CURRICULUM VITAE

Dr. Umesh Kumar Soni

Ph.D. (Power Electronics & Drives), M.E. (Control System), B.E. (Electrical Engg.)

Contact: +91 7379650440 **E-mail:** soni.umesh9@gmail.com, ree1456@mnnit.ac.in

Present Address: H. No. 578, Ward No. 29, Near Lok nayak School, jaiprakash marg, panden-Tola, Rewa, MP

About Myself:

- BE in Electrical Engineering from JEC Jabalpur in 2003.
- ME from JEC Jabalpur in 2012 in Control System Specialization.
- PhD from MNNIT Allahabad in 2020 in Electrical Engg. with Specialization in Power Electronics and Drives.
- Area of interest: Power Electronic Converter Control, high speed Superefficient Motors and Controls, Wireless Electricity, Robotics control, Neuro Fuzzy Control, Identification, Solar, Renewable Energy Harvesting and Integration, Wind Power, Biped Robot, robotic vehicle navigation, and Image Processing for navigation.
- Presently working on multiport DC-DC isolated and non-isolated converter topologies, partial power processing, cell balancing, resonant DABs for HESS, BESS, EV charging and High speed drives for Drones and CNC machines.
- Actively looking for an opportunity to utilize my technical skills and knowledge in an organization with team-work culture.

Research Experience: 5.5 years *(during PhD)*

- **Hands on Experience** in hardware circuit development, simulation, sensor module & controller designing, hardware implementation, prototype development and testing especially power electronics devices, converters and drives.
- Fully exposed to converters design, component selection, analysis and others requirements in Power Electronics Converters, DC-AC inverters, AC-DC converters, DC-DC unidirectional and bidirectional converters High frequency resonant converters, PFC, bridgeless topologies and Inverters for sinusoidal and Trapezoidal permanent magnet machines, Multilevel converters, sensored and sensorless BLDC motor control. Circuit development for healthcare sensors, robotic rehabilitation and Physiotherapy and sensors for environmental monitoring.

Embedded Hardware & Software Skills:

- **MATLAB/ Simulink based operation of Arduino, C2000 and NI controllers** for monitoring and control of Power Electronics Systems.
- **Intelligent Controllers application and Hardware Impelmentation:** especially Fuzzy, ANFIS and NN in hardware using realtime controllers with MATLAB.
- **Texas Instruments C2000 Controllers:** TMS320F28069M and TMS320F28379D with Code Composer Studio CCSV4 and CCSV5
- **LABVIEW**: for Real-time control of power electronics Hardware with NI controllers (PCI 6221, NI-USB6008, NI-ELVIS)
- **NI-PCI 6221 DAQ and C2000 controller Simultaneous Operation:** for monitoring and control of real-time power electronics hardware using two controllers i.e. at the same time.
- **FPGA/Xilinx:** Simulation & Modeling of power electronics control circuit in MATLAB using Xilinx Blocksets/System Generator for hardware interfacing and operation in FPGA based controllers.
- **ANSYS Maxwell** Electromagnetic Simulation & Analysis
- **PSCAD, PSPICE, PROTEUS & PCB** design & development.

H-Index: 4 (Google Scholar)

Citations: 63 (Google Scholar)

Publications: 22 *(Details in Annexure)*

Journal	SCIE	02
	Scopus + ESCI	02
	Scopus only	02
	Communicated (SCI)	01
	ISSN(non-peer reviewed)	02
Book	Lambert Publication	01
Book Chapter	Scopus	01
Conferences	Scopus indexed IEEE International	08
	IRnet International (non-IEEE)	01
	non-indexed National	02

Industrial Experience: 2.5 years

Industry Experience	**Period**		**Employer/Location**	**work profile**
	From	**to**		
Electrical Engineer	05-01-2005	12-03-2005	**Global Engineering Services**, Indore, (MP), 'A' class electrical contractor Licenced 23/1414A	**O & M** at Site 'Bharat Gas, LPG Bottling Plant' (A unit of BPCL) Pithampur,Sector-4, Dhar (M.P.)
GTE	01-08-2005	25-08-2007	**Satna Cement Works**, Satna (A unit of Birla Corporation Ltd.).	**Electrical O & M** in Sagmaniya Mines Plant.
Site Engineer	04-12-2007	15-02-2008	**Variscon Engineering Services** Pvt. Ltd. S-94, Okhala, Phase-II, New Delhi.	**Interior Electrification**, of Multistoried Building (INOX Tower Noida sector 16, Film City

