Claudia **LATELLA**

Robotics Engineer

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Pieve Ligure, Genoa, Italy
Date of birth : November, the 5th, 1986

I am a Bioengineer with a PhD in Cognitive Robotics, Interaction and Rehabilitation Technologies. My scientific interests include human modeling and human dynamics estimation for human-robot interaction scenarios. My scientific objective aims to enhance the physical collaboration mechanisms between humans and robots via the development of algorithms that endow any robotic platforms (humanoid robots, exoskeletons, cobots) with the capability to react, interact and actively collaborate with people.

EXPERIENCES

September 2021 – Present
Senior technician, ITALIAN INSTITUTE OF TECHNOLOGY, Genoa, Italy
Artificial and Mechanical Intelligence (AMI), Center for Robotics and Intelligent Systems (CRIS)
- Development of realtime validation algorithms for monitoring human biomechanics.
- Coordination of experimental activities.
- Support for EU projects proposal writing.
- Management of dissemination activities and HW management.

algorithms validation | experimental activities coordination | EU proposal

March 2018 – September 2021
PostDoc Researcher, ITALIAN INSTITUTE OF TECHNOLOGY, Genoa, Italy
Dynamic Interaction Control (DIC), Center for Robotics and Intelligent Systems (CRIS)
Development of realtime dynamics estimation algorithms on floating-base systems for exoskeleton control applications. The PostDoc activity is fully related to the H2020 European Project An.Dy.
human odometry techniques (Xsens) | force sensors (AMTI/6-axis FT sensors/tactile skin) | exoskeleton | MATLAB | YARP | C++

November 2014 – March 2018
PhD Fellow, ITALIAN INSTITUTE OF TECHNOLOGY, Genoa, Italy
Dynamic Interaction Control Lab (DIC)
Research on collaborative physical human-robot interaction techniques, development of realtime dynamics estimation algorithms for multibody systems, under the supervision of Francesco Nori. The PhD research has highly contributed to the H2020 European Project An.Dy.
human odometry techniques (Xsens) | force sensors (AMTI/6-axis FT sensors) | MATLAB | YARP | C++

August 2017 – October 2017
Visiting PhD Fellow, UNIVERSITY OF WATERLOO (UW), Ontario, Canada
Adaptive Systems Lab, ELECTRICAL AND COMPUTER ENGINEERING DEPT.
Collaboration with Prof. Dana Kulić to develop experimental protocols for online estimation of the human dynamics.
human odometry techniques (MotionAnalysis CORTEX/Xsens) | force sensors (AMTI/6-axis FT sensors)

September 2010 – February 2011
Guest MEng student, UNIVERSITY OF APPLIED SCIENCES OF SOUTHERN SWITZERLAND (SUPSI), Lugano
DynaMat Lab
Collaboration with Prof. Ezio Cadoni to investigate the mechanical behaviour of cortical bovine bones under high strain-rate tensile loading conditions.
tensile machine tools (modified Hopkinson Bar/hydro-pneumatic machine)

September 2008 – February 2009
BEng student, DIMES, University of Genoa
Faculty of Medicine
Collaboration with Prof. Marco Bove to study the correlation between the learning of a motor task and the transfer of the procedural knowledge among the brain hemispheres.
transcranial magnetic stimulation (TMS) technique

Education

November 2014 – March 2018
PhD in Bioengineering and Robotics, Italian Institute of Technology, University of Genoa, Italy
Cognitive Robotics, Interaction and Rehabilitation Technologies
Research in : physical human-robot interaction mechanisms, human biomechanics modelling, multimodal wearable sensor fusion.
- Thesis : "Human Whole-Body Dynamics Estimation for Enhancing Physical Human-Robot Interaction", `https://arxiv.org/abs/1912.01136`.

human odometry techniques (Vicon/Xsens) | force sensors (AMTI/6-axis FT sensors)

April 2009 – March 2011
MEng in Bioengineering, University of Genoa, Italy
Faculty of Engineering
Main topics : Biomechanics and ergonomics elements, Biomedical imaging, Medical informatics, Rehabilitation engineering and control of prostheses, Rigid bodies mechanics, Fluids mechanics, Materials science (for prostheses), Economy and health management.
- Thesis : "Influence of the Strain-Rate on the Mechanical Tensile Behaviour of Bovine Bones".
- Grade of 110/110 *cum laude*, mention *Just in Time*.

