Theo Brown

EDUCATION

UNIVERSITY COLLEGE LONDON   PhD in Machine Learning (2nd year)

Learning-based optimisation & control for the STEP tokamak, with a focus on incorporating physics and safety guarantees
Supervisors: Ilija Bogunovic (UCL), Lorenzo Zanisi/Francis Casson (UKAEA).

UNIVERSITY OF CAMBRIDGE   MEng Information Engineering

3rd & 4th year: Probabilistic inference & machine learning, systems & control, signal processing & information theory

1st & 2nd year: General Engineering

IET Diamond Charles Belling Scholar: one of two recipients of highest scholarship offered by the IET

PLASMA SUMMER SCHOOL   Culham Centre for Fusion Energy, Oxfordshire

World-leading intensive course on the foundations of plasma physics for nuclear fusion, targeted at plasma physics postgrads

COLYTON GRAMMAR SCHOOL, DEVON   A-levels (5 A*)

PUBLICATIONS

T. Brown, A. Cioba and I. Bogunovic. Sample-efficient Bayesian optimisation using known invariances. Accepted at Neural Information Processing Systems (2024).

T. Brown, S. Marsden, V. Gopakumar, A. Terenin, H. Ge, and F. Casson. Multi-objective Bayesian optimisation for design of Pareto-optimal current drive profiles in STEP. IEEE Transactions on Plasma Science (2024).

T. Brown. Reinforcement Learning for Plasma Control. Master's thesis (2023).

EMPLOYMENT

VISITING RESEARCHER   United Kingdom Atomic Energy Authority (current)

Paid contract extended through my master's year, working with the machine learning, tokamak science, and control teams.

Comparison of state-of-the-art RL methods applied to a simplified tokamak simulation.

Demonstration of interpretable multi-objective ML-based optimisation of fusion plasmas, leading to identification of new tradeoffs that could be made to improve plasma properties in the UK's next-generation reactor.

Instigated AI for nuclear fusion collaboration between University of Cambridge & UKAEA. Familiarity with high performance computing, PyTorch, and state-of-the-art plasma modelling codes.

SOFTWARE & UI DEVELOPER   Internship, University of Cambridge

10 weeks project in a team of two developing a vibration data logger and analysis toolkit in Python with Qt GUI.

TUTOR   Young Direction Tutoring Shanghai & freelance

5 students: maths and physics preparation for GCSEs/entrance exams, fundamentals of computer science & programming

PROJECTS

OBJECT-TRACKING QUADCOPTER   C++, computer vision, control

Image segmentation with PID control & Kalman filtering IMU from scratch; regional prize, UK Young Engineer of the Year.

ESPORTS TOURNAMENT SERVER APP   Python, PostgreSQL, Docker, Redis, CI/CD, FastAPI

Containerised microservices application to run university gaming tournaments; dynamically sets up servers & tracks data.