Pradyot Yadav

107 Carson Dr | North Wales, PA, USA | 215-718-8348
pradyotyadav@gmail.com, yadavps@mit.edu
US Citizen

Objective

Ph.D. student at MIT researching 3D Heterogeneous Integration for mmWave/sub-THz systems, novel sub-THz GaN transistors, and advanced packaging technologies using DTCO/STCO. Experienced high frequency device fabrication and circuit design researcher. Strengths focus on 3D sub-terahertz circuit design/devices/packaging/modeling, particularly relating to GaN, Si CMOS, and glass. Recipient of **Best Student Award in Electronic Devices at 15th International Conference on Nitride Semiconductors (ICNS-15)** and **IEEE RFIC 2025 Best Student Paper Finalist. National Defense and Science Graduate (NDSEG) Fellow** and **IEEE MTT-S Graduate Fellow. 1st place winner of the prestigious 2019 IMS PA Student Design Competition.** Recipient of the **Barry Goldwater Scholarship** in 2021**.** Recipient of **Intel Andy Grove Scholarship. Rank of Eagle Scout received** in 2018**.** Additional experience in DOD, electronic design consultancy, areas of expertise include high frequency (MHz-THz) and high voltage circuitry (kVs), biomedical applications. Strong relationships with defense primes, national labs and industry.

Education

Massachusetts Institute of Technology | Cambridge, MA **August 2022 – Present**
Doctor of Philosophy in Electrical Engineering, GPA 5.00
Minor : Public Policy and Security Studies of Emerging Technologies

Master of Science in Electrical Engineering **August 2022 –May 2024**

Georgia Institute of Technology | Atlanta, GA **August 2018 – May 2022**
Bachelor of Science in Electrical Engineering, GPA 3.60/4.00
Study Abroad - Georgia Tech Lorraine | Metz, France

North Penn Senior High School | Lansdale, PA **September 2014 – June 2018**
Unweighted GPA: 4.10/4.00
Weighted GPA: 6.26/6.00
Rank: 10/986

Awards

- Best Student Award in Electronic Devices at 15th International Conference on Nitride Semiconductors (ICNS-15), **2025**
- IEEE RFIC Best Student Paper Finalist, **2025**
- Qualcomm Innovation Fellowship Finalist, **2024**
- SRC Jump 2.0 CHIMES Annual Review Best Poster, **2023 / 2024**
- IEEE MTT-S Graduate Fellowship, **2023**
- National Defense and Science Graduate (NDSEG) Fellowship (accepted), **2023**
- National Science Foundation (NSF) Graduate Research Fellowship (received), **2023**
- Georgia Tech Electrical and Computer Engineering (ECE) Best Undergraduate Research Award, **2022**
- Barry Goldwater Scholarship, **2021**
- Intel Andy Grove Scholarship, **2020**
- NSF Registration Award RFIC, **2020**
- 1st Place IEEE International Microwave Symposium (IMS) High Efficiency Power Amplifier (HEPA) Design Competition, **2019**
- Eagle Scout, **2018**

Publications

1. **P. Yadav** *et al.* “3-D-Millimeter Wave Integrated Circuits (3D-mmWIC) using GaN-on-Si Dielets with Si CMOS for 5G FR2 Power Amplifiers," *in IEEE Transactions on Microwave Theory and Techniques*, doi: 10.1109/TMTT.2026.3653256.
2. **P. Yadav** *et al.* " Integrated Circuit-on-Glass (ICoG): A Self-Packaged 3D-Heterogeneous Integration (3DHI) Platform for Millimeter Wave Circuits with Embedded GaN-on-Si Dielets," *in IEEE Transactions on Microwave Theory and Techniques*, doi: 10.1109/TMTT.2025.3627479.

