DIGBY CHAPPELL

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RESEARCH & EDUCATION

Imperial College London, UKRI Centre for Doctoral Training in AI for Healthcare *2019 - Present*
PhD in Robotics and Machine Learning
Robotic and Machine Learning Techniques to Improve Prosthetic Hand Control
– Key research themes: prosthetic hand control, biosignal processing (EMG), human dexterity, virtual reality, haptic feedback, machine learning
– Jointly supervised by Dr Nicolas Rojas (robotics), Dr Petar Kormushev (machine learning), and Professor Fernando Bello (medical simulation)
– Teaching assistant and supervisory roles

University of Leeds, School of Computing *2022*
Visiting Researcher
Upper Limb Prosthetics
– Key research themes: prosthetic hand control, continuous EMG control, haptic feedback
– Supervised by Professor David Hogg (Director of UKRI Centre for Doctoral Training in AI for Medical Diagnosis and Care)

University of Cambridge, Jesus College *2015 - 2019*
Engineering MEng, BA Hons
Final Year Project: Wearable Muscle Activity Sensors
– Key themes: flexible electrodes, biosignal processing (EMG), machine learning
– Supervised by Professor George Malliaras, Cambridge Bioelectronics Lab
Modules
– Robotics, Deep Learning, Probabilistic Machine Learning, Optimisation and Reinforcement Learning

The Neale Wade Academy (formerly Neale Wade Community College) *2007 - 2014*
A Levels: Mathematics (A*), Further Mathematics (A*), Physics (A), Chemistry (A)
GCSEs: 2 A*s, 6 As, 4 Bs (including Mathematics and English)

RECENT PUBLICATIONS

D. Chappell, Z. Yang, A. B. Clark, A. Berkovic, C. Laganier, W. Baxter, F. Bello, P. Kormushev, and N. Rojas, "Natural Sensorimotor Control of Prosthetic Hands: a Holistic End-User Study of Closed-Loop Continuous Myoelectric Control," *Science Robotics*, 2023 (Under review)

K. Li, **D. Chappell**, and N. Rojas, "Immersive Demonstrations are the Key to Imitation Learning," in *IEEE International Conference on Robotics and Automation (ICRA)*, London: IEEE, May 2023 (To appear)

D. Chappell, H. W. Son, A. B. Clark, Z. Yang, F. Bello, P. Kormushev, and N. Rojas, "Virtual Reality Pre-Prosthetic Hand Training with Physics Simulation and Robotic Force Interaction," *IEEE Robotics and Automation Letters*, vol. 7, no. 2, pp. 4550–4557, Apr. 2022

D. Chappell, Z. Yang, H. W. Son, F. Bello, P. Kormushev, and N. Rojas, "Towards Instant Calibration in Myoelectric Prosthetic Hands: A Highly Data-Efficient Controller Based on the Wasserstein Distance," in *IEEE International Conference on Rehabilitation Robotics (ICORR)*, Rotterdam: IEEE, 2022 (Spotlight presentation).

Z. Yang, A. B. Clark, **D. Chappell**, and N. Rojas, "Instinctive Real-time sEMG-based Control of Prosthetic Hand with Reduced Data Acquisition and Embedded Deep Learning Training," *2022 International Conference on Robotics and Automation (ICRA)*, pp. 5666–5672, May 2022

A. Berkovic, C. Laganier, **D. Chappell**, T. Nanayakkara, P. Kormushev, F. Bello, and N. Rojas, "A Multi-Modal Haptic Armband for Finger-Level Sensory Feedback from a Prosthetic Hand," in *Haptics: Science, Technology, Applications, EuroHaptics*, Hamburg: Springer, May 2022, pp. 138–146

F. Cursi, **D. Chappell**, and P. Kormushev, "Augmenting Loss Functions of Feedforward Neural Networks with Differential Relationships for Robot Kinematic Modelling," *20th International Conference on Advanced Robotics (ICAR)*, pp. 201–207, 2021

R. P. Saputra, N. Rakicevic, **D. Chappell**, K. Wang, and P. Kormushev, "Hierarchical Decomposed-Objective Model Predictive Control for Autonomous Casualty Extraction," *IEEE Access*, vol. 9, pp. 39 656–39 679, 2021

