Curriculum Vitae

Dr. Abhinav Bhatnagar
(Assistant Professor)
Department of Electronics & Communication Engineering,
Birla Institute of Applied Sciences, Bhimtal (U.K.)

Mo: +91-9891448951, 7691073623
Email: abhinav.ece@birlainstitute.co.in, abhinavscisolar@gmail.com

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Educational Qualifications:

Degree	Institution / University	Division	Year
Ph.D. (Electronics & Communication)	Malaviya National Institute of Technology (MNIT) - Jaipur (Rajasthan)	First (Course work)	2023
M.TECH (Electronics & Communication)	Galgotias University, Greater Noida (U.P.)	First	2015
B. TECH (Electronics and Communication)	IEC College of Engg. And Technology, Greater Noida (U.P.)	First	2009
Senior Secondary (12^{th})	St. Francis Sr. SEC. school, Bareilly (U.P.)	First	2005
Secondary (10^{th})	St. Francis Convent school, Bareilly (U.P.)	First	2003

Work Experience:

- **Founder and Head** of **Green Energy Research Lab** at Birla Institute of Applied Sciences, Bhimtal (Uttarakhand).
- Currently working as **Assistant Professor** at Birla Institute of Applied Sciences, Bhimtal (since September 2020).
- Six months experience as **Teaching Associate** at **Malaviya National Institute of Technology (MNIT) -** Jaipur (Rajasthan).
- **Teaching experience** (officially conducted laboratories) at **Malaviya National Institute of Technology (MNIT)-** Jaipur.
- Three years **Research Experience** as Junior Research Fellow in **Department of Science and Technology's** (New Delhi) project titled "**Efficiency enhancement in thin film GaAs solar cells using photonic crystal as back reflector**".
- Two years experience as a **R&D engineer** in Autopromoters India Pvt. Ltd., Bawana Industrial area, New Delhi.
- Two years experience as an **Embedded Design Engineer** in Simpal Technologies Pvt. Ltd, New Delhi.
- Serving as a potential reviewer of projects at **National Innovation Foundation, India** since 2021.
- Worked for two years as **President of SPIE** (Society of Photo-Optical Instrumentation Engineers) Journal's student chapter-MNIT, Jaipur.
- Working experience with renowned companies like Minda, Hella Pvt. Ltd., Videocon, Intex, DLF, SM Semiconductors, Bajaj Automobiles.

Patent(s):

Patent title	Vaccine Carrier System
Description	Novel design smart vaccine carrier system integrated with thin film CIGS solar cell for power on the go.
Patent type	Indian
Patent No.	202311000300

Research Projects:

Ph.D.	**High Performance Thin Film CIGS Solar Cell for Portable Electronic Devices**
Description	Device fabrication of efficient thin film solar cell based on CIGS material for powering portable electronic devices such as unmanned armed systems etc.
Software Used	LUMERICAL CAD tool, SYNOPSYS's RSOFT CAD tool, FLUXIM
Simulation Type	2D, 3D

DST Project (completed)	**High Performance Thin Film CIGS Solar Cell for Portable Electronic Devices (Duration 2019 – 2022)**
Description	Worked as **Principal Investigator (PI)** in this project under the DST project scheme "Scheme for Young Scientist and Technologist" (SYST).
Software Used	LUMERICAL CAD tool
Objective	CIGS based solar cell device fabrication

DST Project (completed)	**Efficiency Enhancement in Thin GaAs Solar Cells Using Photonic Crystal As Back Reflector**
Description	Enhancing efficiency of the thin film GaAs based solar cells using a 2D photonic crystal (rods in slab) as selective wavelength back reflector.
Software Used	SYNOPSYS's RSOFT CAD tool
Simulation Type	2D

Project (M. tech)	**Designing and Realization of PCF Based Sensor for Biomedical Application (SCI publication on the project)**
Description	Proposed a novel design for concentration sensor based on circular lattice Photonic Crystal Fiber of 1 micron sandwich in between two single mode fibers of 1 micron each for sensing concentration of glucose in blood.
Software Used	FDTD Solutions developed by ANSYS LUMERICAL.
Simulation Type	2D

