

# DIGBY CHAPPELL

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## RESEARCH & EDUCATION

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**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 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)

## EMPLOYMENT AND EXPERIENCE

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**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.

**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.

## SELECTED PUBLICATIONS

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**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,” in *IEEE International Conference on Robotics and Automation (ICRA)*, Philadelphia: IEEE, 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 *Eurohaptics*, Hamburg: Springer, May 2022

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

## TECHNICAL SKILLS

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<b>Programming</b>	Python	Advanced	CasADi (Optimal Control), PyTorch, Tensorflow, Rospay, 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
<b>Robotics</b>	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
<b>Human-Computer Interaction</b>	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
<b>CAD and Simulation</b>	SolidWorks	Advanced	Solidworks2URDF (Robot Modelling)
	Unity3D	Advanced	ArticulationBody, Hand Simulation, URDF (Robot Modelling)
	Gazebo	Intermediate	Robot Simulation

## AWARDS, INTERESTS, & OTHER ACHIEVEMENTS

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- **Awards:** UKRI AI CDTs in Healthcare Conference 2022 best presentation award, Telegraph STEM Awards 2016 Design category winner.
- **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:** Baking the perfect cheesecake.

## REFERENCES

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References are available upon request.