Teaching Experience: 7 years

Experience	**Period**		**Location/Detail**
	From	**to**	
Pre-PhD Teaching	01-08-2008	30-06- 2009	Govt. Rewa Engg. College (REC), Rewa (MP), India
	25-01-2012	11-08-2014	Jawarlal Nehru College of Technology (JNCT), Rewa (M.P.) India.
	12-08- 2014	15-12-2014	EED, MNNIT Allahabad (UP) India.
Post-PhD Teaching	29-12-2020	30-06-2023	EED, MNNIT Allahabad (joined from 17-11-2020) [NIRF ranking 49 in 2023]
Post PhD teaching	15-02-2024	Till Present	AKS University, Satna, MP

Other Achievements: *(see details in Annexure)*

Fellowship 52500/- PM (Vishveshwaraya PhD Scheme of Digital India Corp. MEITy)	1
Awards	2
Intern Program/Training/FDP/STC Conducted	1
Technical/Expert/Invited Lecture	4
Trainings, Interactive Sessions and Short Terms Courses Attended	12
Appreciations:	12
Guest Edited Special Issue/ Journals	1

Special Interviews Attended:

Austrian Institute of Technology(AIT), *Vienna, Austria*	**Position**: Research Engineer for Electric Vehicle Power Electronics **Interviewer:** Plassnegger Bernd, Scheuermann Peter, Yagüe-Marti Cecilia, **Date:** Nov 20, 2023
Silicon Austria Lab, Graz, Austria	**Position:** Scientist Power Electronics – Magnetics Design for Power Converters **Interviewers:** Langbauer Thomas, Vollmaier Franz, Bäck Elisabeth **Date:** Jan 16, 2024

Research Profile Links:

Orcid	**https://orcid.org/0000-0002-2418-7784**
LinkedIn	https://www.linkedin.com/in/umesh-kumar-soni-71313032/
Web of Science	https://www.webofscience.com/wos/op/peer-reviews/summary
Scopus	https://www.scopus.com/authid/detail.uri?authorId=57193984606
Research gate	https://www.researchgate.net/profile/Umesh_Soni4?ev=hdr_xprf
Google Scholar	https://scholar.google.com/citations?view_op=list_works&hl=en&hl=en&user=ol3Gc_gAAAAJ
Youtube	My Technology channel "**Engineering and technology world**" https://www.youtube.com/watch?v=bv9H80opIGA&list=PLKtIc7EHwHZcT4nXApxWXaMEqJACFaNhy

Educational Qualification Details:

Course	Year	Subject/Specialization	Institute/ Board/University	Percentage /CPI	Division
10th	1995-1996	Hindi, English, science, Social science, maths	Hr. Sec. School Gauri, Tahsil hanumana, Rewa (MP) / MP board, Bhopal	69.60	First
12th	1997-1998	PCM	Hr. Sec. School Gauri, Tahsil hanumana, Rewa (MP) / MP board, Bhopal	72.67	First
B.E.	1999-2003	EE	Govt. JEC Jabalpur / R.G.P.V. Bhopal MP	65.06	First
M.E.	2009-2011	EE./ Control System	Govt. JEC Jabalpur / R.G.P.V. Bhopal MP	73.83	First
Ph.D.	2015-2020	EE/ Power Electronics & Drives	Motilal Nehru National Institute of Technology Allahabad (UP)	8.5 CPI	First

Projects/ Dissertation /Thesis in courses :

Course	Project/Thesis Title	Detail
Ph.D. Project/ Thesis Open 14-01-2020 Oral Exam 24-12-2020 Awarded 31-12-2020	*"Sensorless Control of High Speed BLDC Motor Drive with Torque Ripple Minimization"*	Supervisor: **Dr. Ramesh Kumar Tripathi** Professor, EED, MNNIT Allahabad, 2020
Minor Project in PhD Coursework	*"Two Phase unipolar and Bipolar Operation Using Multiconfiguration Stator and Operation with LABVIEW"*	Supervision: **Dr. Ramesh Kumar Tripathi** 2016
Short Time PhD Project	*"The Tesla Coil Based Wireless Electricity"*	Supervision: **Dr. Ramesh Kumar Tripathi** 2016
Dissertation in M. E. (Submitted on 29-12-2011.)	*"Optimal Navigation of Multisensor Mobile Robot in Real Environment using MSANFIS"*	Supervision: **Dr. Hemant Amhia,** JEC Jabalpur, 2011
Major Project in M.E.	*"Six Axis Robot"*	JEC Jabalpur (govt.),2010
Major Project in B.E.	*"Phase Controlled Battery Charger"*	JEC Jabalpur (govt.),2003
Guided B. Tech. Projects	*Low Inertia Low Cost In-house Wind Electricity Generator* by Sonali Dixit 0306EX101050) and Group (9 students),	JNCT, Rewa, MP, (2013)
	Embedded Based Power Tempering Detection System by Akhand Pratap Shukla and Group (6 Students),	JNCT Rewa, MP. (2013)
	Footstep Based Energy Harvester Using High Speed Synchronous generators for Power bank Application by Rahul Singraul & others	AKS University Satna (2024)
	Hall Effect Based Bipolar Current sensing Module for Monitoring and Controller Interface, Ajad Maravi & others,	AKS University Satna (2025)

