Giulia

Vezzani

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Who I am

I am a *PhD student* in *humanoid robotics*, with *automation engineering* background and three year *research experience*.

My current position and my past studies have taught me how to *solve challenging problems*, quickly *develop new skills*, *team up* with people with different backgrounds and *supervise and manage* research activity of other students.

In my future employments, I am eager to keep giving my *personal contribution to research* in humanoid robotics and AI. I feel dealing with challenging problems very exciting and thus I am very prone to work hard and find suitable solutions.

6 facts about me

- Automation engineer, with three year experience on *humanoid robotics research*.
- Proven *C++ skills*, with a good knowledge of YARP and iCub libraries.
- Background: *Robotics*, *Bayesian filtering*, *Optimization* and *Deep Reinforcement Learning*.
- Four years experience on *Linux-based* systems.
- *Hardware experience* with the humanoid robotic platform iCub.
- Main interests: *Grasping*, *Localization*, *Perception*, *Deep Reinforcement Learning* and *3D object modeling*.

Short Bio

I was born in Florence in 1991. I got my Bachelor's degree in Electronic and Telecommunications Engineering (cum laude) in July 2013 at the Universita' degli Studi di Firenze. In the same university, in October 2015, I held my Master's degree (cum laude) in Electrical and Automation Engineering, with the dissertation of the thesis "3D object tactile localization for the humanoid robot iCub." Currently, I am a PhD fellow in Bioengineering and Advanced Robotics - curriculum Advanced and Humanoid Robotics - at the Istituto Italiano di Tecnologia in Genova, iCub Facility, in collaboration with the Universita' di Genova. The goal of my PhD program is to improve object localization and manipulation for humanoid robots, by exploiting both visual and tactile information and to implement and test the developed techniques on the humanoid robot iCub.

Experience

January, 2018 - currently	**Visiting Research Scholar @ Berkeley Artificial Intelligence Research (BAIR)**, *Electrical Engineer and Computer Science (EECS)*, UC Berkeley, California. My research activity at Bair focuses on the design of new deep reinforcement learning techniques aimed at improving robot manipulation and grasping capabilities.

November, 2015 - currently	**Phd Fellow @ iCub Facility (Istituto Italiano di Tecnologia)**, *Bioengineering and Advanced Robotics, curriculum Humanoid and Advanced Robotics*, Istituto Italiano di Tecnologia & Universita' di Genova, Genova, Italy. During my PhD activity, I have designed novel algorithms improving 3D object modeling and localization for autonomous and robust grasping, by merging vision and tactile information on the humanoid robot iCub.
July, 2017	**Mentor @ Easy Peasy Robotics**, *Campus Party Italia*. I was one of the mentors and organizers of Easy Peasy Robotics, a 2-days crash course whose aim was to provide participants with a brief overview of the research problems and applications related to humanoid robot programming, from perception to control.
November, 2016 - February, 2017	**European Project TacMan: Tactile Manipulation**, *project founded by the European Union*, FP7 ICT Cognitive System and Robotics, no. 610967. I developed a novel pipeline in order to make the iCub robot perform the handover task, i.e. transfer an object from one hand to the other.
August - September, 2016	**Brains, Minds and Machines Summer School 2016**, *organized by Harvard Medical School and Massachusetts Institute of Technology*, Woods Hole, Massachusetts, US.. I attended this intensive three-week course giving a "deep end" introduction to the problem of intelligence – how the brain produces intelligent behavior and how we may be able to replicate intelligence in machines. I also joined a team project, implementing an algorithm capable of detecting and recognize activities in real videos.(Selected students: 30/300 nearly.)
July, 2016	**International Computer Vision Summer School 2016 (ICVSS)**, *organized by University of Cambridge and University of Catania*, Ragusa, Italy. This experience gave me both a clear overview and in-depth analysis of the state-of-the-art research in Computer Vision, both in academia and industry. (Selected students: 150/396.)
February, 2015 - October, 2015	**Research Fellow @ iCub Facility (Istituto Italiano di Tecnologia)**, *6D object tactile localization for the humanoid robot iCub*, Istituto Italiano di Tecnologia & Universita' di Firenze, Genova, Italy. During my M.Sc. thesis in collaboration with IIT, I designed a novel 6-DOF tactile localization algorithm, named Memory Unscented Particle Filter.
July, 2015	**The iCub Summer School - Veni Vidi Vici 2015**, Sestri Levante, Italy. The school focuses on humanoid robotics, with the goal to foster collaboration on robot software across the boundaries and lifetimes of specific platforms and projects.
December, 2013	**52th IEEE Conference on Decision and Control**, *Crew Member*, Florence, Italy. I contributed to the organization of the CDC conference as a crew member, learning how to organize an international event with more than one thousands attendees.

Papers

2018	**Improving Superquadric Modeling and Grasping with Prior on Object Shapes,**, *G. Vezzani, U. Pattacini, G. Pasquale and L. Natale*, IEEE International Conference on Robotics and Automation (ICRA), Brisbane, 2018.
2018	**Markerless Visual Servoing on Unknown Objects for Humanoid Robot Platforms**, *C. Fantacci, G. Vezzani, U. Pattacini, V. Tikhanoff and L. Natale*, IEEE International Conference on Robotics and Automation (ICRA), Brisbane, 2018.

