KYLE L. WALKER

Postdoctoral Researcher, Robotics

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SUMMARY

Postdoctoral Robotics Researcher passionate about developing compliant and adaptive robots that exploit their morphology to interact intelligently in dynamic marine environments. I have investigated this through either environment-aware control or passive compliance and smart structural design. My goal is to perform research at the intersection of these and develop systems that exploit both, as living organisms do. I am committed to bridging fundamental scientific discovery with application-based research, pushing technology into the field for societal impact.

Research Interests: Marine Robotics, Design/Control of Soft Robotics, Predictive Control, Variable Stiffness Mechanisms, Bioinspiration, Soft/Rigid Hybrid Systems.

EDUCATION

9/2019 - 9/2023 **Ph.D. Robotics (Marine/Soft)** — **University of Edinburgh**

- Supervisors: Dr. Francesco Giorgio-Serchi, Dr. Adam A. Stokes and Dr. Aristides Kiprakis.
- Fully Funded via EPSRC DTP Scholarship Award; aligned with ORCA Hub UK consortium.
- Thesis title: *"Preview-Based Control Methods for Ocean Wave Disturbance Mitigation for Underwater Robots".*

9/2017 - 6/2018 **M.Eng. Electrical and Mechanical Engineering (Study Abroad)** — **HKUST**

- Study abroad year as part of undergraduate degree below.

9/2014 - 6/2019 **M.Eng. Electrical and Mechanical Engineering** — **University of Strathclyde**

- Grade: 1:1
- Thesis title: *"Design of a Low Cost Myoelectric Prosthetic Hand".*

EXPERIENCE

11/2024 – Present **Postdoctoral Researcher** — **EPFL, Lausanne, Switzerland**

- Supervisor: Dr. Josie Hughes
- Project topics include soft-rigid manipulator design, locomoting robots, aquatic robots and soft sensing.
- Collaborating with interdisciplinary teams on multiple projects, both At EPFL and externally (Univ. of Edinburgh, Swisscom, Univ. of Cambridge).
- Manage tight deadlines for publication, mentor students (Master and PhD level), contribute to grant writing and disseminate findings

3/2023 – 11/2024 **Robotics Engineer** — **The National Robotarium, Edinburgh, UK**

- Develop and implement robotic technologies and solutions in collaboration with industrial partners across all sectors. Projects contributed to covered marine robotics, soft robotics and prosthetics.

Autumn 2022 **Visiting Researcher** — **Tohoku University, Japan, Sendai**

- Advised by Prof. Kenjiro Tadakuma
- Designed and prototyped a variable stiffness cable-driven manipulator for inspection, maintenance and intervention purposes in marine environments, later advancing to a functional proof of concept at The National Robotarium.

Spring 2022 **Visiting Researcher** — **TU Delft, Delft, The Netherlands**

- Advised by Prof. Cosimo Della Santina
- Investigated predictive control for disturbance mitigation of soft manipulators in wave-dominated environments, using deterministic wave predictions incorporated directly within the control architecture.

5/2021 – 3/2023 **Lead Electronic Design Engineer** — **Bioliberty, Edinburgh, U.K.**

- Drove advancement towards a Minimum Viable Product (MVP)- designed, prototyped and experimentally validated hardware functionality including machine-learning based Electromyography (EMG) control.
- Bioliberty recently secured £2.2m funding from investors; funding round led by Archangels.

6/2017 – 9/2018 **Electronic Circuit Design Intern** — **MBDA U.K., Stevenage, U.K.**

- Summer intern for two consecutive years desigining and manufacturing PCB's for future concept products.
- Invited to return in 2018 based on performance in 2017. Offered graduate role but opted to pursue a PhD.

SELECT PROJECTS

Ph.D.

Preview-Based Control Methods for Ocean Wave Disturbance Mitigation for Underwater Robots
Primary Supervisor: Dr. Francesco Giorgio-Serchi.
Developing improved control strategies for underwater vehicles in harsh and turbulent seas to facilitate operation around marine renewable devices.

Industry

Continuum Manipulators for Offshore Applications
Partnership with Senai Cimatec and Shell Brazil, developing highly articulated manipulators for maintenance and inspection of offshore platforms and subsea structures.