Personal Detail:

Name: **Umesh Kumar Soni** S/O	**Marital Status**: Married
Father's Name: shri. Ramkishor Soni (Late)	**Language Known:** English, Hindi.
Date of Birth: 22 July 1981	**Nationality**: Indian
Gender: Male	**Hobbies**: Water color drawing, Singing, Writing Poems

Annexure

List of Publications

Book

1. **Umesh Kumar Soni**, "Driverless Autonomous Guided Robotic Vehicle with MS-ANFIS", Lambert Academic Publishing, ISBN 978-613-8-38653-7, pages 148, 2018.

International Journals:

2. **Umesh Kumar Soni, Prof. Ramesh Kumar Tripathi,** "High Load Fast Startup Sensorless Control of Wheel BLDC Motor with Line-to-Line Back EMF Extraction Using Least Pth-Norm IIR Digital Filter," J. Circuits, Syst. Comput., Vol. 29, Issue No. 09, July 2020, 2050145-1 to 2050145-39, (SCIE) IF 1.393. [First published as online ready on 19 November 2019] **(SCIE)**
3. **Umesh Kumar Soni, Prof. Ramesh Kumar Tripathi,** "Sensorless Control of High Speed BLDC Motor using Equal Area Criterion Based Precise Commutation Scheme with Fuzzy based Phase Delay Compensation" Published in International Transaction in electrical Energy Systems, Volume 31, Issue 9, July 2021, Wiley Publications. [First published 11 July 2021] **(SCIE) IF 2.860**
4. **Umesh Kumar Soni, Prof. Ramesh Kumar Tripathi**, "Recent Challenges and Advances in Sensorless Control of BLDC Motors", Recent advances in Electrical and Electroncs Engineering, Volume 14, issue 1, pp. 90-113, 2021**.** [First Published on 24 August 2020] **(Scopus and ESCI)**
5. **Umesh Kumar Soni, Prof. Ramesh Kumar Tripathi,** "A low-power prototype of contactless field power controlled BLAC and BLDC motors", Wireless Power Transfer, Volume 7, issue 2, September 2020, pp.106-115, Cambridge University Press**.** [First published as FirstView on 13 August 2020] **(Scopus and ESCI).**
6. **Umesh Kumar Soni, Maloth Naresh, Prof. Ramesh Kumar Tripathi,** "Performance Analysis of Sensorless Controlled BLDC Motor Using Direction Independent U-function" International Journal of Applied Engineering Research, vol.13, issue 7, pp. 5223-5235, 2018. **(Scopus)**
7. **Maloth Naresh, Umesh Kumar Soni, Prof. Ramesh Kumar Tripathi,** "Power Flow control and Power Quality Improvement in DFIG based Wind Energy System Using Neuro Fuzzy System" International Journal of Applied Engineering Research, Vol.13, Issue 7, pp. 5236-5243, 2018. **(Scopus).**
8. **Umesh Kumar Soni**, "Behavior Integration via MS-ANFIS for realistic Navigation of Multisensor Mobile Robot in real Environment" published in International Journal of Scientific and Research Publications (IJSRP), ISSN No. 2250-3153, volume 3, issue 9, September 2013.
9. **Umesh Kumar Soni** "Pitch Control of CFVWS Turbine Using PID Controlled Internal Pitch Loop" International Journal of Electrical, Electronics and Computer Systems (IJEECS), ISSN (Online): 2347-2820, Volume -3, Issue-3 2015.

