

Dr. Dipankar Bhattacharya, Ph.D.

Marie Skłodowska-Curie Fellow

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Research Profile

Independent robotics researcher developing model-based and learning-enabled robotic systems for healthcare, and rehabilitation. My work integrates soft robotics, cable-driven actuation, deformable-object manipulation, perception, and control, including RoSE, an early soft-robotic esophagus for controlled endoprosthetic stent testing (radial force, migration, manometry; *Soft Robotics*, 2021), validated through industry-funded work (BvW Holding, NZD 39,000, 2018). Subsequent biomimetic esophageal motility research in *Nature Communications* (2026) cites RoSE as prior work. As Marie Skłodowska-Curie Fellow at Imperial College London, I lead CASREx (Grant No. 101205678; EUR 276,187.92, 24 months) on cable-driven exosuits for upper-arm muscle-impairment rehabilitation, building on this soft-robotics and control foundation, cable wrapping modeling (MMT, 2025; IEEE TCST, 2023), and fabric manipulation (IEEE IROS, 2026; IEEE RA-L, 2025).

Education

- 2016 – 2021** **Ph.D., Mechatronics Engineering** in Department of Mechanical and Mechatronics Engineering, The University of Auckland (UoA), 01/08/2016 – 14/04/2021.
Thesis title: *Robotic Soft Esophagus Design, Modelling, and Control for Endoprosthetic Stent Testing and Food Swallow Investigation*
Developed RoSE, a pneumatic soft-robotic esophagus for in vitro stent radial-force, migration, and manometry studies; first-author *Soft Robotics* (2021); outputs: 3 journal articles, 2 conference papers, 1 invited book chapter (Springer, 2019). RoSE is cited as foundational biomimetic esophageal motility work in **Nature Communications** (Kilroy et al., 2026).
- 2011 – 2013** **M.Tech , Systems and Control** in Department of Electrical Engineering, Indian Institute of Technology (IIT), 22/07/2011 – 04/07/2013.
Dissertation title: *Non-Linear Predictive Control Model using Relevance Vector Machine*. GPA: **8.4 / 10.0**
Relevance Vector Machine (RVM)-based nonlinear MPC policy, first validated in simulation and then deployed on hardware. Output: 1 journal article (Int. J. Sustainable Energy, 2015).
- 2004 – 2010** **B.Tech , Electronics and Communication Engineering**, North Eastern Regional Institute of Science and Technology (NERIST), 21/07/2004 – 23/06/2010.
Project title: *Design and Synthesis of a Sixth Order Tow Thomas Bi-quad filter*. GPA: **9.1 / 10.0**

Employment History

- 2025 – Present** **Marie Skłodowska-Curie Postdoctoral Fellow**, Dyson School of Design Engineering, Imperial College London. Supervisor: Prof. Thrishantha Nanayakkara (**Morph Lab**).
CASREx: Cable-driven Arm Soft Reconfigurable Exoskeleton for Muscle-Impairment Rehabilitation (Grant No. 101205678; EUR 276,187.92, 24 months).
• Leading research on human-inspired stiffness modulation in cable-driven elbow exosuits for upper-arm rehabilitation.

- Developing an Isaac Sim digital twin for reinforcement-learning policy training and sim-to-real deployment.
- Integrating human trials and EMG into adaptive exosuit control.
- Developing and validating a compliant cable-driven manipulator–exosuit platform with antagonistic co-contraction control.

