# Elisa Tosello | Ph.D.

*Embedded Systems. Fondazione Bruno Kessler – Via Sommarive, 18, 38123, Povo (TN), Italy*

✉ etosello@fbk.eu

RESEARCH INTERESTs: Artificial Intelligence. Planning, Reasoning, and Learning. Task and Motion Planning. Cognitive Robots.

## Current Position

**Post-Doc Researcher**.
Embedded Systems, Fondazione Bruno Kessler, Trento, Italy

## Education

**11 Nov 2016** — **Ph.D. in Robotics**.
Doctoral School of Science and Information Technology
Dept. of Information Engineering, University of Padova, Italy
DISSERTATION: Cognitive Task Planning for Smart Industrial Robots
*Implementation of a sampling-based motion planner for the resolution of the Navigation Among Movable Obstacles problem inside a Smart Factory. Use of Cloud Computing technologies to build an Artificial Knowledge Base that makes industrial mobile manipulators Cognitive while solving Task and Motion Planning problems (Advisor: Prof. E. Pagello).*

**23 Apr 2012** — **M.Sc. in Computer Engineering**.
Dept. of Information Engineering, University of Padova, Italy
THESIS: Motion Planning for multi-Degrees Of Freedom robots - Grade: 109/110
*Study of the Open Motion Planning Library and the Search-Based Planning Library for the resolution of a motion planning problem for robots with multi-Degrees of Freedom. Tests performed on a simulated humanoid using the Robot Operating System.*

**29 Sept 2009** — **B.Sc. in Computer Engineering**.
Dept. of Information Engineering, University of Padova, Italy
THESIS: Learning science through the Educational Robotics
*Implementation of some scientific experiments by using Lego Mindstorms NXT robots in order to improve the use of robots for teaching science in Middle and High Schools.*

**Jun 2006** — **Accounting School Diploma**.
I.T.C.S P.F. Calvi, Padova, Italy

COURSES ATTENDED OUTSIDE THE STUDY PLAN

**Deep Learning Specialization**.
by Andrew Ng (online: https://www.coursera.org/specializations/deep-learning#about)

**Developmental Robotics**.
by Angelo Condelosi (online)

**May-Jun,17** — **Introduction to a Web of Linked Data**.
by Fabien Gandon, Olivier Corby, Catherine Faron Zucker (online)

**Fall 2016** — **Robotics Foundations I - Robot Modeling**.
by Bruno Siciliano (online)

**Fall 2016** — **Comp/Elec/Mech 450 / 550 - Algorithmic Robotics**.
by Lydia Kavraki at Rice University. Houston, Texas

## Scientific Experience

**2020-2021** — **Senior Post-Doc**.
Research Grant - CURAMI, Grant Prof. E. Menegatti
Dept. of Information Engineering, University of Padova, Italy
TOPIC: *Task scheduling and motion planning for collaborative robots*

**Mar 2017 - Dec 2019** — **Post-Doc**.
Research Grant - Call. No. 11-2017, Grant Prof. S. Ghidoni
Dept. of Information Engineering, University of Padova, Italy

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| Mar 2016 - Feb 2017 | **Ph.D. Student / Research Fellow.**<br>Research Grant - Call. No. 13-2016, Grant Prof. E. Menegatti<br>Dept. of Information Engineering, University of Padova, Italy<br>TOPIC: *Development of systems for the autonomous motion planning and use of Cloud Computing for the robotization of manufacturing processes* |
| 2013-2016 | **Ph.D. Student.**<br>Three years Fellowship - Area: ICT and Electronic Component<br>Dept. of Information Engineering, University of Padova, Italy - Supervisor: Prof. E. Pagello<br>TOPIC: *Development of a Motion Planning algorithm for the resolution of the Navigation Among Movable Obstacles problem. Use of Cloud Computing to make industrial mobile manipulators Cognitive.* |

INTERNATIONAL GROUPS

**IEEE-RAS P1872.2 Working Group.**

*The group developed an Autonomous Robotics Ontology Standard whose draft has just been pubblished - Chair: Prof. Howard Li. I'm a voting member of the group.*