3. **P. Yadav** *et al.* "3D-Millimeter Wave Integrated Circuit (3D-mmWIC) : A Gold-Free 3D-Integration Platform for Scaled RF GaN-on-Si Dielets with Intel 16 Si CMOS," *2025 IEEE Radio Frequency Integrated Circuits Symposium - RFIC 2025*, San Francisco, CA, USA, 2025.
4. **P. Yadav** *et al.* "First Demonstration of Highly Scaled RF GaN-on-Si Dielets Embedded in Glass Interposer," *2025 IEEE/MTT-S International Microwave Symposium - IMS 2025*, San Francisco, CA, USA, 2025.
5. X. Li *, **P. Yadav *(equal contribution)** *et al.* " Heterogeneously-Integrated Amplifier-on-Glass with Embedded Gallium Nitride (GaN) Dielet for mmWave Applications," *2025 IEEE Radio Frequency Integrated Circuits Symposium - RFIC 2025*, San Francisco, CA, USA, 2025.
6. **P. Yadav**, Q. Xie, J. Niroula, G. K. Micale, H. Pal and T. Palacios, "First Demonstration of GaN RF HEMTs on Engineered Substrate," 2023 Device Research Conference (DRC), Santa Barbara, CA, USA, 2023, pp. 1-2, doi: 10.1109/DRC58590.2023.10186940.
7. J. Niroula, M. Taylor, Q. Xie, **P. Yadav**, S. Luo, Y. Zhao, T. Palacios, "Record High Temperature Performance in Scaled AlGaN/GaN-on-Si HEMTs up to 500°C," *2024 Device Research Conference (DRC)*, College Park, MD, USA, 2024, pp. 1-2, doi: 10.1109/DRC61706.2024.10605318.
8. J. Niroula, Q. Xie, N. S. Rajput, P. K. Darmawi-Iskandar, S. I. Rahman, S. Luo, R. H. Palash, B. Sikder, M. Yuan, **P. Yadav**, G. K. Micale, N. Chowdhury, Y. Zhao, S. Rajan, T. Palacios, "High temperature stability of regrown and alloyed Ohmic contacts to AlGaN/GaN heterostructure up to 500 °C," *Appl. Phys. Lett.* 13 May 2024; 124 (20): 202103, doi: 10.1063/5.0191297.
9. Q. Xie, M. Yuan, J. Niroula, B. Sikder, S. Luo, K. Fu, N. Rajput, A. B. Pranta, **P. Yadav**, Y. Zhao, N. Chowdhury, and T. Palacios, "Towards DTCO in high temperature GaN-on-Si technology: arithmetic logic unit at 300°C and CAD framework up to 500°C", 2023 Symposium on VLSI Technology and Circuits (VLSI 2023), June 2023, Kyoto, Japan, pp. 1-2, doi: 10.23919/VLSITechnologyandCir57934.2023.10185364
10. **P. Yadav**, "Optimizing the Doherty Amplifier: Design of a 3-GHz GaN Doherty Amplifier Achieving 60% Efficiency," in IEEE Microwave Magazine, vol. 21, no. 2, pp. 88-95, Feb. 2020, doi: 10.1109/MMM.2019.2953348.*1st Place IEEE MTT-S IMS HEPA Student Design Competition*

Patents

1. **P. Yadav** and T. Palacios, "Heterogeneous Integrated Circuit." *Patent Pending* (2025).

