

# Siba Kumar Patro

## Personal Information

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8828291127.
- Current Affiliation:** Visvesvaraya National Institute of Technology Nagpur.
- Date of Birth:** 25/08/1992
- Gender(M/F/T):** Male
- Category Gen/SC/ST/OBC:** General
- Whether differently abled (Yes/No):** No
- Academic Qualification:**

SL No.	Qualification	University	Year	Area of Specialization	Division	Marks	Additional Information
1	Ph.D.	Indian Institute of Technology Bombay (IIT Bombay)	2021	Power Electronics	First	--	Received Excellence in Thesis Award
2	M.Tech.	Indian Institute of Technology Bombay (IIT Bombay)	2017	Power Electronics and Power Systems	First	9.1	M.Tech. + Ph.D. Dual Degree
3	B.Tech.	Veer Surendra Sai University of Technology (VSSUT), Formerly UCE Burla, Govt. University	2014	Electrical Engineering	First	9.18	--
4	Intermediate Science	Sri Krushna Chandra Gajapati Autonomous College, CHSE, Odisha State Board	2010	---	First	78.3	--
5	10 <sup>th</sup>	St. Ann's Convent School, Pathapatnam, ICSE Board	2008	--	First	86.7	--

### 9. Experience Detail:

Sl. No.	Designation	Organization	From	To	Basic Pay and AGP
1	Assistant Professor	Visvesvaraya National Institute of Technology Nagpur	30-05-2021	Till Date	70900 and AGP 6000
2	Trainee Teacher	Visvesvaraya National Institute of Technology Nagpur	01-05-2017	29-05-2021	51271 and AGP 6000

### Teaching

#### Course Taught:

- 1) Advanced Power Electronics (8<sup>th</sup> Sem, UG, Class strength: 98, 58)
- 2) Power Electronics (4<sup>th</sup> sem, UG, Class strength: 95)
- 3) HVDC Transmission (8<sup>th</sup> Sem, UG and 1<sup>st</sup> Sem PG, Class strength: 62)
- 4) Industrial Automation (6<sup>th</sup> Sem, UG, Class strength: 93)
- 5) Processor Application in Power Electronics (1<sup>st</sup> Sem PG, Class strength: 25)

#### Course Introduced:

- 1) Industrial Automation (6<sup>th</sup> Sem, UG)

### Research interests

HVDC, MVDC, DC-DC Converter, Multilevel and Modular Multilevel Converter

### Supervision of Bachelor/Master thesis

#### 1. M. Tech. thesis

Sl. No.	Thesis Title	Name of the Student	Year
1	Design Of Hybrid Modular Multilevel Converter with Enhanced Efficiency and Dc Fault Tolerant Capability	Aditya Gupta	2021
2	Level Multiplier Circuit for Modular Multilevel Converter	Akhil Manoj Shende	2021

#### 2. B. Tech. thesis

Sl. No.	Thesis Title	Name of the Students	Year
1	Simulation and Analysis of VSC-HVDC and MMC systems	Mugdesh Hole Sudhanshu Chatterjee Vaibhav Uplapwar	2021