REGIONAL PROJECTS

**CURAMI.**

*CURAMI (Collaborazione Uomo-Robot per Assemblaggi Manuali Intelligenti) is a Cariverona project with the Department of Information Engineering, University of Padova. The supervisor is Prof. E. Menegatti. It is a two years project that started in Jan 2020. CURAMI aims to develop an intelligent robotic framework that exploits human-robot collaboration for semi-autonomous warehouse management and just-in-time supply of assembly workstations. This framework should also assist human operators during the assembly (e.g., by holding or changing the pose of heavy components to facilitate human actions). Finally, it will real-time monitor operators' working postures, detecting potentially hazardous nonergonomic poses and suggesting corrections to reduce operators' fatigue and minimize injury risk. Within the project, I'm responsible of the task scheduling and motion planning activity.*

INTERNATIONAL CHALLENGES

**MBZIRC.**

*The Mohamed Bin Zayed International Robotics Challenge (MBZIRC) is an international robotics competition that took place in Abu Dhabi in March 2017. I was the Team Leader of Detert Lion: the University of Padova team, under the supervision of Prof. E. Pagello. Our team competed in Challenge 2 (and its corresponding part in the Grand Challenge), where a UGV had to locate and reach a panel in a outdoor arena, select and grasp an assigned wrench on the panel, and use it to turn a valve stem on the panel itself. The team ranked third in the Gran Challenge in collaboration with Czech Technical University of Prague, University of Pennsylvania, and University of Lincoln (UK).*

COLLABORATION WITH COMPANIES

**ROS-Industrial Comau Project.**

*Project of the Department of Information Engineering, University of Paodva under the supervision of Prof. E. Menegatti from 2012 to 2014. The project aimed at developing a ROS-I inferface for Comau robots by exploiting the Comau open access platform to directly control Comau robots through a real-time linux machine. I was one of the software developer and data scientist of the project.*

## ▬▬ Prizes and Awards

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| 2017 | **3rd place in the Gran Challenge of MBZIRC**, in collab. with Czech Technical University of Prague, University of Pennsylvania, University of Lincoln (UK). March 2017. Abu Dhabi (UAE). |
| 2013 | **Kanako Miura Travel Award**, *IEEE Humanoids 2013*, Atlanta (Georgia). |

## ▬▬ International Activities

VISITING SCHOLAR

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| Aug 2016 - Feb 2017 | **Kavraki Lab.**<br>Rice University. Houston, Texas.<br>PROJECT: *Integration of the Cloud-based Robotics Framework proposed by my Ph.D. thesis into the Task and Motion Planning Framework (TMkit) proposed by the Kavraki Lab* |

SUMMER SCHOOLS ATTENDANCE

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| Oct 29 - Nov 2, 12 | **5th BRICS Research Camp on Mobile Manipulator.**<br>http://www.best-of-robotics.org/BRICS-research-camps/5th-research-camp |
| July 2-6, 12 | **4th BRICS Research Camp on Robot Software Architectures.**<br>http://www.best-of-robotics.org/BRICS-research-camps/4th-research-camp-on-robot-software-architectures |

# Contributions to the scientific community

### CONFERENCES AND WORKSHOPS ORGANIZATION

May 16, 18    **Combining Task and Motion Planning in the frame of Cloud robotics (TMPC) Workshop**, *IEEE SIMPAR 2018 International Conference*, Brisbane, Australia.

### PHD COMMISSION

Apr 4, 19    **Universitat Politècnica de Catalunya**.
Barcelona, Spain.
THESIS: *Combining task and motion planning for mobile manipulators. A. Akbari*

### PROGRAM COMMITTEE

Jun 20-21, 22    **PlanRob 2022 - the 10th ICAPS Workshop on Planning and Robotics (ICAPS)**, *at the 32st International Conference on Automated Planning and Scheduling (ICAPS)*, online.

Aug 31-Sep 3, 21    **The 10th European Conference on Mobile Robots (ECMR)**, online.

Jun 7-8, 21    **PlanRob 2021 - the 9th ICAPS Workshop on Planning and Robotics (ICAPS)**, *at the 31st International Conference on Automated Planning and Scheduling (ICAPS)*, online.

Jun 7-12, 21    **The 31st International Conference on Automated Planning and Scheduling (ICAPS 2021)**, *special track on Robotics and special track on System Demonstrations*, online.

Sept, 21    **International Workshop on Ontologies for Autonomous Robotics (ROBONTICS 2020)**, *at the 11th International Conference on Formal Ontology in Information Systems (FOIS 2020 → 2021) - part of Bolzano Summer of Knowledge (BOSK 2021)*, Bolzano, Italy.