Conferences

1. **P. Yadav** *et al.* " Au-Free 3D-Heterogeneous Integration of mmWave GaN-on-Si Dielets with Si CMOS and Glass Interposer for 5G NR FR2 Amplifiers," *International Conference of Nitride Semiconductors 15,* ICNS15, Malmö, Sweden, 2025, *Oral Presentation.*
2. **P. Yadav** *et al.* " 3D-Millimeter Wave Integrated Circuit (3D-mmWIC) : A Gold-Free 3D-Integration Platform for Scaled RF GaN-on-Si Dielets with Intel 16 Si CMOS," *2025 IEEE Radio Frequency Integrated Circuits Symposium - RFIC 2025*, San Francisco, CA, USA, 2025.
3. **P. Yadav** *et al.* "First Demonstration of Highly Scaled RF GaN-on-Si Dielets Embedded in Glass Interposer," *2025 IEEE/MTT-S International Microwave Symposium - IMS 2025*, San Francisco, CA, USA, 2025.
4. X. Li *, **P. Yadav *(equal contribution)** *et al.* " Heterogeneously-Integrated Amplifier-on-Glass with Embedded Gallium Nitride (GaN) Dielet for mmWave Applications," *2025 IEEE Radio Frequency Integrated Circuits Symposium - RFIC 2025*, San Francisco, CA, USA, 2025.
5. J. Niroula…, **P. Yadav**, T. Palacios, "Trends, Challenges, and Opportunities of GaN Based High Temperature RF Electronics", GOMACTech 2025 Conference, *Oral Presentation.*
6. **P. Yadav** *et al.* "GaN Technologies and Devices to Enable the Full Potential of Back-Side Power Delivery," *2024 International Workshop on Nitride Semiconductors – 2024 International Workshop on Nitride Semiconductors – 2024 IWN*, Honolulu, HI, USA, 2024, *Oral Presentation.*
7. **P. Yadav** *et al.* "CMOS-Compatible AlGaN/GaN-on-Si HEMTs featuring Record ft / fmax = 61/156 GHz with Novel 80nm Copper T-Gate and Regrown Contacts," *2024 International Workshop on Nitride Semiconductors – 2024 IWN*, Honolulu, HI, USA, 2024, *Oral Presentation.*
8. **P. Yadav** *et al.* "RF GaN HEMTs on Engineered Substrate for High Temperature Applications," *International Conference of Nitride Semiconductors 14,* ICNS14, Fukuoka, Japan, 2024, *Oral Presentation.*
9. J. Niroula, M. Taylor, Q. Xie, **P. Yadav**, S. Luo, Y. Zhao, T. Palacios, "Record High Temperature Performance in Scaled AlGaN/GaN-on-Si HEMTs up to 500°C," *2024 Device Research Conference (DRC)*, *Oral Presentation.* College Park, MD, USA, 2024, pp. 1-2, doi: 10.1109/DRC61706.2024.10605318.
10. **P. Yadav** *et al.* "First Demonstration of GaN RF HEMTs on Engineered Substrate," *2023 Device Research Conference (DRC)*, *Oral Presentation.*
11. Q. Xie, M. Yuan, J. Niroula, B. Sikder, S. Luo, K. Fu, N. Rajput, A. B. Pranta, **P. Yadav**, Y. Zhao, N. Chowdhury, and T. Palacios, "Towards DTCO in high temperature GaN-on-Si technology: arithmetic logic unit at 300°C and CAD framework up to 500°C", 2023 Symposium on VLSI Technology and Circuits (VLSI), *Oral Presentation.*

12. J. Niroula, Q. Xie, M. Yuan, **P. Yadav**, T. Palacios, "High Temperature Modeling of Commercial GaN HEMTs Using an Enhanced MVSG Framework", GOMACTech 2023 Conference, *Oral Presentation.*
13. **P. Yadav**, T. Palacios, "Heterogeneous Integration of GaN and Si CMOS for RF Front Ends above 300 GHz," Semiconductor Research Corporation (SRC) Techcon 2023, *Oral Presentation.*

Volunteering

- IEEE Reviewer – IEEE Electron Device Letters, IEEE Microwave and Technology Letters
- 2024 MIT Microsystems Annual Research Conference (MARC) **Chair**
- MIT EECS Graduate Application Assistance Program (GAAP) Mentor
    - Mentorship of 2 prospective PhD Students
    - The EECS Graduate Application Assistance Program (GAAP) is a student-run, volunteer-based program that assists EECS PhD applicants from underrepresented groups and non-traditional academic backgrounds. In GAAP, current/past graduate students pair with applicants and guide them through the graduate application process.

