Yue Hu
Assistant Professor

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Citizenship: Italian

──── Education

10/2013– 04/2017	**Dr. rer. nat. (Computer Science)**, *Optimization in Robotics and Biomechanics Group (ORB), Combined Faculty of the Natural Sciences and Mathematics, Heidelberg University*, Germany, grade: < 1.0, *Summa cum laude (with distinction)*.
09/2011– 08/2013	**MASc in Erasmus Mundus in Advanced Robotics (EMARO), double Italian-French degree**, *University of Genoa (1st year), grade: 108/110, École Centrale de Nantes (2nd year), grade: Très bien (Very good)*, Italy and France.
09/2008– 10/2011	**Bachelor in Electronics Engineering**, *University of Genoa*, Italy, grade: *102/110*.

──── Research experience

09/2021– present	**Assistant professor (tenure track)** Head of Active & Interactive Robotics Lab (AIR Lab). Department of Mechanical and Mechatronics Engineering, Faculty of Engineering, University of Waterloo, Waterloo (ON), Canada.
12/2020– 08/2021	**Assistant professor**, Venture Lab, Department of Mechanical Systems Engineering, Tokyo University of Agriculture and Technology (TUAT), Japan.
11/2018– 11/2020	**Post doc**, JSPS (Japan Society for the Promotion of Sciences) fellowship, CNRS-AIST JRL (Joint Robotics Laboratory), National Institute of Advanced Industrial Science and Technology (AIST), Japan.
03/2018– 10/2018	**Post doc**, Dynamic Interaction Control Group (now Artificial Machine Intelligence), Italian Institute of Technology (IIT), Italy.
05/2017– 02/2018	**Post doc**, Optimization in Robotics and Biomechanics Group (ORB), Heidelberg University, Germany.
03/2014– 08/2017	**Affiliated guest student**, iCub Facility and Dynamic Interaction Control Group (DIC), Italian Institute of Technology (IIT), Genoa, Italy.
10/2013– 04/2017	**PhD**, European Project KoroiBot, Optimization in Robotics and Biomechanics Group (ORB), Heidelberg University, Germany.
Thesis title	*The role of compliance in humans and humanoid robots locomotion*
Supervisors	Katja Mombaur (Heidelberg University), Francesco Nori (Italian Institute of Technology, IIT)
02/2013– 08/2013	**Master thesis**, Institut de Recherche en Communications et Cybernétique de Nantes (IRCCyN), France.
Thesis title	*NaVaRo: actuation mode selection and path placement*
Supervisors	Stéphane Caro, Damien Chablat

Affiliations and partnerships

2022–present	Affiliated faculty, Waterloo Artificial Intelligence Institute Waterloo.AI
2021–present	Extended member, Waterloo RoboHub, University of Waterloo
2021 - present	Collaboration with Dr. Chris Yee Wong and Prof. Wael Suleiman, University of Sherbrooke, Canada
2020 - present	Collaboration with Dr. Naoko Abe, The University of Sydney, Australia
2018 - present	Collaboration with Prof. Gentiane Venture, Tokyo University of Agriculture and Technology (TUAT)
2018 - present	Visiting Researcher, National Institute of Advanced Industrial Science and Technology (AIST), Japan
2014 - 2017	Affiliated PhD student, Italian Institute of Technology (IIT)

Funding

Fellowships

11/2018– 11/2020	Postdoc fellowship. Japan Society for the Promotion of Sciences (JSPS), Japan.
Competition	International, 10% success rate in 2018.
05/2017– 02/2018	Postdoc Fellowship. Graduate School HGSMathComp (Heidelberg Graduate School of Mathematical and Computational Methods for the Sciences), Germany.
Competition	Internal, selected out of 3 applicants.

