# Vartika Dahima

Date of Birth: 22nd March 1991, Address: 79-B, Shahi Complex, Sec-11, Udaipur, India, 313001
+91-9001393943 Vartika.dahima@gmail.com 500104939@stu.upes.ac.in Vartika Dahima
GoogleScholar ORCiD

My area of research is focused on developing Design, Analysis, and Optimization of Frequency Selective Surfaces for Electromagnetic Filtering and Shielding Applications.

## Education

**University of Petroleum and Energy Studies** **July 2022 – till date (Thesis submitted, September 2025)**
*PhD (Electronics and Communication Engineering)* *Dehradun, India*

Thesis Title: "*Spatial Filtering and Shielding by using Frequency Selective Surface for Wireless Communication* "

**CTAE, Maharana Pratap University of Agriculture and Technology** **July 2018 – March 2021**
*M.Tech (Communication Systems)* *Udaipur, India*

**Sir Padampat Singhania University** **July 2010 – June 2014**
*B.Tech (Electronics and Communication Engineering)* *Udaipur, India*

## Experience

**University of Petroleum and Energy Studies, (QS World Ranking - 239)** **July 2022 – Present**
*Teaching Assistant, Department of Electrical and Electronics Engineering*

- **Analog Electronics**: Delivered lectures and tutorials on BJTs, FETs, MOSFETs, amplifier types, biasing, and multistage configurations; prepared course materials and assessments.
- **Communication Systems**: Delivered lectures and tutorials on Fundamentals of Communication Systems, Analog and Digital Modulation Techniques, types of noise; prepared course materials and assessment.
- **Microprocessor and Microcontroller**: Facilitated laboratory sessions on programming, interfacing, and applications of microprocessors and microcontrollers; guided undergraduate students on projects and experiments.
- **Antenna and Microwave Lab**: Supervised hands-on experiments of 'Antenna Radiation and Microwave Propagation Techniques' emphasizing fundamental concepts of antenna, electronic components, using microwave test bench, design and simulation of different types of antenna on HFSS and MATLAB; provided mentoring to undergraduate students.
- **Digital Signal Processing Lab**: Supervised practical exposure to core DSP concepts, including discrete-time signal generation, system analysis, convolution, Fourier transforms, digital filter design (FIR and IIR), and spectral analysis using tools like MATLAB; provided mentoring to undergraduate students.
- **MATLAB Lab**: Supervised MATLAB programming with a focus on mathematical modeling, data visualization, matrix computations, and simulation.
- Executed event management tasks involving coordination, timetable arrangements, and participant correspondence for the **International Conference on Intelligent Communication, Control, and Devices (ICICCD 2023, 2024 and 2025)**.

**Yadav Measurements Pvt. Ltd.** **Nov. 2016 – July 2018**

- Trained with thorough hands-on testing, calibration, bug fixing, and new development.
- Projects done: Voltage level converter, Voltage level indicator, Autocompensation of VT, Burden Box, Calibration of CT-VT tester.

## Technical Projects

**Ph.D.**

1. **Design, fabrication, testing and analysis of double-band notched frequency selective surface for LTE bands**
   (a) Designed a FSS which attains accurate dual-band filtering at 1.9 GHz and 2.1 GHz, ensuring sufficient bandwidths for LTE applications.

(b) Achieved angular stability up to 80 degrees, which is far better than the usual stability of designs that are 30–60 degrees.

(c) Simplified the design while maintaining efficiency, compactness with the unit-cell dimension of 0.33l × 0.33l, and a single-layer approach for enhanced scalability and practicality..

(d) Application: Tackling the complexities of PIM in contemporary wireless networks by adopting an FSS framework that minimizes interference and improves communication dependability.

2. **Design, fabrication, testing and analysis of double-band notched frequency selective surface for 5G NR bands**

(a) Designed and optimized FSS, single-layer dual-passband FSS featuring alternating copper-dielectric configurations formed for n78 and n79 frequency bands, ensuring high selectivity, angular stability, and minimal interference for sub-6 GHz 5G communication systems.

(b) Tackled interference mitigation in 5G communications through the implementation of the FSS-based filtering solution with 'R-T-R-T-R (reflection-transmission-reflection-transmission-reflection) characteristics.

(c) Tested the design for angular stability and improved performance by conducting simulations and experimental tests in anechoic chamber to showcase effective filtering, stable angular performance up to 60°.

