Muhammad Haseeb **ARSHAD**

Electrical Engineer | Electric Drives, Machine Learning

linkedin.com/in/haseeb-arshad-ee github.com/hasyarshad
+966 58 223 2313 haseeb.arshad.ee@gmail.com Personal Website

House No. 10-A, Street No 1, Younaspura, Daras Road, Baghbanpura, Lahore
Born on October 10, 1989 (30 years) in Lahore, Pakistan

A proactive and enthusiastic engineer, having more than 01 year experience in IT and over 03 year experience in electrical & control system domain, with excellent academic record through distinctions and competent practical knowledge of the subjects. Motivated to achieve in depth research skills and excel in the field of IT

Skills

Programming	**C++**, **MATLAB**, **MAPLE**, VHDL, Python, R
Engineering Softwares	**MATLAB**, **Proteus**, **NI MultiSim**, **CorelDraw**, NI LABView, Kiel, Photoshop CS5
Operating System	**Windows 10**, **Mac OS X**, Windows 7, Linux Redhat
Other	RStudio, Jupitor Notebook, AVR Studio, dSpace, Active-HDL, Wordpress, MS Office, MS Visio

Education

2018-2020 — **M.Sc. Electrical Engineering (Specialization: Control & System Engineering)**
- King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia
- CGPA 3.857/4.0

Thesis: *Intelligent Model Predictive Torque Control of Induction Motor*

2016-2017 — **M.Sc. Electrical Engineering (Specialization: Power & Control Systems)**
- University of Engineering & Technology, Lahore, Pakistan
- CGPA 3.63/4.0

Design Project: *Advance Direct Torque Control of Two Phase Symmetrical Induction Motor fed with B4 Inverter*

2009-2013 — **B.Sc. Electrical Engineering (Specialization: Electronics & Telecommunication)**
- University of the Punjab, Lahore, Pakistan
- CGPA 3.81/4.0

Thesis: *Wandering Autonomous Lifelike Behaviour Based Ground Vehicle*

2006-2008 — **F.Sc. Pre-Engineering**
- Punjab College of Science, Lahore, Pakistan
- Percentage: 85.18%

Professional Training & Courses

Today / October 2019 — **R Programming | Data Science Specialization, John Happkins University, Coursera**
- Introduction to R Programming
- RStudio for R programming
- Data Inferential Analysis using RStudio

RStudio | Excel | MATLAB

December / September 2019 — **ICS-460 | Introduction to Machine Learning, KFUPM, Saudi Arabia**
- Machine Learning and its Fundamentals
- Supervised, Unsupervised & Reinforced Learning
- Regression vs Classification Techniques
- Introduction to Deep Neural Networks
- Implementation of Machine Learning Algorithms using Jupitor Notebook

Jupitor Notebook | MATLAB | Excel

July 2017 / September 2017 — **The Data Scientist's Toolbox | Data Science Specialization, John Happkins University, Coursera**
- Introduction to Data Science
- Big Data Analytics

MS Word

Work Experience

Present
September 2019

Teacher Assistant, KFUPM, Saudi Arabia
EE-460 Power Electronics for Department of Electrical Engineering
Grader & Summary Class Instructor
- Assignment and quiz grader
- Project groups co-supervisor

MATLAB | MultiSim | PSpice | MAPLE | LaTeX

Present
September 2018

Researcher, KFUPM, Saudi Arabia
FACTS LAB for Department of Electrical Engineering
Graduate Researcher under Dr. Mohammed Ali Abido, working on
- Optimization of FCS-MPTC for Induction Motor
- Modular Hybrid Multilevel Inverters with Switched Capacitor Units

MATLAB | MultiSim | Simulink | dSpace | RTDS | LaTeX

May 2019
April 2019

Teacher Assistant, KFUPM, Saudi Arabia
Assitant to Dr. Umar Johar for Department of Electrical Engineering
Personal Assistant for Clerical Work
- Book Keeping of student records of past three years (2016-2019)
- Helper for academic petition forms

Excel | MS Word | Outlook

January 2017
December 2015

Site Engineer, Mughal Traders, Pakistan
Assistant to CEO Mr. Adnan for IT Department
- Preparing route planning and cost estimation
- Technical Advisor for site members and sub-contractors

Excel | Outlook | Soft Skills

Research Projets

Wandering Autonomous Lifelike Behaviour Based Ground Vehicle
2012 - 2013

WAR Ground Vehicle Demo

A behavior based wandering autonomous robot with six different behavior using subsumption architecture was made. For robot motor controls an expansion board for Arduino with L293D was used. It used ultrasonic sensor (HC-SR04) mounter on a servo motor for 270^o obstacle avoidance and as a base sensor to mimic the prey & predator behavior. Light dependent resistance (LDR) sensor was used to mimic the foraging behavior of mammals. State of charge (SOC) was maintained with the help of a solar panel whose reading was displayed on a 16-bit LCD. The robot uses two microcontrollers; one Arduino Leonardo to control the data flow between the embedded circuitry and motor control while the other one (Atmel 8051) for all sensor interface.

