodal Deep Learning for Activity and Context Recognition. In *IMWUT Volume 1 Issue 4*. Also in *MobiUK '18*.
- 2018 Vincent WS. Tseng, Sourav Bhattacharya, Javier Fernández Marqués, Milad Alizadeh, **Catherine Tong**, and Nicholas D. Lane. Deterministic Binary Filters for Convolutional Neural Networks. In *The 27th International Joint Conference on Artificial Intelligence (IJCAI '18)*.

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## Workshop, Poster and Others

- 2020 Valentina Zantedeschi\*, Daniele De Martini\*, **Catherine Tong\***, Christian Schroeder de Witt, Alfredo Kalaitzis, Matthew Chantry, Duncan Watson-Parris and Piotr Biliński. Towards Data-Driven Physics-Informed Global Precipitation Forecasting from Satellite Imagery. In *Tackling Climate Change with Machine Learning (NeurIPS 2020 Workshop)*.
- 2020 **Catherine Tong\***, Christian Schroeder de Witt\*, Valentina Zantedeschi, Daniele De Martini, Alfredo Kalaitzis, Matthew Chantry, Duncan Watson-Parris and Piotr Biliński. RainBench: Enabling Data-Driven Precipitation Forecasting on a Global Scale. In *Tackling Climate Change with Machine Learning (NeurIPS 2020 Workshop)*.
- 2020 **Catherine Tong**, Shyam A. Tailor, and Nicholas D. Lane. Are Accelerometers for Activity Recognition a Dead-end? In *The 21st International Workshop on Mobile Computing Systems and Applications (Hotmobile '20)*.
- 2018 **Catherine Tong**, Gabriella M. Harrari, Angela Chieh, Otmane Bellahsen, Matthieu Vegreville, Eva Roitmann and Nicholas D. Lane. Poster: Inference of Big-Five Personality Using Large-scale Networked Mobile and Appliance Data. In *The 15th ACM International Conference on Mobile Systems, Applications, and Services (MobiSys '18)*.
- 2017 **Catherine Tong**, Omar A. Guerrero, Eduardo Lopez and Felix Reed-Tsochas. Diffusing Workers in a Multiplex World. Master's thesis, [SSRN:3056730](https://ssrn.com/abstract=3056730).

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## Work Experience

- Aug 2020 **Oxford Women in Computer Science Society, President.**  
– Present I oversee the workings of the society – I work with the committee to organize outreach, academic and industry events, liaise with University departments and external sponsors, and represent the society in general.
- June – Aug 2020 **Frontier Development Lab, Machine Learning Researcher.**  
Focus: Enabling global medium-range precipitation forecasts from satellite imagery.  
I am part of the Digital Twin Earth team.  
We are developing a novel multi-modal system which incorporate physical understanding into a deep learning approach for skillful forecasts across the globe.
- June – Sep 2019 **Microsoft Research, Cambridge, Research Intern.**  
Focus: Understanding the behaviours of mental health patients on an online Cognitive Behavioural Therapy platform.  
I was part of Project Talia in the Healthcare Intelligence group.  
We developed a deep learning framework to analyze and predict health outcomes (as measured by depression scores) by modelling patients' browsing trajectories and relevant site content.
- June – Sep 2017 **Nokia Bell Labs, Cambridge, Research Intern.**  
Focus: Analyzing multi-modal deep learning models for activity and context recognition.  
We compared the performance of different multi-modal setups. We also trained machine learning models to analyze health-related data collected by smart appliances in the *Withings* range.
- May – July 2017 **Centre for Agent-Based Dynamic Networks, University of Oxford, Research Assistant.**  
Focus: Modelling the labour economy using methods from Statistical Physics.  
We formulated and solved an agent-based Markov model on multiplex networks to describe the movement of labour across the economy. We analyzed the approach on UK labour survey data.
- May – July 2020 **Ufonia, Part-time Researcher.**  
Focus: Automating post-surgery phone conversations with NHS patients.  
I helped develop a knowledge-graph-based approach to structure incoming conversation data.

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## Volunteer Activities

- 2019-Present **Membership Co-Chair**, N2Women Board
- 2017-Present **Committee**, Oxford Women in Computer Science Society
- 2020 **Teaching Assistant**, *Foundamentals of Sensing*
- 2014-2017 **Undergraduate Mentor**, Oxford Women in Physics Society
- 2014-2015 **Volunteer Tutor**, Jacari

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## Awards

- 2017-2022 EPSRC DPhil (PhD) Scholarship
- 2018, 2020 ACM Student Travel Award
- 2016 Examiners' Commendation for Best Practical Work in Physics
- 2013-2017 College Scholarship for Outstanding Performance in Physics Exams