Oct 26-30,20    **PlanRob 2020 - the 8th ICAPS Workshop on Planning and Robotics (ICAPS)**, *at the 30th International Conference on Automated Planning and Scheduling (ICAPS)*, Nancy, France (→ online).

Nov 20-22,19    **Special Session "Ontologies and Knowledge Representation for Robotics"**, *in ROBOT'2019 - The Fourth Iberian Robotics Conference*, Porto, Portugal.

### SCIENTIFIC PEER REVIEWING WORK

IEEE Transaction on Automation Science and Engineering (T-ASE).

Robotics and Autonomous Systems (RAS).

International Journal of Advanced Robotic Systems.

IEEE International Conference on Robotics and Automation (ICRA).

IEEE International Conference on Intelligent Robots and Systems (IROS).

International Conference on Automated Planning and Scheduling (ICAPS).

IEEE International Conference on Simulation, Modeling, and Programming for Autonomous Robots (SIMPAR).

IEEE Global Engineering Education Conference (EDUCON).

IEEE/RAS International Conference on Humanoid Robots (HUMANOIDS).

International Conference on Intelligent Autonomous Systems (IAS).

Iberian Robotics Conference.

ICAPS Workshop on Planning and Robotics (PlanRob).

International Workshop on Ontologies for Autonomous Robotics (ROBONTICS).

AMC Workshop on Design, Modeling and Evaluation of Cyber Physical Systems (CyPhy).

European Conference on Mobile Robots (ECMR).

### CONFERENCES AND WORKSHOPS ATTENDANCE

Aug 2-13, 2021    **The 31st International Conference on Automated Planning and Scheduling (ICAPS 2021)**, *online*.

Jun 22-25, 2021    **Intelligent Autonomous Systems (IAS)-16**, *online*.

Jul 7 - 9, 19    **12th Symposium on Advances in Control Education (IFAC)**, *Philadelphia, Pennsylvania*.

Jun 22-26,19    **Robotics: Science and Systems (RSS) Workshops and Conference**, *Freiburg, Germany*.

Mar 19, 17    **Mohamed Bin Zayed International Robotics Challenge (MBZIRC) Workshop**, *Abu Dhabi, UAE*.

Dec 18-20,16    **12th International Workshop on Algorithmic Foundations of Robotics (WAFR 2016)**, *San Francisco, California*.

Jun 21-22,16    **47th International Symposium on Robotics (ISR 2016)** , *Munich, Germany*.

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| May 16-21,16 | **IEEE International Conference on Robotics and Automation (ICRA 2016)**, *Stockholm, Sweden.* |
| Apr 10-13,16 | **IEEE Global Engineering Education Conference (EDUCON 2016)**, *Abu Dhabi, UAE.* |
| Oct 20-23,14 | **Simulation, Modeling, and Programming for Autonomous Robots. 4th International Conference (SIMPAR 2014)**, *Bergamo, Italy.* |
| Oct 18-20,15 | **International CAE Conference 2015**, *Pacengo Lazise, Verona, Italy.* |
| Sept 3, 2015 | **First MoveIt! Community Meeting**, *Online.* |
| Jul 19, 2014 | **New Research Frontiers for Intelligent Autonomous Systems; Workshop (NRF-IAS-2014)**, *Venice (Italy).* |
| Jul 15-19,14 | **13th international conference on Intelligent Autonomous Systems (IAS13)**, *Padova, Italy.* |
| Jun 26, 14 | **ROS-Industrial Conference**, *Fraunhofer IPA, Stuttgart, Germany.* |
| Jun 2-3, 14 | **45th International Symposium on Robotics (ISR 2014) and 8th German Conference on Robotics (ROBOTIK 2014)**, *Munich, Germany.* |
| Apr 28, 2014 | **2nd ROS-Industrial Community Forum Webinar**, *Online.* |
| Oct 15-17,13 | **IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS 2013)**, *Atlanta, Georgia, USA.* |
| Oct 15, 2013 | **Benchmarking of State-of-the-Art algorithms in Generating Human-Like Robot Reaching Motions, Workshop on**, *Atlanta, Georgia, USA.* |
| Jul 29 - Aug 2, 13 | **Biomimetic and Biohybrid Systems, Second International Conference (LIVING MACHINES 2013)**, *London, United Kingdom.* |
| Jul 29, 2013 | **Learning from the Plant Kingdom to Invent Smart Artificial Solutions, Workshop on**, *London, United Kingdom.* |
| Aug 2, 2013 | **Neuromorphic models, circuits, and emerging nano-technologies for real-time neural processing system, Workshop on**, *London, United Kingdom.* |