Proteus | Keil | Arduino IDE

Advanced Direct Torque Control of Four Switch Fed Two-Phase Symmetric Induction Motor
June 2018

Link to Publication

In this paper, a modified direct torque control (DTC) method for four-switch two-leg inverter, also known as B4 inverter, fed two-phase symmetrical induction motor is proposed. The presented technique shows a prospect of developing a similar DTC strategy of six-switch fed three-leg three-phase induction motor by emulation. With the help of suitable combinations of active intrinsic vectors of B4 inverter, enhanced torque dynamics as well as considerable reduction in torque ripple is achieved. Simulation results confirm the high performance of the proposed technique, which ultimately can very effectively be employed in automotive industry.

LaTeX | MATLAB | Simulink

A Chaos Based SVPWM technique for B4 Inverter fed Two-Phase Symmetric Induction Motor for THD & EMI improvement at Low Modulation Index
July 2019

Link to Publication

Based on chaos theory, a hybrid space vector pulse width modulation, Chaotic SVPWM, is proposed. The conventional SVPWM contains harmonic components with higher amplitudes around the switching frequency (fixed) whereas the proposed chaotic SVPWM is operated at chaotic period of the inverter thereby varying the switching frequency for the inverter. Because of this varying switching frequency, the peak value of harmonics got distributed over the output harmonics spectrum of the inverter, effectively suppressing the influence of harmonics and ultimately reducing the current/torque ripple of the induction motor. Furthermore, the proposed scheme is cost efficient, straightforward and can be used to suppress EMI characteristics of the inverter. The design methodology is based on a two-phase power system, but it can easily be extended for n-phase systems as well. The simulation is performed in MATLAB to validate this C-SVPWM control technique

LaTeX | MATLAB | Simulink | SPSS

Weighting Factors Optimization of Model Predictive Torque Control of Induction Motor Using NSGA-II With TOPSIS Decision Making 9 December 2019

Link to Publication

Model predictive control (MPC) is the result of the latest advances in power electronics and modem control. It is regarded as one of the best techniques when it comes to handling of nonlinearities in the intrinsic model of induction motor (IM). Conventional MPC utilizes weighting factors in the objective function that are tuned after rigorous experimental work which can be improved by utilizing the more mature intelligent optimization techniques like NSGA-II etc. In this study, the weighting factor optimization for the conventional MPC control of IM based on NSGA-II with TOPSIS decision-making criteria is studied. A control algorithm is designed, and an experimental test setup is made to obtain the results of this intelligent MPC which are compared with conventional MPC based on some performance indices like torque and flux ripple, switching frequency loss etc.

LaTeX | EndNote | MS Visio | CorelDraw | MATLAB | Simulink | dSpace Control Desk 4.5

Hierarchical Control of DC Motor coupled with Cuk Converter combining Differential Flatness and Sliding Mode Control - Not published yet December 2019

Under Review - Reviewer Comments Addressed

This paper, proposes a hierarchical control law for DC Motor fed by DC-DC power Cuk Converter. The control is divided into two parts. Firstly, the property of differential flatness associated with the mathematical model of the DC motor is studied to design a robust control that achieves the task of tracking the reference angular speed trajectory for the motor. It also gives the voltage profile ϑ which must be followed by the Cuk converter. The second independent controller, based on cascade control, is proposed for the Cuk converter, which allows the converter output voltage to follow the specified trajectory ϑ. Sliding mode control is used in the inner loop, whereas proportional integral control is used in the proposed cascade controller's outer loop. Numerical simulation of the hierarchical control technique is carried out in MATLAB/Simulink and results under parametric variation show robustness. Finally, a comparison is drawn with Buck converter fed DC motor to shows the effectiveness of using Cuk converter for angular speed trajectory tacking of a DC motor.

LaTeX | EndNote | MS Visio | CorelDraw | MATLAB | Simulink

An Overview of Sequential Learning Algorithms for Single Hidden Layer Networks: Current Issues & Future Trends- Not published yet June 2020

Under Review

In this paper, a brief survey of the commonly used sequential-learning algorithms used with single hidden layer feed-forward neural networks is presented. A glimpse at the different kinds that are available in the literature up until now, how they have developed throughout the years, and their relative execution is summarized. Most important things to take note of during the designing phase of neural networks are its complexity, computational efficiency, maximum training time, and ability to generalize the under-study problem. The comparison of different sequential learning algorithms in regard to these merits for single hidden layer neural networks is drawn.