Research funding - awarded/holding

11/2018– 11/2020	Grant-in-aid for research fellow. Japan Society for the Promotion of Sciences (JSPS), Japan.
Role	Main user (PI: Eiichi Yoshida, National Institute of Advanced Industrial Science and Technology (AIST))
09/2021–2025	Start-up grant, Department of Mechanical and Mechatronics Engineering, University of Waterloo, Canada.
Role	PI

Research funding - applied for

2022–2027	NSERC Discovery grant
Title	Human-state based active physical human-robot interaction
Role	PI
2022–2024	NSERC Alliance Missions
Title	Development of human-aware robot control and motion planning for enhancing user safety and comfort in physical human-robot interactions with humanoid service robots
Role	Co-applicant (PI: Wael Suleiman, University of Sherbrooke)
2022–2023	NSERC Research Tools and Instruments (RTI)
Title	Collaborative and modular robot arm for human-aware physical interactions
Role	PI
2022–2027	Canada Foundation Innovation (CFI) - John R. Evans Leaders Fund (JELF)
Title	Dual-arm mobile manipulation: human-in-the-loop human-robot interaction
Role	PI
2022–2027	Ontario Research Foundation (ORF) - Small Infrastructure
Title	Dual-arm mobile manipulation: human-in-the-loop human-robot interaction

Role	PI
2022–2024	Waterloo Interdisciplinary Trailblazer Fund
Title	Trustworthy robotic assistants to promote health and wellbeing
Role	Co-PI (PI: Kerstin Dautenhahn)
2022–2025	WiSTEM2D Scholars Award, Johnson&Johnson
Title	User-aware physically assistive robots for elder care
Role	PI
2022–2023	Agilent Early Career Professor Award (AECPA)
Theme	Artificial Intelligence and Machine Vision technologies for intuitive Collaborative Robots (Cobots)
Role	PI

Awards

2022	Awarded, IEEE-RAS Most Active Technical Committee Award, shared with the co-chairs of the IEEE-RAS Technical Committee on Model-Based Optimization for Robotics
2021	Finalist, Young Investigator Fund Best Paper Award, The Third International Jc-IFToMM Symposium in conjunction with the Twenty-Sixth Jc-IFToMM Symposium on Theory of Machines and Mechanisms

Scholarly services and activities

Conference organization and chairing

2019–present	Co-chair of the IEEE-RAS Technical Committee for Model-based Optimization for Robotics.
2016–2017	Fellows speaker of Graduate School HGS MathComp, Heidelberg University, Germany.
2014–2015	Organizer of Annual Colloquium 2014 and 2015 of Graduate School HGS MathComp, Heidelberg University, Germany.

Memberships

2022–present	Member, Women in Robotics
2014–present	IEEE - Institute of Electrical and Electronics Engineers
2014–present	IEEE-RAS - Robotics and Automation Society
2021–present	IFToMM - International Federation for the Promotion of Mechanism and Machine Science

Associate editor roles

2020–present	IEEE-RAS International Conference on Robotics and Automation (ICRA)
2019–present	IEEE-RSJ International Conference on Intelligent Robots and Systems (IROS)
2022–present	IEEE International Conference on Robot & Human Interactive Communication (RO-MAN)
2021–present	Robotics and Automation Letters (RA-L), IEEE-RAS

Review activities

Grant agencies	Canada Foundation for Innovation (CFI)
Journals	Transaction on Robotics (T-RO), IEEE Robotics and Automation Letters (RA-L), IEEE-RAS Robotics and Automation Systems, Elsevier Autonomous Robots (AURO), Springer Applied Sciences, MDPI
	Frontiers in AI International Journal of Social Robotics, Springer

Conferences   IEEE-RAS International Conference on Humanoid Robots (Humanoids)
IEEE International Conference on Simulation, Modeling, and Programming for Autonomous Robots (SIMPAR)
International Federation of Automatic Control (IFAC) Workshop on Periodic Control Systems (PSYCO)
IEEE-RAS-EMBS International Conference on Rehabilitation Robotics (ICORR)
IEEE-RSJ International Conference on Intelligent Robots and Systems (IROS)
IEEE-RAS International Conference on Robotics and Automation (ICRA)
IEEE International Conference on Robot & Human Interactive Communication (RO-MAN)
Robotics: Science and Systems (RSS)

Scientific publications

Journal publications

2022   "Optimization-Based Control for Dynamic Legged Robots", Andrea Del Prete, Adrien Escande, Yue Hu, Nicolas Mansard, Michael Posa, Patrick Wensing, *IEEE-RAS Transaction on Robotics (T-RO), under preparation*

