Maria Elena Giannaccini

Lecturer in Robotics
School of Engineering
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Honorary Research Associate at the University of Bristol, UK
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Education

CREATE, Level 1 and 2 September 2017 – September 2019
University of Bristol, Bristol UK

PhD in Robotics August 2010 – September 2015
Marie Curie Fellow in the ITN INTRO project
Bristol Robotics Laboratory
University of the West of England, Bristol - United Kingdom

- Thesis title: "*Safe and Effective Physical Human-Robot Interaction: Approaches to Variable Compliance via Soft Joints and Soft Grippers*"

Master's Degree in Biomedical Engineering September 2005 – July 2010
University of Pisa, Pisa – Italy

- Final Dissertation: "*Implementation of the bio-inspired control techniques for the realization of movement patterns typical of the octopus (Octopus Vulgaris)*" within the OCTOPUS project in Scuola Superiore Sant'Anna, Marine Robotics Lab, Livorno.

Bachelor's Degree in Biomedical Engineering September 2001 – June 2005
University of Pisa, Pisa – Italy

- Final Dissertation: "*Characterization and microfabrication of conducing polymers layers for neural interfaces*" at Centro Piaggio, University of Pisa and National Centre for Research (CNR), Pisa.

Research Appointment and Experience

Research Associate February 2017 – September 2019
University of Bristol
*Bristol Robotics Laboratory (**BRL**) and SoftLab*
RoboVox – Soft Robotics Implantable Larynx Device – This research is part of the four year project Robovox, funded by the Wellcome Trust and developed in cooperation with UCL. Robovox aims to develop a soft robotics implantable larynx device. The goal is to restore breathing, swallowing and vocalisation in patients who had their larynx removed, for example due to laryngeal cancer. This work includes analysis of the biomechanical structure of the larynx and its fundamental operations. This informs the design, development and evaluation of an implantable device and assisting with pre-clinical tests of the device.

Research Associate January 2016 – January 2017

University of Bristol

*Bristol Robotics Laboratory (**BRL**)*

Tactile Superresolution Sensing – This EPSRC funded position centres on the characterisation and modelling of the force sensing capabilities of the TacTip sensor and on the development of a more robust and modular version of the sensor. TacTip is a biomimetic, soft tactile sensor shown to be effective in localisation, shape perception, contour following and texture identification tasks. The work also focused on optimising the integration of the TacTip in robotic hands and grippers in order to replace the sensorisation provided by fingertips and achieve successful in-hand manipulation tasks. The use of Bayesian active perception allows the fingertip to achieve positional hyperacuity, in that the object positions are perceived more accurately than the taxel spacing.

Research Fellow January 2015 – January 2016

University of Salford

Soft, safe and variable stiffness continuum manipulators for intelligent automation – This feasibility study investigated the development of a soft, continuum, pneumatic muscle based robotic manipulator that could work in close cooperation with humans but also achieve a higher level of accuracy through the ability to adjust its stiffness. The novel physical design of the robot arm allowed stiffness and end-effector position to be varied independently of one another. A thorough characterisation of the stiffness configurations of the arm and a model of its curvature behaviour were performed. The work was funded by the EPSRC Centre for Innovative Manufacturing in Intelligent Automation.

Research Associate October 2014 – Decemeber-2014

University of the West of England

Bristol Robotics Laboratory (BRL)

Medical Robotics project on Immobilisation and Motion Sensing Device for Radiotherapy – The project aimed at designing and building a prototype device to be worn by a patient undergoing radiotherapy. The aim of the device was twofold: a) to immobilise the patient's head and neck and b) to sense the possible motion of the patient's head.

Teaching Experience

Teaching Assistant October 2017 – January 2019

University of Bristol

The Introduction to Computer Programming unit (EMAT10007) – This unit covers the basic principles of sequential programming, namely input/output, variables, data types, conditionals, iteration, exceptions and functions. Throughout there is a focus on the principles of good programming practice. Lectures begin with a theoretical explanation of the fully functional scripting language Python 3 concepts, then students (~220) practice their understanding of these newly learned concepts. My role is to directly teach a cohort of 20 students and assist the others when needed. I actively engage students by asking questions that lead them to the solution instead of simply answering their questions with the right answer. Also, I adapt my teaching style to suit different student learning approaches.

Associate Lecturer January 2013 – April 2014

University of the West of England

Introduction to Robotics – In this unit I was responsible for delivering the practical laboratories, which focused on short theoretical presentations followed by practical exercises on sensors, actuator and programming an Arduino board. The teaching method was focused on allowing the students to develop a unique combination of hardware, software and problem solving skills. The students gained plenty of hands-on experience in building and testing a mobile robot that performs line following, odometry and used sensory feedback to identify and reach a target position.

