MUHAMMAD RAFEY TAHIR

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EDUCATION

National University of Sciences & Technology, Islamabad (PK). *Aug 2021 - Jan 2024*
Master in Electrical Engineering (Control Systems) **GPA: 3.70**
Core Courses: *Optimal Control, Convex Optimization, Nonlinear Control Systems, Adaptive Control & Power Electronics.*

Muhammad Nawaz Sharif University of Engineering & Technology, Multan (PK). *Oct 2017 - July 2021*
Bachelor of Science in Electrical Engineering, ***GPA: 3.61*** ($4^{\text{th}} Position$)
• Award-winning Final Year Project.
• Ranked in the top 10% of Engineering Science students.
• Registered Engineer **PEC : ELECT/94875**
Core Courses: *Linear Control Systems, Digital Logic Design, Microprocessor Systems, Industrial Control System, Digital Signal Processing.*

Govt. Postgraduate College, Khanewal (PK). *April 2014 - Sept 2017*
Intermediate (Pre-Engineering), **Grade: A**

TECHNICAL SKILLS

Professional:	Communication Skills, Problem Solving, Data Management, Leadership
Programming:	Julia, Python, C/C++, Assembly Language, Ladder Logic Language(PLC), LaTeX
Software & Tools:	MATLAB/Simulink, ROS, Proteous, Multisim, LabVIEW, Microwind, Arduino IDE

PROJECTS

Model-Free Intelligent Control Design For Underactuated Mechanical Systems *-Master's Thesis*

In recent years, there has been growing interest in the development of controller design and algorithms for underactuated systems. Underactuated systems are those in which the number of actuators is less than the number of degrees of freedom. This makes them more challenging to control, but they are also more common in practice. Model-free control techniques are attractive because they does not require any information about system's dynamics. In my research, I have developed a new control framework using model-free robust adaptive controller for underactuated systems. The hardware experimental videos can be found here [video].

Research Projects: (Under progress)

- Assembling of a 6 Degree-of-Freedom Robot Manipulator from the Ground Up.
- Circuit Design Automation using Reinforcement Learning.

Smart Bionic Prosthetic Leg (Best Final Year Project Award) *-Bachelor's Thesis*

My Final Year Project is a Smart Prosthetic Leg which mainly focuses on patients of an above-the- knee amputee. In this project, we have designed a smart and safe embedded system that controls the leg using different modes for different activities. Due to the low cost of our design This prosthetic technology could be applied in public sector hospitals to serve the less fortunate.

Semester Projects:
• Air flow ball levitation using PID Controller
• Arduino Based Metal Detector
• Arduino Based Heart Rate Monitor
• DC to AC Inverter
• DC-DC Buck Boost Converter

RESEARCH EXPERIENCE

Control Systems Laboratory -SEECS, NUST *Jun 2023 - Present*
Research Assistant - Advisor: Dr. Usman Ali
• Implementation of Model-free Robust Adaptive controller on Quanser QNET Rotary Inverted Pendulum Board 2.0 hardware setup.
• Performance validation on Quanser QNET Vertical Take-off and Landing system 2.0 hardware setup.

Graduate Research Complex –SEECS, NUST *Sep 2022 - Jun 2023*

Graduate Student Researcher - Advisor: Dr. Usman Ali

• Conducting research on controller design and optimization techniques for underactuated mechanical systems.
• Designing and implementation of a novel model-free control framework for underactuated systems
• Collaborating with a research team to refine the approach and develop solutions to research problems.

Digital Control Laboratory - DoEE, MNS-UET *April 2020 - Jun 2021*

Research Associate - Advisor: Engr. Hamza Khan

• Conducting research on the designing of smart bionic prosthetic leg for limb amputee patients.
• Developed a smart safe embedded system that controls the leg using different modes for different activities.

TEACHING EXPERIENCE

National University of Sciences & Technology *Islamabad, PK*
• Teaching Assistant, MATH-816: Applied Linear Algebra *Fall 2023*
Muhammad Nawaz Sharif University of Engineering & Technology *Multan, PK*
• Teaching Assistant, CSC-341: Introduction to Computing *Fall 2019*
• Teaching Assistant, EEE-562: Linear Control Systems *Fall 2020*

COURSES & CERTIFICATIONS

- Mathematics for Engineers *-The Hong Kong University of Science and Technology*
- Introduction to Programming with MATLAB *-Vanderbilt University*
- Machine Learning with Python *-IBM*
- Modern Robotics: Mechanics, Planning and Control *-Northwestern University*
- Cloud Solution Architect *-TechLift*

SCHOLARSHIPS & AWARDS

- Honored with a laptop by the Prime Minister of Pakistan for sustaining a high GPA in Masters.
- Dean's Honour Roll - Fall 2019, Spring 2020, Fall 2020, Spring 2021
- HEC Merit based Scholarship
- Awarded Scholarship AMERICA from PepsiCo Foundation in B.Sc. Electrical Engineering.
- Best Final Year Project of Batch EE-2017.

LANGUAGES

- **E**nglish
- **U**rdu

REFERENCES

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