International Edited Book Chapter

10. **Umesh Kumar Soni, Maloth Naresh and Prof. Ramesh Kumar Tripathi,** "FPGA Based Speed Control and Back EMF Extraction from Line Voltages using IIR digital Filters for BLDCM",

Advances in Power and Control Engineering (LNEE Springer), volume 609, pp 41-62, 2020. **(Scopus)** [proceeding of International conference GUCON 2019]

International Conference Papers

11. **Umesh Kumar Soni and Prof. Ramesh Kumar Tripathi**, "Two Phase Bipolar and Two phase Split unipolar Operation of PMSM with Multiconfiguration Stator Using LABVIEW" 2017 IEEE 4th International Conference on Power, Control and Embedded Systems (ICPCES 2017), ISBN: 978-1-5090-4426-9, 9-11 March 2017, MNNIT Allahabad, UP, India**.(Scopus Listed)**
12. **Umesh Kumar Soni and Prof. Ramesh Kumar Tripathi, "**Novel Back EMF Zero Difference Point Detection Based Sensorless Technique for BLDC Motor" Proceedings of IEEE Industrial Electronics Society's 18th International Conference on Industrial Technology (**ICIT 2017**) 22-25 March 2017, Canada, ISBN: 978-1-5090-5320-9 , pp.330-335**.(Scopus Listed)**
13. **Umesh Kumar Soni and Prof. Ramesh Kumar Tripathi, "**Novel Estimated Back EMF ZDP based Sensorless Controlled BLDCM Using Unknown Input Observer", Proceedings of 2017 International Seminar on Intelligent Technologies and Its Applications (ISITIA-2017), ISBN: 978-1-5386-2706-8, pp. 205-210, held on 28-29 August 2017 at Indonesia, (**Scopus Listed)**
14. **Umesh Kumar Soni and Prof. Ramesh Kumar Tripathi, "**Four Quadrant Torque Ripple Free Operation of BLDC Motor by Virtual Hall Signal Transitions at Phase Back EMF ZDPs" 2017 IEEE PES Asia Pacific Power and Energy Engineering Conference (APPEEC), 8-10 November 2017, Bangalore, ISBN: 978-1-5386-1379-5, page No. 1-6,.**(Scopus listed)**
15. **Umesh Kumar Soni and Prof.Ramesh Kumar Tripathi**, "Direction Independent U-function based sensorless Control of BLDC Motor" Proceedings of 12th international Conference on Industrial and Information Systems (ICIIS) 2017, ISBN: 978-1-5386-1676-5, 15-16 December 2017, Sri Lanka. **(Scopus listed).**
16. **Umesh Kumar Soni and Prof. Ramesh Kumar Tripathi,** "BLDC Motor Specific PCOTLC Converter with Active Current Waveshaping for Torque Ripple Minimization" 2018 IEEMA Engineer Infinite Conference (eTechNxT), 13-14 March, Noida, UP, India**.(Scopus listed)**
17. **Umesh Kumar Soni and Prof. Ramesh Kumar Tripathi**, "Back EMF Noise Band based Initial Startup Scheme for Sensorless Operation of BLDC drive", Proceedings of IEEE international conference on Innovation and Advanced Computing Technologies (i-PACT 2019), ISBN: 978-1-5386-8190-9, 22-23 March 2019, VIT Vellore, India. **(Scopus listed).**
18. **Umesh Kumar Soni** "Power Quality Improvement Using PID Based Reference Voltage Compensation with STATCOM" Proceedings of 2013 IEEE International Conference on Green Computing, Communication and Conservation of Energy (ICGCE 2013), ISBN: 978-1-4673-6126-2, pp. 397-403, RMD Engineering College, Tamilnadu, India, 12-14 December, 2013. **(Scopus Listed)**
19. **Umesh Kumar Soni, Hemant Amhia** "Multistage ANFIS in Robotic Navigation Problem" published in the Proceedings of International Conference on Artificial Intelligence and Soft Computing (ICAISC) 2011, pp. 222-225, IIMT Bhuwaneshwar, Orissa, India 9- 10 April 2011.

National Conference Papers:

20. **Umesh Kumar Soni, Hemant Amhia** "Fuzzy Rule Simplification Using Multistage ANFIS in Robotic Obstacle Avoidance", presented in National Conference on Energy Conservation for

Sustainable development, held at Gyan Ganga College of Technology Jabalpur (MP) ,India, 18-19 Feb.2011.

21. **Umesh Kumar Soni, Hemant Amhia** "The Overview Of New Trends In Hybrid Artificial Intelligence And Control Techniques", presented in National Conference on IT-Contemporary and Future Technologies for Social Change, ITM universe, Gwalior, 11-12 March 2011.

