Yang Chen

JSPS Research Fellow (DC2) (01/04/2022 ~ 31/03/2024)

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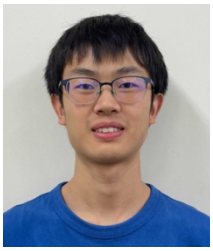

Summary

- I am a robotics researcher. Currently, I am enrolled in Ph. D program in Empowerment Informatics at University of Tsukuba and research fellow (DC2) of Japan Society for the Promotion of Science (JSPS). I expect to graduate in March 2023. My research interest includes human-robot interaction, mobile robotics, teleoperation, human sensing, assistive technology, etc.
- Research goal: Use robotics technology to empower humans.

Education

- **Jilin University** *Sep. 2013-Jun. 2017*
  Bachelor of Engineering in Mechanical Engineering (Excellent Engineers Training Plan, Ministry of Education)
  Supervised by Prof. DongF. Wang
  Bachelor thesis: *Explore the Way of Designing the Piezoelectric Dividing Structure to Both Realize the Pressure Distributing Evenly and Achieve Largest Output Voltage*
- **University of Tsukuba** *Oct. 2017-Apr. 2018*
  Research student
- **University of Tsukuba** *Apr. 2018-Mar. 2020*
  Master of Human Informatics
  Master thesis: *Torso Control System and Autonomous Docking Support for a Standing Mobility Device*
- **University of Tsukuba** *Apr. 2018-Mar. 2023*
  Ph. D Program in Empowerment Informatics
  Doctoral thesis: *A Study on Upper-body based Shared Navigation Control for Assistive Mobility Devices*
  Supervised by Prof. Kenji Suzuki

Internship

- **École polytechnique fédérale de Lausanne (EPFL)** *Aug. 2019-Oct. 2019*
  Lab: Learning Algorithm and System Laboratory (LASA)
  Research topic: *Autonomous docking system for a standing mobility device*
  Supervised by Prof. Aude Billard
- **National Institute of Advanced Industrial Science and Technology (AIST)** *Aug. 2021-Present*
  Lab: CNRS-AIST JRL (Joint Robotics Laboratory),
  Research topic: *Complementary SLAM for Immersive Teleoperation with A Humanoid*
  Supervised by Prof. Fumio Kanehiro

Current Main Projects

- **Control interface for hands-free navigation of personal mobility vehicles** *Oct. 2017-Present*
  I developed a torso control interface which enables hands-free control with user's natural upper-body movement for personal mobility devices. I built a support bar which was installed in front of the user's waist level, the bar consists of both solid segment and soft segment. An array of force sensors was attached on the inner surface of the bar. One IMU sensor was attached on the bar for detecting the bending angle of the user. An algorithm was developed for estimating the driving intention through pressure distribution and bending angle. A calibration algorithm was developed for different users. Different experiments have been conducted to verify the effectiveness of proposed torso control system.
  Keywords: Hands-free control, intention estimation, human-robot interface.
  Skills: Python, ROS, 3D modeling (Solidworks), dynamics, Eagle, user study

- **Virtual landmark-based control of docking support for assistive mobility devices** *Oct. 2018-Present*
  This works proposes an autonomous docking support approach for assistive mobility devices like intelligent wheelchairs to assists the user in approaching a rest surface, such as a chair or bed. A virtual landmark estimation method was proposed to extract the target pose from a chair through point cloud processing without any additional landmark. A stable nonlinear feedback controller is designed for the pose alignment task under the constraint of camera's field of view (FOV). The effectiveness of the proposed system was demonstrated with a real-time implementation on a standing mobility vehicle.
  Keywords: virtual landmark estimation, nonlinear controller, stability
  Skills: Python, C++, ROS, kinematics, MATLAB

- **Enhanced Visual Feedback with Decoupled Viewpoint Control in Immersive Humanoid Robot Teleoperation using SLAM** *Aug. 2021-Present*
  This work aims to enhance the tele-visualization experience for the operator in humanoid robot teleoperation. In teleoperation scenario, usually the operator wears head mounted display (HMD) to control the head motion of the robot, the visual information from a camera on the robot is transmitted to the HMD as well. we construct a virtual space for decoupled viewpoint control, and we use a prebuilt mesh to complement the real-time point cloud to reduce the visual latency.
  Keywords: latency, tele-visualization, SLAM
  Skills: Unity, ROS

