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Development of Analytical Models for Photovoltaic Systems

Arjun M

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H-index: 08, i-10 Index: 06

EXPERIENCE

Employer	Designation	From	To
Manipal Academy of Higher Education	Assistant Professor	Nov 2021	Till Date

EXPERIENCE (Startup)

Employer	Designation	From	To
Apsaram Technologies Pvt Ltd	Director-Tech	May 2017	Till date

ACADEMIC QUALIFICATIONS

Academic Program	Specialization	Institute	Year	CPI/%
Post Doctoral Fellowship	Electrical Engineering	IISc Bengaluru	2021	NA
Doctoral	Electrical Engineering	NITK Surathkal	2019	9.48
Masters in Technology	Power Electronics and Control	MIT Manipal	2015	9.71
Bachelor of Engineering	Electrical and Electronics Engineering	VTU Belagavi	2012	9.03

AREAS OF RESEARCH AND DEVELOPMENT

- Mathematical Modeling and Control of Power Electronic Converters, Solar Photovoltaics, Induction Motor Drives

SKILLS

- **Tools**: MATLAB, SCILAB, LaTeX, dSPACE control desk, EAGLE
- **Programming Languages**: Basics of C

R&D PRODUCTS \ PROJECTS AT STARTUP

PROJECT DETAILS	From	To
Design and Development of 2.5kW, 300V, 8.5A, Bi-directional Non Inverting Power Converter	AUG 2021	AUG 2022
Design and Development of 30 V, 2.5 A, 5 kHz, Programmable Linear Motor Driver for HIL simulations	AUG 2021	JULY 2022
Devolopment of 1kW, 3 Phase Modular Programmable Inverter	June 2020	JULY 2021

MAJOR ACADEMIC PROJECTS

- **Modeling and Control of Unidirectional Single-Stage Soft-Switched High Frequency Link DC-AC Converters (Post Doctoral)**
    - The Research aims at development of mathematical models for studying HFL based grid connected systems which will help further help in development of closed loop control strategies to address the problems associated with practical grid conditions.

- **A study on Effects of Partial Shading on PV fed Induction Motor Water Pumping Systems (Doctoral)**
    - Analytical models are one of the potent tools to understand even the most complex phenomena and explain them using mathematical tools. Therefore, my research explains the detrimental effects partial shading might cause on water pumps through developed analytical models. The results from the mathematical models are validated by conducting experiments on laboratory setup. The research involved development of steady state, dynamic and small signal models of the entire proposed system and have revealed some thoughtful results and conclusions. I believe that the research work could be framed as a graphical user interface design tool to help practitioners who wish to study PV fed pumps
- **Steady State and Stability Analysis of Switched Mode Power Converters (Masters)**
    - In this masters thesis, I have worked on development of steady state and small signal models for boost and buck boost converters considering the possible non idealities. Through simulation and experimentation, I have tried understanding the effects caused by non idealities
- **Voltage and Current Control Strategies for Grid Connected Variable Speed Wind Turbine Induction Generator (Undergraduate)**
    - In this undergraduate thesis, I have worked on simulation studies of evaluating various voltage and current control strategies using back to back PWM voltage source converters. Simulation studies involving two level and three level converters with sine pulse width and space vector modulation are studied.