Paper in process ***(hardware based)***

22. **Umesh Kumar Soni and Prof. Ramesh Kumar Tripathi** "Development and Analysis of Footstep based Energy Harvesting Scheme with Improved Design of Peizoelectric Pressure Plate" submitted.

Intern Program/Training/FDP/STC Conducted:

- Convener in Four week Internship Programme on "**Embedded System Control & IoT with Arduino (ESCIA-2023)"** July 03 – July 28, 2023, organized by EED, Motilal Nehru NIT Allahabad.

Technical/Expert/Invited Lecture:

- Delivered two days invited lecture from 23.01.2017 to 24.01.2017 on the given topic "**Selection of Ratings of Electrical Equipments, Safety and Protection Devices**" In a quality improvement program for Junior Engineers of MES, held at **Military Engineering Services (Garrison Engineer), Military Cantonment** Allahabad (UP), India
- Technical Lecture on "**New Era of Renewable Resources and Energy Harvesting**" in Five days Short Term Course on "Power Elecronics and Renewable Integration for Consumer Application", PERICA-2020 orgranized by EED, MNNIT from 16-09-20 to 20-09-20.
- Technical Lecture on **"Artificial Intelligence in Power Converters, Drives, Renewable and Robotics"** in five days short term course on Power Electronics Interface and Drives for Electric Vehicles (PEIDEV-2021) held on 13-11-2021 to 17-11-2021 in EED, MNNIT Allahabad.
- Technical Lecure on **"Real-time Problems in Power Electronics Hardware Implementation and Controller Interface"** in 3rd- one week short-term course on 'Advances in Power Technologies (APT)-2021" 20-24th December, 2021, organized in EED, MNNIT Allahabad.

Trainings, Interactive Sessions and Short Terms Courses Participated

- Three days Interactive Training in Quality Woven Sacks Pvt. Ltd. Rewa (M.P) as partial requirement of degree of Master of Engineering in Electrical Engineering with specialization in Control System.
- One day Learning program in FPGA based Wavect Motor Drive System for Servo /PMSM motors by Entuple Technologies Pvt. LTD, organized in Virtual Instrumentation Lab, MNNIT Allahabad.
- IEEE–International Conference on Power, Control and Embedded Systems, MNNIT, Allahabad.
- short term course on "Power Electronics and its Control PEC 2015" in MNNIT Allahabad, from 27-31, January 2015.
- Short Term Course on "Electric Power Quality: Analysis and Improvement (EPQAI 2015)" in MNNIT, Allahabad (UP), from 21-25 january 2015.
- Short Term Course lectures on " Soft Switched and Resonant DC-DC converter topologies and their control(161018D03)" delivered by Prof. Praveen K. Jain, Queen's University Canada, held at MNNIT Allahabad from 19-23 December 2016 encouraged by GIAN, India.

- Short Term Course on Advanced Power Technologies (APT) 2017, held at MNNIT Allahabad on 15-20 May 2017.
- NAMPET Phase-II Short-Term Course on Advances in Power Electronics and Renewable Energy Systems, held at MNNIT Allahabad on 21-23 July 2017.
- Training of 17 days in "FPGA based control strategies for motor drives" at Entuple Technologies, Bangalore.
- Short Term Course on "Modelling and Simulation of Renewable Energy Systems" organized by NITTTR, Chandigarh at MNNIT Allahabad during 28th May to 1st June 2018.
- workshop on "Use Hindi language in Research Papers and Importance" Hindi Cell, Chemistry Department, MNNIT Allahabad, 28-09.2018.
- Short Term Course on "Unpacking E-Mobility Technologies in India" organized by EED, MNNIT from 20-11-2021 to 24-11-2021, under Scheme for Promotion of Academic Research Collaboration (SPARC).
- Short Term Course on "30 days master class on Internet of things" from 25-12-2023 to 24-01-2024 at Pantech e-learning pvt. Ltd.
- PMRF course "Design of Controller for power converter Application" 02-12-2023 to 09-02-2024 by Institute of Smart Structures and Systems, Department of Aerospace Engineering, IISC Banglore.
- PMRF course "Design of Controller for Advanced power converter Application" 24--08-2024 to 16-11-2024 by Institute of Smart Structures and Systems, Department of Aerospace Engineering, IISC Banglore.
- workshop on ""Research Publication Analytics" held in MNNIT Allahabad by Elsevier.
- FDP on "AI and ML in Power System" organized jointly by NIT Durgapur and NIT Warangal on 21st april 2025 to 1st may 2025.

