

# Giovanni Pittiglio, PhD

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## Contact Details

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## Personal Info

Citizenship: Italian  
Spoken Languages: Italian, English

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## Research Experience and Education

### **Boston Children's Hospital - Harvard Medical School / Research Fellow**

2022 - PRESENT, Boston, MA

Supervisor: Prof. Pierre E. Dupont.

Development of novel continuum robots for cardiac surgery - focus on sensing and control.  
Large animals trial experience. Experience with ROS2 C++ programming.

### **University of Leeds / PhD Student**

2018 - 2022, Leeds, UK

Supervisor: Prof. Pietro Valdastrì.

Thesis: "Control of Magnetic Continuum Robots for Endoscopy."

Advanced design, sensing and control for magnetic continuum robots for clinical applications.  
Experience in ROS C++ and Python programming. Programming of industrial serial robots.  
Cadaver trial experience.

### **Imperial College London / Master of Research in Medical Robotics and Image Guided Intervention**

2016 - 2017, London, UK

Supervisor: Dr. George Mylonas.

Thesis: "Dynamic control of cable driven parallel robots with unknown cable stiffness: a joint space approach."

Experience in C++ programming, Solidworks, 3D printing.

### **University of Pisa / Master of Science**

2012 - 2016, Pisa, Italy

Supervisor: Prof. Antonio Bicchi.

Thesis: "Non Invasive Measurement of Variable Mechanical Stiffness of Robots and Humans: an Exact Linearized Observer Approach."

Advanced mathematical knowledge for modeling, sensing and control of physical systems.

### **University of Pisa / Bachelor of Science**

2009 - 2012, Pisa, Italy

Supervisor: Prof. Roberto Roncella.

Thesis: "Control of brushed and brushless electric motors."

Dimensioning of electrical motor actuation systems.

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## Awards

**Winner of [UK Alumni Award 2022-23](#), British Council**, for the Science and Sustainability in the United States of America; assigned for outstanding results in the field of Science and sustainability to one alumni amongst the graduates from British universities within the past 15 years.

**Best paper award** at [Hamlyn Symposium on Medical Robotics](#) 2023 for the paper: "Workspace Characterization for Hybrid Tendon and Ball Chain Continuum Robots", **G. Pittiglio**, M. Mencattelli, A. Donder, Y. Chitalia, P. E. Dupont.

**Best paper award** at [International Symposium on Medical Robotics \(ISMR\)](#) 2023 for the paper: "Closed-form Kinematic Model and Workspace Characterization for Magnetic Ball Chain Robots", **G. Pittiglio**, M. Mencattelli, P. E. Dupont.

**[KUKA Innovation Award 2019](#)**, project "Painless Colorectal Cancer Screening, Surveillance and Intervention with Robotic Assistance". A panel composed of 5 experts from both academia and industry awarded our team with €20000.

**Carter prize 2021-22 for the best research paper** in the School of Electronic and Electrical Engineering, University of Leeds Awarded for the paper: "Patient-Specific Magnetic Catheters for Atraumatic Autonomous Endoscopy", **G. Pittiglio**, P. Lloyd, T. da Veiga, O. Onaizah, C. Pompili, J. H. Chandler, P. Valdastrì. [Interview](#) on Computer Vision News.

**Best paper award** at Conference on New Technologies for Computer and Robot Assisted Surgery (CRAS) 2022 for the paper: "Dual-Arm Platform for Control of Magnetically Actuated Soft Robots", M. Brockdorff, **G. Pittiglio**, T. da Veiga, J. H. Chandler, P. Valdastrì. [Interview](#) on Computer Vision News.

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## Journal Papers

*Personalized magnetic tentacles for targeted photothermal cancer therapy in peripheral lungs*, **G. Pittiglio**, J. H. Chandler, T. da Veiga, Z. Koszowska, M. Brockdorff, P. Lloyd, K. L. Barry, R. A. Harris, J. McLaughlan, C. Pompili, P. Valdastrì, Nature Communications Engineering 2(50) (2023).

*Patient-Specific Magnetic Catheters for Atraumatic Autonomous Endoscopy*, **G. Pittiglio**, P. Lloyd, T. da Veiga, O. Onaizah, C. Pompili, J. H. Chandler, P. Valdastrì, Soft Robotics (SoRo), Soft Robotics 2022 9(6), 1120-1133, 2022.