- 2026 – Present** **Assistant Supervisor**, Dyson School of Design Engineering, Imperial College London, United Kingdom, 15/01/2026 – Present.
Assistant Supervisor for two Year 3 MEng (Design Engineering) placement students on exosuit R&D (March 2026–Present).
Delivered lecture on **Robotics Simulation and Control using PyDrake** for **DESE71002 Robotics Research Projects**, Dyson School of Engineering, Imperial College London (28/01/2026).
- 2024–2025** **Senior Research Engineer–Control Systems** in the Center for Transformative Garment Production (TransGP), Mentor: Prof. Kazuhiro Kosuge, 02/07/2024 – 31/10/2025.
Physics-based Cloth Manipulation with policy generated from imitation learning.
 - Led multidisciplinary work on dual-arm fabric pre-sewing handling and flattening (mesh perception + imitation learning).
 - Contributed to IEEE IROS (2026) on dual-arm fabric flattening (RTFF), IEEE RA-L (2025) on automated straight-line sewing, and IEEE ICMA (2025) fabric destacking.
 - Built and validated robotic fabric manipulation testbeds for industrial sewing and destacking workflows (May–Oct 2025).
- 2024 – 2025** **Visiting Research Associate** in the Department of Electrical and Electronic Engineering, Hong Kong University (HKU), 02/07/2024 – 31/10/2025.
- 2021 – 2024** **Postdoctoral Fellow** in the Department of Mechanical and Automation, The Chinese University of Hong Kong. Supervisor: Prof. Darwin Lau, 01/03/2021 – 30/06/2024
Project title 1: Modeling and control of cable-driven robots with cable wrapping around obstacles and links.
Project title 2: Design of a cable-driven growing vine robot for safer false ceiling inspections.
 - Numerical kinematic/dynamic modeling of cable-object interference and wrapping for complex-shaped CDPRs; validated in simulation and hardware (MMT, 2025; GeoWrapSim-CDPR).
 - Tri-space reactive + iterative-learning control for redundant multilink/hybrid CDPRs under cable-force and interference constraints (IEEE TCST, 2023).
 - Mentored undergraduate final-year and placement students, including a cable-driven vine-robot inspection project (CUHK, 2023–2024).
 - Co-authored grant proposals and technical reports; mentored PhD students at HKU and CUHK (2021–2026).
- 2021 – 2022** **Visiting Postdoctoral Fellow** in Laboratoire des Sciences du Numérique de Nantes (LS2N), École Centrale de Nantes (ECN). Supervisors: Prof. Stephane Caro and Prof. Darwin Lau, 26/10/2021 – 05/01/2022.
Project title: Iterative-learning control of cable-driven parallel robot.
Delivered iterative-learning control experiments on cable-driven parallel robots (Oct 2021 – Jan 2022).
- 2017 – 2020** **Graduate Teaching Assistant**, The University of Auckland, New Zealand, 2017–2020.
- 2018 – 2019** **Research Assistant**, The University of Auckland (Prof. Peter Xu), 09/01/2018 – 08/01/2019.
 - Measured migration of esophageal stents of multiple designs on robotics soft esophagus platform (BvW-funded project), and published in Soft Robotics (2021).
 - Developed actuation protocols and test reports for industry stent-testing deliverables.
- 2013 – 2016** **Lecturer (Assistant Professor Grade-1)**, School of Electrical, Electronics and Communication Engineering, Galgotias University, India, 19/07/2013–18/06/2016.

Teaching and Supervision

Teaching

- 2026** **DESE71002**, *Robotics Research Projects*, Year 4/MSc (Design Engineering), Dyson School of Design Engineering, Imperial College London, United Kingdom.
Guest lecture on *Robotics Simulation and Control using PyDrake* (28/01/2026).
- 2021 – 2024** **MAEG5090**, *Topics in Robotics*, for postgraduate students (MSc/MPhil), Department of Mechanical and Automation Engineering, The Chinese University of Hong Kong, Hong Kong SAR. Class size: 50 students.
- 2017 – 2020** **MECHENG 706**, *Mechatronics Design Projects*, for 4th year undergraduate students, The University of Auckland, New Zealand.
- 2017 – 2020** **MECHENG 306**, *Design of Sensing and Actuating Systems*, for 3rd year undergraduate students, The University of Auckland, New Zealand.
- 2017 – 2020** **ENGGEN 115**, *Principles of Engineering Design*, for undergraduate students, The University of Auckland, New Zealand.
- 2017 – 2020** **ENGGEN 131**, *Introduction to Engineering Computation and Software Development*, for undergraduate students, The University of Auckland, New Zealand.
- 2013 – 2016** Undergraduate courses (class size: 60 each), School of Electrical, Electronics and Communication Engineering, Galgotias University, India:
BECE3304 *Neural Networks and Fuzzy Control*; **BECE2010** *Digital Electronics*; **BECE2016** *Signals and Systems*; **BTEE2002** *Network Analysis and Synthesis*; **BEEE3002** *Control Systems*; **BEEE2001** *Electrical Measurement and Instrumentation*; **BECE3020** *Digital Signal Processing*; **BTEE3019** *Advanced Control System*.
- 2013 – 2016** Postgraduate courses (class size: 20), School of Electrical, Electronics and Communication Engineering, Galgotias University, India:
BEEE5004 *Digital Control*.

