

PERSONAL INFORMATION

Family name, First name: Valdastri, Pietro

Researcher unique identifiers: 0000-0002-2280-5438 (ORCID), A-2840-2010 (ResearcherID)

Date of birth: 26 April 1977 Nationality: Italian

Science and Technologies of Robotics in Medicine (STORM) Lab Website: <http://stormlabuk.com/>

EDUCATION

2006 PhD in Innovative Technologies of ICT and Robotics, Scuola Superiore Sant'Anna, IT. PhD Supervisors: P. Dario and A. Menciassi. Thesis title: Multi-axial force sensing in minimally invasive robotic surgery. Degree date: 21/12/2006. Evaluation: 100/100 *cum laude*

2002 Laurea Degree in Electronic Engineering, Department of Electronic Engineering, Università di Pisa, IT. Degree date: 18/02/2002. Evaluation: 110/110 *cum laude*

WORK EXPERIENCE – PRIMARY APPOINTMENTS

2016 - present Professor and Chair in Robotics and Autonomous Systems, School of Electronic and Electrical Engineering, Faculty of Engineering, University of Leeds, UK

2011 - 2016 Assistant Professor, Mechanical Engineering, Vanderbilt University, USA

2008 - 2011 Assistant Professor, Biomedical Engineering, Scuola Superiore Sant'Anna, IT

WORK EXPERIENCE – SECONDARY APPOINTMENTS

2016 - present Adjoint Professor of Mechanical Engineering, Vanderbilt University, USA

2015 - present Senior Fellow, Department of Mechanical Engineering, University of Melbourne, AU

2009 - 2017 Co-Founder and Scientific Director, WINMEDICAL s.r.l. (<http://www.winmedical.com>), IT

2013 - 2016 Assistant Professor of Medicine, Division of Gastroenterology, Hepatology, and Nutrition, Vanderbilt University School of Medicine, USA

INSTITUTIONAL RESPONSIBILITIES

2017 – present Director, Robotics at Leeds network (<https://robotics.leeds.ac.uk/> — 54 faculty members and more than 100 graduate researchers), University of Leeds, UK

2016 – present Director, Institute of Robotics, Autonomous Systems and Sensing (14 faculty members, 40 graduate researchers), University of Leeds, UK

2015 – 2016 Standing member, Health Sciences Institutional Review Board, Vanderbilt University, USA

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

I am currently primary supervisor for 5 post-docs, 8 PhD students and 1 Master students. I have completed primary supervision for 2 post-docs, 6 PhD students and 38 Master students.

2016 – present 5 Post-docs, 7 PhD students, 1 Master Students, STORM Lab UK, School of Electronic and Electrical Engineering, University of Leeds, UK

2014 – present 2 PhD students, STORM Lab USA, Department of Mechanical Engineering, Vanderbilt University, USA

2011 – 2018 2 Post-docs (Ekawahyu Susilo, now Co-Founder and CTO at Conectric Network, LLC, CA, USA; Erdem Erdemir, now Assistant Professor of Computer Science at Tennessee State University, TN, USA), 4 PhD students (Nicolò Garbin, now Hardware Engineer at Johnson and Johnson, AZ, USA; Addisu Taddese, now Software Engineer at Open Source Robotics Foundation, CA, USA; Marco Beccani, now Hardware Engineer, Apple Inc., CA, USA; Christian Di Natali, now post-doc at the Italian Institute of Technology, IT), 12 Master students graduated at Vanderbilt University, USA.

2008 – 2011 6 PhD students (2 as primary supervisor: Massimiliano Simi, now Co-Founder and CTO at MMI srl, IT; Gastone Ciuti, now Assistant Professor at Scuola Superiore Sant'Anna,

IT), 22 Master students graduated at Scuola Superiore Sant'Anna.

SELECTED COMMISSIONS OF TRUST

- 2018 – present Senior Editor of the IEEE Robotics and Automation Letters for the scientific area “Medical and Rehabilitation Robotics”
- 2018 – 2019 Expert panellist on the artificial intelligence and robotics work stream of the UK Secretary of State commissioned Topol Review <https://www.hee.nhs.uk/our-work/technology-review>
- 2016 – 2018 Editor for IEEE International Conference on Robotics and Automation (ICRA), the flagship conference of the IEEE Robotics and Automation Society, ~2,500 submissions.
- 2013 – 2015 Associate Editor for IEEE International Conference on Robotics and Automation (ICRA).