Publication

- Y. Chen, D. Paez-Granados, M. Hassan, and K. Suzuki, "Upper-Body Based Control Interface with compliant coupling support for Assistive Mobility Devices", IEEE/ASME Transactions on Mechatronics, 2023. (**In preparation**)
- Xiaoxi Zhang, Y. Chen, M. Hassan, and K. Suzuki, "Development of a Hands-free Human-guided Smart Stroller Using a UWB Localization System", 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2023. (**Under review**)
- K. Kaneko, A. Dallard, Y. Chen, Rohan P. Singh, M. Benallegue, R. Cisneros-Limón and F. Kanehiro, "Cybernetic Avatar HRP-4CR: a Humanoid Robot with a Realistic Head and Figure used as an Avatar", 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2023. (**Under review**)
- Santiago P. Torrendell, Y. Chen, H. Kadone, M. Hassan, K. Suzuki, "Design of a Multi-Degree-of-Freedom Elastic Neck Exoskeleton for Persons with Dropped Head Syndrome", 6th IEEE-RAS International Conference on Soft Robotics (RoboSoft), 2023. (**Peer-reviewed, accepted**)
- Y. Chen, L. Sun, M. Benallegue, R. Cisneros-Limón, Rohan P. Singh, K. Kaneko, A. Tanguy, G. Caron, K. Suzuki, A. Kheddar, and F. Kanehiro, "Enhanced Visual Feedback with Decoupled Viewpoint Control in Immersive Humanoid Robot Teleoperation using SLAM," IEEE-RAS International Conference on Humanoid Robots (Humanoids), 2022. (**Peer-reviewed, link**)
- R. Cisneros, M. Benallegue, K. Kaneko, H. Kaminaga, G. Caron, A. Tanguy, R. Singh, L. Sun, A. Dallard, C. Fournier, M. Tsuru, C. Yang, Y. Osawa, G. Lorthioir, F. Kanehiro, A. Kheddar. *"Team JANUS Humanoid Avatar: A cybernetic avatar to embody human telepresence". RSS 2022 Workshop on "Towards Robot Avatars: Perspectives on the ANA Avatar XPRIZE Competition"*, New York City, U.S.A., 2022. (**Peer-reviewed**, link)
- D. Paez-Granados, H. Kadone, M. Hassan, Y. Chen, & K. Suzuki, "Personal Mobility With Synchronous Trunk-Knee Passive Exoskeleton: Optimizing Human-Robot Energy Transfer", IEEE/ASME Transactions on Mechatronics, 2021. (**Peer-reviewed, IF = 5.673, link**)
- Y. Chen, D. F. Paez Granados, B. Leme and K. Suzuki, "Virtual Landmark Based Control of Docking Support for Assistive Mobility Devices," in IEEE/ASME Transactions on Mechatronics, doi: 10.1109/TMECH.2021.3081426. (**Peer-reviewed, IF = 5.673, link**)
- Y. Chen, D. Paez-Granados, H. Kadone and K. Suzuki, "Control Interface for Hands-free Navigation of Standing Mobility Vehicles based on Upper-Body Natural Movements," 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020, pp. 11322-11329, doi: 10.1109/IROS45743.2020.9340875. (**Peer-reviewed, link**)
- Y. Chen, D. Paez-Granados, and K. Suzuki, "Holistic body machine interface solution for standing mobility vehicle for the lower-body impaired–integrating autonomous docking system–," in The Proceedings of JSME annual Conference on Robotics and Mechatronics (Robomec) 2020. The Japan Society of Mechanical Engineers, 2020, pp. 2P1–D10. (**Non-peer-reviewed, link**).
- Y. Chen, D. Paez-Granados and K. Suzuki, "Torso Control System with A Sensory Safety Bar for a Standing Mobility Device," 2019 International Symposium on Micro-NanoMechatronics and Human Science (MHS), 2019, pp. 1-5, doi: 10.1109/MHS48134.2019.9249303. (**Peer-reviewed, link**)
- Y. Liu, Y. Chen et al., "Developing MEMS electric current sensors for end use monitoring of power supply: Part VIII - segmentation design and empirical analysis of piezoelectric layers based on cantilever beam structure," 2018 Symposium on Design, Test, Integration & Packaging of MEMS and MOEMS (DTIP), 2018, pp. 1-4, doi: 10.1109/DTIP.2018.8394240. (**Peer-reviewed, link**)

Presentation at international conference

- Y. Chen, M. Hassan, D. Paez-Granados, Yosuke Eguchi, Mehdi Benallegue, and K. Suzuki, "Torso Control Interface with Compliant Coupling for Assistive Mobility Devices", Humanoids 2022 Workshop on "the Advances in Close Proximity Human-Robot Collaboration", 2022. (**Oral, link**)