2022   "Human perception towards an unanticipated robot action in the context of physical interaction", N. Abe, Y. Hu, , M. Benallegue, N. Yamanobe, G. Venture, E. Yoshida, *ACM Transactions on Human-Robot Interaction (THRI), under preparation*

2022   "Towards Active Physical Human-Robot Interaction: quantifying the human state during interactions", Y. Hu, N. Abe, M. Benallegue, N. Yamanobe, G. Venture, E. Yoshida, *IEEE Transaction on Human-Machine Systems, published in Early Access.*

2020   "Interact with me: an Exploratory Study on Interaction Factors for Active Physical Human-Robot Interaction", Y. Hu, M. Benallegue, G. Venture, E. Yoshida, *IEEE Robotics and Automation Letters (RA-L), vol. 5(4), pages 6764-6771*

2019   "A Benchmarking of DCM Based Architectures for Position, Velocity and Torque Controlled Humanoid Robots", G. Romualdi, S. Dafarra, Y. Hu, P. Ramadoss, F.J. Andrade Chavez, S. Traversaro and D. Pucci, *International Journal of Humanoid Robotics (IJHR), vol 17(1)*, pp. 1950034

2018   "Humanoid Gait Generation in Complex Environments Based on Optimality Principles Learned from Humans", D. Clever, Y. Hu and K. Mombaur, *International Journal of Robotics and Research (IJRR), vol 37(10), pages 1184–1204*

2018   "Bio-Inspired Optimal Control Framework to Generate Walking Motions for the Humanoid Robot iCub Using Whole Body Models", Y. Hu and K. Mombaur, *Applied Sciences, vol. 8(2), pages 278*

Conference publications

2021   "Impression evaluation of robot's behavior when assisting human in a cooking task", M Yamamoto, E. Coronado, Y. Hu, G. Venture, *IEEE International Conference on Robot and Human Interactive Communication, pages 743-748*

2021   "Active Physical Human-Robot Interaction: an experiment towards quantifying human interactions", Y. Hu, N. Abe, M. Benallegue, N. Yamanobe, G. Venture, E. Yoshida, *Proceedings of the 26 th Jc-IFToMM Symposium, 3rd International Jc-IFToMM Symposium* **Finalist for Young Investigator Fund Best Paper Award.**

2019   "Telexistence and teleoperation for walking humanoid robots", M. Elobaid, Y. Hu, G. Romualdi, S. Dafarra J. Babic, D. Pucci, *SAI Intelligent Systems Conference, pages 1106–1121.*

2018   "A Benchmarking of DCM Based Architectures for Position and Velocity Controlled Walking of Humanoid Robots", G. Romualdi, S. Dafarra, Y. Hu, D. Pucci, *IEEE/RAS International Conference on Humanoid Robots (Humanoids), pages 1–9.*

2017 "Closed loop control of walking motions with adaptive choice of directions for the iCub humanoid robot", K. Stein, <u>Y. Hu</u>, M. Kudruss, M. Naveau and K. Mombaur, *IEEE/RAS International Conference on Humanoid Robots (Humanoids), pages 184–190*.

2017 "Optimal control based push recovery strategy for the iCub humanoid robot with Series Elastic Actuators.", <u>Y. Hu</u> and K. Mombaur, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), pages 5846–5852*.

2017 "Influence of compliance modulation on human locomotion.", <u>Y. Hu</u> and K. Mombaur, *IEEE International Conference on Robotics and Automation (ICRA), pages 4130–4137*.

2016 "Walking of the iCub humanoid robot in different scenarios: implementation and performance analysis.", <u>Y. Hu</u>, J. Eljaik, K. Stein, F. Nori, and K. Mombaur, *IEEE/RAS International Conference on Humanoid Robots (Humanoids), pages 690–696*.

2016 "Analysis of human leg joints compliance in different walking scenarios with an optimal control approach.", <u>Y. Hu</u> and K. Mombaur, *6th IFAC Workshop on Periodic Control Systems PSYCO, volume 49, pages 99–106*.

