

# MUAWWIZ ALI YOUSUF

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## RESEARCH INTEREST

- Autonomous Robots
- Human-Robot Collaboration
- Sustainability OR Sustainable Manufacturing

## EDUCATION

<b>University of Engineering and Technology</b> BSc. Mechatronics and Control Engineering. CGPA 3.72/4.00	<b>Expected, May 2025</b> Lahore, Pakistan
<b>Jinnah Education System</b> FSc Pre-Engineering (FBISE). Grade A1	<b>August 2021</b> Taxila, Pakistan
<b>Jinnah Education System</b> FSc Pre-Medical (FBISE). Grade A1	<b>August 2020</b> Taxila, Pakistan
<b>Jinnah Education System</b> Matric Science (FBISE). Grade A1	<b>August 2018</b> Taxila, Pakistan

## HONOURS & AWARDS

- Awarded the FEB & GIF Educational Grant of PKR 80,000 annually (2021–2025).
- Received a merit-based laptop under the PMYLS program (2023).
- Secured a PKR 40,000 merit scholarship for the highest GPA in the second semester (2022).
- Honoured with the UET 100 Years of Academic Excellence coin for an A+ in Computer Programming Course (2022).
- Achieved 1st position for a Popsicle Truss Bridge design bearing 130 lbs (2022).
- Won 1st position in Mechanical 2D/Isometric Drawing using AutoCAD in TechnoWar (2022).
- Achieved 10th position in Pakistan at the International Bebras Informatics Contest (IBIC), earning a Three-Star Performance Badge (2019).

## RELATED PROJECTS

<b>Autonomous Mobile Robot</b>	<b>Expected May 2025</b>
<ul style="list-style-type: none"><li>• Designed and implemented a robust autonomous robot for material handling, integrating advanced sensors such as LiDAR and depth cameras to enable real-time navigation and obstacle avoidance.</li><li>• Implemented the Simultaneous Localization and Mapping (SLAM) algorithm within the ROS environment to achieve precise localization and dynamic path planning.</li><li>• Performed chassis design, suspension system development, and Finite Element Analysis (FEA) to ensure structural integrity and a payload capacity of 80-100 kg.</li><li>• Developed a user-friendly mobile application and touch-screen interface for real-time robot monitoring and control, featuring call/recall functionality.</li><li>• Incorporated safety features, including alarms, manual override mechanisms, and redundant navigation systems to ensure reliable operation in industrial environments.</li><li>• Integrated human-robot interaction and collaboration capabilities to enable seamless integration into shared workspaces, enhancing operational efficiency.</li></ul>	

### SMART Parking Lot Control System Using OpenPLC

December 2024

- Designed and implemented a SMART parking lot control system using OpenPLC with ladder logic programming.
- Conducted hardware implementation using Arduino Mega, simulating practical PLC-based systems with a focus on cost-effectiveness and scalability.
- Developed a scalable solution for parking automation, capable of monitoring and managing vehicle flow efficiently.

### Ball Balancing on a Plate

May 2024

- Designed and implemented a 3DOF robotic platform (3RPS parallel manipulator) for a ball balancing system.
- Implemented and tuned PID controllers for real-time motor control with Arduino, achieving stable ball balancing and trajectory tracking.

### Design & Analysis of Amber Lucid One Robot

May 2024

- Designed a complete CAD model of the Amber Lucid One Robot, a 7-DOF robotic system, using SolidWorks with precise material and dimension specifications.
- Performed static stress analysis to validate the structural integrity of the robot under operational loads.
- Developed a MATLAB routine to seamlessly import the SolidWorks assembly into the Simulink Multibody environment for advanced simulation.
- Conducted dynamic simulations, including trajectory generation utilizing the Robotics System Toolbox.
- Analyzed position, velocity, and torque profiles to optimize robot motion and evaluate its kinematics.

### Modeling & Simulation of Regenerative Braking System

January 2024

- Developed a mathematical model of a regenerative braking system for electric vehicles, focusing on energy recovery and efficiency improvements.
- Simulated dynamic behaviour and system response using MATLAB and Simulink, analyzing performance under varying parameters such as voltage, resistance, and gear ratios.

### Automatic Pick and Place System

January 2024

- Designed and implemented an electro-pneumatic pick-and-place system for automated material handling.
- Integrated sensors and control components for precise operation and automation.

### Portable Ventilator Using AMBU Bag

May 2023

- Developed a Herringbone Rack-and-Pinion mechanism driven by a stepper motor and controlled via a TIVA Launchpad to compress the AMBU bag.
- Controlled the key ventilation parameters, i.e., tidal volume, respiratory rate, and inhale/exhale ratio.

### Salah Pose Analysis Using Mediapipe and OpenCV

December 2022

- Developed a Python-based solution for real-time detection and tracking of Salah poses using the Mediapipe library.
- Created a tool to assist individuals and instructors in improving Salah postures through real-time feedback and pose tracking.

### Autonomous Robot Navigation Using Genetic Algorithm

December 2022

- Developed a C-language program for an autonomous robot navigation system using a Genetic Algorithm (GA) that optimized pathfinding through uncertain environments while avoiding obstacles.
- Implemented complex path planning algorithms incorporating Minimized path length, Reduced number of turns, and Avoided infeasible steps/collisions.

