NICHOLAS BACKSHALL

EMPLOYMENT

Independent Software Contractor   2024-2025
- Delivered software development and consulting services for cross-platform **C++** applications
- Enhanced an app for churches by developing new features, establishing **CI/CD pipelines**, and introducing **testing frameworks**, improving code reliability and maintainability
- Redesigned the app's user interface, modernising the experience and advising on future development strategies

Co-Founder / Engineer, Stealth Startup   2024
Cooking Robotics Startup
- Prototyped a dual-arm cooking robot for cooking tasks using **robot learning techniques**
- Built a demo collection stack to train robots, demonstrating feasibility in task generalisation
- Collaborated on hardware-software integration and early-stage product development

Senior Robotics Research Engineer, Dyson Robot Learning Lab   2022-2024
Research Lab led by Dr Stephen James
- Led research in **sample-efficient imitation learning** and **reinforcement learning** for robot manipulation, inventing a novel action-space resulting in **100% increase in task success rates**
- Created **BiGym** and led project: benchmark environment for mobile bi-manual demo-driven robotic manipulation, with a **VR** demo-collection pipeline and 40 diverse tasks
- Developed **real-world robot learning environment** using **ROS2**, **Python** and **C++** for Franka Panda and UR5 robots
- Contributed to the development of efficient and robust robot learning training infrastructure
- Managed and mentored a graduate robotics engineer, fostering growth and development within the team

Software Application Engineer, Dyson   2021-2022
New-Product-Innovation Software team
- Created core **Android BLE** library in Kotlin, for controlling Dyson Connected Products
- Designed cross-platform messaging protocol implemented in **GoLang**, **JavaScript**, and **Python**
- Built iOS (Swift) and Android (Kotlin) apps to prototype and test innovative product concepts

iOS Developer, Dyson   2020-2021
New-Product-Innovation Software team
- Engineered high-performance iPhone **AR application** using **Metal** and **Metal Shading Language**, simulating airflow with 0.5M dynamic particles
- Developed Dyson AQ App using **SwiftUI**, integrating **Bluetooth** for real-time air quality visualization

Android Developer, Dyson   2019-2020
MyDyson Application team
- Enhanced the MyDyson app, adding **connected light** features using **Kotlin** and **Java**
- Maintained high code coverage through **Test-Driven Development (TDD)**

Engineer, Dyson   2017-2019
Worked in six teams across the engineering departments:
Mechanical, Electrical, and Software
- **Mechanical Team:** Developed a manufacturing strategy to tune cleaner heads
- **Electronics Team:** Conducted cost-benefit analysis of sensor technologies
- **Cloud Computing Team:** Developed a debug platform for diagnosing faults in live robots
- **Anthropometric Research Team:** Designed & conducted user product perception studies
- **EV HV Architecture Team:** Created architecture doc for integrating multiple HV subsystems
- **Hair Care Product Team:** Prototyped new attachments for hair care products

PUBLICATIONS

BiGym: A Demo-Driven Mobile Bi-Manual Manipulation Benchmark
Nikita Chernyadev*, **Nicholas Backshall***, Xiao Ma, Yunfan Lu, Younggyo Seo, and Stephen James
CoRL 2024

Redundancy-aware Action Spaces for Robot Learning
Pietro Mazzaglia*, **Nicholas Backshall***, Xiao Ma, and Stephen James
IEEE Robotics and Automation Letters, 2024

* Joint first author

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nbackshall.github.io
nicholas.backshall@gmail.com

I am a versatile software engineer with experience in robotics, machine learning, AR/VR and mobile applications. At Dyson's Robot Learning Lab I led breakthrough research in ML that doubled task success rates through novel algorithms, while my work developing AR applications with 0.5M dynamic particles demonstrates my ability to build performant 3D experiences. My published research and experience leading technical teams shows my ability to drive innovation while collaborating effectively across disciplines.

SKILLS & TECHNOLOGIES

Programming Languages:
Python, C++, Kotlin, Swift, C#, JavaScript
Frameworks & Libraries:
PyTorch, ROS2, MoveIt, SwiftUI, Android SDK
Technologies:
Reinforcement Learning, Imitation Learning, Robotics, AR/VR, Bluetooth Low Energy (BLE)
Cloud & DevOps:
Ubuntu, Docker, AWS Lambda, RESTful APIs

EDUCATION

2017 – 2021
First Class BEng (with Honours) in Engineering (Electronics - Software)
The University of Warwick & Dyson Institute of Engineering and Technology

- 1 of 33 selected out of 900+ applicants for the paid Degree-Apprenticeship
- **Relevant Modules:** Applied Programming, Software Development for Engineers, Agile Software Development, Systems and Network Architecture, Embedded Systems, Internet of Things, Data Science and Machine Learning, Vision and Processing

INTERESTS

Graphic Design | Tennis | Skiing