

MUHAMMAD FAROOQ MEMON

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 Muhammad Farooq Memon

Education

Union College

Bachelor of Science Honors Computer Engineering, Minor in Mathematics

Sep 2021 – June 2025

Schenectady, NY

- **Cumulative GPA:** 3.641/4.0, **Major GPA:** 3.71/4.0

Research Interests

- Soft Robotics
- Internet of Things
- Robotics
- Computer Vision in Sports

Research Publications

Robustness in Diversity: Quality-Diversity Driven Discovery of Agile Soft Robotic Gaits Apr 2024

IEEE 7th International Conference on Soft Robotics (RoboSoft) 2024

San Diego, CA

- Paper has been published- [Link to the paper](#)

Presentations

Cricket: Biomechanical Analysis of Fast Bowling

May 2025

35th Steinmetz Symposium

Schenectady, NY

- **Presenters:** Muhammad Farooq Memon & Zuhair-Al-Massri

Quality-Diversity Driven Discovery of Agile Soft Robotic Gaits

Aug 2023

Summer Research Presentations

Schenectady, NY

- **Presenters:** Muhammad Farooq Memon

Improving the Micromouse Robot: Maze-Solving and Distance Control

May 2022–2024

32nd, 33rd and 34th Steinmetz Symposium

Schenectady, NY

- **Presenters:**

32nd Steinmetz Symposium: Ali Khan, Edwin Garcia-Flores, Sean Miller, Jia (Scarlett) Wei, Samuel Degemu, Jiajun Lin, Luka Mgaloblishvili, Muhammad Farooq Memon

33rd Steinmetz Symposium: Fischman, Jonathan, Luka Mgaloblishvili, Muhammad Farooq Memon, Hope Crisafi

34th Steinmetz Symposium: Luka Mgaloblishvili, Muhammad Farooq Memon, Alexia Goldenberg

Research/Work Experience

Evolutionary Robotics Lab, Union College

Apr 2022 – Jun 2025

Soft Robot Researcher and Back-end developer

Schenectady, NY

- Working under the supervision of Professor John Rieffel and simulating voxel based soft robots in 2 dimensions using EvoGym.
- Conducted robotics experiments using 2D voxel-based simulators (2D-VSR-sim, EvoGym) to evaluate and compare the fitness of soft robots on various terrains using CMAES and QDA algorithms.
- Analyzed simulation results, visualized data using Matplotlib, and explored Pyribs for optimizing performance.

Department of Electrical, Computer & Biomedical Engineering, Union College

Apr 2024 – Mar 2025

Biomechanical analysis of Fast Bowling in cricket using ML and IoT

Schenectady, NY

- Collaborated with Professor Shane Cotter to research factors influencing cricket fast bowling pace and techniques for performance enhancement via feedback from the system.
- Developed a Computer Vision system using OpenCV and MediaPipe for motion tracking and landmark detection to analyze bowling techniques.
- Implemented a Random Forest model in Python to weigh factors contributing to bowling pace and provide non-real-time feedback to users.

Union College Robotics Crew (UCRC)

Sep 2021 – Jun 2025

Coding and Electrical team

Schenectady, NY

- Led the distance control project for the micromouse robot, using trial-and-error methods, creating UML diagrams for process breakdown, and developing virtual mazes to test the flood-fill algorithm.
- Conducted workshops on Python and hardware for Robotics Crew members, enhancing collaboration and understanding of project tasks.

- Presented the micromouse robot at three Steinmetz Symposia and led the team to secure 5th place at the IEEE Region 1 Micromouse Competition at MIT.
- Organized hands-on robot-building workshops for new club members, fostering engagement and skill development.

Research And Development With Innovation (RADWI)

June 2024 – Aug 2024

Backend developer and Embedded Engineering Intern

Islamabad, Pakistan

- Developed and debugged IoT solutions, including deploying TinyML models on ESP-32, implementing dual-core architecture for smart plug devices, and creating maintainability flowcharts for codebases.
- Created an API to livestream office camera feeds on a local server and explored solutions to mitigate face detection errors that posed security threats.

Electrical, Computer and Biomedical Engineering (ECBE) Helpdesk

Sep 2024 – Jun 2025

Tutor

Schenectady, NY

- Assisted students in understanding complex electrical and computer engineering concepts through targeted guidance.
- Encouraged critical thinking and independent problem-solving by providing structured question road-maps.
- Strengthened communication and teaching skills through personalized one-on-one interactions.

Science, Technology, Engineering Program (STEP)

Aug 2021 – Jun 2022

Calculus 1, 2 and SAT Math tutor

Union College

- Provided personalized instruction in Calculus I, II, and SAT Math through in-person and virtual sessions, fostering understanding by solving problems collaboratively and maintaining regular progress check-ins.

Technical Skills

Languages: Python, Java, C++, MATLAB, HTML/CSS, JavaScript, LaTeX, MIPS

Developer Tools: VS Code, PyCharm, IntelliJ, Arduino IDE, Arm Keil Studio, EDA Playground, Spyder, QtSpim, Sublime Text, Simulink

Libraries: EvoGym, PyBullet, Tensorflow, NumPy, MediaPipe, OpenCV, Matplotlib, Sklearn, Gymnasium

Technologies/Frameworks: Windows, Linux, GitHub, Gitlab, 2D-VSR-Sim, Terminal

Course Related Projects

Gesture and Remote Controlled Robot | *Python, Pandas, Tensorflow, Sklearn, C++, ESP-32, ESP-NOW* June 2024

- Designed an autonomous fertilizer-spilling robot with gesture control using a trained ML model, MPU6050 sensor, and ESP-NOW communication, supported by detailed video and IEEE-standard report.

Evolving Mona Lisa using Genetic Algorithm | *Python, NumPy, OpenCV, Sklearn, OS, Matplotlib* Nov 2024

Nov 2024

- Created a genetic algorithm to approximate the Mona Lisa through iterative pixel optimization and analyzed crossover methods under varying mutation rates.

Simulating Adaptive Robotic Locomotion for Unsafe Environments | *Python, EvoGym, Matplotlib, OS* Nov 2024

- Explored evolutionary algorithms to develop adaptive robotic locomotion strategies tailored for unsafe environments, leveraging quality-diversity methods to enhance robustness and adaptability.

Academic Honors

- Dean's List — **2022, 2023, 2024, 2025**

- Awarded (\$3,796) Union College Summer Research Fellowship for an 8-week research project — **2022**

- William C. White Memorial Scholarship — **2021, 2022, 2023, 2024**

- Earl Steinart Scholarship — **2021, 2022, 2023, 2024**

Leadership / Extracurricular

SAE Aero Club

Sep 2023 – Jun 2024

Treasurer, Electrical team member

Union College

Residential Education

Aug 2022 – Present

Community/Resident Advisor, Event Organizer, Interview Committee member

Union College

Cricket Club

Oct 2022 – Present

Co-Founder, President, Captain, Website Manager

Union College