MEDIA AND OUTREACH

My research has been featured by major media outlets, including the BBC (BBC Two—Newsnight, 27/11/2017; and BBC One Yorkshire—Look North, 20/11/2017), Financial Times (22/11/2017), Wired, The Spectator, IEEE Spectrum, Medgadget, Medical Xpress, Newswise, and NSF Science Now.

SELECTED HONORS AND AWARDS

- 2018 ERC Consolidator Grant, “NoLiMiTs – Novel Lifesaving Magnetic Tentacles”, European Research Council (€2,698,136)
- 2018 Best Student Paper, International Symposium on Medical Robotics, Atlanta, GA, USA
- 2016 Overall Winner and Best Application Prize, Surgical Robot Challenge 2016, Hamlyn Symposium of Medical Robotics, London, UK
- 2016 Wolfson Research Merit Award, The Royal Society, UK, Fellowship (£75,000)
- 2015 NSF-CAREER Award, National Science Foundation, USA, Fellowship (\$452,000)
- 2013 OLYMPUS Best Laparoscopy/Robotic Paper Award, 31st World Congress of Endourology, New Orleans, USA
- 2012 OLYMPUS ISCAS Best Paper Award, 16th Annual Conference of the International Society for Computer Aided Surgery (ISCAS), Pisa, IT
- 2012 Best Oral Presentation Award, ASME Design of Medical Devices Conference, Minneapolis, USA
- 2011 Best Oral Presentation Award, Hamlyn Symposium on Medical Robotics, London, UK
- 2011 Best Technology Presentation Award, 19th International Congress of the European Association of Endoscopic Surgery, Turin, IT

RESEARCH GRANTS AS PRINCIPAL INVESTIGATOR

In my career, I have been PI on grants in excess of £13M, with a total of £7,666,314 and an equipment donation of about £1,000,000 since my start at the University of Leeds.

Research grants as PI since my start at the University of Leeds

1. *H. Pylori-Scopy – Marie Curie Fellowship for Manish Chauhan*, H2020 European Union; 1/4/2019—31/3/2021; Total Budget: €224,933.76 (approx. £198,000).
2. *A technical innovation in bowel preparation*, Cystic Fibrosis Trust; 1/2/2019—31/1/2020; Total Budget: £10,000.
3. *A robotic magnetic flexible endoscope for painless colorectal cancer diagnostic screening, surveillance and intervention – CRUK Early Detection Committee - Project Award*; Cancer Research UK; 1/9/2019—31/8/2021; Total Budget: £1,138,647.11.
4. *ERC Consolidator Grant: NoLiMiTs – Novel Lifesaving Magnetic Tentacles*; European Research Council; 01/05/2019-30/04/2024; Total Budget: €2,698,136 (approx. £2,361,193).
5. *Surgery Enabled by Ultrasonics Programme Grant*; My Role: PI at the University of Leeds (PI: Margaret Lucas, University of Glasgow, UK); EPSRC; 01/10/2018-30/09/2023; Full economic cost of the Leeds component: £1,324,996.

6. *HEFCE GCRF pump priming – Ultra-low-cost diagnosis of Helicobacter Pylori in rural India*; HEFCE via the University of Leeds; 23/01/2018—31/07/2018; Total Budget: £99,806.
7. *EPSRC GCRF: Ultra-low-cost endoscopy for gastric cancer screening in rural China*; EPSRC; 01/05/2017-30/04/2020; Total Budget: £1,610,090.
8. *SonoPill Programme Grant*; My Role: PI at the University of Leeds (PI: Sandy Cochrane, University of Glasgow, UK); EPSRC; 01/02/2017-27/11/2018; Full economic cost of the Leeds component: £257,950.
9. *Development and pre-clinical validation of a soft tethered endoscopic robot to replace colonoscopy as a screening tool for colorectal cancer*; University of Turin, Italy; 01/04/2018-30/11/2019; Total Budget: £50,000.
10. *Ultra-low-cost endoscopy for gastric cancer screening in Central America*; Royal Society; 05/12/2016-04/12/2018; Total Budget: £99,289.
11. *Magnetic capsule endoscope for colonoscopy in patients with IBD*; Vanderbilt University, National Institutes of Health, National Institute of Biomedical Imaging and Bioengineering; 10/11/2016—09/10/2018; Total Budget: £378,422.
12. *EPSRC GCRF pump priming - Ultra-low-cost endoscopy to enable gastric cancer screening in the Central America 4 Region*; EPSRC via the University of Leeds; 01/08/2016—31/03/2017; Total Budget: £62,921.
13. *Wolfson Research Merit Award: Lifesaving Capsule Robots*; Sponsor Royal Society; 01/07/2016—30/06/2021; Total Budget: £75,000.
14. *Intuitive Surgical Da Vinci Research Kit*; Intuitive Surgical; 01/03/2017—present; Value of the donated equipment: £1,000,000.