*Closed Loop Static Control of Multi-Magnet Soft Continuum Robots*, **G. Pittiglio**, A. L. Orekhov, T. da Veiga, S. Calò, J. H. Chandler, N. Simaan, P. Valdastrì, IEEE Robotics and Automation Letters, 8(7), 3980-3987, July 2023.

*Collaborative Magnetic Manipulation via Two Robotically Actuated Permanent Magnets*, **G. Pittiglio**, M. Brockdorff, T. da Veiga, J. Davy, J. Henry Chandler, P. Valdastrì, IEEE Transactions on Robotics 39(2), 1407-1418, 2023.

*On the Observability and Observer Design on the Special Orthogonal Group Based on Partial Inertial Sensing*, **G. Pittiglio**, S. Calò, P. Valdastrì, Transactions on Automatic Control, 66(10), 4998-5005, 2020.

*Independently Actuated Soft Magnetic Manipulators for Bimanual Operations in Confined Anatomical Cavities*, Z. Koszowska, M. Brockdorff, T. da Veiga, **G. Pittiglio**, P. Lloyd, T. Khan-White, R. A. Harris, J.W. Moor, J.H. Chandler and P. Valdastrì, Advanced Intelligent Systems 2023, 2300062.

*Challenges of continuum robots in clinical context: A review*, T. da Veiga, J. H. Chandler, P. Lloyd, **G. Pittiglio**, N. J. Wilkinson, A. K. Hoshier, R. A. Harris, P. Valdastrì, Progress in Biomedical Engineering, 2(3), 032003, 2020.

*Adaptive Dynamic Control for Magnetically Actuated Medical Robots*, L. Barducci\*, **G. Pittiglio\***, J. C. Norton, K. L. Obstein, P. Valdastrì, IEEE Robotics and Automation Letters, 4(4), 3633-3640, 2019.

*Magnetic Levitation for Soft-Tethered Capsule Colonoscopy Actuated With a Single Permanent Magnet: A Dynamic Control Approach*, **G. Pittiglio\***, Lavinia Barducci\*, J. W. Martin, J. C. Norton, C.

A. Avizzano, K. L. Obstein, P. Valdastrì, IEEE Robotics and Automation Letters, 4(2), 1224-1231, 2019.

*Magnetic Soft Continuum Robots With Braided Reinforcement*, P. Lloyd, O. Onaizah, **G. Pittiglio**, D. K. Vithanage, J. H. Chandler, P. Valdastrì IEEE Robotics and Automation Letters, 7(4), 9770-9777, 2022.

*Six-Degree-of-Freedom Localization Under Multiple Permanent Magnets Actuation*, T. da Veiga, **G. Pittiglio**, M. Brockdorff, J. H. Chandler and P. Valdastrì, in IEEE Robotics and Automation Letters, 8(6), 3422-3429, 2023.

*A Magnetically-Actuated Coiling Soft Robot With Variable Stiffness*, P. Lloyd, T. L. Thomas, V. K. Venkiteswaran, **G. Pittiglio**, J. H. Chandler, P. Valdastrì, S. Misra, IEEE Robotics and Automation Letters, 8(6), 3262-3269, 2023.

\*First co-authors.

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## Conference Proceedings

*Hybrid Tendon and Ball Chain Continuum Robots for Enhanced Dexterity in Medical Interventions*, **G. Pittiglio**, M. Mencattelli, A. Donder, Y. Chitalia, P. E. Dupont, 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), accepted.

*Magnetic Ball Chain Robots for Endoluminal Interventions*, **G. Pittiglio**, M. Mencattelli, P. E. Dupont, 2023 IEEE International Conference on Robotics and Automation (ICRA), 4717-4723, 2023.

*Closed-form Kinematic Model and Workspace Characterization for Magnetic Ball Chain Robots*, **G. Pittiglio**, M. Mencattelli, P. E. Dupont, 2023 International Symposium on Medical Robotics (ISMR), 1-7, 2023.