- Y. Chen*, L. Sun*, M. Benallegue, R. Cisneros-Limón, Rohan P. Singh, K. Kaneko, A. Tanguy, G. Caron, K. Suzuki, A. Kheddar, and F. Kanehiro, "Enhanced Visual Feedback with Decoupled Viewpoint Control in Immersive Humanoid Robot Teleoperation using SLAM," IEEE-RAS International Conference on Humanoid Robots (Humanoids), 2022. (**Oral, peer-reviewed**)
- Chen, Y., Paez-Granados, D., Leme, B., and Suzuki, K., "Virtual Landmark Based Control of Docking Support for Assistive Mobility Devices", IEEE/ASME International Conference on Advanced Intelligent Mechatronics, 2021. (**Oral, peer-reviewed**)
- Y. Chen, D. Paez-Granados, H. Kadone, and K. Suzuki, "Control interface for hands-free navigation of standing mobility vehicles based on upper-body natural movements," in 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). IEEE, 2020. (**Oral, peer-reviewed**)
- Y. Chen, D. Paez-Granados, and K. Suzuki, "Torso Control System with A Sensory Safety Bar for a Standing Mobility Device," in International Symposium on Micro-Nano Mechatronics and Human Science (MHS-2019), MEXT, Ed. Nagoya, Japan: IEEE, 2019. (**Oral, peer-reviewed**)

Presentation at domestic conference

- Y. Chen, D. Paez-Granados, and K. Suzuki, "Holistic body machine interface solution for standing mobility vehicle for the lower-body impaired–integrating autonomous docking system–," in The Proceedings of JSME Annual Conference on Robotics and Mechatronics (Robomec). (**Poster, non-peer-reviewed**)
- Chen Yang, Diego Paez-Granados, Kenji Suzuki, "Upper-Body Sensing Based Control System with Docking Support on A Standing Mobility Device", 生体医工学シンポジウム, 予稿・抄録集, 2019, 1A-23. (**Poster, non-peer-reviewed**)

Honors & Awards

- Mathematical Modeling Contest Third Prize *Dec. 2015*
- 1st prize in First Robot Competition of Jilin University *Mar. 2017-May 2017*
- Finalist (5/80, $500,000 grant received) in Toyota Mobility Unlimited Challenge *Apr. 2018-Dec. 2020*
  The $4 million Mobility Unlimited Challenge supports radical improvements in the mobility and independence of people with lower-limb paralysis through smarter assistive technology. We (Team Qolo) developed a mobile exoskeleton on wheels, allowing users to sit or stand with ease.
- JST SPRING Fellowship Qualified Student (Class 1) *Oct. 2021-Mar 2022*
- Finalist of the ANA Avatar XPRIZE international competition: Team Janus *Mar. 2018-Present*

Activities

- Interdisciplinary Workshop for Leading Students 2018 (IW4LS): 1st prize in final presentation *Apr. 2018*
- Summer workshop Vitality& City in Netherlands *Aug. 2018*
- Summer workshop in Waseda University: 1st prize in final presentation *Oct. 2018*
- Visit Shiseido Museum, NEC laboratory, Hitachi laboratory, Fujitsu laboratory

Skills

- Programming language: Python, MATLAB, C++
- Software tools: Linux, ROS, Unity
- 3D/2D Modelling: CATIA, Solid works, AutoCAD, Fusion 360
- Electronics: EAGLE
- Language: Chinese (native), English (full professional proficiency), Japanese (N2)

Research Grants

- 2019
  - Challenge Grant 300,000 Japanese yen
- 2020
  - Challenge Grant 300,000 Japanese yen
- 2021
  - Challenge Grant 300,000 Japanese yen
  - JSP SPRING Research Grant 250,000 Japanese yen
- 2022-2024
  - Grant-in-Aid for JSPS Fellows 2300,000 Japanese yen

Scholarship

- 2015~2017
    - University Scholarship (3rd-class), Jilin University
- 2018~2021
    - Special Fellows Scholarship, University of Tsukuba
- 2021~2022
    - JST SPRING Fellowship (1st-class), JST
- 2022~2024
    - JSPS Fellowship (DC2), JSPS

Academic Service (review)

- RAL 2022 [2]
- IROS 2022 [1]
- T-MECH 2022 [1]
- HRI 2023 [1]