Dr. Usman Javaid

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RESEARCH INTERESTS AND OBJECTIVES

My research interests lie in the fields of nonlinear control, renewable energy sources, and robotics. I am particularly interested in the application of advanced control strategies to enhance the performance and efficiency of renewable energy systems, as evidenced by my recent work on the design of nonlinear control algorithms for polymer electrolytic membrane fuel cells. Additionally, I am actively involved in the nonlinear control design of Unmanned Aerial Vehicles (UAVs), where Sliding Mode Control (SMC) plays a crucial role in achieving robust and adaptive control in dynamic environments. This experience has ignited my passion for exploring innovative control methodologies in robotics applications. Moving forward, I aspire to further explore the intersection of control theory, renewable energy, and robotics to address real-world challenges and contribute to the advancement of sustainable technologies.

WORK EXPERIENCE

Research Associate   Dec 2009 - Dec 2011

– As a Research Associate, I focused on the area of LDPC (Low-Density Parity-Check) codes and error-correcting algorithms. My primary responsibility involved conducting research to advance the understanding and development of LDPC codes and related error-correction techniques. I collaborated with a team of researchers to explore novel approaches, analyze data, and develop innovative algorithms aimed at improving error correction efficiency and reliability. Through this role, I gained valuable experience in conducting experimental studies, analyzing complex data sets, and contributing to the advancement of knowledge in the field of error correction coding.

Lab Engineer   Feb 2011 - Jan 2013

– I have worked as a Lab Engineer, where my main responsibility was to conduct laboratory sessions and provide guidance to students. I facilitated practical sessions covering various topics such as Electric Circuit Analysis, Control Systems, Programmable Logic Controllers (PLCs), Digital Logic Design (DLD), Electronics 1, and Electronics 2. Through these experiences, I developed strong communication skills and a deep understanding of the subjects, enabling me to effectively impart knowledge to students and foster their understanding of theoretical concepts through hands-on practical work.

Lecturer   Jan 2013 - present

– I am currently serving as a Lecturer, actively engaging in various departmental committees such as the Student Engagement Committee and Orientation Committee. In my teaching role, I cover a diverse range of topics including Electric Circuit Analysis, Control Systems, Programmable Logic Controllers, Digital Logic Design (DLD), Renewable Energies, Electronics 1, Electronics 2, and E-commerce. Additionally, I supervise a variety of projects spanning topics such as Artificial Intelligence, Microcontrollers, and Renewable Energy. Through these responsibilities, I aim to cultivate an enriching learning environment and foster the academic and professional development of my students.

PROJECTS

Some Project Supervised (2023-2024)

1. AI Based Student Monitoring System
2. Human Behaviour Recognition using WiFi Channel State Information (CSI)
3. Fully Automated Solar Grass Cutter
4. Image Processing and CNN based Skin Disease Detection System in Human
5. Dual Power Generation Solar Plus Windmill Generator (**Funded by PEC**)
6. Magzak Turbine
7. Tumor Detection using Deep Learning
8. IoT Powered Guardian Helmet for Coal Miners

EDUCATION

2016 - 2023	PhD (Electrical Engineering) at **COMSATS University Isb**	(GPA: 3.65/4.0)
2010 - 203	MS (Electrical Engineering) at **COMSATS University Isb**	(GPA: 3.14/4.0)
2005 - 2009	Bachelor's(Electrical Engineering) at **COMSATS University Isb**	(GPA: 2.91/4.0)
2004 - 2005	Pre-engineering FBISE at **IMCB F-10/3**	(Grade A)
2002 - 2003	Matriculation FBISE at **PAEC Model College ISB**	(Grade A)

PUBLICATIONS

Qazi, SA et al. (2009). "A comparative analysis of LDPC decoders for image transmission over AWGN channel". In.

Alam, W et al. (2018). "Nonlinear control of a flexible joint robotic manipulator with experimental validation". In: *Strojniški vestnik-Journal of Mechanical Engineering* 64.1, pp. 47–55.

Javaid, U, A Mehmood, A Arshad, et al. (2020). "Operational efficiency improvement of PEM fuel cell—A sliding mode based modern control approach". In: *IEEE Access* 8, pp. 95823–95831.

Ullah, S et al. (2021). "Dynamic modeling and stabilization of surveillance quadcopter in space based on integral super twisting sliding mode control strategy". In: *2021 International Conference on Artificial Intelligence (ICAI)*, pp. 271–278.

Javaid, U, J Iqbal, et al. (2022). "Performance improvement in polymer electrolytic membrane fuel cell based on nonlinear control strategies—A comprehensive study". In: *Plos one* 17.2, e0264205.

Javaid, U, A Mehmood, J Iqbal, et al. (2023). "Neural network and URED observer based fast terminal integral sliding mode control for energy efficient polymer electrolyte membrane fuel cell used in vehicular technologies". In: *Energy* 269, p. 126717.

SKILLS

Softwares	MATLAB, AutoCAD, Pspice, Electronic Workbench, Circuit Maker, MS Office, Microwave Office, HFSS, Canva, Overleaf, Latex, WordPress, Wix, Shoppify , LT-SPICE, PSPICE
Operating Systems	MS Windows, Crystal
Tools	MS Word, MS PowerPoint
Programming Languages	C++, Visual C++, Network Programming, Assembly Language

References

- Dr. Adeel Mehmood
  University of Hull, UK
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  Phone +44 7417 378661
  Expertise: Fluid dynamics, Control systems, Mechatronic systems, Robotics

- Prof. Jamshed Iqbal
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  Expertise: Robotics, Mechatronics, Higher Education, Pedagogy

- Dr. Ali Arshad Uppal, Ph.D., SMIEEE
  Tenured Associate Professor
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  Phone +92 331 3666163
  Expertise: Control systems, Mechatronic systems, Robotics,Control-oriented modeling and optimization, Renewable energy