## Publications

### 1. Journal

S.No.	Author(s)	Title	Name of Journal	Volume	Page	Year
1	<b>Siba Kumar Patro</b> and Anshuman Shukla	Highly Efficient Fault-Tolerant Modular Embedded Thyristor Directed Converter for HVDC	<i>IEEE Transactions on Power Delivery</i>	vol. 35, no. 1, pp. 349-363, Feb. 2020.		
2	<b>Siba Kumar Patro</b> and Anshuman Shukla	Modular Directed Series Multilevel Converter for HVDC Applications	<i>IEEE Transactions on Industrial Applications</i>	vol. 56, no. 2, pp. 1618-1630, March-April 2020		
3	<b>Siba Kumar Patro</b> and Anshuman Shukla	Enhanced Parallel Hybrid Converter with DC Ripple Minimization Control	<i>IEEE Transactions on Industrial Electronics</i>	vol. 67, no. 11, pp. 9969-9975, Nov. 2020		
4	<b>Siba Kumar Patro</b> Anshuman Shukla and Mahendra B. Ghat	Hybrid Series Converter: A DC Fault Tolerant HVDC Converter with Wide Operating Range	<i>IEEE Journal of Emerging and Selected Topics in Power Electronics</i>	vol. 9, no. 1, pp. 765-779, Feb. 2021		
5	P. Bakas, Y. Okazaki, A. Shukla, <b>S. K. Patro</b> , K. Ilves, F. Dijkhuizen, A. Nami	Review of Hybrid Multilevel Converter Topologies Utilizing Thyristors for HVDC Applications	<i>IEEE Transactions on Power Electronics</i>	vol. 36, no. 1, pp. 174-190, Jan. 2021		
6	<b>Siba Kumar Patro</b> and Anshuman Shukla	Control and Derived Topologies of Parallel Hybrid Converter	<i>IEEE Transactions on Industrial Applications</i>	vol. 57, no. 1, pp. 598-613, Jan.-Feb. 2021		
7	Mahendra B. Ghat, <b>Siba Kumar Patro</b> and Anshuman Shukla	The Hybrid-Legs Bridge Converter: A Flexible and Compact VSC-HVDC Topology	<i>IEEE Transactions on Power Electronics</i>	vol. 36, no. 3, pp. 2808-2822, March 2021		
8	<b>Siba Kumar Patro</b> and Anshuman Shukla	The Thyristor Augmented Modular Bridge Converter: A Highly Efficient VSC-HVDC Converter with Reduced Energy Storage Requirement	<i>IEEE Transactions on Power Delivery</i>	vol. 36, no. 3, pp. 1335-1348, June 2021		
9	Ibhan Chand Rath, <b>Siba Kumar Patro</b> and Anshuman Shukla	Parallel Hybrid Converter based STATCOM and Capacitor Voltage Control Technique	<i>IEEE Journal of Emerging and Selected Topics in Power Electronics</i>	vol. 9, no. 5, pp. 5597-5612, Oct. 2021, doi: 10.1109/JESTPE.2021.3049867		

10	A. V. Khergade, R. Satputaley and <b>Siba Kumar Patro</b>	Investigation of Voltage Sags Effects on ASD and Mitigation using ESRF theory-based DVR	<i>IEEE Transactions on Power Delivery</i>	vol. 36, no. 6, pp. 3752-3764, Dec. 2021, doi: 10.1109/TPWRD.2020.3048838
11	I. Chand Rath, <b>Siba Kumar Patro</b> and A. Shukla	Parallel-Hybrid Converter based STATCOM: Operating Principles and Capacitor Voltage Control using Fundamental Frequency Zero-sequence Voltage	<i>IEEE Transactions on Power Electronics</i>	Early access, doi: 10.1109/TPEL.2022.3175321.