## ADDITIONAL PROJECTS

Ball Balancing on a Beam | PID Control, MATLAB & Simulink

December 2024

Creative Cardboard Ice Cream Cart walking Robot | Toy, Product Design

November 2024

IoT Based Security Alarm System |

May 2024

IoT Based Button (Switch Bot) |

December 2023

Design and Simulation of Conveyor Belt System | SolidWorks

December 2023

## WORK EXPERIENCE

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### Human Centered Robotics Lab, UET Lahore

July 2024 - August 2024

*Mechatronics Intern*

*Lahore, Pakistan*

- Conducted research on SLAM (Simultaneous Localization and Mapping) navigation algorithms for autonomous mobile robots (AMRs).
- Integrated and configured multiple sensors (LiDAR and depth camera) with Jetson Nano controller using a Robot Operating System (ROS).
- Developed conceptual designs of an autonomous mobile robot (AMR) for healthcare and industrial applications, emphasizing cost-effective solutions through iterative design sketches.

### Precision Manufacturing Pvt Ltd.

January 2024 - February 2024

*Design Trainee*

*Lahore, Pakistan*

- Designed and reverse engineered mechanical parts of military projects using SolidWorks.
- Overseen production and manufacturing processes in CNC workshop.

### RADWI Electronics Pvt Ltd.

June 2023 - August 2023

*Embedded Systems Engineer Intern*

*Islamabad, Pakistan*

- Developed optimized ESP32 firmware for RFID-based smart lock integration and efficient data storage.
- Implemented UDP and MQTT protocols for efficient IoT communication.
- Debugged and tested prototypes, ensuring seamless embedded system performance.

### Designmen Consulting Engineers Pvt Ltd.

August 2022

*HVAC Design & FLS Systems Intern*

*Islamabad, Pakistan*

- Gained hands-on experience in HVAC design, Fire & Life Safety (FLS) Systems, and AutoCAD drawings with site visits.
- Implemented cost-effective solutions, resulting in a reduction in project expenses.
- Coordinated project tasks, ensuring adherence to engineering standards and regulations.

## CERTIFICATIONS & COURSES

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**Project Management Foundations** | LinkedIn Learning - NASBA  
February 2025

[Link](#)

**Ambassador Challenge: Azure AI Mastery** | Microsoft Learn Student Ambassador  
July 2024

[Link](#)

**Problem Solving Using Computational Thinking** | University of Michigan - Coursera  
November 2023

[Link](#)

**Safety in the Utility Industry** | University at Buffalo, The State University of New York - Coursera  
October 2023

[Link](#)

**Optimizing Your Work with Microsoft 365** | LinkedIn Learning  
July 2023

[Link](#)

**SOLIDWORKS: Design for Mechatronics** | LinkedIn Learning  
July 2023

[Link](#)

**Digital Marketing Training** | DigiSkills Training Program  
June 2023

[Link](#)

**Lean Thinking Business Course** | LeanScape  
February 2023

[Link](#)

**Python For Beginners Course In-Depth** | Udemy  
October 2022

[Link](#)

**Fundamentals of Lean** | LeanScape  
October 2022

[Link](#)

**AUTOCAD Training** | DigiSkills Training Program  
December 2021

[Link](#)

## DIGITAL SKILLS

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### Programming

Assembly and Embedded C | Python | Arduino IDE | MATLAB | PLC Languages  
Robot Operating System (ROS) - Nvidia Jetson Nano

### Simulation

MATLAB & Simulink | ANSYS Workbench (Basic level) | Festo FluidSIM Hydraulic & Pneumatic

### PCB Design

Proteus Professional

### CAD Modelling

SolidWorks | AutoCAD | Mastercam

### Other Software

Microsoft Office 365

## EXTRACURRICULAR ACTIVITIES

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**Entrepreneurship In Engineering** | *Mechatronics Club, UET Lahore* [Link](#)  
*August 2023*

**How To Ace Your Interviews** | *NESTERNSHIP - NESTLE* [Link](#)  
*April 2023*

**Breaking the GPA Barrier** | *Arbisoft* [Link](#)  
*March 2023*

**Report Writing: Space Journalism** | *World Space Week, Institute of Space Technology (SUPARCO)* [Link](#)  
*October 2018*

**Artist of the Year** | *Jinnah Education System (JES)* [Link](#)  
*March 2014*

**Gymnastics** | *Jinnah Education System (JES)* [Link](#)  
*March 2011*

## REFERENCES

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### Dr. Ali Raza

Chairman, Associate Professor at Department of Mechatronics & Control Engineering, Main Campus UET Lahore, Pakistan  
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### Dr. Muhammad Ahsan

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## PUBLICATIONS

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Muawwiz Ali Yousuf, Muhammad Saad, Muhammad Rafay, & Dr. Ali Raza. (2025). *Autonomous Mobile Robot for Lab-to-Lab Sample Shifting*. Undergraduate Thesis, University of Engineering and Technology Lahore. (under progress)

## LANGUAGE PROFICIENCY

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- English
- Urdu (Native)