

Nikhil Navaratna

EDUCATION

Nanyang Technological University (NTU)

Ph.D., Physics

▪ GPA: 4.88/5.0

Aug. 2021 – Present

Singapore

Birla Institute of Technology and Science, Pilani

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

▪ GPA: 8.59/10

July 2020

Hyderabad, India

WORK EXPERIENCE

Nanyang Technological University (NTU)

Graduate Researcher. Supervisor: Prof. Ranjan Singh

Aug. 2021 – Present

- Engineered silicon-based on-chip interconnects and devices for the 300 GHz band.
 - Developed broadband terahertz interconnects, achieving record data transmission rates of **400 Gbps** over 80 GHz bandwidths with minimal signal loss.
 - Conceptualized and implemented compact **monolithic terahertz Mach Zehnder interferometers** with < 2 dB insertion loss and > 20 dB isolation.
 - Published results in **high-impact journals** (*Nature Communications*, *Applied Physics Letters*), emphasizing breakthroughs in device performance, scientific novelty, and the practical application of photonics in 6G technology.
- Designed and implemented high-frequency HBT amplifiers for the 300 GHz band.
 - 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.**
 - Led the design of a low noise amplifier (LNA) achieving a gain of **11 dB**, and an input reflection coefficient better than -18 dB. The design is finalized and **ready for tapeout.**
- Development of **6G testbed** for characterizing terahertz and high-frequency devices
 - Implemented a testbed capable of both on-chip and over-the-air data communication experiments with complex modulation formats.
 - Performed real-time device characterization of waveguides and reconfigurable intelligent surfaces.

Texas Instruments

Intern

Jul. 2019 – Dec. 2019

Bangalore, India

- 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

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.
- **N. Navaratna**, Y. J. Tan, R. Singh, Topological Line Defect Waveguide. *Adv. Optical Mater.* 2025, 2403451.
- 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.
- Review paper: **Navaratna, N.**, & Singh, R. (2024). Convergent electronic-photonic systems for future 6G-XG wireless communications. *Nature Reviews Electrical Engineering*, *Under review*
- **Navaratna, N.**, & Singh, R. (2025). Monolithic terahertz topological photonic Mach Zehnder Interferometer, *Manuscript under review, Advanced Materials*
- **Navaratna, N.**, Muhammed, H., & Singh, R. (2025). Beyond $f_{\max}/2$ cascode amplifiers for 300 GHz communications, *Manuscript under preparation*
- **Navaratna, N.**, Szriftgiser, P., Ducournau, G., & Singh, R. Low dispersion photonic crystal waveguides for beyond 400 Gbps communications. *Manuscript under preparation.*

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