## 2. Conferences Papers.

1. **S. K. Patro** and A. Shukla, "Modular Directed Series Multilevel Converter for HVDC Applications," in proc. *2018 IEEE Energy Conversion Congress and Exposition (ECCE)*, Portland, OR, 2018, pp. 5552-5558.
2. **S. K. Patro**, M. B. Ghat and A. Shukla, "DC Fault Tolerant Modified Parallel Hybrid Converter with Enhanced Operating Range," in proc. *2018 IEEE Energy Conversion Congress and Exposition (ECCE)*, Portland, OR, 2018, pp. 119-126.
3. **S. K. Patro** and A. Shukla, "Parallel Hybrid Converter: Derived Topologies and Control," in proc. *2018 IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES)*, Chennai, India, 2018, pp. 1-6.
4. P. Chaturvedi, M. A. Mulla and **S. K. Patro**, "Power Electronics Laboratory Education using ARM Cortex M4 32-bit Microcontroller," *2018 IEEE International Conference on Power Electronics, Drives and Energy Systems (PEDES)*, Chennai, India, 2018, pp. 1-6, doi: 10.1109/PEDES.2018.8707575.
5. **S. K. Patro** and A. Shukla, "Hybrid Phase Converter with Enhanced Efficiency and dc Fault Tolerant Capability for HVDC Application," in proc. *2019 IEEE Energy Conversion Congress and Exposition (ECCE)*, Baltimore, MD, USA, 2019, pp. 55-61.
6. I. C. Rath, **S. K. Patro** and A. Shukla, "STATCOM Operation of Parallel-Hybrid Modular Multilevel Converter," in proc. *2019 IEEE Energy Conversion Congress and Exposition (ECCE)*, Baltimore, MD, USA, 2019, pp. 6783-6789.
7. **S. K. Patro** and A. Shukla, "A Control Technique to Eliminate dc Harmonics in Series-Connected Hybrid VSCs for HVDC Applications," *2020 IEEE Energy Conversion Congress and Exposition (ECCE)*, Detroit, MI, USA, 2020, pp. 4885-4890, doi: 10.1109/ECCE44975.2020.9236012.
8. M. S. Ansari, I. Chand Rath, **S. K. patro** and A. Shukla, "High Power Dc-Dc Converter Based on Parallel Hybrid Converter," *2020 IEEE Energy Conversion Congress and Exposition (ECCE)*, Detroit, MI, USA, 2020, pp. 4879-4884, doi: 10.1109/ECCE44975.2020.9235732.
9. A. M. Shende, A. Gupta, S. K. Patro and M. A. Chaudhari, "Fault Tolerant Si-SiC based Hybrid Modular Multilevel Converter with Enhanced Efficiency" presented at *Second IEEE International Conference on Smart Technologies for Power, Energy and Control (STPEC 2021)*.
10. A. M. Shende, S. K. Patro and M. A. Chaudhari, "Hybrid Modular Multilevel Converter based on Si and SiC Devices with Level Multiplier Circuit" presented at *Second IEEE International Conference on Smart Technologies for Power, Energy and Control (STPEC 2021)*.

## Patents

S.No	Patent Title	Name of Applicant(s)	Patent No.	Award Date	Agency/Country	Status
1	Hybrid modular multilevel converter	<b>Siba Kumar Patro</b> and Anshuman Shukla	201821011623	Not Applicable	IP India/ India	Filed on 28 March 2018
2	Hybrid modular multilevel converter	<b>Siba Kumar Patro</b> and Anshuman Shukla	16/194,884	Not Applicable	US Patent/ USA	Filed on 19 November 2018
3	Hybrid Modular Multilevel Converter Topologies for STATCOM Applications	Ibhan Chand Rath, <b>Siba Kumar Patro</b> and Anshuman Shukla	202021004129	Not Applicable	IP India/ India	Filed on 30 January 2020
4	Hybrid Multilevel Converter	Ibhan Chand Rath, <b>Siba Kumar Patro</b> and Anshuman Shukla	202021016994	Not Applicable	IP India/ India	Filed on 20 April 2020

## Sponsored research projects

Sl. No.	Title	Sponsoring agency	Amount	Duration	Role
1	Sustainable Energy System for Achieving Novel Carbon Neutral Energy Communities (SUSTENANCE), Ongoing	Indo-EU Joint call, DST-EU.	56.97 Lakhs for VNIT (total 1,504 Lakhs)	42 Months	Co-PI
2	Intensification of Research in High Priority Areas (IRHPA) program, titled, "Sustainable Technology for Smart Off-Grid Renewable Energy Transformation and Electrochemical Storage Management", SERB Centre for Energy Transformation and Storage.	DST-SERB	Rs. 1.42 Cr for VNIT	60 Months	Co-PI

## Consultancy

Sl. No.	Title	Sponsoring agency	Amount	Duration	Role
1	Technical Evaluation of PLC control wiring for water treatment plant at various locations of Maharashtra (Maharashtra Jeevan Pradhikaran) and Madhya Pradesh, Completed	SAP Control, Laxmi Civil Engg., Allied Electromech., SBM Projects, and Narayana Engg.	5.03 Lakhs	36 Months	Co-PI

