Ruikun Luo | Resume

Contact Information

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Education

Ph.D., Robotics — *June 2016 - Present*
University of Michigan, Ann Arbor, MI — Cumulative GPA: 3.90/4.00

Ph.D., Robotics Engineering — *Aug. 2014 - June 2016*
Worcester Polytechnic Institute, Worcester, MA — Cumulative GPA: 4.00/4.00

M.S., Mechanical Engineering — *Aug. 2012 - May 2014*
Carnegie Mellon University, Pittsburgh, PA — Cumulative GPA: 3.97/4.00

B.E., Mechanical Engineering and Automation — *Aug. 2008 - July 2012*
Innovative Talent Cultivating Program — *Aug. 2010 - July 2012*
Tsinghua University, Beijing, China — Cumulative GPA: 3.80/4.00

Selected Awards

- IROS 2015 NSF Travel Award — 2015
- RBE fellowship, Worcester Polytechnic Institute — 2014-2015
- SMC Student Travel Grant — 2014
- SMC 2014 Best Student Paper Finalist — 2014
- 2nd/3rd Place RoboCup China Open Humanoid League — 2009-2011
- Championship in the Penalty Contest of RoboCup China Open Humanoid League — 2011
- 2nd Class Scholarship for Scientific and Academic Work, Tsinghua University — 2011
- 3nd Class Scholarship for Scientific and Academic Work, Tsinghua University — 2010
- 3nd Class Scholarship for Scientific and Academic Work, Tsinghua University — 2010
- 1st Prize in 26th National College Student Physics Competition — 2009

Research Experience

Robotics Institute, University of Michigan, Ann Arbor
Advisor: Xi Jessie Yang — May.2018 - now

- Human Driver Workload Inference for Mutually-Adaptive Shared Control
  - Proposed a Bayesian inference based approach to estimate human's workload using gaze trajectory and pupil size data from 4 second time window.
- Explanation to enhance transparency in human-robot interaction
  - Proposed an option-centric rationale notation approach to increase human robot team performance and human's trust
- Robot Docent to Arouse Visitors' Interest in Art Museum
  - Proposed a method to estimate human's comfort level of interacting with art based on human's answers to questions about specific art objects.

Robotics Institute, University of Michigan, Ann Arbor
Advisor: Dmitry Berenson — Aug. 2016 - May.2018

- Robot Motion Planning with Actuation Uncertainty in Contact-rich Environment
  - Design motion planner that uses contact to reduce uncertainty
  - Learn controller success rate for each edge in the PRM

Robotics Engineering Program, Worcester Polytechnic Institute
Advisor: Dmitry Berenson — Aug. 2014 - June. 2016

- Human Robot Collaboration in Shared Workspace
  - Proposed cost functions for robot trajectory optimization considering human avoidance and robot motion consistency
- Unsupervised Online Human Reaching Motion Recognition and Early Prediction
  - Proposed an unsupervised online learning algorithm for human motion recognition, which achieves 98% precision for human reaching motion recognition
  - Proposed a two-layer framework for human motion prediction based on the proposed unsupervised online learning algorithm

Robotics Institute, Carnegie Mellon University
Advisor: Katia Sycara and Nilanjan Chakraborty Aug. 2012 - Oct. 2013

- Supervisory Control for Cost-Effective Redistribution of Robotic Swarms
  - Proposed an optimal control law and a closed form control law which performs close to the optimal control law for the redistribution of robotic swarms
- Human Activity Recognition for Sequential Tasks from RGBD data
  - Used knowledge base of task information as prior knowledge to guide human activity recognition and anticipation
  - Proposed a temporal segmentation method for sequential RGBD data by analyzing signal of model scores

Project for Machine Learning(10701) Feb. 2013 - May. 2013

- Multi-Task Regularization with Covariance Dictionary for Linear Classifiers
  - Propose a multi-task linear classifier learning algorithm which learns covariance from the same learnt dictionary

Project for Computer Vision(16720) Sep. 2013 - Dec. 2013

- Unsupervised Image Co-segmentation based on Community Detection
  - Mining cooccurrence patterns of pairwise visual segments to discover semantic segments over all categories
  - Proposed a Vectorized Mixture Membership Stochastic Block Model for community detection

Project for Learning Based Method in Vision(16824) Sep. 2013 - Dec. 2013

- Conditional Random Fields with Confidence Propagation
  - Proposed a modified conditional random field model which nodes with confident unary potentials only influenced by themselves

Institute of Manufacturing Engineering, Tsinghua University, China
Advisor: Jing Xu, Ph.D Sep. 2011 - June 2012

- Active Dancing Partner Robot Based on Kinect
  - Proposed a real-time human leg detection and localization algorithm using Kinect
  - Developed the omni-directional motion control system for mobile robots

Publications

1. **Ruikun Luo**, Yifan Wang, Yifan Weng, Victor Paul, Mark J. Brudnak, Paramsothy Jayakumar, Matt Reed, Jeffrey L. Stein, Tulga Ersal and X. Jessie Yang. "Real-time Assessment of Workload: A Bayesian Inference Approach", HFES 2019.
2. **Ruikun Luo**, Na Du, Kevin Y. Huang and X. Jessie Yang. "Enhancing Transparency in Human-autonomy Teaming via the Option-centric Rationale Display", HFES 2019.
3. **Ruikun Luo**, Na Du, Kevin Y. Huang and X. Jessie Yang. "Enhancing autonomy transparency: an option-centric rationale approach", Special Issue in Ergonomics in Design (submitted).
4. **Ruikun Luo**, Rafi Hayne and Dmitry Berenson. "Unsupervised Early Prediction of Human Reaching for Human-robot Collaboration in Shared Workspaces", Autonomous Robots 2017.
5. Rafi Hayne, **Ruikun Luo**, and Dmitry Berenson. "Considering Avoidance and Consistency in Motion Planning for Human-Robot Manipulation in a Shared Workspace", ICRA 2016
6. **Ruikun Luo**, Dmitry Berenson. "A Framework for Unsupervised Online Human Reaching Motion Recognition and Early Prediction", IROS 2015
7. **Ruikun Luo**, Nilanjan Chakraborty and Katia Sycara. "Supervisory Control for Cost-Effective Redistribution of Robotic Swarms" SMC 2014(Best Student Paper Award Finalist)
8. Fanyi Xiao **Ruikun Luo**, and Zhiding Yu. "Multi-Task Regularization with Covariance Dictionary for Linear Classifiers." arXiv preprint arXiv:1310.5393 (2013).