Yaru Niu

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EDUCATION

Georgia Institute of Technology   Aug 2019 – May 2021 (exp)
Master of Science in Electrical and Computer Engineering

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*. International Conference on Advanced Robotics and Intelligent Control (ICARIC), 2018 (Accepted, will be published by FILOMAT).

[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 Application Number: CN107818318A.

[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   Aug 2016 – June 2019
Undergraduate Researcher   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.   Jan 2018 – May 2018
Research Intern   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