Curriculum Vitae - Ahmed Qureshi

CONTACT
INFORMATION

Advanced Robotics Lab
University of California
San Diego, CA 92093-0436, USA

Phone: +1-858-349-8122
E-mail: a1quresh@eng.ucsd.edu
URL: qureshiahmed.github.io

RESEARCH
STATEMENT

I develop reinforcement learning and planning algorithms inspired by the human cognitive process and their neural modeling to enable machines to safely interact with their environments and solve practical navigation and manipulation planning problems. Currently, I am looking for a full-time research position starting Summer/Fall 2021.

RESEARCH
INTERESTS

Reinforcement Learning, Deep Learning, Approximate Inference, Cognitive Process, Planning & Control.

EDUCATION

University of California San Diego, USA
2017 - 2021

PhD, Intelligent Systems, Robotics and Control (CGPA: 4.00/4.00)

- Dissertation Topic: Learning-based motion planners for high-dimensional problems.
- Advisor: Prof. Michael C. Yip

Osaka University, Osaka, Japan
2015 - 2017

M.S, Artificial Intelligence (CGPA: 3.00/3.00)

- Dissertation Topic: Deep Reinforcement Learning for Human-Robot Interaction in the Real-World.
- Advisors: Prof. Hiroshi Ishiguro

National University of Sciences and Technology (NUST), Pakistan
2010 - 2014

B.S., Electrical Engineering (CGPA: 3.59/4.00)

- Dissertation Topic: Enhanced RRT* for motion planning in complex cluttered and time-varying environments.
- Advisors: Prof. Yasar Ayaz and Prof. Osman Hasan

TEACHING
EXPERIENCE

- **Teaching Assistant**, Advances in Robot Manipulation, UC San Diego   **Spring, 2020**
- **Co-Instructor**, Robot Reinforcement Learning, UC San Diego   **Fall, 2019**
- **Teaching Assistant**, Cognitive Neuroscience Robotics I & II, Osaka University   **Feb, 2016 - 2017**
- **Instructor**, Variational Inference(derivation and examples), Osaka University   **Dec, 2016**
- **Instructor**, Deep learning and its applications, Osaka University   **Fall, 2015**
- **Teaching Assistant**, Circuits Analysis, National University of Sciences & Technology   **Fall, 2011**

RESEARCH
EXPERIENCE

Research Intern
Sep, 2020 - Dec, 2020 (Expected)

NVIDIA Robotics Research (Advisor: Dieter Fox), Seattle USA.

Research Student
Apr, 2015 - Aug, 2015

Professor Hiroshi Ishiguro Laboratory, Osaka University, Japan.

Worked as junior researcher on various projects:
- RGB-D based human activity recognition using dual stream convolutional neural network.
- Facial expressions recognition through deep neural networks.
- Collected RGB-D dataset of daily life human activities.

Research Associate   **Jul, 2014 - Mar, 2015**

Robotics and Intelligence System Engineering (RISE) Lab, NUST, Pakistan.

Worked on various internationally collaborated research projects:
- Solving integrated perception and planning problems for an autonomous wheelchair.
- Team coordinator and co-supervisor of the teams qualified for RoboCup Standard-League Challenge (2014 & 2015).

Research Assistant   **Aug, 2012 - Jun, 2014**

Robotics and Intelligence System Engineering (RISE) Lab, NUST, Pakistan.

Worked on various AI research problems:
- Path planning in kidney-like environments with narrow passages.
- Path planning in time-varying environments.
- Goal directed sampling heuristics for sampling-based planning methods.
- Person detection and tracking in crowded places.
- Solutions to the perceptual aliasing problem in map generation and localization.
- Optimal collision avoidance method for autonomous vehicles operating in a joint space.

Research Intern   **Jan, 2013 - Apr, 2013**

Smart Machines and Robotics Technology Lab, NUST, Pakistan.

- Worked on the development of interactive and adaptive welcome system for NUST entrance using Microsoft KINECT sensors and various machine learning techniques.

Research Intern   **Jul, 2012 - Aug, 2012**

Vision Imaging And Signal Processing Lab, NUST, Pakistan.

- Worked on the project of robust and efficient pose estimation using Microsoft KINECT Sensor.