Conference and Workshop Organisation

Conference Organizer
Program Chair and Co-organiser of the 19th "Towards Autonomous Robotic Systems" (TAROS) Conference from 25th - 27th July 2018 in Bristol, United Kingdom. http://www.brl.ac.uk/taros2018.aspx

Workshop Organiser
Co-organiser of the *Hardware and software modularity and interoperability in Service Robotics: Towards standardisation* Workshop in ERF2015.

Co-organiser and co-chair of the *Experimenting in HRI for Priming Real World Set-ups, Innovations and Products* Workshop in HRI2014.

Co-organiser of the *1st International Workshop on Intelligent Robot Assistants*, 2014

Conference Session Chair
Chair of the Medical Robotics session at the IEEE-ROBIO 2017 (2017 IEEE Int. Conf. on Robotics and Biomimetics) conference held from Dec. 5 – Dec. 8, 2017 in Macau, China.

Chair of the Soft Robotics and Swarm Robotics session at the 2018 TAROS conference

Conference Program Committee
Living Machines Conference

Publications
(The underlined papers are my most significant ones – for REF 2021)

Submitted/In preparation:
Giannaccini, M. E., Rossiter, J., Lepora N., 2019 Characterization of Material Properties of a Moulded and a 3D printed TacTip. To be submitted to the Bioinspiration & Biomimetics Journal.

Giannaccini, M.E., Stinchcombe, A., Conn, A. and Rossiter, J., (2019), Coughing and Phonation in a Simulator of the Human Respiratory System. To be submitted to the Journal of Voice.

Published Journal Papers:
Ward-Cherrier, B., Pestell, N., Cramphorn, L., Winstone, B., Giannaccini, M.E., Rossiter, J. and Lepora, N.F., (2018). The tactip family: Soft optical tactile sensors with 3d-printed biomimetic morphologies. Soft robotics, 5(2), pp.216-227.

Giannaccini, M.E., Xiang, C., Atyabi, A., Theodoridis, T., Nefti-Meziani, S. and Davis, S., (2018). Novel design of a soft lightweight pneumatic continuum robot arm with decoupled variable stiffness and positioning. Soft robotics, 5(1), pp.54-70.

Hao, L., Xiang, C., Giannaccini, M.E., Cheng, H., Zhang, Y., Nefti-Meziani, S. and Davis, S., (2018). Design and control of a novel variable stiffness soft arm. Advanced Robotics, 32(11), pp.605-622.

Xiang, C., Giannaccini, M.E., Theodoridis, T., Hao, L., Nefti-Meziani, S. and Davis, S., (2016) Variable stiffness Mckibben muscles with hydraulic and pneumatic operating modes. Advanced Robotics, 30(13), pp.889-899.

Giannaccini, M. E., Georgilas, I., Horsfield, I., Peiris, B. H. P. M., Lenz, A., Pipe, A. G., & Dogramadzi, S. (2014). A variable compliance, soft gripper. Autonomous Robots, 36(1-2), 93-107.

Dogramadzi, S., Giannaccini, M. E., Harper, C., Sobhani, M., Woodman, R., & Choung, J. (2014). Environmental Hazard Analysis-a Variant of Preliminary Hazard Analysis for Autonomous Mobile Robots. Journal of Intelligent & Robotic Systems, 1-45

Published Conference Proceedings:

Giannaccini, M. E., Hinitt, A., Gough E., Stinchcombe A., Yue K., Conn A., and Rossiter J., (2019), Robotic Simulator of Vocal Fold Paralysis, Accepted in the 2019 Living Machines Conference, Japan.

Giannaccini, M.E., Yue, K., Graveston, J., Birchall, M., Conn, A. and Rossiter, J., (2017), Respiratory simulator for robotic respiratory tract treatments. In Robotics and Biomimetics (ROBIO), 2017 IEEE International Conference on (pp. 2314-2319). IEEE.

Giannaccini, M.E., Whyle, S. and Lepora, N.F., (2016) Force Sensing with a Biomimetic Fingertip In Conference on Biomimetic and Biohybrid Systems (pp. 436-440). Springer International Publishing.

Giannaccini, M.E. (2015) Safe and Effective Physical Human-Robot Interaction: Approaches to Variable Compliance via Soft Joints and Soft Grippers, Thesis, Online publication.

Barattini, P., Virk, G. S., Mirnig, N., Giannaccini, M. E., Tapus, A., Bonsignorio, F. (2014) Experimenting in HRI for Priming Real World Set-ups, Innovations and Products, in Proc. 3rd ACM/IEEE Int Human-Robot Interaction (HRI) Conf.