Supervision

- 2026 – Present** **Assistant Supervisor**, Dyson School, Imperial College London.
Year 3 MEng Design Engineering placement: **Ben Surtees** and **Lijiangke Liu** (from March 2026). Exosuit R&D.
- 2024 – 2026** **PhD research supervision**, University of Hong Kong.
• **Wenbo Dong** (2024–2026) — fabric robotics, perception, and machine learning.
• **Kai Tang** (2024–2026) — dual-arm fabric manipulation; co-authored RTFF / IROS 2026.
• **Bingchen Jin** (2024–2025) — automated garment sewing; co-authored IEEE RA-L 2025.
- 2023 – 2024** **Herman** — Year 4 BEng placement, Mechanical and Automation Engineering, The Chinese University of Hong Kong.

Research Publications

Journal (Published/Accepted)

- [1] **D. Bhattacharya**. “SFIL: Safety Filtering for Imitation Learning on Series-Elastic Cable Arms under Co-Contraction”. In: *IEEE Robotics and Automation Letters* (2026). Submitted.

- [2] W. Wang, **D. Bhattacharya**, A. Kobayashi, A. Seino, F. Tokuda, N. C. Tien, and K. Kosuge. “Robotic Fabric Alignment System for Sewing Using Global-Local Weighted ICP”. In: *IEEE Transactions on Automation Science and Engineering* (2026). Accepted for publication. **arXiv Project Website**. DOI: 10.1109/TASE.2026.3713128.
- [3] B. Jin*, A. Kobayashi*, **D. Bhattacharya**, A. Seino, F. Tokuda, N. Tien, and K. Kosuge. “Automated Straight-line Sewing of Stretchable Fabrics with Different Lengths”. In: *IEEE Robotics and Automation Letters* (2025). *Equal contribution. **arXiv**, pp. 1–8. DOI: 10.1109/LRA.2025.3619791.
- [4] **D. Bhattacharya**, T. K. Cheung, Y. Wang, and D. Lau. “Kinematic and Dynamic Modeling of Cable-Object Interference and Wrapping in Complex Geometrical-Shaped Cable-Driven Parallel Robots”. In: *Mechanism and Machine Theory* 214 (2025). **Code**, p. 106092. DOI: 10.1016/j.mechmachtheory.2025.106092.
- [5] **D. Bhattacharya**, Y. P. Chan, S. Shang, Y. S. Chan, Y. Tan, and D. Lau. “Tri-Space Operational Control of Redundant Multilink and Hybrid Cable-Driven Parallel Robots Using an Iterative-Learning based Reactive Approach”. In: *IEEE Transactions on Control Systems and Technology* (2023). **arXiv Code**. DOI: 10.1109/TCST.2023.3263689.
- [6] **D. Bhattacharya**, L. K. Cheng, and W. Xu. “Nonlinear Model Predictive Control of a Robotic Soft Esophagus for Endoprosthetic Stent Testing.” In: *IEEE Transactions on Industrial Electronics* (2021). **arXiv Code Project Website**. DOI: 10.1109/TIE.2021.3121755.
- [7] **D. Bhattacharya**, S. Jesna, L. K. Cheng, and W. Xu. “RoSE: A Robotic Soft Esophagus for Endoprosthetic Stent Testing.” In: *Soft Robotics* (2021). **arXiv Project Website**. DOI: 10.1089/soro.2019.0205.
- [8] Y. Dang, Y. Liu, R. Hashem, D. Bhattacharya, J. Allen, M. Stommel, L. K. Cheng, and W. Xu. “SoGut: A Soft Robotic Gastric Simulator”. In: *Soft Robotics* (2021). DOI: 10.1089/soro.2019.0136.
- [9] **D. Bhattacharya**, L. K. Cheng, and W. Xu. “Sparse Machine Learning Discovery of Dynamic Differential Equation of an Esophageal Swallowing Robot”. In: *IEEE Transactions on Industrial Electronics* 67.6 (2020), pp. 4711–4720. DOI: 10.1109/TIE.2019.2928239.
- [10] **D. Bhattacharya**, M. G. Nisha, and G. Pillai. “Relevance vector-machine-based solar cell model”. In: *International Journal of Sustainable Energy* 34.10 (2015), pp. 685–692. DOI: 10.1080/14786451.2014.885030.

