Gennaro Raiola

Curriculum Vitae

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Fields of interest

Robotics, computer science, motion planning, human-robot interaction, machine learning, controls, DevOps, hacking.

Profession

09/2017-current *Post-Doc* @ Istituto Italiano di Tecnologia (IIT), Genoa, Italy www – Development and maintenance of robot real-time control frameworks and communication systems with EtherCAT. Software architecture development with the integration of control modules in current frameworks to make the robots capable of executing tasks in complex environments. Open source code adaptation, ROS and ROS packages integration on the robots. DevOps processes: create and maintain fully automated CI/CD pipelines for code deployment using GitLab-CI, apt servers and Docker containers. Development of software for safety to protect robot hardware and operators. Development and integration of GUI to interact with the robot. Cooperation with external work groups (mainly Moog, Vodafone and Inail) in the development of robot software.

03/2017-07/2017 *Post-Doc* @ at Robotics and Mechatronics group, University of Twente, Enschede, The Netherlands. www - Development of a Safety and Energy aware impedance controller for the KUKA LWR 4+. Supervision of students in the laboratories.

01/2016-12/2016 *Ph.D. student in Robotics* @ CEA-List (French Alternative Energies and Atomic Energy Commission - Laboratory for Integration of Systems and Technology), Gif-sur-Yvette, France. www - Transfering research results from the PhD to a Startup at CEA-List (ISybot). Development of a force controller to generate virtual guides through kinesthetic teaching. Integration of the controller in the software framework of the startup's collaborative robot.

05/2012-12/2013 *Research Engineer in Motion Control of Humanoid Robots* @ PAL Robotics S.L., Barcelona, Spain. www - Development, testing and design of ROS-Control and ROS-Controllers to implement a Hardware Abstraction Layer for different kinds of robots (humanoids, manipulators and mobile robots). Implementation through ROS-Control of an inverse kinematics solver with task optimization for REEM-H and REEM-C robots.

09/2012-02/2013 *Internship* @ ENSTA-ParisTech and UPMC-ISIR, Paris, France. www - Development of a library in Matlab and C++ to generate Motion Primitives and perform Skills Optimization for humanoid robots (MEKA, NAO, ICub and Pepper). Maintenance of MEKA robot libraries.

Education

2014-2016 *Ph.D. student in Robotics* @ Université Paris-Saclay, Palaiseau, France. www.

2009-2012 *Master's Degree (M.Sc) with honor in Automation and Control Engineering* given by the University of Naples "Federico II", Naples, Italy.

2006-2009 *Bachelor's Degree (B.Sc) in Computer Engineering* given by the University of Naples "Federico II", Naples, Italy.

Technical skills

- Proficient in the following programming languages: C, C++ and Matlab
- Competent with Python and Bash scripting.
- Competent with Qt, Eigen, ROS and Boost libraries.
- Excellent knowledge of GIT.
- Excellent knowledge of CMake and Makefile for managing the build process of software and Doxygen for code documentation.
- Competent with Docker and Virtual Machines deployment for testing and development.
- Deep knowledge of Linux-based operating systems (Ubuntu, Kali, Debian).
- Experienced with real time operating systems (RTAI Linux, Xenomai Linux, RT-PREEMPT) and Kernel configuration.
- Good understanding of UML process.
- Good understanding of Agile Scrum process.

Selected open-source software projects

- "ros-control"
  Ros packages to make controllers generic to all robots.
- "Stack-of-Task"
  Integration of the stack of tasks inverse kinematics solver on the REEM-H and REEM-C robots at PAL Robotics.
- "DmpBbo"
  C++ framework for motion primitives and black-box optimization.
- "mekabot"
  Meka robot packages.

- "m3ros-control"
  C++ bridge to integrate the control layer of the Meka robot into a ROS environment.
- "virtual-fixtures"
  Library of virtual guides for co-manipulation.

Publications

Journals

2018 Susana Sánchez Restrepo, **Gennaro Raiola**, Joris Guerry, Evelyn D'Elia, Xavier Lamy and Daniel Sidobre.
"Towards an Intuitive and Iterative 6D Virtual Guides Programming Framework for Human-Robot Comanipulation".
Under review at Robotica

2017 **Gennaro Raiola**, Carlos Cardenas Alberto, Tadele Shiferaw Tadele, Theo De Vries, Stefano Stramigioli.
"Development of a Safety and Energy Aware Impedance Controller for Collaborative Robots".
In *IEEE Robotics and Automation Letters.*
The contents of this paper were also selected by ICRA'18 Program Committee for presentation at the Conference.

2017 S. Chitta, E. Marder-Eppstein, W. Meeussen, V. Pradeep, A. Rodriguez Tsouroukdissian, J. Bohren, D. Coleman, B. Magyar, **G. Raiola**, M. Ludtke and E. Perdomo Fernandez.
"ros_control: A generic and simple control framework for ROS".
In *The Journal of Open Source Software.*

2017 **Gennaro Raiola**, Susana Sanchez Restrepo, Pauline Chevalier, et al.
"Co-manipulation with a Library of Virtual Guiding Fixtures".
In *Autonomous Robots, Special Issue on Learning for Human-Robot Collaboration.*

Conferences

2017 Pauline Chevalier, **Gennaro Raiola**, Brice Isableu, Jean-Claude Martin, Christophe Bazile and Adriana Tapus.
"Do Sensory Preferences of Children with Autism Impact an Imitation Task with a Robot?".
In *Conference on Human-Robot Interaction (HRI).*

2017 Susana Sanchez Restrepo, **Gennaro Raiola**, Pauline Chevalier, Xavier Lamy, and Daniel Sidobre.
"Iterative Virtual Guides Programming for Human-Robot Comanipulation".
In *IEEE International Conference on Advanced Intelligent Mechatronics (AIM).*

2015 **Gennaro Raiola**, Xavier Lamy, and Freek Stulp.
"Co-manipulation with Multiple Probabilistic Virtual Guides".
In *International Conference on Intelligent Robots and Systems (IROS).*

2015 **Gennaro Raiola**, Pedro Rodriguez-Ayerbe, Xavier Lamy, Sami Tliba, and Freek Stulp.
"Parallel Guiding Virtual Fixtures: Control and Stability".
In *IEEE Multi-Conference on Systems and Control (MSC).*

2014 Freek Stulp, Laura Herlant, Antoine Hoarau, and **Gennaro Raiola**.
"Simultaneous On-line Discovery and Improvement of Robotic Skill".
In *International Conference on Intelligent Robots and Systems (IROS).*

2013 Freek Stulp, **Gennaro Raiola**, Antoine Hoarau, Serena Ivaldi, and Olivier Sigaud.
"Learning Compact Parameterized Skills with a Single Regression".
In *IEEE-RAS International Conference on Humanoid Robots.*

Service

Open-source Maintainer of ROS packages.

Research Reviewer for international conferences and journals:
- Autonomous Robots (Springer).
- IEEE Robotics and Automation Letters (RA-L).
- The International Conference on Robotics and Automation (ICRA).
- International Conference on Intelligent Robots and Systems (IROS).

Languages

italian native proficiency

english professional working proficiency

french limited working proficiency

spanish basic knowledge