MATLAB | LabVIEW

September 2005 – March 2009
BEng in Biomedical Engineering, University of Genoa, Italy
Faculty of Engineering
Main topics : Fundamentals of biomedical instrumentation, Human physiology, Materials science, Signal and biomedical image processing, Modelling and control of biological systems, Clinical engineering.
- Thesis : "Neurophysiological Mechanisms Involved in Transfer of Procedural Knowledge".
- Grade of 100/110, mention *Just in Time*.

MATLAB

Courses

September 2020 – December 2020
Pre-Acceleration Program 2020, B4I - Bocconi for innovation, Bocconi
3-month training program for aspiring startups
Lectures in business, finance, digital marketing for validating early stage business ideas of aspiring entrepreneurs for starting up a business.
- `https://www.b4i.unibocconi.it/pre-acceleration`.

July 2017
Science Management for Scientist and Engineers, SoSMSE, University of Genoa
2-week intensive management course for scientists
Lectures in Communication, Economy management, Information Technology, Copyright and patent law, Project management, Risk capital and funding.
- `https://www.sosmse.eu`.

January 2015
Gaussian Process, GPSS, University of Genoa
1-week intensive course on Gaussian process
Lectures in Regression and Probability, Gaussian and multiple output processes.
- `http://gpss.cc`.

Skills

Programming languages	Matlab
Software and libraries	YARP (Yet Another Robot Platform), iDynTree (Multibody Dynamics Library for Free Floating Robots), Gazebo, ROS, OpenSim, Mokka
Operative systems	Mac OS, Windows, Linux
Markup languages	Latex, HTML, Markdown
Version control tools	Git

Languages

Italian ●●●●●
English ●●●●○
Spanish ●●○○○

Strengths

- Team working capability
- Working in a multicultural environment
- Agile project management via Scrum

Scientific Activity

Publications

2021 Latella, C.; Tirupachuri, Y.; Tagliapietra, L.; Rapetti, L.; Schirrmeister, B.; Bornmann, J.; Gorjan, D.; Čamernik, J.; Maurice, P.; Fritzsche, L.; Gonzales-Vargas, J.; Ivaldi, S.; Babič, J.; Nori, F.; Pucci, D. "Analysis of Human Whole-Body Joint Torques during Overhead Work with a Passive Exoskeleton" - IEEE Transaction of Human-Machine Systems, pp. 1-9, Dec. 2021, **https://ieeexplore.ieee.org/document/9647004**

2021 Tirupachuri, Y.; Ramadoss, P.; Rapetti, L.; Latella, C.; Darvish, K.; Traversaro, S.; Pucci D. "Online Non-Collocated Estimation of Payload and Articular Stress for Real-Time Human Ergonomy Assessment" - IEEE Access, pp. 1–1, Aug. 2021, **https://ieeexplore.ieee.org/document/9526592**

2020 Rapetti, L.; Tirupachuri, Y.; Darvish, K.; Dafarra, S.; Nava, G.; Latella, C.; Pucci D. "Model-Based Real-Time Motion Tracking using Dynamical Inverse Kinematics" - Algorithms 2020, 13, 266, **https://www.mdpi.com/863594**

2020 Sorrentino, I.; Andrade Chavez, F.J.; Latella, C.; Fiorio, L.; Traversaro, S.; Rapetti, L.; Tirupachuri, Y.; Maggiali, M.; Dussoni, S.; Metta, G.; Pucci, D. "A Novel Sensorized Skin Insole for Sensing Feet Pressure Distributions", Sensors 2020, 20, 747, **https://www.mdpi.com/628474**