Activities, Certificates and Appreciations:-

- program organizing committee member in workshop on ethical hacking and security.
- best Project Guidance for the project Low Cost Low Inertia In-house Wind Electricity Generator.
- Best Project for project title "Footstep based Energy Harvester using High Speed Synchronous Generators for Power Bank application" in Department of Electrical Engineering, AKSU Satna.
- Hospitality committee student member in 6th international and 43rd National Conference on fluid mechanics and fluid power (FMFP-2016) held in MNNIT Allababad, UP, from 15-17 December 2016.
- Volunteered the 4th IEEE International Conference On Power, Control and Embedded Systems (ICPCES- 2017) held at MNNIT Allahabad, 9-11 March 2017.
- Volunteered SCES 2019, held at MNNIT Allahabad.
- Member, "Nasha Mukti Samiti", EED, MNNIT Allahabad.
- Coordination UPCON-2020 held at MNNIT Allahabad, 27-29 November 2020.
- Reviewed papers in International Conference PARC 22, GLA University, Noida, UP, India
- Reviewed papers in International Conference SCES 2022 held in MNNIT Allahabad.
- Coordination in International Conference ICPCES 2023 held in MNNIT Allahabad on 06-08, Jan 2023.
- Reviewed the papers in SCES 2024 held in MNNIT Allahabad in 21-23 June 2024.

Academic Visits:

- Thermal power plant Meza, UP.
- Tons Hydel power plant, Sirmour (2024)

Positions Held:

- HOD Electrical Engineering , JNCT Rewa till 25 august 2012
- Vice Chair IEEE Student Branch MNNIT , IEEE UP Section (for the year 2015-2016)
- Track Chair "Power Energy & Control" track in IEEE sponsored 7th Student Conference in Engineering and Systems (SCES 2022) organized by MNNIT Allahabad on July 1-3, 2022.

Award/Fellowship by Academic Bodies

- Fellowship of INR 52500/- per month (for 5 years) from Vishveshwaraya PhD scheme, MEITY, Govt. of India from 22-01-2015 to 21-01-2020.
- IEEE PES Banglore Chapter- Registration fee Refund of selected Papers for APPEEC 2017, Bangalore worth INR 9440.
- Asian Development Bank (ADB)- Registration of Selected Papers of ICIIS 2017, Sri-Lanka without Fee of INR 12000.

Professional Body Membership:-

***Lead Guest Editor*:** Special Issue on "**Advances in Power, Control and Embedded System"** of International Journal of Energy and Power Engineering, Science PG publishing group

IEEE Memberships for 2015-20 (Membership No. 92805688)

- Member of Power and Energy Society
- Member of Industrial Electronics Society

Editorial Board Membership/Reviewer

- **American Journal of Electrical Power and Energy Systems**, science publishing group, USA, ISSN online 2326-9200, ISSN print 2326-912X, http://www.sciencepublishinggroup.com/j/epes
- **International Journal of Electrical Electronics and Computer Science**. (IJEECS, IRD India) ISSN (online): 2347-2820. http://www.irdindia.in/journal_ijeecs/editorial_board.html
- **International Journal on Advanced Electrical and Computer Engineering** (IJAECE). ISSN(Online): 2349-9338, ISSN(Print): 2349-932X, http://www.irdindia.in/journal_ijaece/editorial_board.html
- **International Journal of Energy, Power Electronics and Drive Systems , IJPEDS (Scopus)** ISSN: 2088-8694, http://ijpeds.iaescore.com/index.php/IJPEDS/about/editorialTeam
- **International Journal of Advanced Computer Research (IJACR) (Scopus), ISSN (Print):2249-7277, ISSN (Online):2277-7970.** https://accentsjournals.org/editorialBoard.php?journalsId=103

Subjects / Topics of Class Lectures:

EEE Subjects: Electrical Machines I-II, Generalized Theory of Electrical Machines, Power System Protection, Power Electronics and Drives, Intelligent Control of Drives, Robot Modelling and Control, Advanced Power Electronics, Control System, Measurement, Basic Electrical, Resonant and Soft Switched Converters, Generation Transmission Distribution, Mines Electrical Engineering, Signal & System, Advance power Electronics Lab, Simulation Lab, Drives lab,

Microprocessor & Computer Organization Theory and Lab. Electric Drive and Renewable Energy Lab, Control Technique in Power Electronics.