K. Wang, D. Marsh, R. P. Saputra, **D. Chappell**, Z. Jiang, A. Raut, B. Kon, and P. Kormushev, "Design and control of SLIDER: An ultra-lightweight, knee-less, low-cost bipedal walking robot," *IEEE International Conference on Intelligent Robots and Systems*, pp. 3488–3495, Oct. 2020

EMPLOYMENT AND EXPERIENCE

Imperial College London - Graduate Teaching Assistant *Oct. 2019 - Present*

- Teaching assistant for the AI for Healthcare CDT, Robotics taught module and Robotics Research Project module for the Design Engineering department.
- Assistant supervisor of multiple Masters students during their final year project.
- Reviewer of Undergraduate Research Opportunities Programme (UROP) applications.

Nagwa - Freelance Physics Video Developer *Sep. 2020 - Dec. 2021*

- Producing educational materials (worksheets, voice-overs, videos) for physics lessons aimed at ages 11 to 18.

Fluidic Analytics - Graduate Software Engineering Intern *Jul. 2019 - Sep. 2019*

- Software to interface with a range of mechanical devices.
- User interfaces to automate experiments and manufacturing.

PA Consulting - Data Science Intern *Jul. 2018 - Sep. 2018*

- Time series analysis and prediction.
- Geographical data analysis.

TTP Labtech - Engineering Intern *Jul. 2017 - Sep. 2017*

- Classical computer vision for nanomaterial inspection.
- Mechanical design to automate R&D processes.

TECHNICAL SKILLS

Programming	Python	Advanced	CasADi (Optimal Control), PyTorch, Tensorflow, Rospy, OpenCV, Pandas
	C#	Advanced	Unity3D, Serial and TCP/IP Communication, ML-Agents Toolkit
	MATLAB	Intermediate	CasADi (Optimal Control), Robotics Toolkit, ICLOCS (Optimal Control)
	C++	Intermediate	ROS, Arduino, ESP32, TCP/IP Communication
Robotics	Control	Advanced	Non-Linear Model Predictive Control, Trajectory Optimisation, Prosthetic Hand Control, Bipedal Walking Robots
	Design	Intermediate	Prosthetics, Rigid-Link Robots, Tendon-Driven Robots
	Visualisation	Intermediate	rviz, RQt Plot, Matplotlib
Human-Computer Interaction	Biosignals (EMG)	Advanced	Myo Armband, Intan Arduino Shield, Real-Time Analysis, Action Classification & Regression
	Haptic Feedback	Intermediate	SenseGlove Haptic Feedback Exoskeleton, Non-invasive Haptic Feedback Devices, Robot Arm Interaction
CAD and Simulation	SolidWorks	Advanced	Solidworks2URDF (Robot Modelling)
	Unity3D	Advanced	ArticulationBody, Hand Simulation, URDF (Robot Modelling)
	Gazebo	Intermediate	Robot Simulation

AWARDS, INTERESTS, & OTHER ACHIEVEMENTS

- **Awards:** UKRI AI CDTs in Healthcare Conference 2022 best presentation award, Telegraph STEM Awards 2016 Design category winner, Arkwright Scholar.
- **Teaching:** Associate Fellow of the Higher Education Authority.
- **Outreach:** Robot Intelligence Lab blog and outreach, President of the Jesus College Engineering Society.
- **Projects:** Party Gadgets (see LinkedIn for details), Data Science.
- **Sports and Games:** Badminton, Othello, Rock Climbing.
- **Cooking:** Making the perfect ice cream.

REFERENCES

Dr. Nicolas Rojas
Lecturer, Dyson School of Design Engineering, Imperial College London
n.rojas@imperial.ac.uk
Relationship: PhD Supervisor (Robotics)

Prof. Fernando Bello
Professor of Surgical Computing and Simulation Science, Department of Surgery and Cancer, Imperial College London
f.bello@imperial.ac.uk
Relationship: PhD Supervisor (Medical)

Anthony Douglas
Director, Ideation Consulting Ltd. (formerly Head of Engineering, Fluidic Analytics, and Mechanical Engineer, TTP Labtech)
duglasio@hotmail.com
Relationship: Placement Supervisor at Fluidic Analytics, Colleague at TTP Labtech

Further references are available upon request.