## Invited Talks

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| Jun 23, 2019 | **A Cloud-based approach for Task And Motion Planning: combining Deep Reinforcement Learning and Knowledge Bases**, *RSS 2019 - Workshop on Robust Task and Motion Planning*, Freiburg, Germany. |
| Apr 3, 2019 | **Combining Deep Learning and Knowledge Bases to solve Task And Motion Planning problems in the Cloud**, *UPC*, Barcelona, Spain. |
| Feb 11, 2019 | **Combining Deep Learning and Knowledge Bases to solve Task And Motion Planning problems in the Cloud**, *CNR*, Trento, Italy. |
| Mar 26-28, 15 | **La robotica umanoide allo IAS-Lab (Humanoid robotics at IAS-Lab)**, *MECPSE - Tecnologie per l'Innovazione (Technologies for Innovation)*, Fiera di Parma, Parma, Italy. |
| June 26, 14 | **A non real-time ROS interface for the real-time COMAU controllers**, *The ROS-Industrial conference*, Fraunhofer IPA, Stuttgart, Germany. |
| Apr 28, 2014 | **A non real-time ROS interface for the real-time COMAU controllers**, *The 2nd ROS-I Community Forum Webinar*. |

## Oral Presentations

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|---|---|
| Jun 22-25, 2021 | **Intelligent Autonomous Systems (IAS)-16**, *online.* |
| Jul 7 - 9, 19 | **12th Symposium on Advances in Control Education (IFAC)**, *Philadelphia, Pennsylvania.* |
| Jun 21-22,16 | **47th International Symposium on Robotics (ISR 2016)**, *Munich, Germany.* |
| Oct 20-23,14 | **Simulation, Modeling, and Programming for Autonomous Robots; 4th International Conference on (SIMPAR 2014)**, *Bergamo, Italy.* |
| Jul 19, 2014 | **New Research Frontiers for Intelligent Autonomous Systems; Workshop on (NRF-IAS-2014)**, *Venice, Italy.* |
| Jul 15-19, 14 | **13th International Conference on Intelligent Autonomous Systems (IAS13)**, *Padova, Italy.* |
| Oct 15-17, 13 | **IEEE-RAS International Conference on Humanoid Robots (Humanoids 2013)**, *Atlanta, Georgia, USA.* |
| Jul 29 - Aug 2,13 | **Biomimetic and Biohybrid Systems, Second International Conference on (Living Machines 2013)**, *London, United Kingdom.* |

Jun 2-3, 14 **45th International Symposium on Robotics (ISR 2014) and 8th German Conference on Robotics (ROBOTIK 2014)**, *Munich, Germany*.

# Teaching Experience

from March **Teaching**.
2022   Smact, Padova, Italy
Role: *40 hours of teaching of embedded systems programming for ITS students in the Big Data and Analysis course*

2020-2021 **Tutoring**.
Dept. of Information Engineering, University of Padova, Italy
Role: *24 hours of ROS tutoring for M.Sc. students in the Autonomous Robotics course*

**Tutoring**.
Dept. of Mathematics "Tullio Levi-Civita", University of Padova, Italy
Role: *24 hours of tutoring for M.Sc. students in the Deep Learning course*

2017-2020 **Teaching**.
Dept. of Information Engineering, University of Padova, Italy
Role: *Teaching 3 of the 9 credits of the Autonomous Robotics course*

Jun, 2019 **Teaching**.
Automationware Srl. Via L. Cacace 5, 30030 Maerne, VE
Role: *20 hours of teaching - An introduction to the Robot Operating System (ROS) Framework: overview of its architecture and practical tutorials on perception, manipulation, and navigation*

Feb-Mar,19 **Teaching**.
Dept. of Mathematical, Computer and Physical Sciences, University of Udine, Italy
Role: *20 hours of teaching of the Social Robotics Laboratory*

May-Jun,17 **Teaching**.
Saipem Spa. Via delle Industie 28, 30175 Porto Marghera, VE
Role: *20 hours of teaching - An introduction to the Robot Operating System (ROS) Framework: overview of its architecture and practical tutorials on perception, manipulation, and navigation*

Jan-Feb,17 **Teaching**.
Kavraki Lab. Rice University, Houston. TX
Role: *20 hours of teaching to robotics Master and Ph.D. students of the lab - An introduction to the Robot Operating System (ROS) Framework: overview of its architecture and practical tutorials on perception, manipulation, and navigation*