Industrial Project	**Day Tank Monitoring System for DLF**
Description	A system designed to measure the various parameters (level, temperature, fumes etc) of diesel tank, along with the automatic remote control and monitoring system for diesel generator reducing diagnosis time and to keep an eye on its operation.
Language	C Language Programming

Industrial Project	**Building Management System**
Description	Direct digital control board for building management system (controlling AHU, Plant room, Door controller etc).
Language	C Language Programming

Industrial Project	**Capacitive Discharge Ignition System for TVS**
Description	A system designed to provide electronic spark through the ignition coil to fire the spark plugs.
Language	C Language Programming

Industrial Project	**Automobile Break Light System for TATA motors**
Description	An electronic system designed to illuminate the parking and break light with different intensities.
Language	N.A.

Publications:

1. **Abhinav Bhatnagar** and Nidhi Singh, "Concentration Sensor Based on Circular Lattice Photonic Crystal Fiber Placed Between Two Single Mode Fibers", **Journal of Optoelectronics and Advanced Materials-Rapid Communication**, Vol. 10 (Nov. - Dec., 2016):840-843.
2. **A. Bhatnagar** and V. Janyani, "Enhancing absorption in thin film organometal trihalide perovskite solar cell by photon recycling", **Journal of Advanced Materials Letters**, Adv. Mater.Lett., 2018, 9 (10), pp 721-726, doi: 10.5185/amlett.2018.2108.
3. **A. Bhatnagar** and V. Janyani, "Cost effective and high power conversion efficiency ultra-thin film GaAs solar cell," 2017 **IEEE International Conference on Computer, Communications and Electronics (Comptelix)**, Jaipur, 2017, pp. 516-520, doi: 10.1109/COMPTELIX.2017.8004024.
4. **A. Bhatnagar** and V. Janyani, "Efficiency Enhancement in Thin Film ITO-cSi Heterojunction Solar Cell Using Photonic Crystal," **14th IEEE India Council International Conference (INDICON)**, Roorkee, 2017, pp. 1-6, doi: 10.1109/INDICON.2017.8487953.
5. S. Upadhyay and **A. Bhatnagar**, "A review of telemedical system with the implementation of bio-photonic sensor", **2nd International Conference on RTDEEE-2018, ISST Journal** (India).
6. Priya Pandey, **A. Bhatnagar** and Vijay Janyani, "Multi-junction Solar Cell Based on Efficient III–V InGaP/GaAs with GaInAsP as BSF Layers", **Optical and Wireless Technologies (LectureNotes in Electrical Engineering Book Chapter)** Vol. 546, pp. 521-532, Springer Singapore, Print ISBN: 978-981-13-6158-6, DOI: 10.1007/978-981-13-6159-3_55.
7. Anoopshi Johari, Brajesh K. Kaushik, **Abhinav Bhatnagar**, P.K. Dubey and Sanjeev Nathani, "Implementation of Mach Zehnder modulator based all optical gates", **Proc. SPIE, Novel Optical Systems, Methods, and Applications XXII**, 111050R (2019); https://doi.org/ 10.1117/12.2529410.
8. **A Bhatnagar**, A Johari, V Janyani, "Performance analysis of thin film CIGS solar cell at different values of thickness, bandgap and temperature through numerical simulation", **Proc. SPIE 11467, Nanoengineering: Fabrication, Properties, Optics, Thin Films, and Devices XVII,** 114670K (21 August 2020); https://doi.org/10.1117/12.2567882.
9. A Johari, **A Bhatnagar**, BK Kaushik, S Naithani, "Design of Mach-Zehnder Modulator based optical reversible gate for high speed data transmission", **Proc. SPIE 11483, Novel Optical Systems, Methods, and Applications XXIII,** 114830M (21 August 2020); https://doi.org/10.1117/12.2568668
10. A Johari, **A Bhatnagar**, BK Kaushik, S Naithani, "Performance analysis of photo detector and VCSEL for efficient on chip optical interconnect", **Proc. SPIE 11483, Novel Optical Systems, Methods, and Applications XXIII,** 114830L (21 August 2020); https://doi.org/10.1117/12.2568582
11. Anant Johari, **Abhinav Bhatnagar**, Anoopshi Johari, "Method for Determining the Small Signal Equivalent Model for GaN HEMT Device", **International Conference on Fourth Industrial Revolution based Technology and Practices ICFIRTP**' 2020, Quantum University, Roorkee, U.K.