TECHNICAL SKILLS
- Programming Languages: C/C++, Python, Lua, Cmake, MATLAB etc.
- Machine Learning Tools: TensorFlow, PyTorch, libTorch, Scikit-learn, OpenCV, PyMC3.
- Robotic Software: ROS, Gazebo, OpenRave, OMPL, V-REP, Mujoco, MoveIt.
- Operating Systems: Linux, Macintosh, Windows.

SELECTED PEER-REVIEWED JOURNAL

J7. **A.H.Qureshi**, J.Dong, A.Choe, and M.C.Yip. Neural Manipulation Planning on the Constraint Manifolds, IEEE/RAS Robotics and Automation Letters 2020. (under review)

J6. **A.H.Qureshi**, Y.Miao, A.Simeonov, and M.C.Yip. Motion Planning Networks: Bridging the Gap Between Learning-based and Classical Motion Planners, IEEE Transaction on Robotics 2020. (under review)

J5. **A.H.Qureshi**, Y.Nakamura, Y.Yoshikawa and H.Ishiguro. Intrinsically motivated reinforcement learning for human–robot interaction in the real-world, Neural Networks, Vol 107, pp.23-33, 2018. (IF: 7.197)

J4. Zahid. Tahir, **A.H.Qureshi**, Y.Ayaz and R.Nawaz. Potentially guided bidirectionalized RRT* for fast optimal path planning in cluttered environments, International Journal of Robotics and Autonomous Systems, Elsevier, Vol. 108, pp. 13-27, 2018. (IF: 2.638)

J3. **A.H.Qureshi** and Y.Ayaz. Potential Functions Based Sampling Heuristic for Optimal Motion Planning, Autonomous Robots, DOI 10.1007/s10514-015-9518-0, 2015. (IF: 2.066)

J2. **A.H.Qureshi** and Y.Ayaz. Intelligent Bidirectional Rapidly-Exploring Random Trees for Op-

timal Motion Planning in Complex Cluttered Environments, International Journal of Robotics and Autonomous Systems, Elsevier, Vol. 68, pp. 1-11, 2015. (IF: 1.256)

J1. **A.H.Qureshi**, S.Mumtaz, Y.Ayaz, O.Hasan, M.S.Muhammad and M.T.Mahmood.Triangular Geometrised Sampling Heuristic For RRT* Motion Planner, International Journal of Advanced Robotic Systems (IJARS), InTech Publishers, 12:10, 2015, (Top Most Popular Paper of IJARS for 3 consecutive weeks in February - March 2015). (IF: 0.526)

PEER-REVIEWED CONFERENCE PUBLICATIONS

C12. **A.H.Qureshi**, J. J. Johnson, Y. Qin, T. West, B. Boots, and M.C.Yip. Composing Task-Agnostic Policies via Deep Reinforcement Learning, International Conference on Representation Learning (ICLR), 2020.

C11. **A.H.Qureshi**, B. Boots, and M.C.Yip. Adversarial Imitation Via Variational Inverse Reinforcement Learning, International Conference on Representation Learning (ICLR), 2019.

C10. **A.H.Qureshi**, A.Simeonov, M.J.Bency, M.C.Yip. Motion Planning Networks, IEEE/RAS International Conference on Robotics and Automation (ICRA), pp. 2118-2124, Montreal, Canada 2019.

C9. M.J.Bency, **A.H.Qureshi**, M.C.Yip. Neural Path Planning: Fixed Time, Near-Optimal Path Generation via Oracle Imitation, Proceedings of IEEE/RSJ International Conference on Intelligent Robot and Systems (IROS), pp. 3965-3972, Macau 2019.

C8. **A.H.Qureshi** and Michael.C.Yip . Deeply Informed Neural Sampling For Robot Motion Planning, Proceedings of IEEE/RSJ International Conference on Intelligent Robot and Systems (IROS), pp. 6582-6588, Madrid, Spain 2018.

C7. **A.H.Qureshi**, Z.Tahir, G.Tariq, Y.Ayaz. Re-planning Using Delaunay Triangulation for Real Time Motion Planning in Complex Dynamic Environments, IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), pp. 905-911, uckland, New Zealand 2018.