Books and Chapters

- [11] **D. Bhattacharya**, L. K. Cheng, S. Dirven, and W. Xu. *Artificial Intelligence Approach to the Trajectory Generation and Dynamics of a Soft Robotic Swallowing Simulator*. Cham: Springer International Publishing, 2019, pp. 3–16. DOI: 10.1007/978-3-319-78452-6_1.

Conference Proceedings

- [12] **D. Bhattacharya***, K. Tang*, X. Hang, F. Tokuda, N. Tien, and K. Kosuge. “RTFF: Random-to-Target Fabric Flattening Policy Using Dual-Arm Manipulator”. In: *2026 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. accepted. *Equal contribution. **Code**. 2026.
- [13] W. Dong, **D. Bhattacharya**, A. Kobayashi, A. Seino, F. Tokuda, X. Huang, K. Tang, N. C. Tien, and K. Kosuge. “Precise Top-layer Fabric Segmentation for Fabric Destecking with Edge- and Shape-Aware Deep Networks”. In: *2025 IEEE International Conference on Mechatronics and Automation (ICMA)*. 2025, pp. 1343–1348.
- [14] **D. Bhattacharya**, L. K. Cheng, and W. Xu. “Testing and Analysis of Migration Displacement of a Flared Stent Deployed in an Esophageal Swallowing Robot.” In: *25th International Conference on Mechatronics and Machine Vision in Practice (M2VIP)*. 2018, pp. 1–6. DOI: 10.1109/M2VIP.2018.8600911.
- [15] **D. Bhattacharya**, L. K. Cheng, S. Dirven, and W. Xu. “Actuation planning and modeling of a soft swallowing robot”. In: *24th International Conference on Mechatronics and Machine Vision in Practice (M2VIP)*. 2017, pp. 1–6. DOI: 10.1109/M2VIP.2017.8211476.

In Review/Preparation

- [16] Y. Wang, E. Chow, **D. Bhattacharya**, and D. Lau. *Dual-Stage Spatial and Continuum Cable-Driven Parallel Robot for Airlifting in Bored Pile Construction*. in preparation. 2026.

Grants and Scholarships

Grants/Fellowships

- 2025** Recipient, **Horizon Europe Marie Skłodowska-Curie Postdoctoral Fellowship** for the project “CASREx” (Grant No. 101205678), hosted at **Imperial College London**. Funded under HORIZON-MSCA-2024-PF-01-01. Duration: 24 months; value: **EUR 276,187.92**. [Link](#) (CORDIS)
- 2023** Co-author, Innovation and Technology Fund (ITF) Partnership Research Programme (PRP) grant for the project “Flexible Robotic Palm for Human Comforting Touching Sense.”, hosted at the Chinese University of Hong Kong (CUHK).
- 2022** Co-authored Research Talent Hub for Innovation and Technology Fund (RTH-ITF) grant for the project “Hybrid Cable-Driven with Active Soft Backbone Continuum Robot for Dexterous Manipulation in Service Applications.”
- 2018** Recipient, Dynamic Testing of Implant Stents Using Robotic Soft Esophagus (RoSE), BvW Holding, Cham. Duration: 12 months; value: **NZD 39,000**.
- 2018, 2019** Recipient, Riddet Travel Grant, Riddet Institute Centre of Research Excellence; value **NZD 1,500**.

Scholarships

- 2019–2020** Recipient, Doctor of Philosophy Scholarship, University of Auckland.
- 2016–2019** Recipient, Doctor of Philosophy Scholarship, Riddet Institute Centre of Research Excellence.
- 2011–2013** Recipient, Master of Technology Scholarship, Ministry of Human Resource Development (MHRD), Government of India Duration: 24 months; value **INR 192,000**.