3. **Design, fabrication, testing and analysis of shielded frequency selective surface.**

(a) Designed a miniaturized single-element single-layer shielded FSS for 2.4 GHz.

(b) Tested the design for angular stability and improved performance by conducting simulations and experimental tests in anechoic chamber to showcase effective shielding, stable angular performance up to 60°.

(c) Application: Shielding Wi-Fi/Bluetooth frequencies for protection of data in data centre rooms and prison cells.

**M.Tech.**

1. **Mobility-Aware Energy-Efficient Link Recovery Routing Protocol for Low Power and Lossy Networks.**

(a) Region-based deployment and self-regioning algorithm to reduce overhead.

(b) Modified MRO (Message Request Object) structure that includes mobility flag, buffer size, hop distance, and sequence number.

(c) Link recovery by selecting alternate nodes with least mobility and highest buffer size.

(d) Dynamic updates using DIS, DIO, and DAO messages to maintain connectivity of mobile nodes.

(e) Demonstrated increased remaining energy, higher data delivery, and lower node mortality over 1500 rounds.

2. **Trust-Based Mechanism using Multicast Routing in RPL for the Internet of Things**

(a) A Trust-Based Multicasting Mechanism is introduced for RPL to enhance security and efficiency in IoT networks. Only trustworthy nodes participate in routing, reducing the risk of packet drops or routing through malicious nodes.

(b) Reduces network congestion, delay, and enhances data delivery reliability.

(c) Proposed multicast scheme lasted 1000 rounds longer with 20 percent more energy savings.

(d) Higher data delivery rate to base station compared to broadcasting.

**B.Tech.**

1. **Embedded Systems and Robotics**:

(a) Completed a 30-day internship at HP India Pvt. Ltd. from 1st December to 31st December 2012, focusing on the fundamentals and applications of Embedded Systems and Robotics.

(b) The robotics module covered the basics of robot architecture, kinematics, and sensor integration. Simple autonomous robots were developed using microcontroller-based systems that could perform line-following, obstacle avoidance, and edge detection tasks.

(c) Practical sessions involved interfacing LEDs, buzzers, LCD displays, sensors (temperature, IR, ultrasonic), and actuators (motors, servos) with microcontrollers to understand hardware control in embedded environments.

2. **Industrial Automation in PLC SCADA**:

(a) Completed a 30-day internship at Sofcon India Pvt. Ltd. from 13th May to 13th June 2013, focused on Industrial Automation using PLC and SCADA systems.

(b) Study of PLC architecture, working principles, and role in automation. Overview of SCADA system components, architecture, and communication protocols (e.g., RS-232, RS-485, Modbus).

(c) Development of mini-projects simulating real-life industrial processes such as: Conveyor belt automation, Tank level control, Packaging and filling systems).

## Patents

(a) **V. Dahima**, R. Mishra and A. Kapoor, "Cruciform Frequency Selective Surface for Enhanced LTE Band Communication". (published)

## Publications

### Journal Publications

(a) **V. Dahima**, R. Mishra and A. Kapoor, "High selectivity dual-passband FSS for 5G n78/n79 bands with alternating copper-dielectric configuration," ***IOP Engineering Research Express***, vol. 7, 2025, pp. 025310. (https://iopscience.iop.org/article/10.1088/2631-8695/adc780)

(b) **V. Dahima**, R. Mishra and A. Kapoor, "Dual-Band Single-Layered Frequency Selective Surface Filter for LTE Band with Angular Stability," ***Telecom***, vol. 6 (1), 18, 2025. (https://doi.org/10.3390/telecom6010018)

(c) **V. Dahima** and S. Joshi, "Mobility-Aware Energy-Efficient Link Recovery Routing Protocol for Low Power and Lossy Networks," ***MAT - Journal of Electronics and Communication Systems*** vol. 5 No. 3, 2020, pp. 22-30. (https://matjournals.co.in/index.php/JoECS/article/view/3953).

