MUHAMMAD WASEEM

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LinkedIn; Website; Google Scholar; GitHub

EDUCATION

- **PhD. in Mechanical and Aerospace Engineering** (CGPA: 3.92/4.00) Jan_2022- Present
  University of Virginia, Charlottesville, USA
  Advisor: Dr. Qing (Cindy) Chang

- **M.S. in Industrial Engineering (**CGPA: 4.00/4.00) 2017- 2019
  University of Engineering & Technology Peshawar, Pakistan

- **BS in Industrial Engineering (**CGPA: 3.90/4.00) 2013- 2017
  University of Engineering & Technology Peshawar, Pakistan

EXPERIENCE

- **Research Intern-General Motors** May-2024 -- Aug-2024
  - Model the battery assembly line and collect data for the throughput analysis.
  - Develop a machine learning model for the throughput prediction and compare with the state-of-the-art models.
  - Identify the root causes of the bottlenecks.
  - Compare the analytical model, machine learning model and actual results for further improvements.
  - Compile the results and draft a paper.

- **Graduate Research Assistant-UVA** Jan-2022 -- Present
  - Develop a novel math model for dynamic robot assisted multiproduct flexible manufacturing system.
  - Develop a reinforcement learning-based control method for mobile robots' scheduling in multiproduct flexible manufacturing.
  - Develop a reinforcement learning-based Nash-Multiagent deep deterministic policy gradient method to optimally control multiproduct flexible manufacturing system under uncertainty.
  - Modify multiagent deep deterministic policy gradient algorithm to improve market demand satisfaction and throughput optimization.
  - Collect and analyze data from real-world production systems to evaluate algorithm effectiveness and identify areas for improvement.
  - Design and execute experiments to validate research hypotheses and proposed solutions.
  - Collaborate with interdisciplinary teams, including faculty, researchers, and industry partners, on the DOE project for wood drying optimization.
  - Publish/submit 10 research papers to peer-reviewed journals.
  - Present research findings to research communities.

- **Instructor- UET Peshawar Pakistan** Mar-2019 – Dec-2021
  - Mentored students in their final year projects, focusing on the production systems modelling and control.
  - Collaborated with students, fostering a dynamic learning environment, and helping them gain proficiency in using engineering tools to tackle complex challenges.
  - Provided valuable assistance to senior faculty members in their research projects, such as the design and fabrication of prosthetic limbs, contributing to interdisciplinary research endeavors.

- **Shift Engineer-DYNEA Pakistan Petrochemicals** Sep-2017 -- Aug-2018

- Achieved an 11% boost in productivity by conducting a time and motion study and optimizing material handling operations.
- Effectively supervised, managed, and trained 5 new workers.
- Enhanced production output by 7% via optimization of batch processing times.
- Actively participated in Research & Development, emphasizing a commitment to collaborative research efforts.

PUBLICATIONS

Peer-Reviewed Journal Articles

1. Dynamic modeling and analysis of multi-product flexible production line, **Waseem Muhammad**, Chang Qing, Li Chen (2023). International journal of computer integrated manufacturing (IF: 4.2)

2. Adaptive Mobile Robot Scheduling in Multiproduct Flexible Manufacturing Systems Using Reinforcement Learning, **Waseem Muhammad**, Chang Qing (2023). ASME Journal of manufacturing science and engineering (IF: 4)

3. From Nash Q-Learning to Nash-MADDPG: Advancements in Multiagent Control for Multiproduct Flexible Manufacturing Systems, **Waseem Muhammad**, Chang Qing. (2024), Journal of Manufacturing Systems.

4. Optimization of tensile and compressive behaviour of PLA 3D printed parts using categorical response surface methodology, **Waseem Muhammad**, T Habib, U Ghani, M Abas, QMU Jan, MAZ Khan (2022). International Journal of Industrial and Systems Engineering.

5. Multi-response optimization of tensile creep behavior of PLA 3D printed parts using categorical response surface methodology, **Waseem Muhammad**, B Salah, T Habib, W Saleem, M Abas, R Khan, U Ghani (2020). MDPI Polymers (IF: 5)

6. Manufacturing productivity analysis by applying overall equipment effectiveness metric in a pharmaceutical industry, Muhammad Zubair, Shahid Maqsood, Tufail Habib, Qazi Muhammad Usman Jan, Uroosa Nadir, **Waseem Muhammad**, QM Yaseen (2022). Cogent Engineering.

7. Productivity enhancement at molding compound manufacturing plant by applying time and motion analysis, **Waseem Muhammad**, U Ghani, T Habib, S Noor, T Khan (2021). Mehran University Research Journal of Engineering & Technology.

8. Productivity enhancement with material handling system design and human factors analysis-a case study, **Waseem Muhammad**, U Ghani, T Habib, S Noor (2021). Mehran University Research Journal of Engineering & Technology.

9. Excess noise reduction with ear protector applying mathematical algorithm: A case of medium density fiber industry, S Khan, I Noor, T Habib, **Waseem Muhammad** (2020). Noise & Vibration Worldwide.

Journal Articles Submitted / Under Review

10. Integrating Market-driven Demand Adaptation in Multi-Agent Deep Reinforcement Learning for Controlling Multiproduct Flexible Manufacturing Systems, **Waseem Muhammad**, Chang Qing. (Under Review in the Journal of Intelligent Manufacturing Systems).

11. Integrated energy optimization in manufacturing through multiagent deep reinforcement learning: Holistic control of manufacturing, microgrid systems, and battery storage, **Waseem Muhammad**, Mihitha Sarinda Maithripala, Chang Qing, Zongli Lin. (Under Review in ASME Journal of Manufacturing Science and Engineering).

12. A comprehensive approach to energy-efficient and quality conscious control of conveyor belt dryers in petrochemical production. **Waseem Muhammad**, Kshitij Bhatta, Chen Li, Nabeel Haider, Chang Qing. (Under Review in npj Advanced Manufacturing, nature portfolio)

13. Demand-Driven Hierarchical Integrated Planning-Scheduling Control for a Mobile Robot-Operated Flexible Smart Manufacturing System. Chen Li, Kshitij Bhatta, **Waseem Muhammad**, Chang Qing. (Under review in the Journal of Robotics and Computer Integrated Manufacturing)

Conference Papers and Presentations

14. Dynamic modelling and real-time performance analysis of multiproduct batch manufacturing systems with perishable products. Kshitij Bhatta, **Waseem Muhammad**, Chen Li, Chang Qing. (Presented at the 52nd North American Manufacturing Research Conference, NAMRC).

HONORS

- Academic Excellence Scholarship (3 times) 2014-2017
- Gold Medal 2018
- Distinction Award 2020