2020 Maurice, P.; Čamernik, J.; Gorjan, D.; Schirrmeister, B.; Bornmann, J.; Tagliapietra, L.; Latella, C.; Pucci, D.; Fritzsche, L.; Ivaldi, S.; Babič, J. "Objective and Subjective Effects of Passive Exoskeleton on Overhead Work", IEEE Transaction on Neural Systems and Rehabilitation Engineering, 152-164, Volume:28 , Issue:1 , Jan. 2020, **https://ieeexplore.ieee.org/document/8856265**

2019 Tirupachuri, Y.; Nava, G.; Latella, C.; Ferigo, D.; Rapetti, L.; Tagliapietra, L.; Nori, F.; Pucci, D. "Towards Partner-Aware Humanoid Robot Control under Physical Interactions" - Intelligent Systems and Applications. IntelliSys 2019. Advances in Intelligent Systems and Computing, vol 1038. Springer, Cham, **https://link.springer.com/chapter/10.1007/978-3-030-29513-4_78**

2019 Tirupachuri, Y.; Nava, G.; Rapetti, L.; Latella, C.; Pucci, D. "Trajectory Advancement during Human-Robot Collaboration" - 2019 28th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), New Delhi, India, 2019, pp. 1-8, **https://ieeexplore.ieee.org/document/8956339**

2019 Latella, C.; Traversaro, T.; Ferigo, D.; Tirupachuri, Y.; Rapetti, L.; Andrade Chavez, F.J.; Nori, F.; Pucci, D. "Simultaneous Floating-Base Estimation of Human Kinematics and Joint Torques", Sensors 2019, 19, 2794, **https://www.mdpi.com/484006**

2018 Latella, C.; Lorenzini, M.; Lazzaroni, M.; Romano, F.; Traversaro, S.; Akhras, M.A.; Pucci, D.; Nori, F. "Towards Real-time Whole-Body Human Dynamics Estimation through Probabilistic Sensor Fusion Algorithms. A Physical Human–Robot Interaction Case Study", Autonomous Robots, Springer US, October 2018, **https://doi.org/10.1007/s10514-018-9808-4**

2018 Latella, C.; Tagliapietra, L.; Ferigo, D.; Tirupachuri, Y.; Nori, F.; Pucci, D. "Advancing Human-Robot Collaboration through Online Human Inverse Dynamics Estimation", 2018 IEEE Workshop on Advanced Robotics and its Social Impacts (ARSO), **https://ieeexplore.ieee.org/document/8625806**

2017 Romano, F.; Nava, G.; Azad, M.; Čamernik, J.; Dafarra, S.; Dermy, O.; Latella, C.; Lazzaroni, M.; Lober, R.; Lorenzini, M.; Pucci, D.; Sigaud, O.; Traversaro, S.; Babič, J.; Ivaldi, S.; Mistry, M.; Padois, V.; Nori, F. "The CoDyCo Project achievements and beyond : Towards Human Aware Whole-body Controllers for Physical Human Robot Interaction", Special issue on Human Cooperative Wearable Robotic Systems in IEEE Robotics and Automation Letters, 3:516-523, November 2017. (RA-L), 2017, pp. 99, **http://ieeexplore.ieee.org/document/8093992/**

2016 Latella, C.; Kuppuswamy, N.; Romano, F.; Traversaro, S.; Nori, F. "Whole-Body Human Inverse Dynamics with Distributed Micro-Accelerometers, Gyros and Force Sensing", Sensors, vol. 16, pp. 727, **https://www.mdpi.com/140968**

2016 Latella, C.; Kuppuswamy, N.; Romano, F.;Traversaro, S.; Nori, F. "WearDY:Wearable Dynamics. A prototype for human whole-body force and motion estimation", AIP Conference Proceedings 1749, 020011 (2016), **http://dx.doi.org/10.1063/1.4954494**

2015 Latella, C.; Dotta, M.; Forni, D; Tesio, N; Cadoni, E. "Influence of strain rate on the mechanical behaviour in tension of bovine cortical bone" - 11th International Conference on the Mechanical and Physical Behaviour of Materials under Dynamic Loading , DYMAT 2015, Lugano, Switzerland. European Physics Journal - Web of Conferences, 94,2015, **https://doi.org/10.1051/epjconf/20159403001**