12. Anant Johari, Anoopshi Johari, **Abhinav Bhatnagar**, "Fabrication of Germanium Nanowires using Gold Catalyst", **International Conference on Fourth Industrial Revolution based Technology and Practices ICFIRTP**' 2020, Quantum University, Roorkee, U.K.
13. Sanchit Kundal, **Abhinav Bhatnagar**, Ritu Sharma, "1D Photonic Crystal Waveguide Based Biosensor for Skin Cancer Detection Application", **International Conference on Optical and Wireless Technologies, OWT2020** by **Springer**.
14. **Abhinav Bhatnagar,** S. Pancholi, V. Janyani Bhatnagar (2022), "Smart Solar Power-Assisted Wheelchairs for the Handicapped", In **Intelligent Systems for Rehabilitation Engineering** (eds R. Raut, P. Pathak, S. Kautish and N. Pradeep), Wiley **Publications**. https://doi.org/10.1002/9781119785651.ch8
15. **Abhinav Bhatnagar**, Anoopshi Johari, Vijay Janyani, "Photon Recycling for Improved Absorption in Thin Film ITO/INP Heterostructure Solar Cell", **Journal of Critical Reviews, JCR** 2020; 7(19): 8836-8844. doi:10.31838/jcr.07.19.989
16. **Abhinav Bhatnagar**, Sulabh Srivastava, and Vijay Janyani "Design and performance investigation of a highly efficient copper-indium-gallium-selenide solar cell," Journal of Nanophotonics 15(3), 036006 (2 September 2021). https://doi.org/10.1117/1.JNP.15.036006
17. K.K. Choure, G.K. Bharti, A. Saharia, N. Mudgal, **Abhinav Bhatnagar** and G. Singh, "Design and simulation of all-optical Swap and Fredkin gates using mode-rotation based race-track ring resonator". Opt Quant Electron 54, 276 (2022). https://doi.org/10.1007/s11082-022-03662-3
18. **Abhinav bhatnagar**, Hitesh Sharma, Deepak Negi, Srinivasa Rao Nelamarri and Vijay Janyani, "Fabrication and Characterization of CuInGaSe Thin Films Deposited on Silicon and Quartz Substrates Using One-Step Sputtering", Silicon (2023) https://doi.org/10.1007/s1263302302752-5
19. K.K. Choure, G.K Bharti, A. Saharia, N. Mudgal, **A. Bhatnagar** et al., "Design and simulation of all-optical Swap and Fredkin gates using mode-rotation based race-track ring resonator", Opt Quant Electron 54, 276 (2022), doi: 10.1007/s11082-022-03662-3
20. Manjur Hossain, Jayanta Kumar Rakshit, **Abhinav Bhatnagar**, Tanay Chattopadhyay, "Silicon microring resonator based all-optical 3-input majority gate and its applications",Optik, Volume 282, (2023), 170891, ISSN 0030-4026, doi: 10.1016/j.ijleo.2023.170891.
21. Dhiraj Kumar, Jayanta Kumar Rakshit, Uttara Biswas, **Abhinav Bhatnagar**, and Chittaranjan Nayak, "Photonic-crystal-based high-performance ring resonator using a topological interface state: design and analysis," Appl. Opt. 62, 4281-4287 (2023).
22. Anoopshi Johari, Sanjeev Naithani, Baljinder Kaur, **Abhinav Bhatnagar**, and Brajesh Kumar Kaushik "Simulation of waveguide integrated $Ge_2Sb_2T_{e5}$-based tunable photodetector," Optical Engineering 62(8), 087106 (2023). https://doi.org/10.1117/1.OE.62.8.087106
23. Anoopshi Johari, Sanjeev Naithani, Baljinder Kaur, **Abhinav Bhatnagar**, and Brajesh Kumar Kaushik " Ge2Sb2Te5 patch embedded ring resonator for optical switching," Journal of Nano-photonics 18(1), 016008-016008 (2024). https://doi.org/10.1117/1.JNP.18.016008

