

# Hamza Anwar

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## Education

<b>The Ohio State University, College of Engineering</b> <i>Doctor of Philosophy</i> in Electrical and Computer Engineering; GPA: 3.95/4.0 <ul style="list-style-type: none"><li>Dynamic powertrain control and optimization at the Center for Automotive Research</li></ul>	Jan 2018 – May 2023
<b>New York University, Tandon School of Engineering</b> <i>Master of Science</i> in Electrical Engineering; Ernst Weber Fellow; GPA (w/o research credits): 3.62/4.0 <ul style="list-style-type: none"><li>Research and teaching in IoT, cyber-physical systems and networks at NYU Center for Cybersecurity</li><li>Selected Coursework: Advanced Machine Learning, Optimization in Cyber-Physical Networks, Game Theory.</li></ul>	Sep 2015 – Sep 2017
<b>Lahore University of Management Sciences</b> <i>Bachelor of Science</i> in Electrical Engineering with Minor in Computer Science; Dean's Honor List; GPA: 3.61/4.0.	Aug 2010 – Jun 2014

## Patents

H. Anwar and Q. Ahmed. Comprehensive Energy Footprint Benchmarking Algorithm for Electrified Powertrains. PCT/US2023/024137. (Pending).

## Experience

<b>Graduate Research Associate, Center of Automotive Research, OSU, USA</b> <ul style="list-style-type: none"><li>Developed a numerical optimization control technique for energy management in commercial electrified fleets.</li></ul>	Aug 2018 – May 2023
<b>Graduate Teaching Fellow, Dept. of Electrical and Computer Engineering (ECE), OSU, USA</b> <ul style="list-style-type: none"><li>Independently taught a section of ECE 2020: Intro. To Analog Systems and Circuits</li></ul>	Sep 2021 – Dec 2021
<b>Electronic Systems Product Engineer–Intern, Cummins Inc., IN, USA</b> <ul style="list-style-type: none"><li>Gap analysis in multivehicle route optimization tools for pickup-delivery and regional-haul trucks (Corp R&amp;T).</li></ul>	Jun 2021 – Aug 2021
<b>Powertrain Electrification Systems and Controls Engineer–Intern, Cummins Inc., IN, USA</b> <ul style="list-style-type: none"><li>Dynamic optimization framework development in powertrain electrification systems and controls (Corp R&amp;T).</li></ul>	Jun 2020 – Aug 2020
<b>Research Assistant, Center for Cybersecurity, NYU, USA</b> <ul style="list-style-type: none"><li>Designed robust minimax controller and filter for multiscale cyber-physical systems in Internet of Things (IoT).</li></ul>	Sep 2015 – Sep 2017
<b>Research Assistant, Cyber-Physical-Networks Lab, LUMS, Pakistan</b> <ul style="list-style-type: none"><li>A novel framework that inspects watercourses for 3D profiling of silt accumulations using Gaussian Processes</li></ul>	Aug 2014 – May 2015
<b>Visiting Researcher, Robotics Research Lab, TU Kaiserslautern, Germany</b> <ul style="list-style-type: none"><li>Analyzed silted canal terrains for outdoor volume estimation of accumulated soil in canals and bucket excavators.</li></ul>	Summer 2013 & 2014

## Selected Publications

- [J-1] H. Anwar, A. Vishwanath, Q. Ahmed, and A. Chunodkar. Comprehensive Energy Footprint Benchmarking of Commercial Electrified Powertrains. *Applied Energy* 345 (2023): 121299.
- [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
- [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

<b>Multivehicle Commercial Fleet Design and Operations Optimization</b> <ul style="list-style-type: none"><li>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</li></ul>	Jan 2021 – present
<b>Mixed-Integer Optimal Powertrain Control using Pseudo-Spectral Collocation</b> <ul style="list-style-type: none"><li>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</li></ul>	Mar 2019 – Dec 2020

## 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

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- 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 1<sup>st</sup> *GKI All Pakistan Mathematics Olympiad* 2011

## Leadership

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**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

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**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.