

Yue Hu

PhD (Robotics, computer science)

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Nationality: Italian



Education

- Oct. 2013– Apr. 2017** **PhD (Computer Science, Dr. rer. nat.)**, *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)*.
- Sep. 2011– Aug. 2013** **Master 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.
- Sep. 2008– Oct. 2011** **Bachelor in Electronics Engineering**, University of Genoa, Italy, grade: 102/110.

Research experience

- Sep. 2021– present** **Assistant professor (tenure track)**, Mechanical and Mechatronics Engineering, Faculty of Engineering, University of Waterloo, Waterloo (ON), Canada.
- Dec. 2020– Aug. 2021** **Assistant professor**, Venture Lab, Department of Mechanical Systems Engineering, Tokyo University of Agriculture and Technology (TUAT), Japan.
- Nov. 2018– Nov. 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.
- Mar. 2018 – Oct. 2018** **Post doc**, Dynamic Interaction Control Group (DIC), Italian Institute of Technology (IIT), Italy.
- May 2017– Feb. 2018** **Post doc**, Optimization in Robotics and Biomechanics Group (ORB), Heidelberg University, Germany.
- May 2015– Aug. 2017** **Affiliated guest student**, iCub Facility and Dynamic Interaction Control Group (DIC), Italian Institute of Technology (IIT), Genoa, Italy.
- Oct. 2013– Apr. 2017** **PhD**, European Project KoroBot, 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)
- Feb. 2013– Aug. 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

Skills

Technical skills

- Expertise** Human-Robot Interaction, Optimal control, Bipedal locomotion, Human motion analysis.
- Robotic platforms** iCub (Italian Institute of Technology), Sawyer (Rethink Robotics)

Programming languages C/C++, Python, MATLAB, Latex.

Software and libraries MUSCOD (Multiple Shooting Code for Direct Optimal Control), YARP (Yet Another Robot Platform), ROS (Robot Operating System), Gazebo, RBDL (Rigid Body Dynamics Library), iDynTree (Multibody Dynamics Library), Simulink.

Languages

Italian Native

Chinese Native

English Advanced

French Intermediate

Japanese Beginner

German Beginner

Bilingual

TOEFL C1 (2013)

TOEIC B2 (2013)

Awards, honours, and activities

Fundings and fellowships

Nov. 2018–Nov. 2020 JSPS standard fellowship. Japan Society for the Promotion of Sciences (JSPS), Japan.

Nov. 2018–Nov. 2020 JSPS Grant-in-aid for research fellow. Japan Society for the Promotion of Sciences (JSPS), Japan.

May. 2017–Feb. 2018 Post doc fellowship. Graduate School HGSMathComp (Heidelberg Graduate School of Mathematical and Computational Methods for the Sciences), Germany.

Honours and activities

2019–present Co-chair of the IEEE-RAS Technical Committee for Model-based Optimization for Robotics.

2021 Finalist, Young Investigator Fund Best Paper Award, The Third International Jc-IFTToMM Symposium in conjunction with the Twenty-Sixth Jc-IFTToMM Symposium on Theory of Machines and Mechanisms

2020–2021 Associate editor for IEEE/RAS International Conference on Robotics and Automation (ICRA)

2019–2020 Associate editor for IEEE-RSJ International Conference on Intelligent Robots and Systems (IROS)

2017 PhD awarded with distinction (Summa cum laudem, as per German doctorate grading system).

2016–2017 Fellows speaker of Graduate School HGS MathComp.

2014–2015 Organizer of Annual Colloquium 2014 and 2015 of Graduate School HGS MathComp.

Review activities

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
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 (SIMPAP)
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)
Robotics: Science and Systems (RSS)

Scientific publications

Journal publications

- 2021 "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 (submitted)*
- 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. Daffarra, 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 (Accepted)*
- 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-IFTToMM Symposium, 3rd International Jc-IFTToMM Symposium*
- 2019 "Teleexistence and teleoperation for walking humanoid robots", M. Elobaid, Y. Hu, G. Romualdi, S. Daffarra 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. Daffarra, 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, Y. Hu, 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.", Y. Hu and K. Mombaur, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 5846-5852.
- 2017 "Influence of compliance modulation on human locomotion.", Y. Hu 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.", Y. Hu, 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.", Y. Hu 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.", Y. Hu, 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.", Y. Hu 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 Y. Hu, *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, Y. Hu, 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.", Y. Hu, 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.", Y. Hu, 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", Y. Hu 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.", Y. Hu 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.", Y. Hu, K. Mombaur and F. Nori, *Dynamic Walking Conference*.

Talks and presentations

Invited talks

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