2016-2017
2015-2016 **Teaching and Tutoring**.
2014-2015 Dept. of Information Engineering, University of Padova, Italy
2013-2014 Role: *12/12/40/40 hours/year of both teaching and laboratory tutoring for M. Sc. students in the Autonomous Robotics course - An introduction to robot Kinematics and Dynamics, Motion Planning, Task Planning, and Cloud Robotics.*

2015-2016 **Tutoring**.
Dept. of Techniques and Management of Industrial Systems, Univ. of Padova, in Vicenza, Italy
Role: *24 hours of laboratory tutoring for B.Sc. students in the Fundamentals of Computer Science course - Java programming*

2020-2021 **A new scope for Open Cognition: task and motion planning through its Neural-Symbolic Knowledge Store**.
*Michele Thiella*. Master student in Computer Engineering. Dept. of Information Engineering, University of Padova, Italy - Advisor: Prof. E. Pagello

2019-2020 **Controllo in velocità di un manipolatore robotico teleoperato basato su un approccio di autonomia condivisa**.
*Alberto Gottardi*. Master student in Computer Engineering. Dept. of Information Engineering, University of Padova, Italy - Advisor: Prof. E. Menegatti

2018-2019 **Robotic Manipulation for Object Sorting via Deep Reinforcement Learning**.
*Federico Ceola*. Master student in Computer Engineering. Dept. of Information Engineering, University of Padova, Italy - Advisor: Prof. S. Ghidoni

2017-2018 **Robotic Arm Control and Task Training through Deep Reinforcement Learning**.
*Andrea Franschetti*. Master student in Computer Engineering. Dept. of Information Engineering, University of Padova, Italy - Advisor: Prof. S. Ghidoni

**Learning Robot Task Planning Primitives by means of Long Short-Term Memory**.
*Federico Vendramin.* Master student in Computer Engineering. Dept. of Information Engineering, University of Padova, Italy - Advisor: Prof. S. Ghidoni

2015-2016 **A Cloud-based Reinforcement Learning Framework for Humanoid Grasping**.
*Alejandro Gatto.* Master student in Computer Engineering. Dept. of Information Engineering, University of Padova, Italy - Advisor: Prof. E. Pagello

**A sampling-based tree planner for Navigation Among Movable Obstacles**.
*Nicola Castaman.* Master student in Computer Engineering. Dept. of Information Engineering, University of Padova, Italy - Advisor: Prof. E. Pagello

## Patents

2020 **IT 102020000008305**, *UNIPD-Mask: a device for conversion of diving masks to masks for non-invasive ventilation at constant positive pressure with integrated passive safety system and filter*, Inventors: F. Zarantonello, P. Persona, I. Valeri, S. Savino, L. Tagliapietra, E. Tosello, E. Menegatti, G. Navalesi, *Pending - first review passed.*

## Work Experience

Nov 21 - Aug 22 **Senior Software Developer**.
221e srl, Bergamo, Italy
*Programming of embedded systems optimized for wearables*

Jan-Feb 16 **Software Developer**.
Jun-Dec 12 IT+Robotics, Padova, Italy
*Contribution to the creation of a robotic work-cells simulator and its inverse kinematics plugins*

### TRAININGS

Mar 5-6, 14 **Trainings on Comau manipulator robots**, *Comau S.p.A. Torino.*
Jun 11-12, 13
Dec 16-18,13

## Collaborations

**Enrico Pagello**, *Full Professor*, University of Padova. Padova, Italy.

**Emanuele Menegatti**, *Full Professor*, University of Padova. Padova, Italy.

**Stefano Ghidoni**, *Assistant Professor*, University of Padova. Padova, Italy.

**Howard Li**, *Full Professor*, University of New Brunswick. Fredericton, Canada.

**Stefano Borgo**, *Researcher*, CNR. Trento, Italy.

**Lydia Kavraki**, *Full Professor*, Rice University. Houston, Texas.

**Mohammed Diab**, *Research Associate*, Personal Robotics Lab (PRL), Imperial College London (ICL), London, UK.

## Memberships

**IEEE Standards Association (SA)**.

**IEEE Robotics & Automation Society (RAS)**.

**IEEE Systems, Man, and Cybernetics Society (SMC)**.

**Istituto di Robotica e Macchine Intelligenti (I-RIM)**.

**Women in AI**.