C6. **A.H.Qureshi**, Y.Nakamura, Y.Yoshikawa and H.Ishiguro. Show, Attend and Interact: Perceivable Social Human-Robot Interaction through Neural Attention Q-Network, Proceedings of IEEE/RAS International Conference on Robotics and Automation (ICRA), pp.1639-1645, Singapore 2017.

C5. **A.H.Qureshi**, Y.Nakamura, Y.Yoshikawa and H.Ishiguro. Robot gains social intelligence through multimodal deep reinforcement learning, Proceedings of IEEE/RAS International Conference on Humanoid Robots, pp. 745-751, Cancun Mexico, 2016.

C4. **A.H.Qureshi**, S.Mumtaz, Y. Ayaz, and O. Hasan. Augmenting RRT*-Planner with Local Trees for Motion Planning in Complex Dynamic Environments, Proceedings of IEEE/RAS 19th International Conference on Methods and Models in Automation and Robotics (MMAR), pp. 657-662, Miedzyzdroje, Poland 2014.

C3. **A.H.Qureshi**, S.Mumtaz, Y.Ayaz, O.Hasan and W.Y.Kim. Adaptive Potential guided directional-RRT*, Proceedings of International Conference on Robotics and Biomimetics (ROBIO), pp. 1887-1892, China, 2013.

C2. B.Ali, **A.H.Qureshi**, Y.Ayaz, N.Muhammad and W.Y.Kim. Human tracking by a mobile robot using 3D features, Proceedings of International Conference on Robotics and Biomimetics (ROBIO), pp. 2464-2469, Shenzhen, China, 2013.

C1. **A.H.Qureshi**, K.F.Iqbal, S.M.Qamar, F.Islam, Y.Ayaz and N.Muhammad. Potential guided

directional-RRT* for accelerated motion planning in cluttered environments, Proceedings of International Conference on Mechatronics and Automation (ICMA), pp. 519-524, Takamatsu, Japan, 2013.

WORKSHOP PAPERS	W2. **A.H.Qureshi**, M.C.Yip. Adversarial Reward and Policy learning Via Variational Inverse Optimal Control, Bay Area Machine Learning Symposium, August 2018.
	W1. **A.H.Qureshi**, Y. Nakamura, Y. Yoshikawa, H. Ishiguro. Robot Learns Responsive Behavior through Interaction with People using Deep Reinforcement Learning, 3rd International Symposium on Cognitive Neuroscience Robotics, Dec 2016.
PATENTS	P1. M.C.Yip, M.J.Bency, **A.H.Qureshi**. Machine Learning based Fixed-Time Optimal Path Generation, US Patent App. 16/222,706, 2019.

HONORS AND AWARDS

- Outstanding Young Researcher by Heidelberg Laureate Forum, 2018.
- Japanese Government MEXT Scholarship, 2015-2017.
- Young Researcher Award by RISE-NUST, 2014.
- NUST GPA-based scholarship, 2010-2014.

SEMINAR & TALKS

- Deep Learning For Robotics, Neural Computing & Deep Learning Workshop, 6th Heidelberg Laureate Forum, Germany, Sep 2018.
- Learning-based motion planning and control, CRI Seminars, University of California San Diego, May 2018.
- Intrinsically Motivated Reinforcement Learning for Human-Robot Interaction in the Real-World, Artificial Intelligence Seminars, Osaka University, Japan, Nov 2017.
- Living with Robots- The Next Generation of Intelligent Machines, Information Technology University, Pakistan, Mar 2016.
- Sampling-based motion planning algorithms, Topics in Robotics Session, Osaka University, Japan, Apr 2015.

PROFESSIONAL ACTIVITIES

Workshop Organization:
- Organizer, Workshop on *Learning Representations for Planning and Control*, IEEE/RSJ International Conference on Intelligent Robot and Systems (IROS), Macau, China, Nov 2019.

Reviewer:
  Journals:
- Elsevier Neural Networks;
- IEEE Transactions on Robotics;
- Elsevier Robotics and Autonomous Systems;
- Springer Autonomous Robots;
- IEEE Robotics and Automation Letters;
- Cambridge Robotica;
- RSJ Advanced Robotics.

  Conferences:
- Robotics: Science and Systems (RSS)
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

REFERENCES   Available upon request