Intl. Academic Collaboration

Station Keeping of Underwater Legged Robots in Shallow Waters
Principal Investigator: Dr Marcello Calisti
Led by researchers at Scuola Superiore Sant'Anna. Performingn station keeping analysis of the SILVER-2 8-legged underwater robot against traditional propeller-based ROVs. Supported with field trials.

Academic

Soft-Rigid Hybrid Manipulators for Marine Applications
Primary Supervisor: Dr. Josie Hughes.
Investigating the combination of soft and rigid components to address well-known problems associated with each type of manipulator, for example torque-transmission capacity of soft manipulators. Particular focus on a marine environment.

JOURNAL PUBLICATIONS

2025

Contact Modelling, Sensing and Perception for Soft Continuum Robots: A Review Under Review
G. Pei, **K. L. Walker** and J. Hughes.
Nature Machine Intelligence.

2025

Scaling laws for station keeping performance of ROVs subject to wave disturbance Under Review
K. L. Walker and F. Giorgio-Serchi.
Ocean Engineering.

2025

A Sequential Locking Mechanism for Control of Soft-Rigid Hybrid Continuum Structures Under Review
K. L. Walker, J. Wan and J. Hughes.
IEEE Robotics and Automation Letters (RAL).

2025

ScaFi: Length-Scalable, Compliant, Parametric Robotic Fish Design for Operation in Multiple Environmental Niches Under Review
N. Obayashi, A. Anastasiadis, J. Gumowski, K. Junge, **K. L. Walker**, K. Mulleners and J. Hughes
npj Robotics.

2025

A democratized bimodal model of research for soft robotics: Integrating slow and fast science
N. Obayashi, D. Howard, **K. L. Walker**, J, Jørgensen, M. Gepner, D. Sameoto, A. Stokes, F. Iida and J. Hughes.
Science Robotics

2024

Nonlinear Model Predictive Dynamic Positioning of a Remotely Operated Vehicle with Wave Disturbance Preview
K. L. Walker, Laura-Beth Jordan and F. Giorgio-Serchi.
International Journal of Robotics Research (IJRR)

2021

Analysis of station keeping performance of an underwater legged robot
M. Chellapurath, **K. L. Walker**, E. Donato, G. Picardi, S. Stefanni, C. Laschi, F. Giorgio-Serchi and M. Calisti.
IEEE/ASME Transactions on Mechatronics.

2021

Hydrodynamic loads on a restrained ROV under waves and current
R. Gabl, T. Davey, Y. Cao, Q. Li, B. Li, **K. L. Walker**, F. Giorgio-Serchi, S. Aracri, A. Kiprakis, A. A Stokes and D. M. Ingram.
Ocean Engineering.

2021

Experimental validation of wave induced disturbances for predictive station keeping of a remotely operated vehicle
K. L. Walker, R. Gabl, S. Aracri, Y. Cao, A. A. Stokes, A. Kiprakis and F. Giorgio-Serchi.
IEEE Robotics and Automation Letters.

6/2020

Experimental Force Data of a Restrained ROV Under Waves and Current
R. Gabl, T. Davey, Y. Cao, Q. Li, B. Li, **K. L. Walker**, F. Giorgio-Serchi, S. Aracri, A. Kiprakis, A. A Stokes and D. M. Ingram.
MDPI Data.

CONFERENCE PUBLICATIONS

2025 **Design of a Robotic Fish with Independent Control of Tail and Cadual Fin Deflection** **Under Review**
K. L. Walker, J. Wan and J. Hughes.
IEEE International Conference on Soft Robotics (RoboSoft), Kanazawa, Japan.

2025 **Computing Forward Statics from Tendon-Length in Flexible-Joint Hyper-redundant Manipulators** **In Press**
W. Feng, **K. L. Walker**, Y. Yang and F. Giorgio-Serchi
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Hangzhou, China.

2025 **Closed-Loop Control and Disturbance Mitigation of an Underwater Multi-Segment Continuum Manipulator**
K. L. Walker, H.-Y. Chen, A. J. Parlridge, A. A. Stokes, L. C. Da Silva, F. Giorgio-Serchi
IEEE International Conference on Soft Robotics (RoboSoft), Lausanne, Switzerland.