2017 **A Novel Pipeline for Bi-manual Handover Task**, *G. Vezzani, M. Regoli, U. Pattacini and L. Natale*, Special Issue on Advanced Manipulation, Advanced Robotics, pp. 1-14, 2017.

2017 **Real-time Pipeline for Object Modeling and Grasping Pose Selection via Superquadric Functions**, *G. Vezzani and L. Natale*, Frontiers in Robotics and AI: "Building the iCub Mindware: Open-source Software for Robot Intelligence and Autonomy", 4, 59, 2017.

2017 **A Grasping Approach Based on Superquadric Models**, *G. Vezzani, U. Pattacini, and L. Natale*, IEEE International Conference on Robotics and Automation (ICRA), pp. 1579-1586, Singapore, 2017.

2017 **Memory Unscented Particle Filter for 6-DOF Tactile Localization**, *G. Vezzani, U. Pattacini, G. Battistelli, L. Chisci, and L. Natale*, IEEE Transaction on Robotics, 33 (5), pp. 1139-1155.

2016 **A Novel Bayesian Filtering Approach to Tactile Object Recognition**, *G. Vezzani, N. Jamali, U. Pattacini, G. Battistelli, L. Chisci, and L. Natale*, IEEE International Conference on Humanoid Robotics, pp. 256 - 263, Cancun, Mexico, 2016.

Achievements

2017 **Modeling and Grasping Pipeline for the Humanoid Robot iCub**.
I developed a new modeling and grasping method based on superquadric functions. The C++ implementation is available for the iCub humanoid robot. More information are available *here*.

2017 **Handover Pipeline for the Humanoid Robot iCub**.
I designed an autonomous pipeline for executing the handover task with the humanoid robot iCub.*Here* is a video of the pipeline execution.

2016 **6-DOF Tactile Localization Algorithm**.
During my master thesis, I designed a novel localization algorithm, able to localize known objects by using only 3D points belonging to the object surface. This algorithm has been used also for object recognition and visual localization.

Skills

Software **Programming**, C++, Yarp, Python, MATLAB, Tensorflow, OpenCV, Meshlab, IpOpt, Lua, Html, CMake.
OS, Windows, Linux.
Versioning Systems, Git.

Hardware **Robots** & **Platforms**, iCub, LEGO Mindstorms.

Soft Skills **Work-related**, Time management, Problem solving, Critical thinking, Teamwork, Decision Making, Motivation.

Awards

February, **RAS Travel Grant**, *at IEEE International Conference on Robotics and Automation (ICRA)*, 2017 Singapore.

November, 2016	**Dr. Kanako Miura Travel Support Award**, *at IEEE International Conference on Humanoids Robotics*, Cancun, Mexico.
March, 2016	**AEIT Renato Mariani Award**, *as best student graduated in Information Engineering*, Florence, Italy.

Engineering License

January, 2016	**Professional Practical Examination in Industrial Engineering (qualified)**, *Universita' degli Studi di Firenze*, Florence, Italy.

Education

September, 2013 - October, 2015	**M. Sc. with honours in Electrical and Automation Engineering (GPA 4.0/4.0)**, *Università degli Studi di Firenze*, Florence, Italy.

M. Sc. thesis "6D tactile localization for the humanoid robot iCub":
I designed a novel 6D tactile localization algorithm, the Memory Unscented Particle Filter. Such an algorithm has been tested with real objects and measurements on the iCub robot. The results have been summarized in the regular paper "Memory Unscented Particle Filter for 6-DOF Tactile Localization," accepted at the international journal IEEE Transaction on Robotics.

M. Sc. Projects:
○ "Modeling and control of a LEGO Legway".
○ "Comparison between two different algorithms of distributed filtering and smoothing for nonlinear systems".

September, 2010 - July, 2013	**B. Sc. with honours in Electronic and Telecommunications Engineering (GPA 3.96/4.0)**, *Università degli Studi di Firenze*, Florence, Italy.

B. Sc. thesis "Trajectory planning and control of an anthropomorphic robot for pick and place operations":
I implemented a kinematic trajector for an anthropomorphic robot in order to optimize the production in an assembly line of an Italian firm.

B. Sc. projects:
○ "Reliability and Failure rate estimation of an electronic board".

2005 - 2010	**Scientific high school Diploma with full marks**, *Liceo Scientifico Guido Castelnuovo*, Florence, Italy. .

Languages

Italian, mother tongue.

English, very good English speaking and interaction skills, excellent reading skills, everyday training with collegues from all over the world and abroad experience.

Interests and Hobbies

Music	I have been playing the piano since I was a child. I used to perform in public twice per year, in different theatres in **Florence** and in **Lugano** (Switzerland). I love going to the theatre to listen to piano concerts and classical opera.
Music awards	**Exams on Piano and Solfeggio**, *Istituto Superiore di Studi Musicali Rinaldo Franci*, Siena, Italy.

Competition, *XII Concorso Pianistico Nazionale "Giulio Rospigliosi", March 2005*, 4th award, Lamporecchio, Italy.

Competition, *XIII Concorso Pianistico Nazionale "Giulio Rospigliosi", April 2006*, 4th award, Lamporecchio, Italy.

Sport   Running, dancing, skiing, snorkeling.

Art   I like going to visiting exhibitions. In particular, I am very keen on **contemporary** and **scientific** exhibitions.