

## Systematic Design of Medical Capsule Robots

Over the last decade, researchers have explored the design space of medical capsule robots: devices that operate autonomously within the human body and can monitor, diagnose, prevent, and cure diseases. Medical capsule robots are severely resource constrained devices in size, power, and computational capacity. As such, the design process is time consuming and requires deep expertise in multiple domains. To open up the field and unlock the vast clinical potential of these devices as diagnostic and interventional tools, this talk will introduce an open source platform consisting of a library of modular hardware and software components and a web-based collaborative design environment. This work is currently supported by the Cyber-Physical Systems program of National Science Foundation. Preliminary results are reported in DOI: 10.1109/MDAT.2015.2459591 and DOI: 10.5772/59505.

**Pietro Valdastri** graduated cum Laude in Electrical Engineering from University of Pisa in 2001 and received a PhD cum Laude in Biomedical Engineering from Scuola Superiore Sant'Anna in 2006 with Paolo Dario as primary advisor. After spending three years as Assistant Professor at the BioRobotics Institute of Scuola Superiore Sant'Anna, focusing on implantable medical devices and surgical robotics, in 2011 he moved his research to Vanderbilt University, Nashville, TN. He is currently Assistant Professor of Mechanical Engineering, with secondary appointments in the Electrical Engineering Department and in the Division of Gastroenterology, Hepatology and Nutrition at Vanderbilt University Medical Center. Dr. Valdastri is the founder and director of the Science and Technologies Of Robotics in Medicine (STORM) Lab (<https://my.vanderbilt.edu/stormlab/>), a standing member of the Vanderbilt Institutional Review Board, a Senior Member of IEEE, one of the Editors of IEEE ICRA from 2016 to 2018, and Associate Editor of the Journal of Medical Robotics Research. His current research – focusing on capsule robots for gastrointestinal endoscopy and abdominal surgery – is funded by the National Science Foundation, the Broad Foundation, and the National Institute of Health. Dr. Valdastri is co-author of more than 70 peer-reviewed journal publications, co-inventor of more than 30 patents and patent applications, co-founder of a successful medical start-up (WinMedical, [www.winmedical.com](http://www.winmedical.com)), and the recipient of several prestigious awards in the field of medical robotics, including the NSF CAREER Award in 2015, the Sensys 2014 Best Paper Award, the OLYMPUS Best Laparoscopy/Robotic Paper Award 2013, the OLYMPUS ISCAS Best Paper Award 2012, the ASME Design of Medical Devices Conference Best Paper Award 2012, the Hamlyn Symposium on Medical Robotics Best Oral Presentation Award 2011, and the European Association of Endoscopic Surgery Best Technology Presentation Award 2011. Dr. Valdastri's research has been featured by main magazines in the field, including IEEE Spectrum, IEEE Transactions on Biomedical Engineering, Medgadget, Medical Design Technology Magazine, Medical Xpress, Newswise, NSF Science Now.