Achievements and certificates:

1. **Official research partner** of **Uttarakhand Power Technologies (UPT) New Delhi** and **EMTECH FOUNDATION** New Delhi, India.
2. Served as **reviewer** of more than 60,000 Innovative projects under the **Inspire Awards-MANAK** from 2020-2023 at **National Innovation Foundation-India**.
3. Served as a **peer reviewer** for reputed International Journals and conferences such as Taylor and Francis, IEEE, JNP etc.
4. Organized 1 week **DST sponsored** online workshop on "**Advances in Solar Photovoltaics-Emerging Materials and Technologies**" February 2022 as Faculty coordinator, jointly organized by Malaviya National Institute of Technology Jaipur and Birla Institute of Applied Sciences Bhimtal.
5. Organized 1 week **DST sponsored** online workshop on "**Thin Film Photovoltaics-Enabling the**

Era of Next Generation Solar cells" February 2021 as Faculty coordinator, jointly organized by Malaviya National Institute of Technology Jaipur and Birla Institute of Applied Sciences Bhimtal.

6. Participated in AICTE Training And Learning (ATAL) Academy 1 week FDP on "**Green Technology & Sustainability Engineering**" from 10/01/2022 to 14/01/2022 at NIT Manipur.
7. Participated in AICTE Training And Learning (ATAL) Academy 1 week FDP on "**Photonics**" from 2021-07-19 to 2021-07-23 at IIT Bhilai.
8. Participated in AICTE Training And Learning (ATAL) Academy 1 week FDP on "**Physics of Nanoelectronics**" from 02/08/2021 to 06/08/2021 at IIT Kanpur.
9. Delivered an Expert Lecture on "**Green Energy: Solar Cells**" at WIT Dehradun, February 2021.
10. Participated in 1 day training program on "**PCB Designing**" December 2020 at Birla Institute of Applied Sciences Bhimtal.
11. Participated in 1 day training program on "**Internet of Things**" December 2020 at Birla Institute of Applied Sciences Bhimtal.
12. Participated in 1 week faculty development program on "**Renewable Energy: Research to Industry**" – August 2020 at National Institute of Technology Patna n online mode under the "Scheme of financial assistance for setting up of Electronics and ICT Academies" by the Ministry of Electronics and Information Technology (MEITY), Government of India.
13. Participated in 1 week faculty development program on "**Next-Generation Semiconductor Devices for high-end applications**" – June 2020 at National Institute of Technology Patna in online mode under the "Scheme of financial assistance for setting up of Electronics and ICT Academies" by the Ministry of Electronics and Information Technology (MEITY), Governmentof India.
14. Participated in 2 weeks IEEE Virtual Symposia 2020 on "**Power & Energy Technologies**" – June 2020, at IEEE AcSIR-CSIO, Chandigarh.
15. Participated in 1 week online Short Term Course on "**Nanotechnology for Electronic and Photonic Devices (NanoDev 2020)** – June 2020 at PEC University, Chandigarh.
16. Participated in 1 week TEQIP-III sponsored online workshop on "Surface Spectroscopic Techniques", June 2020 at Malaviya National Institute of Technology (MNIT) – Jaipur.
17. Participated in 1 Week International FDP on "**Digital Learning with Multidisciplinary Approaches**", June 2020 at JSS Academy of Technical Education – Noida.
18. Participated in 1 Week TEQIP-III Sponsored Online Workshop on "**AFM and STM**", June 2020 at Malaviya National Institute of Technology (MNIT) – Jaipur.
19. Attended 1 Day International Webinar on "**Science and Engineering for Nature Conservation**" – June 2020 at J.C. Bose University of Science and Technology YMCA, Faridabad.
20. Attended 1 Day Professional Development course on "**Smart Battery Energy Management and Health-Conscious Fast Charging for Future Transport**" – June 2020 at IEEE Professional Development Hours, Florida.
21. Attended 1 Day IEEE Virtual talk Series on "**Software Quality Assurance**" – May 2020 at IEEE AcSIR-CSIO, Chandigarh.
22. Attended 1 Day Webinar series on "**Beyond the Boundaries: Reinventing Horizons**" – May 2020 at Swami Keshvanand Institute of Technology, Management and Gramothan – Jaipur.
23. Participated in online quiz on "**Computer Networks**" and achieved 95%, May 2020 at Sumathi Reddy Institute of Technology for women, Telangana.
24. Attended 1 Day IEEE Virtual talk series on "**Mind Management**" – May 2020, at IEEE AcSIR-CSIO, Chandigarh.
25. Participated in 2 Week GIAN Course on "**An Advance Course on Principles of Biophotonics**" – July 2019, at Malaviya National Institute of Technology (MNIT) – Jaipur.
26. Co-ordinated 2 Week GIAN Course on "**An Advance Course on Principles of Biophotonics**" – July 2019, at Malaviya National Institute of Technology (MNIT) – Jaipur.
27. Attended 1 Week AICTE Sponsored QIP short term course on "**Emerging Nano-Electronics Based Devices, Circuits and Systems**" – July 2019, at Indian Institute of Technology- Roorkee.
28. Attended 1 week short term course on "**Properties of Nano-materials – Why and how they**

