

Dr. Mustafa Mert BAYER

Staff Optical Engineer | LiDAR & Optical Communication Systems

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Google Scholar: [190+ citations](#)

SUMMARY

Staff Optical Design Engineer with 7+ years of experience in LiDAR, optoelectronic systems, and optical communication across automotive, aerospace, and CubeSat platforms. Inventor of a patented coherent LiDAR architecture with deep expertise in receiver design, system integration, and performance modeling. Proven ability to define subsystem requirements, lead cross-functional R&D, and optimize designs for high-yield manufacturing.

Open to roles in advanced LiDAR, optoelectronic hardware, or optical communication systems.

PROFESSIONAL EXPERIENCE

Staff Optical Engineer | [Luminar Technologies](#) | Jan. 2023 – Present

- Architected receiver subsystem requirements and system interfaces, aligning HALO platform performance with upstream and downstream design needs.
- Developed and executed DOE-based experiments to characterize IRIS and HALO platforms, guiding optical and electronic design refinement.
- Delivered >35% efficiency gain in production by leading DOE-based test development and optimizing calibration pass/fail criteria.
- Performed statistical and data-driven analysis using MATLAB to assess receiver yield and detect performance degradation trends.
- Increased manufacturing yield from 60% to 97% by defining receiver calibration pass/fail criteria and building robust test routines.
- Led root-cause analysis for sensor-level defects, reducing sensor failure rate by 25%.
- Collaborated with data science to streamline calibration processes and enhance point cloud quality.

Postdoctoral Scholar | [University of California, Irvine](#) | Sep. 2022 – Jan. 2023

- Defined optical transceiver architecture and link budget for a CubeSat LiDAR payload developed with The Aerospace Corporation.
- Led system integration and requirements definition for end-to-end LiDAR functionality in space-constrained environments.
- Designed remote sensing experiments simulating orbital conditions to validate prototype performance and environmental resilience.

Research Assistant | [University of California, Irvine](#) | Sep. 2017 – Aug. 2022

- Invented the coherent Multi-Tone Continuous Wave (MTCW) LiDAR system; validated through simulation and proof-of-concept hardware. Compared MTCW with FMCW and ToF LiDARs to demonstrate performance trade-offs and advantages.
 - Built Zemax/MATLAB radiometric models and CubeSat-ready system architectures to support space deployment.
 - Led design of a >10 km free-space optical link (>100 Gbps) using DWDMs, EDFAs, and beam-steering alignment under an NSF project for rural broadband.
 - Conducted coherent optical communication experiments with PAM4, QPSK, and OOK formats using frequency-locked lasers and high-speed phase-diverse receivers.
 - Supported NASA's Omnidirectional Inter-Satellite Optical Communicator by designing optical amplifier chains and link budgets for space-based networks.
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EDUCATION

Ph.D. in Electrical Engineering - University of California, Irvine | 2017 – 2022

Dissertation: Multi-Tone Continuous Wave Coherent LiDAR Systems

MSc. in Optoelectronics and Photonics Engineering - Koc University, Turkiye | 2015 – 2017

BSc. in Physics & Electrical Eng. (Double Major) - Koc University, Turkiye | 2010 – 2015

KEY ACHIEVEMENTS

- Inventor, U.S. Patent No. US 12,174,020 B2 – Multi-Tone Continuous Wave LiDAR
 - Co-authored 30+ academic papers; 190+ citations
 - Developed receiver failure diagnostics, cutting production costs by 20%
 - Led a LiDAR manufacturing initiative that improved receiver efficiency by 35%
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TECHNICAL SKILLS

- **Software:** MATLAB, Simulink, Zemax, Python, OptSim, VPI Optical, Arduino, Raspberry Pi, LT Spice, GitHub, Microsoft Office
 - **Design & testing:** Optical system architecture, receiver calibration, DOE methodology, high-speed modulation, signal integrity analysis, statistical performance evaluation
 - **Domain Expertise:** Coherent & FMCW LiDAR, direct detection LiDAR, optical communications, CubeSat payloads, photonic systems, optoelectronic integration
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ADDITIONAL CONTRIBUTIONS

- Reviewer: Optica, IEEE Photonics, and Sensors journals
 - Languages: English (Fluent), Turkish (Native), German (A2)
 - Mentorship: Advised junior engineers and graduate students on LiDAR system design, helping launch academic-to-industry transitions
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