

Nikhil Navaratna

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EDUCATION

Nanyang Technological University (NTU)

Ph.D., Physics

▪ **GPA: 4.88/5.0**

Aug. 2021 – Aug. 2025

Singapore

Birla Institute of Technology and Science, Pilani

M.Sc. (Hons.) Physics, B.E (Hons.) Electronics and Communications

▪ **GPA: 8.59/10**

Jul. 2015 – Jul. 2020

Hyderabad, India

WORK EXPERIENCE

Nanyang Technological University (NTU)

Graduate Researcher. Supervisor: Prof. Ranjan Singh

Thesis title: *On-chip terahertz topological photonic crystals for 6G communications and sensing.*

- Engineered on-chip terahertz interconnects and devices to tackle the scaling limits of electronic-only communication systems.
 - Achieved record single-lane 450 Gbps data transmission speed over a 80 GHz bandwidth with minimal loss, setting a new benchmark for silicon-based broadband terahertz interconnects
 - Developed integrable components such as a monolithic terahertz Mach-Zehnder interferometers with < 2 dB insertion losses and > 20 dB isolation, for high-fidelity signal routing in integrated terahertz photonic systems.
- Developed photonics-enabled 6G testbeds to enable real-time device evaluation.
 - Designed and implemented a versatile testbed supporting both on-chip and over-the-air terahertz communication experiments
 - Executed real-time benchmarking of terahertz waveguides and reconfigurable intelligent surfaces for next-generation networks.
- Designed low-noise, wideband amplifiers tailored for next-generation terahertz communication links.
 - Architected a low-noise amplifier (LNA) delivering 11 dB gain with < -18 dB input reflection, ensuring high sensitivity and minimal mismatch losses; design completed and ready for fabrication.
 - Contributed to the design and layout optimization of a power amplifier, achieving a bandwidth of 51 GHz and a gain of 10.2 dB. Design sent for tapeout.

Aug. 2021 – Present

Texas Instruments

Intern

- Developed a method to calculate jitter at various stages in digital circuits and oscillators using Cadence Virtuoso, improving circuit optimization and performance.
- Applied jitter analysis to enhance the reliability and timing precision of digital circuit designs, contributing to more stable and efficient circuit operation

Jul. 2019 – Dec. 2019

Bangalore, India

SKILLS

- **Simulation and modelling:** Keysight ADS, CST Studio, COMSOL Multiphysics, and Cadence Virtuoso
- **Measurement and Characterization:** Experienced in characterizing high-frequency devices using Vector Network Analyzers (VNAs), spectrum analyzers, and other high-frequency measurement tools.
- **Programming Languages:** C++, Python, and MATLAB for modeling, simulation automation and data processing. Proficient in automating measurement setups and data acquisition using LabVIEW

SELECTED PUBLICATIONS

- **Navaratna, N.**, Tan, Y. J., Kumar, A., Gupta, M., & Singh, R. (2023). On-chip topological THz biosensors. *Applied Physics Letters*, 123(3), 033705.
- Gupta, M., **Navaratna, N.**, Szriftgiser, P., Ducournau, G., & Singh, R. (2023). 327 Gbps THz silicon photonic interconnect with sub- λ bends. *Applied Physics Letters*, 123(17), 171102.
- Kumar, A., Tan, Y. J., **Navaratna, N.**, Gupta, M., Pitchappa, P., & Singh, R. (2024). Slow light topological photonics with counter-propagating waves and its active control on a chip. *Nature Communications*, 15(1), 926.
- **Navaratna, N.**, Tan, Y. J., Singh, R., Topological Line Defect Waveguide. *Adv. Optical Mater.* 2025, 13, 2403451.
- **Navaratna, N.**, Tan, Y. J., Wang, W., Singh, R., Monolithic Terahertz Topological Mach-Zehnder Interferometer. *Adv. Mater.* 2025, 2505657

LEADERSHIP EXPERIENCE

Graduate Student Council

Aug. 2023 – Aug.2024

President

- Led initiatives to improve student engagement, academic collaboration, and overall professional development.
- Represented the student body in multiple decision-making processes with faculty and administration.

INTERESTS

Reading, programming, astronomy and running