- Deep Technology North Penn High School Student Mentor
    - Mentorship and advisement of high school students interested in higher education/careers in deep technology research.

- Mentorship of **4 graduate students** and **7 undergraduate students**
- 2021 IEEE International Microwave Symposium (IMS) Steering Committee
- 2020 IEEE International Microwave Symposium (IMS) Student Volunteer
- 2019 IEEE International Microwave Symposium (IMS) Student Volunteer
- Boy Scouts of America – **Eagle Scout**

Skills

Device Fabrication: 200mm Wafer Processing, GaN RF HEMT Fabrication, III-V Compound Semiconductors, Electron Beam Lithography, Electron Beam Deposition, Photolithography, PECVD, Sputter Deposition, ICP-RIE, XeF_2, Scanning Electron Microscope, Asher, Dektak, AFM

Circuit Design: 5G NR/6G, MMICs, Analog IC, Power Amplifiers, Doherty PA Design, Class E/F Amplifiers, LNAs, RF Switches, Package Design, Transmission Line Design, Smith Charts, Impedance Matching, Amplifier Stability, RF Board Layout, Physical Modelling

Advanced Packaging: 2.5D, 3D, 3.5D, 3DIC, Finetech/MRSI Flip Chip Bonders, Cu/Cu Bonding, Hybrid Bonding, Cu SAP/ Damascene

PDKs : Intel 16 22nm FinFET, GF 150 GaN-on-Si, Qorvo QGaN15, HRL T3 GaN

Software: ADS, AWR, Cadence, HFSS, MBP (Model Builder Program), IC-CAP, Icepak, Micro-Cap, Multisim, OrCAD, Allegro, KiCAD, PSpice, Matlab, AutoCAD, Solidworks

Instrumentation: Vector Network Analyzer, Vector Signal Generator, Power Meter, Pulse-IV Power Supplies, Multimeters, Wafer Probe Station, Semiconductor Analyzer Oscilloscopes, Signal Generator, Spectrum Analyzer, Drills, Grinders, Lathes, Milling machines and Arc Welding

Languages: C++, Python, Matlab, Verilog, Assembly, HTML

Other: Microcontrollers (STM32F4, PSOC3, LPC546XX), FPGA (Xilinx, Altera)

Professional Organizations: IEEE, IEEE Microwave Techniques and Theory Society, IEEE Electron Device Society

Languages: Hindi (native), English (native), German (conversational), French (basic)

Experience

MIT - Tomás Palacios Group and Ruonan Han Group | Cambridge, MA **August 2022 – Present**

Graduate Research Assistant

- Sub-Terahertz Circuits, Devices, and Packaging
- Heterogeneous Integration of GaN, Si CMOS and Glass
- Sub-terahertz GaN-on-Si RF lateral transistors and GaN/Si integrated circuits
- Design/System Technology Co-optimization
- 200/300 mm GaN wafer processing
- High Temperature Electronics
- GaN Logic and Control Circuitry
- Physical Device Modelling

IBM – Quantum | Yorktown Heights, NY **June 2024 – September 2025**

Senior Quantum Research Scientist Intern : Summer 2025
Supervisors: Utku Soylu, Daniil Frolov, Jean-Olivier Plouchart, Alberto Valdez Garcia, Cyril Cabral

- Cryo-PDK development for RF/mixed signal circuit design
- BSIM-IMG/CMG modelling of 22FDX and Samsung 14LLP
- Advanced packaging of cryo-RF circuits

Quantum Research Scientist Intern : Summer 2024
Supervisors: Alberto Valdez Garcia, Daniil Frolov, Jean-Olivier Plouchart, Minhua Lu, Cyril Cabral, Kai Schleupen, Dirk Pfeiffer