Giannaccini, M.E., Meunier, A., Bonard, B., Horsfield I., Coupland S., Lenz A., Pipe A.G. and Dogramadzi S. (2013) Adjustable Torque Limit Variable Compliance Decoupling Joint, Human Friendly Robotics Workshop.

Giannaccini, M.E., Meunier, A., Bonard, B., Lenz, A., Dogramadzi, S. and Pipe, T., (2013) Soft Joints and Soft Grippers for Safe and Effective HRI, in 2013 International Workshop on Soft Robotics and Morphological Computation, Monte Verità, Ascona, Switzerland.

Giannaccini M.E.[1], Sobhani M. [1], Dogramadzi S., Harper C., (2013) Investigating real world issues in Human Robot Interaction: Physical and Cognitive solutions for a safe robotic system, Robotics and Automation (ICRA), 2013 IEEE International Conference on. IEEE.
[1] the first two authors contributed equally and so are considered joint first authors

Giannaccini, M.E., Zheng, Y., Dogramadzi, S. and Pipe, T., (2012) Towards a variable compliance hydrostatic skeleton inspired gripper, in Proceedings of Biomedical Robotics and Biomechatronics (BioRob) Conference, pp.246 – 251.

Harper C., Giannaccini M. E., Woodman R., Dogramadzi S, Pipe T, Winfield A., (2011) Challenges for the hazard identification process of autonomous mobile robots, 4th Workshop on Human-Friendly Robotics Enschede, Netherlands.

Giannaccini, M.E., Dogramadzi, S., Pipe, T. (2011), Solutions for a variable compliance Gripper design, in Proceedings of the 12th Towards Autonomous Robotic Systems (TAROS'2011) Conference, Sheffield, UK.

Cianchetti, M., Follador, M., Arienti, A., Calisti, M., Giannaccini, M. E., Mazzolai, B., Laschi, C., Dario, P., Study and development of a robotic muscular hydrostat inspired by the octopus arm. Italian National Congress of Bioingeneering (2010).

Calisti M., Arienti A., Giannaccini M., Follador M., Giorelli M., Cianchetti M., Mazzolai B., Laschi C. and Dario P.: Study and fabrication of bioinspired octopus arm mockups tested on a multipurpose platform IEEE/RAS-EMBS Int. Conf. on Biomedical Robotics and Biomechatronics (BioRob 2010), Tokyo, Japan (2010)

Books:
Giuliani, M., Assaf, T. and Giannaccini, M.E. eds., 2018. Towards Autonomous Robotic Systems: 19th Annual Conference, TAROS 2018, Bristol, UK July 25-27, 2018, Proceedings (Vol. 10965). Springer.

Awards and Funding

£1,000 *Brigstow Institute Ideas Exchange award* for national research cooperation, University of Bristol in 2019

£3,000 *Binks Trust funding* for international research cooperation, University of Aberdeen in 2019

£3,000 *Queens School of Engineering Research Pump Priming Funds*, University of Bristol in 2016

£20,000 Co-Investigator on EPSRC Impact Acceleration for Neuromorphic Tactile Sensing in 2016

Member of the group that won the *2016 Harvard Soft Robotics Toolkit Design Competition – Research section* with the TacTip device project. http://softroboticstoolkit.com

Member of the group that won third place in the IEEE Robotics and Automation Society Soft Material Robot Challenge 2017

Winner of *Best Presentation* at the 2014 Doctoral Exchanges Research Student Conference, Faculty of Environment and Technology, University of the West of England, Bristol

Internships

Robosoft company, France October – November 2012
Integration of robot arm built as part of my PhD work with Robosoft mobile platform

Humboldt University of Berlin June – July 2013
Collaboration with Prof. Verena Hafner's Cognitive Robotics team on interaction modalities and interfaces for the robot platform built in the context of the INTRO project.

Professional Service

Professional memberships
Women's Engineering Society **WES**
Member of EURobotics Topic Group on Standardization

Invited speaker at euRobotics' dissemination workshop FabLab, in Potenza, 2016

Participant in the draft of the ISO/DIS 13482: 2010-09-20, Robots and robotic devices - Safety requirements – Non-medical personal care robot.

Journal reviewer
IEEE Robotics & Automation Magazine, Frontiers in Robotics and AI**,** Soft Robotics Journal

Supervisor
Co-supervised a PhD student, Ben Ward-Cherrier (University of Bristol), a Master student, Briony Foster and five international undergraduate students.