Selection of Research grants as PI before my start at the University of Leeds

1. *NIH-R01 A magnetic capsule endoscope for colonoscopy in patients with IBD*; National Institute of Health, #1R01EB018992-01; 09/18/2014—05/31/2018; Total Budget: \$1,504,398.
2. *NSF-CAREER: Lifesaving capsule robots*; National Science Foundation, #1453129; 2/1/2015—01/31/2018; Total Budget: \$452,000.
3. *NSF-CPS: Synergy: Integrated Modeling, Analysis and Synthesis of Miniature Medical Devices*; National Science Foundation, #1239355; Period: 12/01/2012—11/30/2016; Total Budget: \$1,052,000.
4. *MINOSSE – Development of an integrated monitoring system for continuous patient care*; Region of Tuscany; 02/01/2010–01/31/2013; Total budget €450,000.
5. *PRIMO Check-Up – Integrated healthcare monitoring in regional hospitals*; Region of Tuscany; 07/15/2009–07/14/2011; Total budget: €990,000. This and MINOSSE supported research and development for the startup that I co-founded in 2009, WINMEDICAL s.r.l.

LEADERSHIP IN INDUSTRIAL INNOVATION

I have strong industrial collaborations in the field of robotics, particularly with the global market leader in robotic surgery, Intuitive Surgical, and with one of the worldwide leading companies in industrial robotics, KUKA GmbH. I am one of the 32 researchers worldwide to have received the Intuitive Surgical da Vinci Research Kit, a donation in equipment equivalent to €1M, and I am the first academic user for the KUKA newly released LBR Med—a serial robotic manipulator certified for use in the surgical theater.

In 2009, I invented, patented and developed a modular solution for continuously monitoring physiological parameters for patients in the hospital and at home. To bring my invention to full fruition, I started a med-tech company—WINMEDICAL s.r.l., I secured seed funding from the regional government of Tuscany and I served as Scientific Director for the company. WINMEDICAL’s CE-marked product is currently in use in 55 hospitals across Europe. In December 2017, ABMedica (a large Italian company active in robotic surgery) acquired WINMEDICAL to scale its business up to a global level.

GRANTED PATENTS AND RECENT PATENT APPLICATIONS

I am listed as co-inventor on 10 granted patents and 7 patent applications. A selection of my granted patents is listed below in reverse chronological order.

- M. Beccani, C. Di Natali, **P. Valdastri**, “System and Method for Detecting Tissue Surface Properties”, US Patent US9826904 (B2), 14/09/2012.
- **P. Valdastri**, C. Di Natali, A. J. Herline, “Local magnetic actuation of surgical devices”, US Patent US9737364 (B2), 14/05/2012.
- **P. Valdastri**, T. Ranzani, C. Di Natali, M. Simi, A. Menciassi, P. Dario, “Robotic platform for mini-invasive surgery”, US Patent US9579163 (B2), 31/05/2011.
- **P. Valdastri**, G. Ciuti, A. Menciassi, P. Dario, “Magnetically guided robotic device for endoscopic procedures”, European Patent EP2651282 (B1), 13/2011.
- U. Scarfogliero, M. Piccigallo, C. Quaglia, S. Tognarelli, **P. Valdastri**, A. Menciassi, P. Dario, “Robotic apparatus for minimally invasive surgery”, European Patent EP2563261 (B1), US Patent US9028468 (B2), 22/04/2011.
- **P. Valdastri**, V. Pensabene, S. Scapellato, A. Mazzeo, A. Misuri, M. Vatteroni, “Support device for sensors and/or actuators that can be part of a wireless network of sensors/actuators”, European Patent EP2276395(B1), US Patent US9612140 (B2), Chinese Patent CN102006820 (B), Japanese Patent JP5637517 (B2), Korean Patent KR101589232 (B1), 26/01/2011. This is core to WINMEDICAL s.r.l.
- **P. Valdastri**, C. Quaglia, A. Menciassi, P. Dario, C. N. Ho, G. Anhoeck, S. Schostek, F. Rieber, M. O. Scurr, “Surgical clip delivering wireless capsule”, European Patent EP2163206 (B1), 16/09/2008.