CSE/EEE/ECE Subjects: Signal & System, Soft Computing, Neuro-Fuzzy Control System and Optimization Techniques, Microprocessor & Computer Organization Theory and Lab, Digital Electronics, IOT and Embedded system control, Virtual Instrumentation, Electronic devices and Circuits (EDC)

Verified Peer Reviews:

ICIT 2017 Canada	
American Journal of Electrical Power and Energy Systems science PG	2
International Journal of Advanced Computer Research	
International Journal of Advanced Computer Engineering	
Journal of Mechatronics and robotics	4
IEEE Transactions on Industrial Electronics	6
IEEE Transactions on Transportation Electrification	3
Energy Conversion and management, Elsevier	1
PARC-2022	5
ICPCES 2023, SCES-2022,SCES-2024 (IEEE Conferences in MNNIT Allahabad)	15
Electric Power Components and Systems, Taylor and Fronsis	1
International Journal of circuit theory and Applications	3
IEEE Access	1

Declaration

I feel my profile is suitable as Post-doctoral Fellow/Research Associate/Power Electronics Engineer/Electric vehicle design engineer/Research Engineer/Hardware development Engineer/Application Engineer in organizations dealing with Drones, EVs, Power Electronics, Drives, Embedded systems, Application development fields and Renewable Energy are welcome.

I hereby declare that the information furnished above is correct to my knowledge and belief. I assure you once your organization provides the opportunity to implement my knowledge & skill; I will prove to be an asset to the organization.

Sincerely Yours

(**Dr. Umesh Kumar Soni**)

Research Statement

Past Work:

- I had been working on the sensorless operation of BLDC motors and PMSMs, torque ripple minimization schemes, rectangular current profile improvement in 120 degree commutation of BLDC motor, PWM strategies for minimizing torque ripple, noise elimination and freewheeling time minimization. The zero speed startup and rotor initial position detection has also been a major part of my research and developed low current fast startup scheme valid for low as well as high speeds.
- For the fast reversal of the rotor a unique function (U-function) was developed which provided the same commutation signals as the real hall sensor during the startup and reversal as well. Commutation angle control scheme was also proposed in order to achieve desired torque and current profile for torque ripple minimization.
- During the high speed operation, BLDC motor efficiency may reduce if phases are not energized with accuracy. In case the commutation timing is not accurate, the resultant high spikes current and high ripple in torque can degrade performance of the drive. Therefore Fuzzy based scheme of phase delay correction in extracted back EMF and Equal Area criterion based commutation precision correction was also proposed.
- Phase current overlap time limiting cell (PCOTLC) converter using three Freewheeling phase current Limiting Transformers, was proposed in my research to equalize commutation current slopes, minimize freewheeling time, minimize phase current overlap time without any PWM controller and current comparisons and current sensing.
- Apart from above control schemes, A contactless field power controlled BLAC and BLDC motor was proposed and experimentally validated in which the Field power was provided to the rotor using High frequency resonant IPT scheme.
- I have a variety of experience in Hardware implementation using DSPs, Realtime controllers like PCI 6221 and Wavect FPGA controllers interfaced with MATLAB Simulink. I also worked on NI-PCI 6221 realtime controller interfaced with LABVIEW platform during initial stage of my research and operated the initially developed Multiconfiguration Stator Motor.
- I operated two controllers at the same time using the same PC and Same Simulink model i.e. one for monitoring (NI-PCI 6221) and other (DSP) for control. For this, I had developed a switch array system which connected the driver circuit to controller either from Ni-PCI 6221 or DSP at a time. This was done to avoid the shorting of grounds in NI-PCI 6221 while the grounds in DSP are common. I also Interfaced Adriuno and NI-6008 kit with MATAB/Simulink platform for initial learning. The development of current sensors and voltage sensors with design of Three Phase Bridges, buck and boost converter module was also done. The FPGA controller was used for operation of BLDC motor in close loop with Encoder for speed feedback and the extraction of back EMF was studied.

Future Research Plan:

- To introduce Fast boost VAM modulation circuit in order to provide very high voltage pulses during the commutation instant so as to reduce the overlap time and torque ripple.

