

Yaru Niu

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EDUCATION

Georgia Institute of Technology

Aug 2019 – May 2021 (exp)

Master of Science in Electrical and Computer Engineering

GPA: 3.86/4.00

South China University of Technology (SCUT)

Sep 2015 – June 2019

Bachelor of Engineering in Intelligence Science and Technology

GPA: 3.63/4.00

University of California, Berkeley

Aug 2018 – Dec 2018

Visiting Student

PUBLICATIONS & PATENTS

[1] Zhijun Zhang*(Advisor), **Yaru Niu***, Ziyi Yan, Shuyang Lin. *Real-time Whole-body Imitation by Humanoid Robots and Task-oriented Teleoperation Using an Analytical Mapping Method and Quantitative Evaluation*. Applied Sciences (Special Issue on Human Friendly Robotics), 2018, 8(10): 2005. [Video] (*Equal Contributions, Impact Factor: 2.217)

[2] Zhijun Zhang (Advisor), **Yaru Niu**, Shangen Wu, Shuyang Lin, Lingdong Kong. *Analysis of Influencing Factors on Humanoid Robots' Emotion Expressions by Body Language*. 15th International Symposium on Neural Networks (ISNN), Lecture Notes in Computer Science, 2018: 775-785.

[3] Zhijun Zhang (Advisor), Lingdong Kong, **Yaru Niu**. *A Time-Varying-Constrained Motion Generation Scheme for Humanoid Robot Arms*. 15th International Symposium on Neural Networks (ISNN), Lecture Notes in Computer Science, 2018: 757-767.

[4] Zhijun Zhang (Advisor), **Yaru Niu**, Lingdong Kong, Shuyang Lin, Hao Wang. *A Real-Time Upper-Body Robot Imitation System*. International Journal of Robotics and Control, 2019, 2(1): 49-56.

[5] Zhijun Zhang (Advisor), Lingdong Kong, **Yaru Niu**, Ziyang Liang. *Modification of Gesture-Determined-Dynamic Function with Consideration of Margins for Motion Planning of Humanoid Robots*. Preprint, 2018.

[6] Invention Patent: Zhijun Zhang (Advisor), **Yaru Niu**. *A Mapping Method of Human Postures Applied to Motion Imitation by Humanoid Robots* (Translated from Chinese). Published Authorization Number: CN107953331B.

[7] Invention Patent: Zhijun Zhang (Advisor), **Yaru Niu**, Hao Wang. *A Similarity Evaluation Method of Imitation by Humanoid Robots* (Translated from Chinese). Published Authorization Number: CN107818318B.

[8] Invention Patent: Zhijun Zhang (Advisor), **Yaru Niu**, Hao Wang. *A Mapping Method of Human Body's Rotation and Displacement Applied to Humanoid Robots* (Translated from Chinese). Published Application Number: CN108858188A.

[9] Invention Patent: Zhijun Zhang (Advisor), **Yaru Niu**, Hao Wang. *An Evaluation Metric of Humanoid Robot and Human Posture Similarity* (Translated from Chinese). Published Application Number: CN109064486A.

RESEARCH EXPERIENCES

Advanced Integrated Cyber-Physical Systems Lab, University of California, Irvine

Summer 2018

Undergraduate Researcher

Advisor: Prof. Al Faruque

DietMate-A Multimodal Diet Monitoring System

- This project is about monitoring people's eating and drinking behaviors using the data obtained from multiple sensors, to help people maintain balanced diets and healthy life styles.

- Processed the time-sequence data and extracted features using NumPy, SciPy and Pandas.
- Trained several classification models using Scikit-learn and Tensorflow.
- Estimated the labels of the behaviors during eating and drinking and eliminated the noises using the mode filter. The models were evaluated by K-fold cross-validation.
- Visualize the results using Matplotlib.

Human-Robot Intelligence Lab, SCUT

Undergraduate Researcher

Aug 2016 – June 2019

Advisor: Prof. Zhijun Zhang

Whole-Body Imitation by Humanoid Robots and Task-Oriented Teleoperation

- A humanoid robot's whole-body imitation system enabling the imitation of head motions, arm motions, Lower-limb motions, hand motions and locomotion.

- Did most work independently including developing theory, designing algorithms and experiments, coding, writing and revising papers and patents.
- Processed the visual information of human motions captured by Kinect sensor using OpenCV and Kinect SDK.
- Proposed and applied an analytical motion mapping method called Geometrical Analysis Based on Link Vectors and Virtual Joints (GA-LVVJ).
- Proposed two quantitative similarity evaluation methods to assess the imitation similarity.
- Designed and applied an analytical inverse kinematics solver to the system.
- Studied and designed the imitation learning algorithms using Dynamic Time Warping, Gaussian Mixture Model, Gaussian Mixture Regression and Semi-Hidden Markov Model.

Analysis of Influencing Factors on Humanoid Robots' Emotion Expressions by Body Language

- This project is to explore humanoid robots' capabilities of expressing emotions by body language and the factors that influence the emotion expression.

- Collected and processed the pictures of different emotions conveyed by body language.
- Designed the questionnaire to collect data of people's recognition of the emotions conveyed by some body language patterns, then analyzed the data.
- Made hypothesis of the factors for the emotion expression through body language.
- Tested the hypothesis using T test and Mann-Whitney test in SPSS.

Shunde Zhike Intelligence Sci & Tech (Foshan) Co., Ltd.

Research Intern

Jan 2018 – May 2018

Advisor: Ziyi Yan, Prof. Zhijun Zhang

Gesture-Determined Dynamical Schemes for Motion Planning of Humanoid Robot Arms

- This project is to design efficient and robust schemes to enable the humanoid robots can perform the end-effector tasks with desired motions.

- Helped our group design the algorithm of the gesture-determined dynamical scheme.
- Helped with the modification of the gesture-determined dynamical function.
- Tested the algorithms in simulations using Matlab.

AWARDS

National Endeavor Scholarship , awarded by Ministry of Education of China	Nov 2018
The Jetta Scholarship , awarded by Jetta Company Limited	Dec 2017
The SCUT Scholarship , awarded by SCUT	Nov 2017
National Endeavor Scholarship , awarded by Ministry of Education of China	Nov 2016

SKILLS

Programming Languages: Python, C, C++, Matlab, Java

Libraries: Tensorflow, OpenAI Gym, MuJoCo, Pytorch, Scikit-learn, Open GL, OpenCV