SELECTED MEMBERSHIPS OF SCIENTIFIC SOCIETIES

- Senior Member of Institute of Electrical and Electronics Engineers (IEEE), IEEE Robotics and Automation Society (RAS), IEEE Engineering in Medicine & Biology Society (EMBS) – by application
- Member of the Technical Committee on BioRobotics, IEEE EMBS – by invite
- Member of the Technology Committee, European Association for Endoscopic Surgery (EAES) – by invite
- Member of the Steering Committee, Society for Medical Innovation and Technology (SMIT) – by invite

KEYNOTE PRESENTATIONS AND INVITED TALKS

In the last five years, I gave more than 60 keynote presentations and invited talks at international conferences, workshops, and universities worldwide. Here, I report a short selection:

- The future of your city: robots, people and healthy infrastructure”, Workshop on European Societal Challenges: The Future of Human-Robot Interaction, *European Parliament*, 2019.
- Capsule Robots for Gastrointestinal Endoscopy, *30th International Congress of SMIT*, 2018.
- Lifesaving Capsule Robots, *8th joint workshop on New Technologies for Computer/Robot Assisted Surgery*, 2018.
- Lifesaving capsule robots, *International Symposium on Medical Robotics*, 2018.
- Present and future of robotic capsule endoscopy, *29th International Congress of SMIT*, 2017.
- Closed loop control of a magnetic flexible endoscope, *25th International Congress of EAES*, 2017.
- Medical capsule robots, *Medical CPS Workshop, CPS Week*, 2016.
- Intraoperative wireless tissue palpation, *ASME Design of Medical Devices Conference*, 2013.
- Wireless tissue palpation for tumour resection in minimally invasive surgery, *IEEE Transducers*, 2013.
- Magnetic Air Capsule demo, Innovation Technology Showcase, *TEDMED*, 2011
- Universities that invited me to give a seminar include *Chinese University of Hong Kong* (2019), *University of Toronto* (2018), *Worcester Polytechnic Institute* (2016), *Stanford* (2015), *University of Pennsylvania* (2015), *University of Melbourne* (2014), *GeorgiaTech* (2013), *University of Colorado—Boulder* (2012).

SELECTED PUBLICATIONS

I have co-authored more than 88 peer-reviewed journal papers over 2,100 citations (cited by others over 1,800 times), and have an h-index of 26 (ISI Web of Science, 26/02/2019). In the field of robotics, the first author is typically the main technical contributor, while the last name indicates the study coordinator. I am

listed as first author for 15 and as last author for 34 peer-reviewed journal papers. While a full list of my publications is available in the ResearchID and ORCID databases, the following are a selection of 15 journal papers relevant to the field of medical robotics, listed in reverse chronological order. The Impact Factor is based on Journal Citation Report 2017, and the number of citations is from the ISI Web of Science.