LaTeX | MS Word | MS Visio | EndNote

A Novel Technique for Studying Chaos using Jerk Equation with Discrete Time Sine Map - Not published yet June 2020

Under Review

Over the past decade, chaotic systems have found its immense application in different fields which has led to the various generalized, novel and modified chaotic systems. In this paper, the general jerk equation is combined with scaled sine map, which has been approximated in terms of a polynomial using Taylor series expansion, for exhibiting chaotic behavior. The paper is based on numerical simulation as well as experimental verification of the system with four control parameters. The chaotic behavior of the proposed system is verified by calculating different chaotic invariants using MATLAB, such as bifurcation diagram, 2-D attractor, Fourier spectra, correlation dimension and Maximum Lyapunov Exponent (MLE). Experimental verification of the system was carried out using Op-Amps with analog multiplier.

LaTeX | MS Word | MATLAB | MS Visio | EndNote

GA based Adaptive Discrete-time Sliding Mode Controller for LCL Grid-Connected Inverter - Not published yet July 2020

Under Review

The development of a two stage cascade control strategy for single phase grid connected inverter with LCL filter based on inverter-side current is proposed to minimize both the grid current tracking error together with the current THD and also to overcome the system resonance introduced because of third order LCL filter. In the first part, a feedforward controller calculates the steady-state reference values for the system states at the steady-state operation with no external disturbance whereas, in the second stage an adaptive discrete-time sliding mode controller is used for disturbance rejection caused by parameter uncertainties etc. The proposed control approach also considers the nonlinear behavior of the pulsed nature of hard switching PWM modulator for the inverter. For the calculation of inverter-side reference values, the grid-side current is taken as in-phase to the grid voltage. MATLAB/Simulink simulation were performed to validate the faster dynamic response of the proposed control strategy under external disturbances and with parametric uncertainties. Also, the inverter current and the grid voltage are in phase at all condition with the same frequency, which improves the robustness of the system. Finally, RTDS was used to get the simulation results for comparison with MATLAB/Simulink based results and to further verify the effectiveness of the proposed methodology.

LaTeX | RTDS | Simulink | MS Word | MS Visio | EndNote

Artificial Bee Colony Optimized Self-tuning PI Speed Controller for FCS-MPCC of Permanent Magnet Synchronous Machines - Not published yet July 2020

Under Review

Permanent magnet synchronous machines are popular option for different applications due their high efficiency and performance. Currently, the difficult task of controlling this machine is done using vector control techniques like field-oriented control, commonly known as FOC. While the most notable advantage of FOC is its reliability, it has significant limitations in the tuning of PI gains and constraints handling. However, newer control technique such as model predictive control have offered great improvements in the area of machine drive control. Although the predictive control technique comes with its increased computational load but, it is somewhat mitigated by powerful microprocessors currently available. In this paper, an artificial bee colony optimization based self-tuning PI speed controller of finite control set model predictive current control for PMSM will be studied. Additionally, the designed optimized self tuning PI regulator performance will be compared to classical PI under the same test in the MATLAB/Simulink environment.

LaTeX | MS Word | MATLAB | Simulink | MS Visio | EndNote

Important Coursework

- Convex Optimization
- Evolutionary Optimization
- Intelligent Control
- Adaptive Control
- Stochastic Process
- Machine Learning
- Digital Signal Processing
- Linear Control Systems
- Advance Power Electronics
- Design of Digital System

Achievements

- Got 1st position in the of Punjab Group Colleges during the session 2006-08
- G ot 4th position in B.Sc. Electrical Engineering at university level during the session 2009-13
- HEC Indigenous Scholar for my postgraduate studies at UET Lahore
- Got 4th position in M.Sc. Electrical Engineering at university level during the session 2016-17
- Graduate Scholar at KFUPM, Dhahran, Saudi Arabia
- Won Travel Grant from IES for ISIE 2018 conference.

Languages

Urdu ●●●●●
Punjabi ●●●●●
English ●●●●○

Forces

- Passionate
- Motivated
- Autonomous

References

Mohammed Ali Abido
Distinguished Professor, KFUPM
@ mabido@kfupm.edu.sa
+966 3 8604379

Mahmoud Kassas
Associate Professor, KFUPM
@ mkassas@kfupm.edu.sa
+966 50 812 4254

Khalid Mehmood-ul-Hassan
Professor/Chairman, UET, Lahore
@ kmhasan@uet.edu.pk
+92 321 4092817