Awards

2023 **LIONS PREMIO DONNA TALENTO** - L'ingenium femminile alla frontiera della conoscenza, Lions Clubs International - Distretto 108 AB, Italy

2019 **Best Student Paper Award** - Tirupachuri, Y.; Nava, G.; Latella, C.; Ferigo, D.; Rapetti, L.; Tagliapietra, L.; Nori, F.; Pucci, D. "Towards Partner-Aware Humanoid Robot Control under Physical Interactions", in Intelligent Systems Conference 2019, IntelliSys 2019, London, UK, September 5-6, 2019

2019 **Springer/IFToMM Lagrange Award 2019 for the Best Phd Thesis on Multibody Dynamics** - "Human Whole-Body Dynamics Estimation for Enhancing Physical Human-Robot Interaction", in ECCOMAS Thematic Conference on Multibody Dynamics, Duisburg, Germany, July 15-18, 2019

2015 **ECSA-2 Best Paper Award** - Latella, C.; Kuppuswamy, N.; Nori, F. "Force and motion capture system based on distributed micro-accelerometers, gyros, force and tactile sensing" - 2nd International Electronic Conference on Sensors and Applications (ECSA) November 15-30, 2015

Projects

2023 Researcher in PNRR projects :
- RAISE-Robotics and AI for Socio-economic Empowerment, `https://www.raiseliguria.it/`
- Fit4MedRob - Fit for Medical Robotics (Grant No. PNC0000007), `https://www.fit4medrob.it`

2021 Researcher in ergoCub project with Italian National Institute for Insurance against Accidents at Work (INAIL), `https://ergocub.eu`

2019 Researchear in iFeel project, a spin-off idea from AMI lab, `https://ifeeltech.eu`

2017 Researcher in H2020 An.Dy - Advancing Anticipatory Behaviors in Dyadic Human-Robot Collaboration (H2020-ICT 2016-2017, Grant Agreement No. 731540), `https://andy-project.eu`

2016 Researcher in the 4th year FP7 CoDyCo-Whole-body Compliant Dynamical Contact in Cognitive Humanoids (FP7-ICT.2011.2.1, Grant Agreement No. 600716), `https://www.codyco.eu/`

Conferences and Workshops

2024 Latella, C.; Fiori, L.; Tatarelli, A.; Valli, E.; Rapetti, L.; Pucci, D.; Tacchino, A.; Grange, E.; Pedullà, L.; Brichetto, G.; Podda, J. "iFeel Wearable Technology for the Assessment of Pathology-Specific Spatiotemporal Indicators in People with Multiple Sclerosis" - Annual RIMS Conference, Hasselts, Belgium, June 27-29, 2024

2023 Latella, C.; Tatarelli, A.; Fiori, L.; Grieco, R.; Rapetti, L.; Pucci, D. "Real-time lower leg muscle forces estimation using a Hill-type model and whole-body wearable sensors" - 5th Italian Conference in Robotics and Intelligent Machines (I-RIM), Rome, October 20-22, 2023, `https://doi.org/10.5281/zenodo.10722443`

2023 Latella, C.; Tatarelli, A.; Fiori, L.; Grieco, R.; Rapetti, L.; Pucci, D. "Evaluation of lower limb muscle forces using the Hill-type model and wearable sensors" - XXIII Congress on Human Movement for Clinical Scenarios, Sports and Industrial (SIAMOC), Rome, October 4-7, 2023, `https://amsacta.unibo.it/id/eprint/7383/`

2023 Valli, E.; Latella, C.; Rapetti, L.; Grieco, R.; Sortino, D.; Gatti, G.; Pucci, D.; Tacchino, A.; Polidori, A.; Pedullà, L.; Brichetto, G.; Podda, J. "A whole-body wearable device for motor function monitoring : testing iFeel Technology in PwMS" - Annual RIMS Conference, May 4-6, 2023, Multiple Sclerosis Journal, vol.29, issue 1 suppl., `https://doi.org/10.1177/13524585231165703`

2021 Latella, C. "Human wearable technologies for agent-robot perception framework" - HUMANOIDS 2020 Workshop on Towards physical-social human-robot interaction, HUMANOIDS 2020, Munich, July 22, 2021

