Hamza Anwar

Columbus, OH • (929) 258-1161 • anwar.24@osu.edu • http://u.osu.edu/hamza/

Education

The Ohio State University, College of Engineering Jan 2018 – May 2023

Doctor of Philosophy in Electrical and Computer Engineering; GPA: 3.95/4.0

- Dynamic powertrain control and optimization at the Center for Automotive Research

New York University, Tandon School of Engineering Sep 2015 – Sep 2017

Master of Science in Electrical Engineering; Ernst Weber Fellow; GPA (w/o research credits): 3.62/4.0

- Research and teaching in IoT, cyber-physical systems and networks at NYU Center for Cybersecurity
- Selected Coursework: Advanced Machine Learning, Optimization in Cyber-Physical Networks, Game Theory.

Lahore University of Management Sciences Aug 2010 – Jun 2014

Bachelor of Science in Electrical Engineering with Minor in Computer Science; Dean's Honor List; GPA: 3.61/4.0.

Patents

H. Anwar and Q. Ahmed. Comprehensive Energy Footprint Benchmarking Algorithm for Electrified Powertrains. P2022-345-7356. (Pending).

H. Anwar and Q. Ahmed. Methods and Systems for Controlling Vehicle Powertrains. P2022-345-7376. (Pending).

Experience

Graduate Research Associate, Center of Automotive Research, OSU, USA Aug 2018 – May 2023

- Developed a numerical optimization control technique for energy management in commercial electrified fleets.

Graduate Teaching Fellow, Dept. of Electrical and Computer Engineering (ECE), OSU, USA Sep 2021 – Dec 2021

- Independently taught a section of ECE 2020: Intro. To Analog Systems and Circuits

Electronic Systems Product Engineer–Intern, Cummins Inc., IN, USA Jun 2021 – Aug 2021

- Gap analysis in multivehicle route optimization tools for pickup-delivery and regional-haul trucks (Corp R&T).

Powertrain Electrification Systems and Controls Engineer–Intern, Cummins Inc., IN, USA Jun 2020 – Aug 2020

- Dynamic optimization framework development in powertrain electrification systems and controls (Corp R&T).

Research Assistant, Center for Cybersecurity, NYU, USA Sep 2015 – Sep 2017

- Designed robust minimax controller and filter for multiscale cyber-physical systems in Internet of Things (IoT).

Research Assistant, Cyber-Physical-Networks Lab, LUMS, Pakistan Aug 2014 – May 2015

- A novel framework that inspects watercourses for 3D profiling of silt accumulations using Gaussian Processes

Visiting Researcher, Robotics Research Lab, TU Kaiserslautern, Germany Summer 2013 & 2014

- Analyzed silted canal terrains for outdoor volume estimation of accumulated soil in canals and bucket excavators.

Selected Publications

- [J-1] H. Anwar, A. Vishwanath, Q. Ahmed, and A. Chunodkar. Comprehensive Energy Footprint Benchmarking of Commercial Electrified Powertrains. *Applied Energy*, 2023 [under review]
- [J-2] M. Q. Fahim, M. Villani, H. Anwar, Q. Ahmed, and K. Ramakrishnan. Co-optimization of Design and Control of Energy Efficient Hybrid Electric Vehicles using Coordination Schemes. *ASME J. Dyn. Sys., Meas., Control*, 2023
- [J-3] H. Anwar, A. Vishwanath, A. Chunodkar, and Q. Ahmed. Comprehensive Energy Footprint Benchmarking Algorithm for Electrified Powertrains. *IEEE Transactions on Control System Technology*, 2021 [under review]
- [C-1] J. Moon, H. Anwar, M. Villani, M. Q. Fahim, P. Jain, Q. Ahmed, and K. Ramakrishnan. Energy-Efficient Optimal Routing of Electrified Powertrain Fleet. *IEEE Conf. on Control Tech. and Applications*, 2023 [under review]
- [C-2] M. Arasu, H. Anwar, Q. Ahmed, and G. Rizzoni. Energy Optimal Routing of a Delivery Vehicle Fleet with Diverse Powertrains. *ASME 2019 Dynamic Systems and Control Conference.* Park City, Utah, 2019.
- [C-3] H. Anwar, M. Arasu, and Q. Ahmed. Ensuring Fuel Economy Performance of Commercial Vehicle Fleets using Blockchain Technology. *SAE Technical Paper 2019-01-1078*. Detroit, Michigan, 2019.
- [C-4] H. Anwar, A. Muhammad, and K. Berns. A Framework for Aerial Inspection of Siltation in Waterways. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Hamburg, Germany, October 2015.