5/2024 **A Modular, Tendon Driven Variable Stiffness Manipulator with Internal Routing for Improved Stability and Increased Payload Capacity**
K. L. Walker, A. J. Partridge, H.-Y. Chen, R. R. Ramachandran, A. A. Stokes, K. Tadakuma, L. C. da Silva and F. Giorgio-Serchi
IEEE International Conference on Robotics and Automation (ICRA), Yokohama, Japan.

2024 **Model Predictive Wave Disturbance Rejection for Underwater Soft Robotic Manipulators**
K. L. Walker, C. Della Santina and F. Giorgio-Serchi
IEEE International Conference on Soft Robotics (RoboSoft), San Diego, USA.

2023 **Disturbance Preview for Non-Linear Model Predictive Trajectory Tracking of Underwater Vehicles in Wave Dominated Environments.**
K. L. Walker and F. Giorgio-Serchi.
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Detroit, USA.

6/2023 **Feed-forward Disturbance Compensation for Station Keeping in Wave-dominated Environments.**
K. L. Walker, A. A. Stokes, A. Kiprakis and F. Giorgio-Serchi.
IEEE/MTS Oceans, Limerick, Ireland.

2021 **Experimental validation of unsteady wave induced loads on a stationary remotely operated vehicle.**
K. L. Walker, R. Gabl, S. Aracri, Y. Cao, A. A. Stokes, A. Kiprakis and F. Giorgio-Serchi.
IEEE International Conference and Robotics Automation (ICRA), Xi'an, China.

10/2020 **Impact of thruster dynamics on the feasibility of ROV station keeping in waves.**
K. L. Walker, A. A. Stokes, A. Kiprakis and F. Giorgio-Serchi.
Global Oceans 2020: Singapore–US Gulf Coast.

4/2020 **Investigating PID Control for Station Keeping ROVs.**
K. L. Walker, A. A. Stokes, A. Kiprakis and F. Giorgio-Serchi.
3rd UK-RAS Conference for PhD Students & Early-Career Researchers on 'Robots into the Real World, Lincoln, UK.

GRANTS & AWARDS

2022 **Summer Program Fellowship (Japanese Society for the Promotion of Science (JSPS)**
∼**£5k** to support a research visit to a Japanese institution.

2022 **Travel Grant (Institute for Engineering and Technology, IET)**
£1k to support attendance at IROS 2022, Kyoto.

2022 **Emerging Researcher Travel Grant (Saltire Scotland, SUPA)**
∼**£5k** to support a research visit to a European institution.

2019 **Doctoral Training Partnership (DTP) Scholarship (UKRI EPSRC)**
Scholarship to support Ph.D studies. **Full coverage of tuition fees, stipend and consumables allowance**.

2021 **IET Postgraduate Award**
3 awards yearly to recognise excellence in engineering research. **Monetary prize of £2.5k**.

2020 **Electronics Weekly Brightspark**
Awards to recognise talented young engineers in the UK.

TEACHING EXPERIENCE

2024-Present **Masters Student Supervisor** **EPFL**
Primarily supervised 4 Thesis and 4 Semester projects to date. Co-supervision of 5 other students within the lab.

2023-2024 **Ph.D. Mentoring** **University of Edinburgh**
Support of 3 junior Ph.D. students. Projects cover modeling, sensing and control for soft robots and manipulators. Advised on experimental methods to validate theories and approaches.

2020-2022 **B.Eng. and M.Eng. Supervisor** **University of Edinburgh**
Guidance of students during dissertation projects. Projects ranged from modelling of underwater robots to physical design of continuum manipulators. Students both at EPFL and internationally.

2019-2022 **Teaching Assistant, Course Demonstrator** **University of Edinburgh**
Tutored, demonstrated labs and marking assignments, offering support on presenting key concepts effectively. Ranged from classical mechanics theory to implementation of optimization algorithms within software.