2021 Valli, E.; Latella, C. "Human wearable technologies for agent-robot perception framework" - iCog Workshop on Cognitive Psychology and Robotics : bridging the gap, virtual event, July 7, 2021

2020 Latella, C.; Rapetti, L.; Tirupachuri, Y.; Kourosh, D.; Traversaro, S.; Pucci D. "The Human Wearable Perception System : a Human-Robot Collaboration Application" - 2nd Italian Conference in Robotics and Intelligent Machines (I-RIM), virtual, Dicember 11-12, 2020, `https://doi.org/10.5281/zenodo.4781154`

2020 Rapetti, L.; Tirupachuri, Y.; Ranavolo, A.; Latella, C.; Pucci D. "Multi-Humanoid-Robot system : balancing and effort distribution during collaboration" - ICRA2020 Workshop - Foundational Problems in Multi-robot Coordination under Uncertainty and Adversarial Attacks, June 4, 2020

2019 Rapetti, L.; Tirupachuri, Y.; Nava, G.; Latella, C.; Darvish, K.; Pucci D. "Partner-Aware Humanoid Robot Control : from Robot-Robot collaboration to Human-Robot Collaboration and Ergonomy Control" - IROS-EPHRC 2019, Workshop on Progress in Ergonomic Physical Human-Robot Collaboration, IROS 2019, Macau, China, November 8, 2019

2019 Latella, C.; Tirupachuri, Y.; Rapetti, L.; Ferigo, D.; Traversaro, S.; Sorrentino, I.; Andrade Chavez, F.J.; Nori, F.; Pucci D. "A Human Perception System for Robot Collaborative Tasks" - IROS-EPHRC 2019, Workshop on Progress in Ergonomic Physical Human-Robot Collaboration, IROS 2019, Macau, China, November 8, 2019

2019 Tirupachuri, Y.; Nava, G.; Rapetti, L.; Latella, C.; Darvish, K.; Pucci D. "Recent Advances in Human-Robot Collaboration Towards Joint Action" - ICSR 2019 Workshop - The Communication Challenges in Joint Action for Human-Robot Interaction

2019 Tirupachuri, Y.; Nava, G.; Rapetti, L.; Latella, C.; Pucci D. "Trajectory Advancement for Robot Stand-up with Human Assistance" - 1st Italian Conference in Robotics and Intelligent Machines (I-RIM), Rome, October 18-20, 2019, **https://doi.org/10.5281/zenodo.4811871**

2019 Latella, C.; Tirupachuri, Y.; Rapetti, L.; Ferigo, D.; Traversaro, S.; Sorrentino, I.; Andrade Chavez, F.J.; Nori, F.; Pucci D. "A Human Wearable Framework for Physical Human-Robot Interaction" - 1st Italian Conference in Robotics and Intelligent Machines (I-RIM), Rome, October 18-20, 2019, **https://doi.org/10.5281/zenodo.4782543**

2019 Latella, C. "Advancing Human-Robot Collaboration via Online Human Kinematics and Dynamics Estimation" - Women in Robotics Workshop (WiRW) V on Robotics : Science and Systems Conference 2019 (RSS), Women in Robotics Workshop, Freiburg im Breisgau, Germany, June 23, 2019

2018 Tirupachuri, Y.; Nava, G.; Latella, C.; Ferigo, D.; Rapetti, L.; Tagliapietra, L.; Nori, F.; Pucci, D. "Towards Partner-Aware Humanoid Robot Control under Physical Interactions" - Intelligent Systems Conference 2019, IntelliSys 2019, London, UK, September 5-6, 2019

2018 Latella, C.; Tagliapietra, L.; Ferigo, D.; Tirupachuri, Y.; Nori, F.; Pucci, D. "Advancing Human-Robot Collaboration through Online Human Inverse Dynamics Estimation" - Workshop on Advanced Robotics and its Social Impacts, ARSO 2018, Genoa, Italy, September 27-28, 2018