PATENTS AND PUBLICATIONS

- Patents
    1. An Indian Patent filed on SOLAR WATER PUMPING SYSTEM IN GRID TIE OR OFF-GRID MODE WITH NET ZERO ENERGY FROM GRID.
       Patent Number: **201641035575**. Status: **Published**
    2. An Indian Patent filed on TRANSFORMER-LESS SOLAR PHOTOVOLTAIC GRID CONNECTED INVERTER. Patent Number: **20184108650**. Status: **Filed**
- Journals
    1. Roopa Viswadev, **Arjun M**, Vanjari Venkata Ramana, B. Venkatesaperumal, Sukumar Mishra (2019) "A Novel AC Current Sensorless Hysteresis Control for Grid-tie Inverters", ***IEEE Transactions on Circuits and Systems II - Express Briefs***, Vol. 67, No. 11, 2020 (Q1, Impact Factor - 3.29)
    2. **Arjun M**, Vanjari Venkata Ramana, Roopa Viswadev and B. Venkatesaperumal (2019), "An Iterative Analytical Solution for Calculating Maximum Power Point in Photovoltaic Systems under Partial Shading Conditions", ***IEEE Transactions on Circuits and Systems II - Express Briefs***, Vol 01, No. 06, June 2019 (Q1, Impact Factor - 3.29)
    3. **Arjun M**, Vanjari Venkata Ramana, Roopa Viswadev and B. Venkatesaperumal (2019), "Small Signal Model for PV fed Boost Converter in Continuous and Discontinuous Conduction Modes", ***IEEE Transactions on Circuits and Systems II - Express Briefs***, Vol 01, No. 06, June 2019 (Q1, Impact Factor - 3.29)
    4. **Arjun M**, Vanjari Venkata Ramana, Roopa Viswadev Damodaran, B. Venkatesaperumal and Sukumar Mishra (2019), "Effect of Partial Shading on PV fed Induction Motor Water Pumping System", ***IEEE Transactions on Energy Conversions*** , Vol 34, No.01, March 2019 (Q1, Impact Factor - 4.31)
    5. Vanjari Venkata Ramana, **Arjun M**, Roopa Viswadev Damodaran, B. Venkatesaperumal and Sukumar Mishra (2019), "Global Peak Tracking of Photovoltaic Array Under Mismatching Conditions using Current Control", ***IEEE Transactions on Energy Conversions*** , Vol 34, No.01, March 2019 (Q1, Impact Factor - 4.31)
    6. **Arjun M**, Vineeth Patil (2015), "Steady state and averaged state space modelling of non-ideal boost converter", ***International Journal of Power Electronics (IJPELEC)***, Inderscience, Vol. 7, No. 1/2
    7. **Arjun M**, Uma Rao K, Deshpande R A (2014). "Wind Energy Conversion System for Rural Applications", ***Journal of CPRI***, Vol 10, No 1.

- Conferences

1. Deepak P, Roopa Viswadev Damodar, B VenkatesaPerumal, **Arjun Mudlapur**, "A Novel Bi-Directional converter for Electric Vehicle to Grid Applications" (2020), *IEEE International conference on Power Electronics, Smart Grid and Renewable Energy, Kochi*
2. **Arjun M**, Subrahmanya Adiga, Anusha R and B V Perumal (2018). Experimental Investigation of the Effectiveness of the LC filter in PV fed Induction Motor Water Pumping Systems with different type of Inductors. *International Conference on Emerging Trends in Engineering, Science and Technology Trissur*
3. Vanjari Venkata Ramana, **Arjun M**, Roopa Visadev, B Venkatesperumal and Sukumar Mishra (2018), "Efficient Global Peak Tracking of PV System Under Mismatching Conditions Using Searching Technique and Bisection Method", *IEEMA Engineer Infinite Conference*, New Delhi
4. Jugal Vijay Kumar Parmar,Sai krishna Reddy, Swaminathan Balasubramania Sarma, **Arjun M** and B Venkatesperumal (2018), "A Normal back to back inverter configuration for Solar water pumping and grid tie applications", *IEEE 18th International Conference on Environment and Electrical Engineering and 2nd Industrial and Commercial Power Systems Europe*
5. **Arjun M**, Uma Rao K, A. B. Raju (2014), "A novel simplified approach for evaluation of performance characteristics of SEIG", *International Conference on Advances in Energy Conversion Technologies (ICAECT)*, Manipal
6. **Arjun M**, A. B. Raju and Uma Rao K (2013), "Evaluation of different PWM techniques for two level inverter in grid connected WECS", *International Conference on Advances in Computing, Communications and Informatics (ICACCI)*, Mysore

ACADEMIC ACTIVITIES

- Regular reviewer for **IEEE Transactions on Energy Conversions, IEEE Transactions on Sustainable Energy, IEEE Transactions on Industrial Electronics,IEEE Transactions on Circuits and Systems and IEEE Transactions on Industrial Informatics**