Robotics Researcher

Yeshasvi Tirupachuri

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"Start where you are. Use what you have. Do what you can."

About

Robotics researcher primarily focused on enabling technologies for physical human-robot collaboration. Strong theoretical background in robot kinematics, dynamics and control, and thorough practical experience with robots of different complexity ranging from manipulators to humanoids. Experienced in system integration of complex software and hardware systems.

Experience

Early Stage Researcher & Doctoral Fellow *2016 - 2020*
Dynamic Interaction Control *IIT, Italy*

- Core Developer and Maintainer - Human Dynamics Estimation v2.0 Library
- Experience in Humanoid Whole-Body Control
- Competence in Robot Simulation
- Open Source Contributor - YARP, iDynTree, GazeboYarpPlugins, Wearables
- Seasoned in Agile Software Development & Research Methodologies
- Engaged in European Research Projects - An.Dy, PACE
- Facilitated Technology Transfer

Master Thesis *Mar - Sep 2015*
Event-Driven Perception for Robotics *IIT, Italy*

- Bio-inspired optical flow estimation and vergence control with neuromorphic stereo vision system on iCub [C7]

Graduate Research *Jan - Mar 2015*
EMARO Lab *Genova University, Italy*

- Gesture recognition through wearable sensors for human-robot interaction [W6]
- AND-OR graph library for task planning during human-robot collaboration

Teaching Assistant *Jul - Sep 2014*
EMARO Lab *Genova University, Italy*

- Developer of Pan-Tilt setup for teaching Software Architecture using ROS

Automation Engineer *2011 - 2013*
Madras Rubber Factory Ltd. *Pondicherry, India*

- Commissioning and Maintenance of Tyre Manufacturing Machines

Doctoral Research

My doctoral research is aimed at addressing some of the research challenges to enabling human-robot collaboration. In particular, I worked on a holistic human perception framework for real-time monitoring of whole-body human motion and dynamics, to communicate human partner's intentions and needs in real-time to a robot partner for successful realization of a collaborative task [W2, C2, C1, U1]. Furthermore, I worked on the challenge of leveraging assistance from a human partner to improve human-robot collaboration. In this direction, an attempt at methodically defining what constitutes an assistance from a human partner is investigated and proposed partner-aware robot control strategies to endow robots with the capacity to meaningfully engage in a collaborative task [C3, C4, C6].

Education

PhD, Human-Robot Collaboration *2016 - 2020*
Italian Institute of Technology (IIT) *Genova, Italy*

MSc, Advanced Robotics *2014 - 2015*
University of Genova *Genova, Italy*

MSc, Robotics Engineering *2013 - 2014*
École Centrale de Nantes *Nantes, France*

BTech, Electrical Engineering *2007 - 2011*
Pondicherry University *Pondicherry, India*

References

Dr. Daniele Pucci *Researcher*
daniele.pucci@iit.it *IIT*

Dr. Silvio Traversaro *Researcher*
silvio.traversaro@iit.it *IIT*

Dr. Chiara Bartolozzi *Researcher*
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Dr. Fulvio Mastrogiovanni *Professor*
fulvio.mastrogiovanni@unige.it *Genova University*

Scholarships & Awards

Best Student Paper Award [C3] *2019*
Intelligent Systems Conference

Best Blooper Award *2019*
ICRA

Early Stage Researcher *2016*
Marie Skłodowska-Curie Fellowship *European Union*

Technical Skills

Robotics Middleware	ROS, YARP
Operating Systems	Linux
Version Control	Git, GitHub, Bitbucket
Programming	C++, Matlab, Python
Simulation	Gazebo
Tools	Qt, Eclipse, PyCharm Simulink

Personal Skills

Resourceful Collaborative Dependable
Cultural Intelligence

Languages & Hobbies

English (C2) Italian (A2) French (A1)
Hindi (B1) Tamil (B1) Telugu (C2)
Hiking Photography Cooking

Publications

[C1] I. Sorrentino, F. J. Andrade Chavez, C. Latella, L. Fiorio, S. Traversaro, L. Rapetti, **Y. Tirupachuri**, N. Guedelha, M. Maggiali, S. Dussoni, G. Metta, and D. Pucci. "A Novel Sensorised Insole for Sensing Feet Pressure Distributions". In: *Sensors* 20.3 (2020). ISSN: 1424-8220. DOI: 10.3390/s20030747. URL: https://www.mdpi.com/1424-8220/20/3/747.

