

USMAN AHMED SYED

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EDUCATION

University of Illinois at Urbana-Champaign (UIUC)

PhD in Electrical and Computer Engineering

CGPA: 3.82/4.00

Specialization: Controls and Machine Learning

Master's in Electrical and Computer Engineering

CGPA: 3.80/4.00

Specialization: Controls and Robotics

National University of Sciences and Technology (NUST), Pakistan

Bachelors in Mechatronics Engineering

CGPA: 3.58/4.00

Relevant Courses:

Control Systems Theory and Design

Analysis of Nonlinear Systems

Optimum Control Systems

Nonlinear and Adaptive Control

Random Processes

Geometric Control Theory

Advanced Robotic Planning

Interplay between Control and

Learning Based Robotics

Machine Learning

EXPERIENCE

Research Assistant at University of Illinois, Urbana-Campaign

May 2015 – Present

Project Title: Analysis of Temporal Difference (TD) based Reinforcement Learning Algorithms

- Study of on-policy TD learning algorithms and its variants as Markov Jump Linear Systems (MJLS)
- Realization of mean error and error covariance dynamics for TD learning as Linear Time Invariant dynamics.
- Synthesis of exact solution for the Mean Square Error for on-policy TD Reinforcement Learning algorithms.
- Study of off-policy TD learning algorithm, Emphatic Temporal Difference Learning (ETD) algorithm.

Project Title: Bat-inspired Flight Control for a MAV

- Study of biological bat landing from high speed video data.
- Synthesis of bat inspired control strategy for agile movements of a micro-air vehicle (MAV).
- Collection of Flight data using Vicon Motion Capture System.
- MATLAB based simulation of a MAV dynamics and its control.
- C++ based implementation and verification on a physical MAV with on-board sensing and control.

Teaching Assistant at University of Illinois, Urbana-Campaign

Aug 2015 – Present

- Conducted lab sessions for **Introduction to Robotics** covering Robot Operating System (ROS), manipulator kinematics and computer vision topics like camera geometry and object detection.
- Taught senior level **Control Systems** lab covering system identification and conventional and state space based control.

Teaching Assistant at COMSATS Institute of Information Technology, Pakistan

Jan 2014 – Jul 2014

- Taught Electric Circuit Analysis lab sessions.

Teaching Assistant at NUST, Pakistan

Aug 2011 – Dec 2013

- Taught labs for Object Oriented Programming and Data Structures using C++, Digital Image Processing using MATLAB, Instrumentation and Measurements, Electromechanical Systems and Solid Modelling.

Research Assistant at NUST, Pakistan

Aug 2011 – Dec 2013

Project Title: Path Planning for Mobile Robots

- Developed a Neural network based approach for planning the shortest path between start and goal locations.
- Devised a drivable space detection scheme using an unsupervised neural network
- Simulated the path planning approach in PlayerStage using C++.
- Experimental validation on a mobile robot platform.

TECHNICAL SKILLS

- **Libraries/Platforms:** TensorFlow, OpenAI, ROS, Opencv.
- **3D solid modeling and analysis:** Creo, AutoCAD.
- **Programming:** C, C++, Assembly, Python, MATLAB, Simulink, NI LabView.
- **Microcontrollers:** Microchip PIC, Atmel AVR, Arduino.
- **Miscellaneous:** LaTeX.

ACTIVITIES AND AWARDS

- Awarded Fellowship for master's in electrical engineering by COMSATS, Pakistan.
- Awarded rector's scholarship by National University of Sciences and Technology (2008-2011).
- Participated in National Engineering Robotics Contest 2009 & 2010.
- Delivered workshops on design and building of mobile robots and microcontroller programming.

PUBLICATIONS

- Bin Hu, Usman Ahmed Syed, "Characterizing the Exact Behaviors of Temporal Difference Learning Algorithms Using Markov Jump Linear System Theory", Advances in Neural Information Processing Systems (NeurIPS), 2019.
- Jonathan Hoff, Usman Syed, Alireza Ramezani, Seth Hutchinson, "Trajectory planning for a bat-like flapping wing robot", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019.
- Usman Ahmed Syed, Alireza Ramezani, Soon-Jo Chung, Seth Hutchinson, "From *Rousettus-Aegyptiacus* Landing to Robotic Landing: Regulation of CG-CP Distance Using a Nonlinear Closed-Loop Feedback", IEEE International Conference on Robotics and Automation (ICRA), 2017.
- Alireza Ramezani, Usman Ahmed Syed, Jonathan Hoff, Soon-Jo Chung, Seth Hutchinson "Describing Robotic Bat Flight with Stable Periodic Orbits", Conference on Biomimetic and Biohybrid Systems, 2017.
- Khurram Kamal, Senthana Mathavan, Tayyab Zafar, Imran Moazzam, Ahsan Ali, Usman Ahmad Syed, and Mujib Rahman, "Performance assessment of Kinect as a sensor for pothole imaging and metrology", International Journal of Pavement Engineering, 2016.
- Usman Ahmed Syed, Kunwar Faraz and Mazhar Iqbal, "Guided Autowave Pulse Coupled Neural Network based real time path planning and obstacle avoidance scheme for mobile robots", Robotics and Autonomous Systems, Elsevier, April 2014.
- Usman Ahmed Syed, Usman Ali Malik, Mazhar Iqbal and Kunwar Faraz, "A Guided Autowave PCNN for Improved Real Time Path Planning," in Proc. Of IEEE International Joint Conference on Neural Networks (IJCNN), 2013.
- Imran Moazzam, Khurram Kamal, S. Mathavan, Usman Ahmed Syed, M. Rahman, "Metrology and visualization of potholes using the Microsoft Kinect sensor", in Proc. Of 16th IEEE International Conference on Intelligent Transportation Systems (ITSC), 2013.
- Usman Ali Malik, Usman Ahmed Syed and Kunwar Faraz, "A self-organizing neural scheme for road detection in varied environments," in Proc. Of IEEE International Joint Conference on Neural Networks (IJCNN), 2011.