- 4K small signal and noise modelling of Samsung CMOS technology
- 4K characterization of cryo-LNA, including development of cryo-RF measurement lab
- Design of 5-layer organic RDL for AI/RF chiplets for 300mm base substrate platform
- GaN-on-Si stealth dicing

Raytheon – Advanced Technology Division | Andover/Tewksbury, MA **December 2023 – Present**

Part-Time Graduate Research Intern
Supervisors: Lovelace Soirez, Timothy Hancock, Jeffery Laroche

- DARPA ELGAR: 200mm W-G Band GaN-on-Si/SiC RF lateral transistors/MMIC design
    - Key developer of a-Si air cavity process
    - Advanced packaging via copper damascene process
- DARPA THREADS: High power GaN-on-SiC with thermal management

Georgia Tech Electronics and Micro-System Lab (GEMS) | Atlanta, GA **May 2020 – May 2022**

GaN MMIC Undergraduate Researcher
Supervisor: Hua Wang

- Air Force Research Laboratory and Qorvo Joint Project working on LMBA GaN MMIC design of a coupler-based impedance scaling and phase shifting baluns targeting 5G applications
- 0.15um GaN design using Advanced Qorvo Research PDK, 26-31GHz Balanced amplifier designed with a unique phase shifting topology featuring Lange and a new variety of Marchand couplers from the GEMS Lab with funding provided from Qorvo and AFRL
- Impedance and power sensors with implementations in reconfigurable PA architecture
- Coupler based impedance and power sensors with Doherty like architecture

Qorvo | Richardson, TX **May 2020 – December 2021**

R&D Intern / Infrastructure and Defense : Summer 2021 - Fall 2021
Supervisors: Jose Jimenez, Kevin Kobayashi

- Further development of a physical based model of the Qorvo GaN process
- Development of high frequency monolithic GaN Varactor

Microwave Module Design Intern / Infrastructure and Defense - Summer 2020
Supervisor: Chris Sanabria

- 5G chipset development and key partner with DARPA, ARFL, Department of Defense in development of high performance III-V compound MMIC solutions.
- 1st Pass Design of TGA2935 Driver Amplifier, achieving 2W output with 55% efficiency over 2.7-3.5 GHz
- Provided ELTA with a design solution to address a high second order harmonic in S-band
- Back builds of various RF switches, LNA's, PA

Micro-C X-Ray Imaging |Atlanta, GA **May 2020 – May 2022**

High Voltage Circuitry Consultant

- Designer of high voltage circuitry for v2. of X-Ray
- 30-80kV output supply featuring circuitry, flyback transformer and Cockcroft/Walton generator

Georgia Tech/ GTRI|Atlanta, GA **August 2018 – May 2022**

RF Design Student Undergraduate Researcher

Supervisor: Under Dr. James S Kenney

- 1st Place 2019 IMS PA Design Competition
- Class E Amplifier Design
- Envelope Tracking Amplifier Design
- Characterization of wideband Qorvo PA, 2-20GHz

Reference Designer Inc |Boston, MA **June 2014 – June 2018**

Test and Rework Technician / Healthcare Monitoring Devices

Performed circuit rework on patient monitoring systems. These are used for remote diagnosis and monitoring of patients. This required outstanding quality of work and are deployed at Veteran's Affair's Hospitals around the country.

Yuva Hindi Sansthan |Hatfield, PA **August 2013 – September 2014**

Hindi Language Teacher / Summer Camp

Other Projects (Undergraduate and Secondary Education)

Low Earth Orbit Satellite (LEOS) Tracking System – Undergraduate Senior Design Project **Spring 2022**
VIASAT

- Matlab implementation of Monopulse and Step Tracking System

A 3 GHz GaN Doherty *1st Place IMS 2019 Design Competition **Spring 2019**

Designed a 3 GHz GaN Doherty from simulation to implementation. The board was completed using Rogers 5880 substrate and Cree 6W GaN devices. The architecture was symmetric and involved heavy use of ADS Momentum simulation and HFSS EM simulation. The project won this year's IMS PA Design Competition.