### **Awards and recognition**

Sl. No.	Awards & Recognition	Agency	Year
1	POSOCO Power System Awards (PPSA)-2022 in Doctoral Category.	Power System Operation Company (POSOCO), New Delhi	2022
2	Naik and Rastogi Award for Excellence in Ph.D. Research for the year 2019-2021. Popularly known as "Best Thesis Award".	IIT Bombay	2021
3	K SHANKAR IEEE BS 2020 Meritorious Paper Award for paper: S. K. Patro and A. Shukla, "Modular Directed Series Multilevel Converter for HVDC Applications," in IEEE Transactions on Industry Applications, vol. 56, no. 2, pp. 1618-1630, March-April 2020.	IEEE Bombay Section	2020
4	IEEE ECCE2019 Student Travel Awards (\$500).	Student activity team ECCE 2019	2019
5	Secured district first rank in the entrance test and participated in 10 days Advanced Training Camp.	Odisha Chemical Society	2009
6	National Level Talent Search Examination 2007-08, received this award during my 10 <sup>th</sup> class.	Vikas Pratibha Awards Society	2008

### **Contributions to the institute**

#### **1) Academic administration**

Sl. No.	Administration Responsibility	Year/s
1	Departmental NBA Coordinator	2020-21,2021-22
2	GATE Coordinator	2017-2021
3	Departmental TEQIP Coordinator	2019-2021
4	Industrial Automation lab in charge (Developed New Lab)	2017-2020
5	Faculty Advisor (BTech: Batch 2020-24)	2021-2024

#### **2) Non-academic administration**

Sl. No.	Administration Responsibility	Year/s
1	Secretary, IEEE PELS/IES Joint Chapter, Bombay Section	2021-till date

### **Contributions outside the institute**

- 1) **One Week IEEE Workshop** on "FPGA Controller for Electrical Power Applications", 15<sup>th</sup> March to 19<sup>th</sup> March 2021. Coordinators: Dr Pradyumn Chaturvedi, Siba Kumar Patro and Prof. V. B. Borghate.
- 2) **One Week STTP** under TEQIP III twinning Program on "Implementation of Power Electronic Converter using Microcontroller", 17<sup>th</sup> to 21<sup>st</sup> March 2018. Coordinators: Dr P. Chaturvedi and Siba Kumar Patro.

- 3) **Publication Chair, STPEC 2020**, *1<sup>st</sup> IEEE Conference on Smart Techniques for Power, Energy and Control* (STPEC 2020), 25-26 Sept 2020. It is financially co-sponsored by IAS and technically co-sponsored by PELS.
- 4) **Organizing Secretary and Publication Chair, INDISCON 2021**, *IEEE India Council International Sub-Sections Conference* (INDISCON 2021), 27-29 August, 2021. The conference theme was, “Impactful innovations for the benefit of industry and society”.
- 5) **Organizing Secretary and Publication Chair, STPEC 2021**, *2<sup>nd</sup> IEEE Conference on Smart Techniques for Power, Energy and Control* (STPEC 2021), 19-22 Dec 2021. It is financially co-sponsored by IAS & PELS and technically co-sponsored by IES.
- 6) **Expert talk** on “Guidance and Support Sessions for GATE-2019 preparation” on 16<sup>th</sup> March 2018 under TEQIP III twinning activity at SATI Vidisha, M.P.
- 7) **Member**, Resonant and Soft Switching Converter Subcommittee, IEEE IES TCPE (2020 onwards)
- 8) **Special Session Organizer** at IEEE IECON 2021 Conferences: “Solid State Transformer for Modern Power Grid”, 13-16 Oct 2021, Toronto, Canada (Co-organizers: Marco Liserre, Dimitri Vinnikov, Rongwu Zhu, Pradyumn Chaturvedi)
- 9) **Regular active reviewer** of research articles for various IEEE Transaction/Journals and several IEEE Conferences worldwide including ICPS, IECON, ECCE, NPEC, PEDES, PSGRE etc.