ACADEMIC ACTIVITIES

Service

- Topic Editor: Co-editor of 3x special topics with Frontiers in Robotics and AI.
- Paper Reviewer: IEEE RA-L, Ocean Engineering, IEEE RoboSoft, IEEE ICRA, IEEE IROS, IEEE Access, various others.
- STEM U.K. Ambassador (2019-2023).
- Postgraduate Student Representative, School of Engineering (2021)

Workshop Organisation

2026	Soft Robotcs: Innovations for Marine Environments and Applications (Under Review)	**IEEE RoboSoft**
2025	Moonshot Goals of Soft Robotics through Embodied Intelligence	**IEEE RoboSoft**
2024	(Re)designing the Tree of Robotic Life: A Game of Alternative Timelines	**IEEE ICRA**
2024	Democratization of Soft Robotics through Embodied Intelligence	**IEEE RoboSoft**
2023	Northumbrian Water Group Innovation Festival	**Industry**

Talks, Seminars, Poster Presentations etc.

2025	Soft-Rigid Hybrid Continuum Structures for Applications in Marine Environments, ***IROS***	**Poster (Workshop)**
2025	Closed-Loop Control and Disturbance Mitigation of an Underwater Multi-Segment Continuum Manipulator, ***RoboSoft***	**Talk & Poster**
2024	"How can soft robotics assist the marine industry?", ***The National Robotarium***	**Interview**
2024	Model Predictive Disturbance Rejection for Underwater Soft Robotic Manipulators, ***RoboSoft***	**Poster**
2024	Undergraduate Engineering Career Talk, ***University of Edinburgh***	**Invited Talk**
2024	A Modular, Tendon Driven Variable Stiffness Manipulator with Internal Routing for Improved Stability and Increased Payload Capacity, ***ICRA***	**Poster**
2023	"Marine Robotics: Exploring our Seas", ***Orkney Science Festival***	**Invited Talk**
2023	Disturbance Preview for Nonlinear Model Predictive Trajectory Tracking of Underwater Vehicles in Wave Dominated Environments, ***IROS***	**Talk & Poster**
2023	Model Predictive Disturbance Rejection for Underwater Soft Robotic Manipulators, ***ICRA***	**Poster**
2023	Feed-forward Disturbance Compensation for Station Keeping in Wave-dominated Environments, ***Oceans***	**Talk & Poster**
2021	Experimental Validation of Unsteady Wave Induced Loads on a Stationary Remotely Operated Vehicle , ***ICRA***	**Talk (Online)**
2020	Impact of Thruster Dynamics on the Feasibility of ROV Station Keeping in Waves, ***Oceans***	**Talk (Online)**
2020	STEM for Britain, ***Houses of Parliament***	**Poster**
2020	Investigating PID Control for Station Keeping ROVs, ***UK-RAS20***	**Poster**

Miscellaneous

2025	The Soft Robotics Embodied Intelligence Challenge, *Lead Organiser*	**Competition**
2024	The Soft Robotics on a Budget Challenge, *Lead Organiser*	**Competition**
2024	FIRST Tech Challenge UK, *Facilitator*	**Competition**
2023	Functional Fashion, *Facilitator*	**Competition**
2021	Rehab Soft Robotics Summer School, *Participant*	**Course**

SKILLS

- Rapid prototyping and fabrication (CAD, 3D Printing, Casting, Design/Assembly etc.)
- Programming (ROS, ROS2, Python, C++, MATLAB, Casadi, WAMIT)
- Experimental design, data collection, analysis (Motion Capture, DAQ etc.)
- Dynamic modelling (linear & nonlinear methods, hydrodynamics)
- Public Speaking (technical and lay audience)
- Project management, people management
- Languages: English (Native), French (Learning), Spanish (Learning)

INTERESTS, CERTIFICATIONS, MEMBERSHIPS

- Football, Cooking, Skiing, Scuba Diving, Golf, Music
- Mental Health First Aid Course, NHS Scotland
- Dive RAID Open Water 20m.
- Institute of Electrical and Electronic Engineers (IEEE)
- IEEE Robotics and Automation Society
- Project management, people management

REFEREES

Current Supervisor **Prof. Josie Hughes** — **Assistant Professor, EPFL**
E-mail: josie.hughes@epfl.ch

Former Supervisor **Dr. Francesco Giorgio-Serchi** — **Lecturer, The University of Edinburgh**
E-mail: F.Giorgio-Serchi@ed.ac.uk

Former Manager **Stewart Miller** — **CEO, The National Robotarium**
E-mail: s.miller@hw.ac.uk