*Workspace Characterization for Hybrid Tendon and Ball Chain Continuum Robots*, **G. Pittiglio**, M. Mencattelli, A. Donder, Y. Chitalia, P. E. Dupont, 2023 Hamlyn Symposium on Medical Robotics, <https://www.hamlynsymposium.org/proceedings/>.

*Dual-Arm Control for Enhanced Magnetic Manipulation*, **G. Pittiglio**, J. H. Chandler, M. Richter, V. K. Venkiteswaran, S. Misra, Pietro Valdastrì, 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 7211-7218, 2020.

*Optimal Design of Soft Continuum Magnetic Robots under Follow-the-leader Shape Forming Actuation*, P. Lloyd, **G. Pittiglio**, James H. Chandler, Pietro Valdastrì, 2020 International Symposium on Medical Robotics (ISMR), 111-117, 2020.

*Material Characterization for Magnetic Soft Robots*, T. Da Veiga, J. H. Chandler, **G. Pittiglio**, P. Lloyd, M. Holdar, O. Onaizah, A. Alazmani, P. Valdastrì, 2021 IEEE 4th International Conference on Soft Robotics (RoboSoft), 335-342, 2021.

*Independent Control of Two Magnetic Robots using External Permanent Magnets: A Feasibility Study*, J. Davy, T. Da Veiga, **G. Pittiglio**, J. H. Chandler and P. Valdastrì, 2023 International Symposium on Medical Robotics (ISMR), 1-7, 2023.

*Dynamic control of cable driven parallel robots with unknown cable stiffness: a joint space approach*, **G. Pittiglio**, A. Kogkas, J. Oude Vrielink, G. Mylonas, 2018 IEEE International Conference on Robotics and Automation (ICRA), 948-955, 2018.

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## Patents

*Magnetic shape-forming surgical continuum manipulator*, WO2021191605A1, 2021. P. Valdastrì, James H. Chandler, **G. Pittiglio**, P. R. Lloyd, Tomàs G. da Veiga, Z. M. Koszowska, O. Onaizah, R. A. Harris, H. E. Owston, S. J. Russell.

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## Training

3rd Summer School on Singularities of Mechanisms and Robotic Manipulators (SIMERO) (Linz, Austria), July 2019.

KUKA College Certificate, LBR iiwa - Commissioning and Programming (Augsburg, Germany), October 2018.

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**Invited Talks**

Invited talk at [Robotics Summit and Expo](#) (Boston, MA), 2023.

Guest Seminar at University of Louisville (Louisville, KY), 2023.

Invited talk at Gordon Research Seminar (Ventura, CA), 2022.

Guest Seminar at University of Burgundy (France), 2021.

Guest Seminar at University of Toronto (Canada), 2019.

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**Lectures**

Guest Lecture at undergraduate course in Biomechatronics, lead by Prof. Peter Culmer (University of Leeds), 2021.

Guest Lecture at University Technical College of Leeds (UTC Leeds), 2018.

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**Organized Workshops**

Organizer of the [Robotics at Leeds PGR Network Conference](#), University of Leeds, Leeds (UK).

Main organizer of IEEE/RSJ IROS 2023 Workshop - [Debate: Data vs Model in Medical Robotics](#).

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**Supervising**

**Master Students**, Joint supervision with Prof. Pietro Valdastrì, during PhD period.

Lavinia Barducci, "Magnetic Capsule Levitation: A Novel Dynamic Control Approach", University of Pisa, 2018-2019.

David Biegger, "Design Optimization of a Magnetization Model for Soft Small-Scale Robots", Leibniz Universität Hanover, 2019.

Michiel Richter, "Eight Degree of Freedom Magnetic Wrench Control using Permanent Magnets", University of Twente, 2019.

**Master Students**, Joint supervision with Prof. Pierre E. Dupont, during postdoc period.

Fabio Leuenberger, On-going, ETH Zurich.

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**Membership**

IEEE, Student Member, 2018-2021.

IEEE, Member, 2022-present.

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**Review**

Reviewer for IEEE Robotics and Automation Letters, IEEE Transactions on Robotics, IEEE Transactions on Automatic Control, IEEE Transactions on Medical Robotics and Bionics, Soft Robotics.

Review Editor in Robot Design for Frontiers in Robotics and AI.