# Douglas Tilley

PhD Candidate in Accountable, Responsible and Transparent Artificial Intelligence, Co-Founder @ Dotresearch Ltd.

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## Personal Profile

Published and award-winning PhD Candidate in Computer Science with ART-AI at the University of Bath, with a proven track record in developing multimodal deep learning models for human–robot interaction and robotics. Experienced at bridging complex **theoretical ML concepts**, including **neuromorphic computing** and **explainable VAEs** and applying them to the real-world. Recognized through **multiple Q1 publications** across varied domains, as well as co-founding DotResearch Ltd, designing **field-tested, patent-pending TinyML vision applications**. Adept at international collaborations with leading global research institutes. A committed, adaptable, and hard-working individual, continuously driving innovation and tangible outcomes for both academic and industrial sectors.

## Skills

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|---|---|
| **Programming** | Python [**NumPy**, **Pandas**, **OpenCV**], C/C++, **ROS**(1/2), MATLAB, Git, Docker |
| **Machine Learning** | Neural Networks [**CNN**, **LSTM**, **Transformer**, **SNN**, **VAEs**, **SSMs**], **GenAI**, PyTorch, Keras, XGBoost |
| **Research Tools** | **LaTeX**, Linux, Bash, Jupyter (Data Analysis), **Statistical Methods**, Experiment Design |
| **Hardware** | Robotics Systems, UAV Design, Sensor Integration, Embedded Systems, PCB Design, Soldering |
| **Soft Skills** | Technical Writing, Research Leadership, International Collaboration, Project Management, Presentation Skills |

## Work Experience

**Machine Learning Researcher** National Institute of Informatics (NII) — *Tokyo, Japan* — *Oct 2024 – Mar 2025*

- Primary lead on **neuromorphic computing** research using hybrid architectures.
- Utilizing **State Space Models** with **SNNs** for explainable temporal modeling on noisy data.
- Implementing advanced representation and explainability techniques using hybrid VAEs.
- Collaborating with 3 international research institutes on improving Deep Learning Optimizers.

**Data Scientist** Tianjin University — *Tianjin, China* — *Nov 2023 – Mar 2024*

- Led pioneering research on three first-of-their-kind multimodal human activity recognition studies (n=25), integrating novel sensor combinations.
- Integrated motion capture systems (**Noraxon, VICON, Neuracle**) for long duration, high fidelity, synchronized data collection.
- Development of tools for precise time synchronisation, feature generation and automatic data labelling.

**University Demonstrator** University of Bath — *Bath, UK* — *Sep 2021 – Present*

- **Mentor** for PhD students and **Demonstrator** for AI and Prototype Engineering.
- Technical advisor for UAV related PhD and Masters projects and Team Bath Drones (Award winning).
- Demonstrator for ROS, Computer Vision, Deep Learning and Advanced Control.

**Research Assistant** University of Bath — *Bath, UK* — *Jul 2019 – Sep 2021*

- Designed and manufacture of custom UAVs and sensors for atmospheric data gathering.
- Led international collaborations between 4 different higher education institutions.
- Chief Pilot and Field Engineer for UAV operations, including **BVLOS** missions up to 6000 ft.
- Produced novel research outputs featured in media (**Sky, ITV, Guardian**).

**Additional Experience** University of Plymouth; UKRI STFC — *Plymouth; Edinburgh; Harwell, UK* — *Jan – Jul 2019; Jul – Aug 2014*

- Course Representative at University of Plymouth.
- UKRI Summer Placements at Royal Observatory Edinburgh and Rutherford Appleton Labs Space (Robotics).

## Publications

### Journal Articles

Hierarchical Deep Learning for Human Activity Recognition Integrating Postural Transitions
Douglas J. Tilley, Uriel Martinez-Hernandez
*IEEE Sensors Journal* 24.24 (2024) pp. 40305–40312. 2024

Ionic Charge Emission Into Fog From a Remotely Piloted Aircraft
R. Giles Harrison, Keri A. Nicoll, Graeme J. Marlton, Douglas J. Tilley, Pejman Iravani
*Geophysical Research Letters* 49.19 (2022). 2022

Demonstration of a Remotely Piloted Atmospheric Measurement and Charge Release Platform for Geoengineering
R. Giles Harrison, Keri A. Nicoll, Douglas J. Tilley, Graeme J. Marlton, Stefan Chindea, Gavin P. Dingley, Pejman Iravani, David J. Cleaver, Jonathan L. Bois, David Brus
*Journal of Atmospheric and Oceanic Technology* 38.1 (2021) pp. 63–75. American Meteorological Society, 2021

### Conference Proceedings

Shallow Hierarchical CNN-LSTM for Activity Recognition to Integrate Postural Transition States
Douglas Tilley, Uriel Martinez-Hernandez
*2023 IEEE SENSORS*, 2023

Electrostatic Charging of Propellors on Unmanned Aerial Vehicles
Douglas Tilley, Kerianne Nicoll, Pejman Iravani, David Cleaver, Jonathan Du Bois
*2021 ESA Annual Meeting*, 2021, Online

## University Projects

**Undergraduate Research** University of Plymouth — *Plymouth, UK* — *2017 - 2019*

- **Multi-Sensor Integration System (1st Class)**: Designed sensor fusion algorithm and hardware, combining LiDAR and RADAR data for real-time awareness
- **Computer Vision Research (1st Class)**: Developed automated vision system for human vision research, using a chatbot, algorithm design and servo control

## Education

**University of Bath** Smart Cyber-Physical Systems for Multimodal Human-Robot Collaboration — *Bath, UK* — *Sept 2021 - Current*

- Integrated MPhil in Accountable, Responsible and Transparent Artificial Intelligence (ART-AI).
- Open day representative, Demonstrator for 2 Robotics, 1 Computer Science and 2 UAV related modules, teaching PhD students to 1st year.
- **Student Doctoral Recognition Award winner 2024.**
- University of Bath 3 Minute Thesis **Finalist** 2024.

**University of Plymouth** Robotics MEng (Hons) — *Plymouth, UK* — *Sept 2015 - 2019*

- Course Representative
- 5th Year Modules: Advanced Intelligent Robotics, Advanced Robot Design, Science and Technology of Autonomous Vehicles, MEng Project.