Projects

Multivehicle Commercial Fleet Design and Operations Optimization Jan 2021 – present

- Framework development for vehicle routing problems that seeks to minimize total cost of ownership for battery-electric, plug-in hybrid electric and conventional powertrains, using realistic urban geospatial and traffic data

Mixed-Integer Optimal Powertrain Control using Pseudo-Spectral Collocation Mar 2019 – Dec 2020

- Developed a comprehensive benchmarking optimization framework to solve large-sized mixed-integer optimal control problems in electrified powertrains, applying to various powertrain architectures and scenarios

ADMM-based Networked Stochastic Variational Inference Sep 2015 – Aug 2017

- Proposed an algorithm for network of deep learning agents performing state-of-art stochastic variational inference for big data applications: topic modeling and classification over large corpora (e.g. *Wikipedia* articles).

Visual *Servoing* of Robotic Mine-Detector Arm, *BS Thesis* Sep 2013 – May 2014

- Involves uneven terrain profiling, 3D motion planning and maneuvering of a real 5 DoF robotic arm. Learned vision-based 3D perception skills, programming for Arduino board, and real-time feedback controller design.

Honors & Awards

- Nominated for **Presidential Fellowship** Competition, *OSU* 2022 – 2023
- ASME DSCD **Rising Stars Award**; gave invited talk at *IFAC Modeling, Estimation & Control Conference* 2022
- Recipient Ernst Weber Fellowship, ECE Dept. *NYU* 2015 – 2017
- Graduated on **Dean's Honor List** *(for maintaining a CGPA above 3.6)* 2012 – 2014
- Semi Finalist in Dell Social Innovation Challenge 2013
- National Finalist in Microsoft Imagine Cup 2012
- Gold Medalist at 1st *GIKI All Pakistan Mathematics Olympiad* 2011

Leadership

Mentor for 6+ Masters' and PhD students at Center for Automotive Research, OSU in succeeding to keep up with the demands of industry-sponsored collaborative projects, with efficient delivery of output, project management, teamwork, conducive learning, and enhanced presentation skills 2019 – 2023

Founder and President of Graduate Muslim Club, *a student organization at OSU* 2022 – 2023

Lab Instructor (x3): *Supervised students, designed experiments, and delivered lectures to perform lab tasks*, Feedback Control Systems (NYU, 2017); Circuits II (NYU, 2016); Mobile Robotics (LUMS, 2015)

Teaching Assistant (x4): *Supervised projects, conducted tutorial sessions, designed, and graded coursework,* Numerical Methods (OSU, 2021); Digital Control Systems (LUMS, 2014); Feedback Control Systems (LUMS, 2014); Computational Problem Solving (LUMS, 2012)

Skills

Programming: MATLAB & Simulink, Python, C++

Software experience: CasADi, YOP, Torch (Machine Learning), VowPal Wabbit, Robot Operating System (ROS), Gazebo, Point Cloud Library (PCL), OpenCV, Linux, ModelSim, Proteus, CoCreate, NI LabView

Hardware proficiency: 2D LiDAR sensors (SICK, Hokuyo), Parrot AR-Drone, iRobot Create 2, Arduino boards, Verilog, stereo cameras, Microsoft Kinect, Mini6410, Xilinx Virtex-II Pro.