- 60% PAE
- 33 dBc IMD3
- 4.7W output power at 24 dBm input
- Utilized advanced Rogers 5880 Substrate
- P. Yadav, "Optimizing the Doherty Amplifier: Design of a 3-GHz GaN Doherty Amplifier Achieving 60% Efficiency," in *IEEE Microwave Magazine*, vol. 21, no. 2, pp. 88-95, Feb. 2020, doi: 10.1109/MMM.2019.2953348

A 2.147 GHz GaN Class E Power Amplifier **Spring 2020**

- 70% PAE
- 33 dBm IMD3
- 4.5W output power at 24 dBm input
- Utilized advanced Rogers 5880 Substrate
- One of the highest efficiencies given the frequency, C/I, and output power among Class E topologies to date

Design of a High Voltage GaN Switching Supply **Spring 2020**

- Variable supply for 30kV to 80kV application
- Small, efficient design utilizing GaN
- High voltage flyback transformer design
- Cockcroft/ Walton Generator fabrication

Highly Efficient Smart LED Lighting System **High School 12th Grade**

Designed and implemented a remote-controlled LED lighting system where the standby power required was only 0.05W which is 14 times less than that of a commercially available conventional LED lighting system. STM32F4, 2.4GHz transceiver and my innovative power supply with very low standby power featured in its design.

- Institute of Institute of Electrical and Electronics Engineers (IEEE) Award
- 1st Place in Engineering Category at the Montgomery County Science Research Competition
- Honorable Mention in Engineering Category at the Delaware Valley Science Fair
- American Society of Naval Engineers Award
- United States Navy/United States Marine Corps Award
- Pennsylvania Society of Professional Engineers-Valley Forge Chapter Engineering Award
- Engineers' Club of Philadelphia Award
- Armed Forces Communications and Electronics Association Award

Development and Implementation of a High-Resolution Digital Vernier Caliper **High School 11th Grade**

Designed and implemented a high-resolution Digital Vernier caliper using an innovative phase detection scheme. The design involved the use of PSOC3 microcontroller and RF circuits including PCB fabrication.

- Institute of Electrical and Electronics Engineers (IEEE) Award
- Second Place in Engineering Category at the Montgomery County Science Research Competition
- Best in Show presented by the Dow Chemical Company
- 1st Place: Leonardo da Vinci Award

Development of a Smart LED Lighting System with Zero Standby Power **High School 10th Grade**

Designed and implemented a remote-controlled LED lighting system which required zero standby power. It involved the use of STM32F4 microcontroller, 2.4GHz transceiver and my ground-breaking zero standby power RF receiver circuit. ADS, ORCAD and PSPICE were used in the design and implementation of this system.

- 1st Place in Engineering Category at the Montgomery County Science Research Competition
- Exelon Corporation Award for Energy-Related Research
- George Purvis Award for Highest Cumulative Point Total for entire Science Fair Career
- 3rd Place in the Engineering category at the Delaware Valley Science Fair
- Armed Forces Communication and Electronics Association Award
- The ASU Walton Sustainability Solutions Award
- Engineers' Club of Philadelphia Award
- Pennsylvania Society of Professional Engineers Award

Relevant Coursework

MIT

- Integrated Microelectronic Devices
- Power Electronics
- Emerging Technology, Intelligence Failure, and The Problem of Surprise
- Electromagnetics
- Analog/Mixed Signal CMOS Design

Georgia Tech

- RF Design I
- RF Design II
- Electromagnetic Applications
- Energy Systems
- Antenna Engineering
- Fiber Optic Communications
- Microelectronics
- Analog Electronics
- Electromagnetics
- Digital Signal Processing
- Digital System Design
- Microelectronics Laboratory