differ from their bulk counter-part", at Material Research Centre, MNIT – Jaipur.

29. Attended 1 week short term course on "**Nano Forms of Carbon"**, at Material Research Centre, MNIT – Jaipur.
30. Attended 3 days training program on "**X Ray Diffraction**" at Material Research Centre, MNIT – Jaipur.
31. Attended Workshop on "**INUP- Nanofabrication Technologies**" at IISC Bangalore.
32. Contributed as Coordinator and attendee in organizing the short term "**Train the Trainers Programme on Optical Fiber (TTPOF)**" in association with TSSC India at MNIT – Jaipur.
33. Attended 1 week GIAN course on "**Research Challenges in Wireless Technologies for 5G**" at MNIT – Jaipur.
34. Attended 1 week academy training program on "**Photonic Integrated Devices & Systems**" under the aegis of Electronics & ICT Academy MNIT-Jaipur.
35. Attended 1 week academy training program on "**Advances in Communication Technologies**" under the aegis of Electronics & ICT Academy MNIT-Jaipur.
36. Attended 1 week short term course on "**Nanotechnology for Electronic and Photonic Devices (NanoDev-2016**) at PEC University, Chandigarh.
37. Participated in "**Innovative Project Science Fair**" under **Unnat Bharat Abhiyan** at MNIT-Jaipur.
38. Attended Workshop on **Embedded Computing and FPGA Technologies** by MYRESEARCH LABS, Greater Noida.
39. Attended Workshop on "**Microwave Antenna and Filters**" at Galgotias University, GreaterNoida.
40. Attended Faculty Development Program on "**Recent Trends in Embedded System Design**" at Ajay Kumar Garg Engineering College, Ghaziabad.
41. One Year **Embedded Systems** training under **MICROCHIP**.
42. Six months training on **Embedded Systems Design** from EMTECH FOUNDATION, New Delhi.
43. Six weeks training certificate from Bharat Sanchar Nigam Limited, Moradabad. Summer Training at "**Bharat Sanchar Nigam Limited, Moradabad"** in June-July 2008.
44. Achieved the distinctive performance certificate from "**NATIONAL SCIENCE OLYMPIAD**" 2001.
45. Achieved the certificate of "**Wings course**" from **Tata Infotech** in year 2000.

Beyond Curriculum:

- Served as **PRESIDENT** for two years and as **SECRETARY** for one year in **SPIE Student Chapter at MNIT – Jaipur.**
- Imparted teachings on basics of Optics and Light to primary and secondary government school students specially focused on educating girl child under **SPIE Chapter** activity at MNIT, Jaipur.
- A member of various professional bodies such as **SPIE, IEEE, Springer and OSA**.
- Taught Meditation to many students as a modern safe drug to cure and improve mental and physical health.
- Participated in College Level Presentation on "**Nanotechnology & Production of Nano-materials**".
- Participated in College Level Presentation on "**OCB telephone Exchange**".

Area of Interests:

Green Energy, Photovoltaics, Thin-Film Solar Cells, Opto-electronic devices, Optical devices, Photonic Crystals, Bio-photonic sensors.