2017 Latella, C.; Tagliapietra, L.; Nori, F. "Towards the Online Ex-situ Human Inverse Dynamics Estimation" - Workshop on Human Movement Understanding for Humanoid and Wearable Robots, IROS 2017, Vancouver, September 28, 2017

2017 Lazzaroni, M.; Lorenzini, M.; Latella, C.; Romano, F.; Traversaro, S.; Akhras, A.; Pucci, D.; Nori, F.; De Momi, E. "Computational Improvement in Human Dynamics Estimation" - 5th International Symposium on Sensor Science, I3S 2017, Barcelona, Spain , September 28, 2017

2017 Latella, C.; Lorenzini, M.; Lazzaroni, M.; Romano, F.; Nori, F. "Online Human Inverse Dynamics Estimation in a Physical Human-robot Interaction" - Workshop on Mechanics of Human Locomotion and the Development of Wearable Robotic Systems, ICRA 2017, Singapore, May 29, 2017

2016 Latella, C.; Lazzaroni, M.; Lorenzini, M.; Nori, F. "Human Whole-body Inverse Dynamics during Human-robot Interaction" - Workshop on Human Performance and Robotics, HUMANOIDS 2016, Cancun, November 15, 2016

2015 Latella, C.; Kuppuswamy, N.; Nori, F. "Force and Motion Capture System Based on Distributed Micro-Accelerometers, Gyros, Force and Tactile Sensing" - NanoItaly, Rome, Italy, September 21-24, 2015

2015 Latella, C.; Dotta, M.; Forni, D; Tesio, N; Cadoni, E. "Influence of Strain Rate on the Mechanical Behavior in Tension of Bovine Cortical Bones" - 11th International Conference on the Mechanical and Physical Behaviour of Materials under Dynamic Loading, DYMAT 2015, Lugano, Switzerland, September 7-11, 2015

2015 Latella, C.; Kuppuswamy, N.; Nori, F. "Multimodal Sensor Fusion for a Wearable Motion and Force Capture System" - Workshop on Robotic and Interactive Technologies for Neuroscience and Neurorehabilitation, RIC-IIT, Arenzano, August 31-September 2, 2015

2015 Latella, C.; Kuppuswamy, N.; Nori, F. "Multimodal Sensor Fusion for a Wearable Motion and Force Capture System" - Workshop on Human Movement Understanding and Neuromechanics, ICRA 2015, Seattle, May 26-30, 2015

2013 Cadoni, E.; Dotta, M.; Forni, D; Latella, C.; Riganti, G.; Tesio, N; "Strain Rate Behaviour of Bovine Bone in Tension" - 8th International Symposium on Impact Engineering, ISIE 2013, Osaka, Japan, September 2-6, 2013

Co-organized workshops

ICRA 2022 Maurice, P; Huber, M.E.; Latella, C.; Ivaldi, S.; Ajoudani, A. "4th Workshop on Integrating Multidisciplinary Approaches to Advance Physical Human-Robot Interaction : *Challenges of Interfacing Wearable Robots with the Human Neuromotor System*" - Philadelphia, USA, May 27-31, 2022
https://project.inria.fr/phrc2022icra/

ICRA 2021 Maurice, P; Huber, M.E.; Latella, C.; Ivaldi, S.; Ajoudani, A. "3rd Workshop on Integrating Multidisciplinary Approaches to Advance Physical Human-Robot Interaction : *Physical Assistance for Occupational Applications*"- Virtual event, May 30-June 5, 2021
https://project.inria.fr/phrc2021icra/

ICRA 2020 Maurice, P; Huber, M.E.; Latella, C.; Ivaldi, S.; Ajoudani, A. "2nd Workshop on Integrating Multidisciplinary Approaches to Advance Physical Human-Robot Interaction" - Virtual event, May 31-June 4, 2020
https://phrc2020icra.loria.fr/

ICRA 2019 Maurice, P; Ivaldi, S.; Huber, M.E.; Latella, C.; Hogan, N. "1st Workshop on Integrating Multidisciplinary Approaches to Advance Physical Human-Robot Interaction : *Human movement science for physical human-robot collaboration*" - Montreal, Canada, May 23, 2019
http://hms2019icra.mit.edu