[C2] C. Latella, S. Traversaro, D. Ferigo, **Y. Tirupachuri**, L. Rapetti, F. J. Andrade Chavez, F. Nori, and D. Pucci. "Simultaneous Floating-Base Estimation of Human Kinematics and Joint Torques". In: *Sensors* 19.12 (2019). ISSN: 1424-8220. DOI: 10.3390/s19122794. URL: https://www.mdpi.com/1424-8220/19/12/2794.

[C3] **Y. Tirupachuri**, G. Nava, C. Latella, D. Ferigo, L. Rapetti, L. Tagliapietra, F. Nori, and D. Pucci. "Towards Partner-Aware Humanoid Robot Control Under Physical Interactions". In: *Proceedings of SAI Intelligent Systems Conference*. Springer. 2019, pp. 1073–1092.

[C4] **Y. Tirupachuri**, G. Nava, L. Rapetti, C. Latella, and D. Pucci. "Trajectory Advancement during Human-Robot Collaboration". In: *2019 28th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*. IEEE. 2019, pp. 1–8. DOI: 10.1109/RO-MAN46459.2019.8956339.

[C5] **Y. Tirupachuri**, S. Traversaro, F. Nori, and D. Pucci. "Momentum-Based Topology Estimation of Articulated Objects". In: *Proceedings of SAI Intelligent Systems Conference*. Springer. 2019, pp. 1093–1105.

[C6] **Y. Tirupachuri***, K. Darvish*, G. Romualdi, L. Rapetti, D. Ferigo, F. J. Andrade Chavez, and D. Pucci. "Whole-Body Geometric Retargeting for Humanoid Robots". In: *Humanoids*. IEEE. 2019, in press.

[C7] V. Vasco, A. Glover, **Y. Tirupachuri**, F. Solari, M. Chessa, and C. Bartolozzi. "Vergence control with a neuromorphic iCub". In: *2016 IEEE-RAS 16th International Conference on Humanoid Robots (Humanoids)*. 2016, pp. 732–738. DOI: 10.1109/HUMANOIDS.2016.7803355.

Under Review

[U1] L. Rapetti, **Y. Tirupachuri**, K. Darvish, C. Latella, and D. Pucci. "Model-Based Real-Time Motion Tracking using Dynamical Inverse Kinematics". In: (2020). arXiv: 1909.07669.

Workshops

[W1] L. Rapetti, **Y. Tirupachuri**, A. Ranavolo, C. Latella, and D. Pucci. "Multi-Humanoid-Robot system: balancing and effort distribution during collaboration". In: (2020), Foundational Problems in Multi–Robot Coordination Under Uncertainty and Adversial Attacks, International Conference on Robotics and Automation (ICRA) 2020, Paris, France. arXiv: 2001.00411 [cs.RO]. URL: https://drive.google.com/file/d/1bAerev1fong0ZU-JL93wZowrGgxoPfve/view.

[W2] **Y. Tirupachuri**, G. Nava, L. Rapetti, C. Latella, K. Darvish, and D. Pucci. "Recent Advances in Human-Robot Collaboration Towards Joint Action". In: (2020), The Communication Challenges in Joint Action for Human–Robot Interaction Workshop, International Conference on Social Robotics (ICSR) 2019, Madrid, Spain. arXiv: 2001.00411 [cs.RO].

[W3] C. Latella, **Y. Tirupachuri**, L. Rapetti, D. Ferigo, S. Traversaro, I. Sorrentino, F. J. Andrade Chavez, F. Nori, and D. Pucci. "A Human Wearable Framework for Physical Human-Robot Interaction". In: (2019), I–RIM, Rome, Italy. URL: https://bit.ly/35iy9k7.

[W4] **Y. Tirupachuri**, G. Nava, L. Rapetti, C. Latella, and D. Pucci. "Trajectory Advancement for Robot Stand-up with Human Assistance". In: (2019), I–RIM, Rome, Italy. arXiv: 1910.06786 [cs.RO].

[W5] C. Latella, L. Tagliapietra, D. Ferigo, **Y. Tirupachuri**, F. Nori, and D. Pucci. "Advancing Human-Robot Collaboration through Online Human Inverse Dynamics Estimation". In: *2018 IEEE Workshop on Advanced Robotics and its Social Impacts (ARSO)*. 2018, pp. 21–22. DOI: 10.1109/ARSO.2018.8625806.

[W6] **Y. Tirupachuri**, P. Ramadoss, B. Bruno, and F. Mastrogiovanni. "Human-Robot Cooperation: is Wearable Sensing the Way to Go?" In: (2015), Robot and Human Interactive Communication (RO–MAN), 2015 IEEE 24th IEEE International Symposium on. eprint: https://bit.ly/2Qmgi7W.