



Photonics Design Engineer Profile

Doctoral Researcher in **Integrated Photonics (Silicon Nitride PICs)** at RWTH Aachen University with hands-on experience in **design, simulation, and experimental validation** of fabrication-tolerant PICs for visible wavelengths. Expertise includes **SiN directional couplers, 1×2 MMI splitters, compact grating emitters, and thermo-optic phase shifters**. Experienced across the full PIC development cycle using **Lumerical MODE/FDTD/EME, OptoDesigner, Python, MATLAB, and LabVIEW**. Seeking an industry R&D role as a **Photonics Design Engineer**.

Core Competencies

| PIC Design & Simulation                                                                                                                                                                                                                               | Fabrication & Characterization                                                                                                                                                                                                                                           |
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| <ul style="list-style-type: none"><li>Silicon Nitride (SiN) PICs</li><li>Directional couplers (2×3)</li><li>MMI splitters (1×2)</li><li>Grating and edge couplers</li><li>Optical phased-array emitters</li><li>Lumerical MODE / FDTD / EME</li></ul> | <ul style="list-style-type: none"><li>Fabrication-tolerant optimization</li><li>DFT-compliant layouts</li><li>OptoDesigner mask generation</li><li>Fiber-array / edge coupling</li><li>Cut-back loss measurements</li><li>Laser microscopy for defect analysis</li></ul> |

Professional Experience

| Doctoral Researcher — Integrated Photonics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                     |
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| RWTH Aachen University, Germany                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Sep 2021 – Jan 2026 |
| <ul style="list-style-type: none"><li>Designed <b>2×3 directional couplers</b> with mid-tap power extraction and near-zero crosstalk.</li><li>Designed and validated <b>1×2 MMI splitters</b> optimized for low imbalance and fabrication tolerance.</li><li>Developed <b>compact grating emitters</b> with Gaussian far-fields, improving OPA fill factor.</li><li>Built MODE/FDTD/EME workflows for modal, coupling, and tolerance analysis.</li><li>Automated fabrication sweeps and far-field evaluation using <b>Python and LabVIEW</b>.</li><li>Performed edge and fiber coupling experiments, loss extraction, and phase-shift calibration.</li></ul> |                     |

Education

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|------------------------------------------------------------------|----------------------|
| PhD — Integrated Photonics (SiN PICs), RWTH Aachen University    | Sept. 2021–Jan. 2026 |
| Optical Telecommunication I (OTK-I): Grade 1.0                   |                      |
| M.Tech — Optoelectronics & Optical Communication, IIT Delhi      | July 2019–Aug. 2021  |
| Exchange semester at TU Braunschweig (DAAD-KOSPIE) — GPA: 9.0/10 |                      |
| B.Tech — Electrical & Electronics Engineering, BIT Mesra         | Aug. 2014–July. 2018 |

Selected Publications

1.

Agrawal P., Ashtiani F., Merget F., Aflatouni F., Witzens J. Optical phased array with 2D beam steering based on nonlinear beam mixing. *Optics Letters*, 47(16), 3996–3999, 2022. DOI: 10.1364/OL.463710

2.

Agrawal P., Tabatabaei Mashayekh A., Hossein P., Gilbert B., Merget F., Witzens J. 2×3 waveguide coupler and compact grating emitter for crossbar phased arrays. *Manuscript under publication process*.

3.

Hossein P., Tabatabaei M. A., Agrawal P., et al. Focusing optical phased array for tissue interrogation with improved side-lobe suppression. *Biomedical Optics Express*, 17(1), 12–37, 2025.

4.

Hossein P., Agrawal P., Tabatabaei M. A., et al. Focusing optical phased array for optically enabled probing of the retina. *ECIO 2024 Proceedings*, Aachen, Germany.

Tools & Programming

|                  |                                   |
|------------------|-----------------------------------|
| Simulation:      | Lumerical MODE, FDTD, EME; COMSOL |
| Layout:          | OptoDesigner                      |
| Programming:     | Python, MATLAB, LabVIEW           |
| Version Control: | Git                               |
| Languages:       | English, Hindi                    |