

Dr. Kanika

Location: Mukerian, Punjab | **Phone:**+91-9780120298 | **Email:**upadhyayk.pu@gmail.com

Languages: English, Hindi, Punjabi

Professional Summary

Accomplished Physics and Electronics educator and researcher holding a PhD from Panjab University, complemented by over 2 years of industrial R&D; experience as an Embedded Systems Design Engineer. Proven expertise in Materials Science, Instrumentation, and Electronics with a robust portfolio of 6 peer-reviewed international publications, 2 international conference presentations, and formal experience as an invited journal reviewer for Elsevier (Heliyon). An experienced mentor who has guided 5+ student dissertations and managed large classrooms (40+ students), seamlessly bridging the gap between theoretical physics principles and safety-critical industrial engineering applications.

Core Qualifications & Certifications

- UGC-NET (Electronic Science) – Qualified, June 2014.
- PSTET – Qualified, 2025.
- CTET – Qualified, December 2022.

Education

- **Ph.D. in Sciences (Physics)** | Department of Physics, Panjab University, Chandigarh – **2023**.
- **Master of Science (M.Sc.) in Physics and Electronics** | Department of Physics, Panjab University, Chandigarh – **2013** (66.65%).
- **Bachelor of Science (B.Sc.) in Physics and Electronics** | Department of Physics, Panjab University, Chandigarh – **2011** (63.57%).
- **Bachelor of Education (B.Ed.) in Special Education** | GRIID, Panjab University, Chandigarh – **2015** (76.23%).

Academic & Mentoring Experience

Teaching Assistant & Research Mentor

Panjab University, Chandigarh | 2016 – 2023

- Mentored 5+ postgraduate and undergraduate students through thesis formulation, scientific data analysis, and dissertation interpretation.
- Managed research documentation, manuscript drafting, and handled the peer-review pipeline for academic journals.
- Assisted in supervising high-level practical physics and electronics laboratory sessions involving UV-vis, FTIR, XRD, and FE-SEM techniques.
- Delivered structured curriculum to classrooms of 40+ students and specialized tutoring batches.
- Prepared diploma students for competitive engineering lateral entry examinations.
- Conducted laboratory experiments and supervised practical sessions with emphasis on safety and conceptual understanding.

Industrial R&D; Experience

Embedded System Design Engineer

Electrowaves Electronics Pvt. Ltd., Panchkula | August 2023 – July 2025

- Led a team of 6–8 engineers in developing TCAS firmware aligned with Indian Railways' S&T; protocols and EN standards.
- Conducted technical meetings, requirement analysis, and documented Minutes of Meetings (MoMs).
- Worked on ARM Cortex-R4 / Cortex-M3 MCUs (TMS570LSx, TM4C129x) using Code Composer Studio (CCS).
- Applied bare-metal programming for real-time signal processing and deterministic task execution.

Key R&D; Projects Executed

- **Project V-TCAS:** Firmware implementation on safety-critical control applications using TI microcontrollers and ARM Cortex platforms.
- **Project IV - ESMON:** Designed real-time sensor logging using TI SPI libraries with CSV output.
- **Project III - Touch Electronic Controller:** Developed an IR-based embedded interface using MSP430 and TI Captivate.
- **Project II - HLC:** Built IPC protocols on TMS320F28379D and created UI layouts in Nextion Editor.
- **Project I - AC TripleGun EV Charger:** Engineered TI microcontroller and ESP32-based smart charging solution.

Embedded Systems Intern

Electrowaves Electronics Pvt. Ltd., Panchkula | February 2023 – July 2023

Gained hands-on experience in Code Composer Studio (CCS), TMS320F28379D DSP, communication protocols, debugging, prototyping, and technical documentation.

Research Publications & Professional Contributions

- Materials Letters (2022) – Low-energy Ar⁺ ion beam induced endotaxial plasmonic Ag nanoparticles in PEDOT:PSS thin-films.
- Materials Chemistry and Physics (2021) – Structural and magnetic investigation of Cr³⁺ substitution on Zn-Co ferro-spinel nanoparticles.
- Materials Today Advances (2020) – Investigating phase transition and morphology of Bi-Te thermoelectric system.
- Vacuum (2019) – Solvothermal assisted synthesis of CoSb₃ phase evolution for thermoelectric applications.
- Materials Today: Proceedings (2019) – Phase-evolution in Co-Sb System: CoSb₃ Solvothermal Synthesis.
- Materials Today: Proceedings (2017) – Rietveld Refinement Study of GeSb₂Te₄ Bulks.

Independent Reviewer: Invited and recognized by Elsevier for contributing independent technical peer reviews for Heliyon.

Technical & Pedagogical Skill Set

- **Scientific Instrumentation:** XRD, FE-SEM, TEM, FTIR, UV-vis spectrophotometers.
- **Research Expertise:** Solvothermal synthesis, ion beam analysis, Rietveld Refinement, thin film deposition.
- **Embedded Systems:** Embedded C, TI DSPs (C2000), MSP430, ARM Cortex MCUs, ESP32, CCS, ESP-IDF.
- **Communication Protocols:** CAN, UART, I2C, SPI, Ethernet.
- **Pedagogy & Documentation:** Classroom management, inclusive education practices, LaTeX documentation.