### Conference Publications

(a) **V. Dahima**, S. Singh, R. Mishra, A. Kapoor and A. Saxena, "Influence of Dielectric Permittivity Variations on the Electromagnetic Filtering Performance of Frequency Selective Surface," 2025 Third International Conference on Microwave, Antenna and Communication (MAC), Bhopal, India, 2025, pp. 1-5. (https://doi.org/10.1109/MAC64480.2025.11140307)

(b) S. Singh, **V.Dahima**, R. Mishra, S. Singh. V. Leela and A. Singh, "Design and Performance Analysis of a Compact Wearable Antenna Integrated into FR4 Substrates for Enhanced Wireless Communication," 2025 7th International Conference on Signal Processing, Computing and Control (ISPCC), SOLAN, India, 2025, pp. 592-596, (https://doi.org/10.1109/ISPCC66872.2025.11039531)

(c) S. Singh, **V. Dahima**, R. Mishra, S. Singh and A. Sexena, "Design and Parametric Analysis of a Textile-Based Patch Antenna for Wearable WBAN Applications," 2025 Third International Conference on Microwave, Antenna and Communication (MAC), Bhopal, India, 2025, pp. 1-5, (https://doi.org/10.1109/MAC64480.2025.11140039)

(d) S. Singh, **V. Dahima**, R. Mishra, A. Kapoor, A. Singh and V. L. Devi, "Pioneer Design of a Single-band U-slotted Patch Antenna Tailored for Enhanced Performance in WiMAX and WLAN Environments," 2024 Second International Conference on Microwave, Antenna and Communication (MAC), Dehradun, India, 2024 (https://ieeexplore.ieee.org/document/10837556)

(e) S. Singh, **V. Dahima**, A. Kapoor, R. Mishra, and S. Singh, "Optimizing Rectangular Microstrip Patch Antennas for High-Performance WiMAX Communication," 2023 International Conference on Smart Devices (ICSD), Dehradun, India, 2024, pp. 1-4. (https://ieeexplore.ieee.org/document/10751350)

(f) A. Singh,V. L. Devi, V. Jaitley, S. Singh **V. Dahima**, S. Dobriyal, and P. Kumar, "3D Printed Solar Cell: A Short Review,"International Conference on Intelligent Communication, Control and Devices (ICICCD 2024), Dehradun, India, 2024, pp 917–930. (https://link.springer.com/chapter/10.1007/978-981-97-8329-8$_6$7)

(g) **V. Dahima**, M. Sisodiya and S. Joshi, "Improved Mobility Aware Energy Efficient Routing Protocol for Link Recovery in Internet of Things," 2020 12th International Conference on Computational Intelligence and Communication Networks (CICN), Bhimtal, India, 2020, pp. 169-174. (https://ieeexplore.ieee.org/document/9242616)

(h) M. Sisodiya, **V. Dahima** and S. Joshi, "Trust based Mechanism using Multicast Routing in RPL for the Internet of Things," 2020 12th International Conference on Computational Intelligence and Communication Networks (CICN), Bhimtal, India, 2020, pp. 392-397. (doi: https://ieeexplore.ieee.org/document/9242582)

### Book Chapter Publication

(a) S. Singh, **V. Dahima**, and R. Mishra, "Exploring the dynamics of microstrip antenna and radiation mechanism of dipole antennas,"Practical Antenna: Design, Analysis, and Applications (1st ed.). CRC Press, 2024, pages-32. (https://doi.org/10.1201/9781003470854)

## Technical skills

- ANSYS HFSS
- CST Studio Suite
- MATLAB
- Advance Design System(ADS)
- Microsoft Visio
- LTspice Simulator
- OriginLab

## Technical Achievements

- Served as a **peer reviewer** for scholarly journals, including the International Journal of Communication Sytems (Wiley) and Engineering Research Express (IOP Publishing).
- Active **Graduate Student Member** of the IEEE, contributing to the professional community through participation in research.

## Languages

**English**: Advanced Reading, Writing and Speaking
**Hindi**: Native Language

## References

**Dr. Ranjan Mishra**, Professor
Department of Electrical and Electronics Engineering
University of Petroleum and Energy Studies
Energy Acres, UPES, Bidholi, via, Prem Nagar,
Uttarakhand 248007, India
+91-8272868001
rmishra@ddn.upes.ac.in

**Dr. Piyush Kuchhal**, Professor and Head of Department
Department of Electrical and Electronics Engineering,
University of Petroleum and Energy Studies
Energy Acres, UPES, Bidholi, via, Prem Nagar,
Uttarakhand 248007, India
+91-9997422104
pkuchhal@ddn.upes.ac.in

**Dr. Ankush Kapoor**, Associate Professor
Department of Electronics and Communication Engineering,
Atal Bihari Vajpayee Government Institute of Engineering Technology
ABVGIET Pragatinagar, Distt. Shimla (HP)
+91-9459679235
Ankush8818@yahoo.com