Dexter Rio Shepherd

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Summary

I am a PhD researcher specializing in machine learning for bio-inspired tactile sensing and robotic locomotion, hands-on experience in designing embedded AI systems that enable advanced texture classification and robot orientation through spatial-temporal models. Experienced in reinforcement learning and evolved simulation, complemented by focused training in AI methodologies. I have collaborated across disciplines on diverse projects, including applying ant navigation pathways to compare against algorithmic approaches to better understand learning in ants.
I have proven leadership skills in coordinating multi-university AI education initiatives in Africa, including curriculum development, logistical planning, and volunteer management. Actively engaged with regional/national governments, traditional rulers, and stakeholders in the UK, Nigeria and Malawi to promote AI capacity building, fostering collaboration, and aligning educational programs with local policy priorities.
Led a successful student mentor program at the University of Sussex, doubling participation by delivering tailored academic and welfare support. Contributed to applied robotics research by building 3D-printed robots powered by Jetson Nano GPUs for bio-inspired navigation, integrating communication and tracking technologies for real-world deployments. Committed to community involvement through outreach, society leadership, and volunteering at national hackathons.
I am experienced in developing and maintaining open-source machine learning and robotics software libraries, with a strong commitment to open science and accessible AI education.[1][2][3]

Education

University of Sussex — Sussex, Brighton
PhD in Bio-Robotics and Artificial Intelligence (Finish in Mar. 2026) — *Oct. 2022 – PRESENT*

University of Sussex — Sussex, Brighton
First Class BSc in Computer Science and Artificial Intelligence — *Sept. 2019 – May 2022*

Experience

Volunteer Course Instructor/ Course Convenor — Dec. 2023 – PRESENT
TReND in Africa, Sussex AI, BioRTC — *Lilongwe University, Malawi and Yobe State university, Nigeria*

- March 2024 Volunteer on site in Malawi delivering postgraduate courses on machine learning fundamentals, including data analysis, regression, classification, and deep learning.
- September 2024 Volunteer online leading a team of 5 teaching staff for a Python crash-course. Part of this involved the development of YouTube videos to accompany worksheets. See GitHub
- March 2025 led African operations, coordinating logistics, planning ML and data-logging hardware courses, developing content, and guiding volunteer teams on the ground. See GitHub
- July 2025 worked with BioRTC in Yobe state Nigeria delivering workshops on ML for Computational Neuroscience. See GitHub

Head of Student Mentor Scheme — Aug. 2022 – Dec. 2025
University of Sussex — *School of Engineering and Informatics*

- I lead a team of skilled students who host support sessions (academic and welfare).
- I regularly met with the team to discuss student issues, coordinate workshops, and provide briefings to senior faculty on student support needs. Since my appointment, sessions numbers have doubled.

Senior Teaching Assistant — Oct. 2022 – May 2025
University of Sussex — *School of Engineering and Informatics*

- Taught 8+ modules at the University of Sussex, including designing the AIAB assessment on evolving agents for real-world robots. Led the build of 200 Python-based robots, managing hardware/software challenges. Developed open-source ML and robotics libraries for embedded systems. GitHub. As is the robot library here.

Research Assistant May 2021 – July 2021, May 2022 – Aug. 2022
University of Sussex *CoNNeCT group*

- Explored cost-effective robotics by integrating 3D printed robots with the Jetson Nano controller. Further investigated ant-inspired navigation algorithms in real-world settings. See GitHub See GitHub
- Incorporated GPS and phone signal circuits for improved tracking accuracy. See GitHub for more...

Reserve Infantry Oct. 2019 – Oct. 2022
British Army *Princess of Wales Royal Regiment*

- Gained advanced first aid training and developed resilience through intensive physical and mental challenges.

Notable Projects

PhD Thesis | *Python* Oct. 2022 – PRESENT

- Developed optical and electrical tactile sensors, several machine learning models and a library for reading and predicting textures and friction. In addition worked on a replicable dataset See GitHub for more.

Ant Simulation | *Python* Jun. 2025 – PRESENT

- Collaborative effort to scan in real ant environments and run evolutionary and RL algorithms to compare biological approaches, in pursuit of better learning algorithms from ant behaviour. See GitHub for more.

Undergraduate Dissertation | *Python, C++* Oct. 2021 – May 2022

- Developed self-aware robotic agents in simulation and real-world settings using Python and C, focusing on Navigation (evolutionary control in Perlin noise environments), Sensing (depth + proprioception), and Robotics (cockroach-inspired chassis with 3D-printed Whegs). See GitHub for more. *(⋆ Received best AI project award and highest mark in cohort)*

Self-Learning chatbots | *Python, SQL, HTML, C++, JavaScript* Sep. 2018 – Jun. 2019, Dec 2020 – May 2021

- Built multiple conversational AI systems using Python, NLTK, and Raspberry Pi hardware, including a voice-interactive bot that learned through semantic matching, and a university chatbot that evolved responses based on user queries. See GitHub guide

Publications and Public Datasets

Texture and Friction Classification: Optical TacTip vs. Vibrational Piezoeletric and Accelerometer Tactile Sensors. Dexter R. Shepherd, Phil Husbands, Andy Philippides, Chris Johnson. MDPI, 2025. Access online

Versatility of Low-Resolution Tactile Sensing for Edge and Pose Detection. Dexter R. Shepherd, Phil Husbands, Andy Philippides, Chris Johnson. IEEE Conference on AI, Robotics and Control, Cairo, 2024. Access online *(⋆ Received best presentation award)*

Low-Resolution Sensing for Sim-to-Real Complex Terrain Robots. Dexter R. Shepherd, James C. Knight. Towards Autonomous Robotic Systems Conference, Cambridge, 2023. Access online

Evolving complex terrain navigation: Emergent contour following from a low-resolution sensor. Dexter R. Shepherd, James C. Knight. UKRAS, Aberystwyth, 2022. Access online *(⋆ Received best paper award)*

Slip Detection and Surface Prediction Through Bio-Inspired Tactile Feedback. Dexter R. Shepherd, Phil Husbands, Andy Philippides, Chris Johnson. Archived preprint, 2023. Access online

Optical Tactile (TacTip) Dataset for Texture Classification. Dexter R. Shepherd, Phil Husbands, Andy Philippides, Chris Johnson. University of Sussex, 2024. Access online

Electrical Tactile Dataset (Piezoelectric and Accelerometer) for Textures. Dexter R. Shepherd, Phil Husbands, Andy Philippides, Chris Johnson.University of Sussex, 2024. Access online

3D printable tactile dataset. Dexter R. Shepherd, Nicolas Herzig, Phil Husbands, Andy Philippides, Chris Johnson. University of Sussex, 2025. Access online

Ant Environment Snapshot Dataset. Oluwaseyi Jesusanmi, Dexter Shepherd, Amany Said Amin, Nay Newman, Alejandra Carriero. University of Sussex, 2025. Access online

Technical Skills

Programming Languages: Python, JavaScript, HTML/CSS, Java, C, C++, C#
Software: Git, LaTeX/Overleaf, MySQL, Anaconda, SketchUp, KiCad, SolidWorks, VSCode, Visual Studio, PyCharm
Libraries of Significance: pandas, NumPy, Matplotlib, pyTorch, Tensorflow, OpenCV, PyBullet, NLTK