

Photonics is a key enabling technology for next-generation communications, computing and sensing systems

At gradient we develop photonic solutions that add functionality and enhance performance while minimizing SWaP particularly relevant for its potential impact in space applications.

Our work leverages novel photonic technologies and advanced integration concepts to address the challenges of demanding operational environments and deliver innovative, high-impact solutions particularly relevant for its potential impact in space applications.



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Photonics

for NewSpace

by gradient 

Two innovation layers

Enabling Integration

Near-term, scalable, system-ready innovation:

- ✓ Boost performance, reduce footprint and power consumption for SWaP-critical payloads.
- ✓ Enable low latency, high bandwidth operation through hybrid electronic-photonic solutions based on RF photonics co-integration
- ✓ Deliver ultrafast broadband analog photonic processing for wideband satellite communication and remote sensing applications

Transformative frontiers

Long-term, paradigm shifting innovation:

- ✓ Advance neuromorphic photonics and photonic AI inference for on-board, real-time processing with extreme speed and energy efficiency
- ✓ Develop energy autonomous photonic solutions based on integrated energy harvesting for near-zero operation
- ✓ Realize simultaneous communication and sensing through photonic based perception-aware connectivity
- ✓ Enable miniaturization of advanced radiation-tolerant photonic sensors with embedded intelligence and autonomy



Communications

Applications

- ✓ Advanced front-end architectures for telecom, aerospace and defense
- ✓ On-board spectrum monitoring and signal intelligence
- ✓ In-band full duplex communication systems
- ✓ Integrated communication, sensing, radar payloads
- ✓ Hybrid electronic/photonic communication submodules

Computation

Applications

- ✓ Low latency on-board edge AI processing for SWaP-constrained environments
- ✓ Real-time data processing for mission-critical systems
- ✓ Photonic neuromorphic computing for low consumption AI inference
- ✓ Near-zero-power operation for autonomous platforms and long-duration missions

Sensing

Applications

- ✓ Precision sensing in complex and harsh environments
- ✓ Multi-functional sensing platforms for situational awareness
- ✓ Compact sensing systems for space and embedded deployment
- ✓ Autonomous sensing for long-term and unattended operation

Gradient in the Photonics value chain

Our capabilities span the complete development lifecycle of photonic solutions, encompassing signal-processing algorithm development, component, chip, and system-level design and modeling, packaging, demonstrator assembly, and experimental laboratory validation