- To extract the back EMF of BLDC in which I can identify the back EMF directly without use of any filtering circuit which generates delays and commutation errors. As the filtering circuit has increasing attenuation and delays with increasing speed and fundamental signal frequency, the spikes and distortion in the terminal voltage due to freewheeling diode conduction has to be eliminated without use of filtering means.
- Improved initial position schemes for identifying the correct rotor position during stand still and also during reversal is essential to provide fast speed responses for EVs.
- To introduce the improved controller and converter scheme for bidirectional power flow in battery storage system from EVs using BLDC motor Drives.
- Road transport based electricity harvesting integration and control scheme with the development of improved and highly efficient power generation modules using conventional and nonconventional (such as piezoelectricity and triboelectricity) techniques. A part of work I have realized to test the level of energy harvesting in which a 1 sq feet module is designed. This will provide enormous amount of free energy proportional to population which can work as source for wireless charging stations. These sources will be working in integration with solar system in order to balance the demanded load power with optimal power flow between the Grid, solar, FC, and other schemes well connected with energy Harvesting and storage system.
- Development of Hardware of the PCOTLC converter (I already proposed) for the phase current overlap time limit without need of any rectangular current generator and PWM scheme and investigate the impact on efficiency in BLDC motor operation.
- Development of IPT/CPT based contactless field power fed High speed BLDC motor for high Power application in industry and EVs.
- I plan to implement and improve the conventional Multilevel converter schemes, DAB schemes, Power factor correction schemes, high efficiency ripple free converters, high boost DC-DC converters.
- The single stage multi-input multi-output converters feeding AC as well as DC power in order to enable the integration of non-conventional energy sources is also my research interest.
- Efficiency improvement in the converters with reduced number of switches and control schemes enabling wide range fast response and accurate reference tracking capability are major objectives in the field.

Details of Industrial Experience

Bharat Gas (LPG Bottling Plant), unit of BPCL

Job Profile: Operation & Mainyenance:

Electrical maintenance, operation and erection, panel designing, regular preventive maintenance record management, inventory. Maintenance of Cooling system, fire system, Safety system, DG sets of 250 and 125 KVA, Battery management, FLP panels, flood lighting, Corousal System maintenance, Automatic Pneumatic relays and counters panel fault rectification.

Satna Cement Works (Birla Corporation)

Company Profile: Birla Corporation Ltd is a multiproduct, multi interest 1200 cr plus conglomerate, plays significant roles in the cement, jute products, PVC floor covering ,Carbide , Industrial Gases, Auto trims and steel casting industries. It has six cement plants two each in Satna, two in Chanderia (Rajasthan), one in Durgapur and one in Raibareli (U.P.).

Job Profile: Operation and Maintenance:

Schedule & Monitoring the execution of all the jobs at site, preparation of Daily, weekly, monthly, half yearly, yearly activity plans. Monitoring the job progress, constant upgrading and revision of work, monitoring the quality of the work at the site, inspection reports review and documentation control e.g. purchase indent ,annual return ,log sheets, history sheets etc.

Preventive maintenance of two H.T. overhead lines of 6.6 kv each 4.5 m long. 500 TPH & 800 TPH crushing Plants, including two motors of 900 kw and NGEF make, ESP and Bag Dust Collector (325 KW IM), Welding Generators and Welding Transformer. Punch Grid Resistance Panel for Starting of 350 KW motor, ASEA breaker (H.T.MOCB).H.T. Capacitor, L.T. motors & Oil immersed rotor starters, L.T. OCB's &ACB's of Cuttler Hammer &English Electric & Easun Ottermill, isolators , transformers rated 1000 KVA,750 KVA & 315 KVA, 6600/440 delta to star, colony &street lighting, OTM DG sets of 15 KVA for plant power and mines illumination. Ropeway indication and communication lines , welding generator , EOT cranes and Thruster brakes (20 ton & 40 ton), Earthing e.g. Plate, Pipe, BFC earthing, workshop machines MCC & PCC, Batteries & Water Pumps, DC Drive of 203 KW,H.T. & L.T. cable laying and jointing. Erection and equipment sizing, fault detection & rectification, predictive maintenance.

Variscon Engineering Services Pvt. Ltd.

Company Profile: Variscon Engineering Services Pvt Ltd. is a multi-project Company and executes its projects all over India in the field of interior electrification of multistoried buildings e.g.Banks , Hospitals, MNCs, Malls & Business centres.

Job Profile: Multistoried Building Interior Electrification:

Project site: INOX tower, Noida, Sector 16-A, Film City. Post Held: Site Engineer (Electrification)

Experience related with Interior Electrification of multistoried buildings e.g. Banks, Hospitals, MNC's, Malls & Business centres comprising AHU, Access systems ,Fire Alarm Systems, Music System, Indoor & outdoor A.C. units, plasma camera ,projectors etc.

Interaction with Client, Architects & Project Coordination deptts. Expert in panel SLD, Earthing SLD, power and lighting drawings, fire and music system drawings. Material and Manpower Management.