1. N. Garbin, L. Wang, J. H. Chandler, K. L. Obstein, N. Simaan, **P. Valdastri**, “Dual-Continuum Design Approach for Intuitive and Low-Cost Upper Gastrointestinal Endoscopy”, IEEE Transactions on Biomedical Engineering, 2019, in press, available on-line. (IF=4.288, Citations=N/A)
2. G. Pittiglio, L. Barducci, J. W. Martin, J. Norton, C. A. Avizzano, K. Obstein, **P. Valdastri**, “Magnetic Levitation for Soft-Tethered Capsule Colonoscopy Actuated with a Single Permanent Magnet: a Dynamic Control Approach”, IEEE Robotics and Automation Letters, 2019, Vol. 4, No. 2, pp. 1224-1231. (IF=will be available with JCR2018, Citations=N/A)
3. A. Taddese, P. Slawinski, M. Pirotta, E. De Momi, K. Obstein, **P. Valdastri**, “Enhanced real-time pose estimation for closed-loop robotic manipulation of magnetically actuated capsule endoscopes”, International Journal of Robotics Research, 2018, in press. (IF=4.047, Citations=1)
4. P. Slawinski, A. Taddese, K. B. Musto, S. Sarker, **P. Valdastri**, K. L. Obstein, “Autonomously controlled magnetic flexible endoscope for colon exploration”, Gastroenterology, 2018, Vol. 154, No. 6, pp. 1577-1579. (IF= 20.773, Citations=1)
5. F. Campisano, F. Gramuglia, I. Dawson, C. Lyne, M. Izmaylov, S. Misra, E. De Momi, D. Morgan, K. Obstein, **P. Valdastri**, “Gastric Cancer Screening in Low-Income Countries System Design, Fabrication, and Analysis for an Ultralow-Cost Endoscopy Procedure”, IEEE Robotics and Automation Magazine, 2017, Vol. 24, No. 2, pp. 73-81. (IF=3.573, Citations=1)
6. P. Slawinski, A. Taddese, K. Musto, K. Obstein, **P. Valdastri**, “Autonomous Retroflexion of a Magnetic Flexible Endoscope”, IEEE Robotics and Automation Letters, 2017, Vol. 2, No. 3, pp. 1352-1359. (IF=will be available with JCR2018, Citations=4)
7. C. J. Laborde, C. S. Bell, J. C. Slaughter, **P. Valdastri**, K. L. Obstein, “Evaluation of a novel tablet application for improvement in colonoscopy training and mentoring (with video)”, Gastrointestinal Endoscopy, 2017, Vol. 85, No. 3, pp. 559-565. (IF=7.204, Citations=2)
8. C. Di Natali, M. Beccani, N. Simaan, **P. Valdastri**, “Jacobian-based Iterative Method For Magnetic Localization in Robotic Capsule Endoscopy”, IEEE Transactions on Robotics, 2016, Vol. 32, No. 2, pp. 327-338. (IF=4.264, Citations=12)
9. C. Di Natali, J. Buzzi, N. Garbin, M. Beccani, **P. Valdastri**, “Closed-Loop Control of Local Magnetic Actuation for Robotic Surgical Instruments”, IEEE Transactions on Robotics, 2015, Vol. 31, N. 1, pp. 143-156. (IF=4.264, Citations=9)
10. M. Beccani, C. Di Natali, L. Sliker, J. Schoen, M. E. Rentschler, **P. Valdastri**, “Wireless Tissue Palpation for Intraoperative Detection of Lumps in Soft Tissue”, IEEE Transactions on Biomedical Engineering, 2014, Vol. 61, No. 2, pp. 353-361. (IF=4.288, Citations=30)
11. C. Di Natali, M. Beccani, **P. Valdastri**, “Real-Time Pose Detection for Magnetic Medical Devices”, IEEE Transactions on Magnetics, 2013, Vol. 49, No. 7, pp. 3524-3527. (IF=1.467, Citations=38)
12. **P. Valdastri**, M. Simi, R. J. Webster III, “Advanced technologies for gastrointestinal endoscopy”, Annual Review of Biomedical Engineering, 2012, Vol. 14, pp. 397-429. (IF=8.788, Citations=76)
13. M. Piccigallo, U. Scarfogliero, C. Quaglia, G. Petroni, **P. Valdastri**, A. Menciassi, P. Dario, “Design of a novel bimanual robotic system for single-port laparoscopy”, IEEE/ASME Transactions on Mechatronics, 2010, Vol. 15, No. 6, pp. 871-878. (IF=3.936, Citations=104)
14. G. Ciuti, **P. Valdastri**, A. Menciassi, P. Dario, “Robotic magnetic steering and locomotion of capsule endoscope for diagnostic and surgical endoluminal procedures”, Robotica, 2010, Vol. 28, No. 2, pp.199-207. (IF=1.177, Citations=124)
15. **P. Valdastri**, R. J. Webster III, C. Quaglia, M. Quirini, A. Menciassi, P. Dario, “A New Mechanism for Mesoscale Legged Locomotion in Compliant Tubular Environments”, IEEE Transactions on Robotics, 2009, Vol. 25, No. 5, pp. 1047-1057. (IF=4.264, Citations=117)