

# Alexander Quessy

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## Education

### PhD

University of Bristol

*Learning to Land: An Unsupervised approach towards Generalization in Reinforcement Learning*

2020-2024

Developed methods to learn generalizable policies through unsupervised learning. This was initially motivated by the problem of navigating fixed-wing aircraft to landing spots in GPS denied environments.

### MEng Aerospace Engineering

University of Bristol

*First Class Honors*

2015-2019

## Work Experience

### University of Bristol

Bristol, UK

*Postgraduate Teaching Assistant*

2020-2024

Teaching assistant for various classes in Computer Science and Aerospace Engineering, notably:

- **Machine Learning:** Fundamental undergraduate course in machine learning: probabilistic inference, neural networks and PCA.
- **Aerial Robotics:** Graduate level robotics course for control systems, autonomous navigation, multi-agent coordination, and sensor integration for UAV applications. Supervised a team of students for the design and development of an autonomous image recognition and object collection task.
- **Aircraft Vehicle Design and System Integration:** Supervised a group of students on a graduate level course in the design & development of a commercial jet transport aircraft working closely with Airbus's future design office over a 12-week period. Awarded 2<sup>nd</sup> place for best design out of 9 competing teams.
- **Bristol mini-RL Conference:** Coordinated and managed a RL conference in collaboration with 3 fellow PhD students. Secured funding and sponsors, invited researchers to present, arranged venue and schedule, and presented my own research on safe-RL.

### Aeros Flight Training

Gloucester Airport, UK

*Flying Instructor*

2017-2019

- Instructed part-time during undergraduate term-time and full-time during holidays for a range of UK pilot licenses from ab-initio private licenses to commercial multi-engine instrument ratings.
- Coordinated between students, operations, air traffic control and engineering to ensure safe-efficient training was conducted in compliance with UK Civil Aviation Authority regulation. Achieved a 100 % pass rate for student flight exams.
- I continue to instruct freelance, mainly in aerobatics and multi-engine instrument training from London Biggin Hill Airport.

## Technical Experience and Projects

- **FlyerEnv:** High speed aircraft flight dynamic simulator with a gymnasium API. Trained using various model free and offline model-based RL procedures. Rust, Skia, Python, CI/CD.
- **Aircraft Landing Site Identification:** Deep Convolutional Neural Network (CNN) based semantic segmentation classifier, trained on purely simulated data and validated on a real world aircraft. C++, Python, Unreal Engine
- **Safe RL with Minimal Supervision:** Designed a safe offline model based RL algorithm, proved the importance of data quality over quantity when learning safe model based policy representations. PyTorch, Python, Mujoco
- **Rewardless Open-Ended Learning:** Unsupervised RL combined with open-ended learning to automatically learn complex agent behaviors. TensorFlow v2, OpenAI Gym, Python

## Languages and Technologies

- **Programming Languages:** Proficient in Python and MATLAB; familiar with C, C++, and Rust.
- **Machine Learning Frameworks:** Primarily experienced with PyTorch for development and deployment, with additional experience using TensorFlow and JAX.
- **Robotics and Control Systems:** Extensive use of OpenAI Gym/Gymnasium and Mujoco, with some experience in ROS 2, applied to both classical control systems (e.g., PID/MPC) and probabilistic control such as RL.
- **Development and Deployment:** High-performance computing (HPC) experience, utilizing CUDA on a home server with an NVIDIA RTX 8000 (provided through an NVIDIA hardware grant), Slurm on a University HPC cluster, and cloud resources via an AWS compute grant. Proficient in Docker, Bash scripting, and version control with Git and GitHub Actions.