Julian Stirling, PhD

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Employment

March 2025 – Present

Chief Executive, Humanitarian Technology Trust

- Leading a UK registered charity that supports the development and implementation of open-source technologies that that can be manufactured around the world for humanitarian purposes.
- Core developer for the OpenFlexure Microscope project, an open-source, laboratory-grade, digital, robotic microscope.

September 2022 – March 2025

Independent Researcher, Freelance Engineer, and Open Technology Consultant

- Worked on numerous projects including: Community building for new a open source hardware charity in Germany; Camera calibration for medical microscopy; Developing open source software for hardware documentation; Development of an open source field dissection microscope; Prototyping a novel automated water testing system.

January 2018 – August 2022

Post-doctoral Research Associate, University of Bath

- Developed open-source laboratory-grade microscopes being trialled for malaria diagnosis in East Africa.
- Collaborated with Tanzanian producers to establish sustainable, local microscope production.
- Developed procedures to bring an academic prototype inline with medical risk management frameworks (ISO 14971 and ISO 13485).
- Developed open source software to automate the creation hardware documentation in a standard format that can easily be maintained for multiple variations of the same device.
- Created a novel workflow using GitLab to automate quality checks and to keep manufacturing files, renders, and assembly documentation up-to-date. This has helped the OpenFlexure project to become one of the most widely reproduced open science hardware projects.

March 2016 – December 2017

Post-doctoral Researcher, Joint Quantum Institute, University of Maryland

This work was a collaboration with NIST, and took place on the NIST campus where I maintained my status as a guest researcher.

- Investigated and improved instrumentation to identify systematic uncertainties in past measurements of the Newtonian constant of Gravitation. A complex precision measurement that involved, combining uncertainties from numerous metrology fields including, mass, force, dimension, angle, AC voltage, capacitance, and timing.

March 2014 – December 2017

Guest Researcher, NIST

- Developed innovative metrological instrumentation for optical power, mass, and force. Including upgrading the NIST electrostatic force balance, reducing the uncertainty of NIST's milligram level calibrations by an order of magnitude.

Education

2014 **PhD in Physics, University of Nottingham**
Title: Scanning Probe Microscopy from the Perspective of the Sensor
Supervisor: Prof. P. Moriarty

2010 **BSc. (Hons) Physics, University of Nottingham**
First Class (University Prize for the highest mark in School of Physics)

Scholarships and Awards

2024 **Health Equity Innovation Award (supported by J&J Foundation:** One of six global teams recognised the award.

2024 **MIT Solve Global Health Equity Challenge:** Won access to a 9-month support program to enable the OpenFlexure Microscope to have global impact.

2023 **Best Paper Prize for Biomedical Optics Express:** Award for for scientific significance, quality, and presentation from papers published in the volume years for 2020, 2021, and 2022.

2022 **Peter Troughton Research Staff Prize:** Yearly prize at the University of Bath for outstanding performance.

2016 **Highlights of 2016, Metrologia:** Selected for outstanding new research in the field of metrology.

2012 **Silver Humies Award:** International award for genetic and evolutionary computation which produces human competitive results.

Selected Peer-Reviewed Publications

Selected from over 30 peer-reviewed publications

- *"Developing the OpenFlexure Microscope towards medical use: technical and social challenges of developing globally accessible hardware for healthcare"*, Philosophical Transactions A, **382**, 20230257 (2024) DOI: 10.1098/rsta.2023.0257
- *"Open instrumentation, like open data, is key to reproducible science. Yet, without incentives it won't thrive"*, Philosophical Transactions A, **382**, 20230215 (2024) DOI: 10.1098/rsta.2023.0215
- *"CAD we share? Publishing reproducible microscope hardware"*, Nature Methods, **19**, 1026, (2022) DOI: 10.1038/s41592-022-01484-5
- *"Combining development, capacity building and responsible innovation in GCRF-funded medical technology research"*, Developing world bioethics, **22**, 276, (2022) DOI: 10.1111/dewb.12340
- *"Robotic microscopy for everyone: the OpenFlexure microscope"*, Biomedical Optics Express, **11**, 2447 (2020) DOI: 10.1364/BOE.385729

Voluntary roles

2018 – Present **Chair of Trustees (since 2021) & Volunteer, Claverton Pumping Station**
Managing the maintenance of a Grade I listed building and historic waterhweel-powered pump. Turned a small unincorporated community group into a registered charity within first two years of leadership. Tripled yearly turnover during same period through crowdfunding and grant writing.

2021 – 2025 **Parish councillor, Claverton village**
Voluntary role in local government of a village of approximately 100 residents.

2021 – 2022 **Board member, Open Science Hardware Foundation (Previously GOSH Inc.)**
The board was responsible for oversight of a 500k USD grant that was held on behalf for the Gathering for Open Science Hardware community.

Skills and Experience

Management, Mentoring, and Supervision Skills:

- Chair of Trustees for Claverton Pumping Station Trust CIO since 2021. Leading daily operations for a volunteer organisation of 25+ volunteers.
- Co-supervised numerous students at BSc, MPhys and PhD level, taking a hands on approach to teaching practical and theoretical skills.

Organisational Skills:

- Created quality management structure, and efficient digital workflows to transition academic hardware project into a design suitable for medical manufacturing.
- Member of the International Programme Committee for IST Africa 2021, hosted by The Government of South Africa. The conference is from an annual series of Ministerial Level Technology Research and Innovation Conferences funded by the African Union and European Commission.

Open Source Engagement:

- Contributed to a diverse range of open hardware and open software projects. From submitting bug fixes and new features to some projects, to acting as core maintainer for others.
- Worked with CERN's Javier Serrano to have a hardware licencing section added to GitHub's https://choosealicense.com/
- Member of numerous open source communities including. Africa Open Science and Hardware, Gathering for Open Science Hardware, Internet of Productione, Open Source Ecology Germany
- Presented at multiple open source software and hardware conference including FOSDEM, Open Hardware Summit, and Africa Open Science and Hardware Summit.

International Development Experience

- Worked local collaborators in Tanzania for the OpenFlexure Microscope project to develop in-country production of microscopes. Our engagement with Ifakara Health Institute and the Tanzanian Medical Devices Authority helped our collaborators register as Medical Device manufacturers.
- Initiated collaborations between the University of Dar Es Salaam and the Tanzania Bureau of Standards to develop locally manufacturable, open-source digital calibration instrumentation for local industry.

Communication Skills:

- Published over 30 peer-reviewed academic papers in fields spanning Metrology, Engineering, Design, Physics, Life sciences, Bio-medicine, Bioethics, and Humanitarian technology.
- Commissioned to write for specialist magazines including The Conversation and Physics World.
- Experienced public speaker, comfortable presenting to a general audience or presenting technical content at conferences.

Analytical Skills:

- Developed and published complex mathematical models and modelling techniques for physics (e.g. Newtonian Gravity) and engineering (e.g. deformation of Atomic Force Microscope sensors).
- Experienced in data analysis ranging from the automated analysis of microscope images, to detailed uncertainty analysis for precision metrology.

Programming Skills:

- Competent programmer familiar with a number of different languages and programming styles. Prefers Python; experience programming in JavaScript, C, C++, BASH, Octave/Matlab and LabView; exposure to numerous other languages.
- Experience utilising DevOps tools for combined Hardware/Software projects, including creating highly customised continuous integration workflows for both automated deployment and software testing. Predominately implemented in using Docker containers within the GitLab CI.