2016 "Squat Motion Generation for the Humanoid Robot iCub with Series Elastic Actuators.", <u>Y. Hu</u>, F. Nori and K. Mombaur, *IEEE RAS & EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob), pages 207–212*.

2014 "Compliance analysis of human leg joints in level ground walking with an optimal control approach.", <u>Y. Hu</u> and K. Mombaur, *IEEE/RAS International Conference on Humanoid Robots (Humanoids), pages 881–886*.

2014 "Algorithm for the actuation mode selection of the parallel manipulator NAVARO.", S. Caro, D. Chablat and <u>Y. Hu</u>, *ASME 2014 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, pages 17–20*.

Book chapters

2017 "Control of Motion and Compliance", K. Mombaur, H. Vallery, <u>Y. Hu</u>, J. Buchli, P. Bhounsule, T. Boaventura, P. M. Wensing, S. Revzen, A. D.Ames, I. Poulakakis, A. Ijspeert, *Bioinspired Legged Locomotion, Butterworth-Heinemann, pages 135–364*

Extended abstracts

2019 "Interact with me: first insights into active pHRI.", <u>Y. Hu</u>, M. Benallegue, G. Venture and E. Yoshida, *Workshop on Progress in Ergonomic Human-Robot Collaboration, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).*

2019 "Interact with me: active physical human robot interaction.", <u>Y. Hu</u>, M. Benallegue, G. Venture and E. Yoshida, *Workshop on Human Movement Science for Physical Human-Robot Collaboration, IEEE International Conference on Robotics and Automation (ICRA).*

2017 "Walking of the iCub Humanoid Robot with Series Elastic Actuators: an Optimal Control Approach", <u>Y. Hu</u> and K. Mombaur, *Workshop on Human Movement Understanding for Humanoids and Wearable Robots, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).*

2017 "Whole-body walking motion generation with optimal control.", <u>Y. Hu</u> and K. Mombaur, *Workshop on Robust Perception, Planning, and Control for Legged Robot Locomotion in Challenging Domains, IEEE International Conference on Robotics and Automation (ICRA).*

2015 "Using optimal control to generate squat motions for the humanoid robot iCub with SEA.", <u>Y. Hu</u>, K. Mombaur and F. Nori, *Dynamic Walking Conference.*

Talks and presentations

Invited talks

8th November 2021
"Research with the iCub - from walking to teleoperation, what's behind successful demos", Y. Hu, *Seminar at Social and Intelligent Robotics Research Laboratory (SIRRL), Waterloo, Canada.* (Online)

19th July 2021
"Interact with me: active physical human-robot interaction.", Y. Hu, *Towards physical-social human-robot interaction, Workshop, IEEE International Conference on Humanoid Robotics, Munich, Germany.* (Online)

10th June 2021
"Towards Active Physical Human-Robot Interaction: An interdisciplinary project and perspective.", Y. Hu, N. Abe, *Seminar at Robotics Research at SIRIS and ACFR, The University of Sydney, Australia.* (Online)

27th January 2021
"Active physical Human-Robot Interaction: a step towards "closer" robots.", Y. Hu, *GVLab seminar, Tokyo University of Agriculture and Technology, Tokyo, Japan.* (Online)

6th July 2020
"Active physical Human-Robot Interaction: get the robot closer (not just physically).", Y. Hu, *University of Waterloo, Waterloo, Canada.* (Online)

Teaching experience

Courses

Winter 2020/21
Mechanical Systems Engineering Experiments - Characteristics of Linear Dynamic Mechanical Systems, Tokyo University of Agriculture and Technology

Fall 2021
MTE544 - Autonomous Mobile Robots, University of Waterloo

Spring 2022
ME262 - Introduction to Microprocessors and Digital Logic, University of Waterloo

FYDP

F21-W22
Mechanical Engineering (ME481-482), "Hercules Assistive Robot", Academic Advisor, University of Waterloo

F21-W22
Biomedical Engineering (BME461-462), "The Nex Step", Academic Advisor, University of Waterloo

Volunteering activities

06/2019
International English camp, The Recovery Assistance Center of Miyagi, Children (6-12 y.o.) care volunteer

12/2021
FIRST Lego League Challenge (FLL), Toronto qualifications, Judge volunteer