Academic Awards, and Miscellaneous Achievements

Academic Awards

- 2026** Nominee, **Creating a Positive Research Environment Award**, Early Career Researcher Institute (ECRI), Imperial College London.
- 15/12/25** Selected, **European Talent Academy 2026** (Imperial College London, TU Munich, Politecnico di Milano).
- 2017** Recipient, **Best Conference paper award**, 5th International Conference on Robotic Intelligence Technology and Applications (RiTA), Daejeon, Korea.
- 2017** **Ranked 2nd** in poster presentation in Delivery of Functionality in Complex Food Systems (DoF 2017) Conference.

Competitive Examinations

- 2011** **Percentile: 99.12% (Rank 1,211/1,37,853)** in Graduate Aptitude Test of Engineering (GATE).
- 2010** **Percentile: 96.00%** in Graduate Aptitude Test of Engineering (GATE).
- 2004** **Ranked 31st** in All India Junior mathematics Olympiad.

Professional Activities

27/08/26	Organized Seminar, Imperial Robotics Seminar . Speakers: Nicolò Botteghi and Simone Mentasti (Politecnico di Milano; reinforcement learning and multi-sensor perception).
05/02/26	Invited Speaker, Dyson Engineering Departmental Seminar , Imperial College London.
29/01/26	Invited Speaker, Imperial Robotics Postgrad Committee , Imperial College London. Talk: <i>Learning-based Fabric Manipulation with Mesh Perception and Visual Servoing</i> .
28/01/26	Delivered lecture on Robotics Simulation and Control using PyDrake for DESE71002 Robotics Research Projects, Dyson School of Engineering, Imperial College London.
08/08/25	Invited Speaker, World Robotics Conference (WRC 2025) , Beijing, China. Talk: <i>Fabric modeling and perception for garment manufacturing</i> .
03/08/25	Workshop Organizer and Presenter, IEEE ICMA 2025 , Beijing, China. Talk: <i>Mesh-based Fabric State Estimation and Manipulation</i> .
13/05/24	Poster Presentation, IEEE ICRA 2024 , Yokohama, Japan. Poster: <i>Kinematic Modeling of Cable Wrapping in Complex Geometrical Shaped Cable-Driven Parallel Robots</i> .
29/05/23	Poster Presentation, IEEE ICRA 2023 , ExCeL London, United Kingdom.
2018	Presenter, BioMouth 2018 Meet , Auckland, New Zealand.
2021 - Current	Reviewer of IEEE Transactions on Automation Science and Engineering (TASE), IEEE Robotics and Automation Letters (RAL), IEEE International Conference on Robotics and Automation (ICRA), ASME Journal of Mechanisms and Robotics (JMR).
2017 - Current	Member of the Institute of Electrical and Electronics Engineers (IEEE).
2014	Former member of the Electrical Engineering Society (EES), IIT Roorkee, and NERIST Electronics Society (NES), NERIST.
2006	Have an 'Outstanding Certificate' in National Service Scheme (NSS) for contributing in activities like blood donation camps, village cleanliness programmes and children education.

Skills

Languages	English and Hindi: professional reading, writing, and speaking proficiency.
Research areas	Soft robotics, cable-driven robots, robotic perception, deformable-object manipulation, digital twin and control, learning-based modeling and control, and robotic systems for healthcare and manufacturing.
Programming	Python, MATLAB, PyTorch, ROS2, LabVIEW, assembly-level programming (8085, 8086, MASM32, and 8051), Git, and LaTeX.
Machine learning	Imitation learning, reinforcement learning, sparse identification modelling, nonlinear MPC with learned dynamics, mesh-based deep perception for deformable objects.
Simulation	NVIDIA Isaac Sim, pydrake, LeRobot, OpenSim
CAD and others	Onshape, Blender, SOLIDWORKS, Autodesk Inventor, Inkscape, and Lightroom.
Hardware	NVIDIA Jetson, Raspberry Pi, myRIO, and Arduino.