

# Dr. Biplab Pal, PhD — Expert Witness CV

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## Executive Summary

- Technology consultant, engineer, entrepreneur, and expert witness with 24+ years across optical communications, semiconductors/SoC, telecom networks, and Industrial IoT/edge-AI.
- Adjunct research faculty at UMBC (CARDS) focused on edge-AI, sensors, autonomy, and secure over-the-air (OTA) update frameworks for large device fleets.
- 26 U.S. patents filed with 22 granted; led development and scale-up of 25+ sensor/AI products with 1,000+ field deployments in factories, hospitals, and buildings.
- Expert-witness services include §102/§103 analyses, claim construction/standards mapping, source-code review, protocol simulation, Rule 26/Daubert reports, deposition and trial testimony.

## Why Dr. Pal for Your Expert Witness

- Direct, hands-on mastery of Electronics/Semiconductor/Telecom/Data/Software/Security pipelines (including NIST-aligned security) and streaming/embedded ecosystems (4K/8K, robotics video links).
- Deep overlap with SoC/memory IP, optical/dark-fiber infrastructure, and industrial IoT devices implicated in modern disputes.
- Proven courtroom readiness: current engagement in a \$15M semiconductor/telecom matter; prior casework in networking silicon, dark-fiber capacity, and IoT device security.
- Clear, defensible methods: discovery using ML-assisted prior-art search (Treeminr), code instrumentation, and reproducible lab validation when samples are available.

## Expert Witness Experience

### Representative Matters

Domain / Matter	Scope & Role
Semiconductor & Telecommunications Dispute	Plaintiff-side expert in a ~\$15M matter; issues include chip-level architecture, wireless protocols, and network engineering; reports and deposition readiness.

OTA Update & Streaming/Embedded Devices	Advised secure OTA stacks for defense across 4K/8K pipelines; licensing/security for device-pushed software.
Dark-Fiber Leasing & Capacity	Analyzed optical plant, budgets, and link engineering to evaluate capacity and service-level claims.
SoC/Memory IP for Networking Silicon	Mapped silicon IP blocks/interconnects to asserted claims; verified latency, reach, and error-rate budgets.
Industrial IoT Security	Designed NIST-aligned OTA frameworks; fielded device fleets in factories, hospitals, and buildings; ran hardening workshops for utilities.

### Litigation Services

- Patent invalidity/infringement (35 U.S.C. §102/103), claim construction, standards/code mapping.
- Source-code inspection, architecture tracing, protocol simulation, and performance/security validation.
- Prior-art discovery via ML-assisted search across global patent and NPL databases.
- Rule 26 / Daubert reports; deposition and trial testimony; rebuttal analyses.

## Technologies Mastered (from attached dossiers)

### Optical Transport & Telecom Networks

- 10G / 40G / 100G systems; coherent & non-coherent optics; polarization-multiplex systems; OSNR optimization; optical cross-connects; dark-fiber infrastructure; network design for AT&T/Verizon.
- Modeling & simulation (OptSim / R-Soft); long-haul, metro, and regional optical planning; silicon on-chip communications; OEM optical cards.

### Wireless / Embedded / IoT

- BLE, Wi-Fi, Zigbee, LoRa; RFID modernization; secure OTA (DoD/NIST-aligned) for large device fleets; device telemetry & remote diagnostics.
- 4K/8K streaming pipelines and embedded video links for robotics; GPX10/64 AI-on-chip ecosystems; firmware/bootloader update chains.

### AI / ML / Data Systems

- Edge-AI for autonomy; LLM, VLM, vLLM; Retrieval-Augmented Generation (RAG); vector databases; agentic frameworks (React-style agents).

- ML-assisted prior-art search (Treeminer); knowledge-graph construction; mixture-of-experts (MoE) architectures.

### Cloud / Platforms / Security

- Azure IoT at scale; Siemens MindSphere integrations; SaaS telemetry & analytics; IEC 62443 practices; FDA/NIST/DoD-conscious design.
- Secure code review environments; network-protocol simulation; code instrumentation and reproducible test harnesses.

### Products & Sensing Systems (Concept → Scale)

- Virawarn® viral-load biosensing; Feverwarn® automated fever screening; PumpSense® predictive maintenance; Power Analyzer®; Vibration Analyzer®; Bridge/Structural Health; Dryersense; Air-quality monitoring.
- Waste-water quality sensors (EPA-aligned); microgrid/energy monitoring; factory electrical hazard detection; Azure plug-in services for cyber-physical systems.

### IP, Standards & Research

- 26 U.S. patents (22 granted) across optical networking, sensor electronics, and AI/ML systems; complete list available on request.
- Standards/code mapping with frequent use of IEEE, JPO, KIPO, and EPO sources; NIST-aligned OTA frameworks for critical-infrastructure contexts.
- Workshops and CLE-style trainings on secure communications/IoT security for utilities and manufacturers.

### Signature Products (Selected)

Product	Summary
Virawarn®	On-device viral-load detection biosensor with cloud telemetry.
Feverwarn®	Market-leading automated fever-screening system.
PumpSense®	Predictive maintenance for industrial pumps (sensor + edge + cloud).
Power Analyzer®	Power-quality diagnostics and efficiency analytics for factories/hospitals/buildings.
Vibration Analyzer®	Rotating-machine health and failure prediction.
BridgeSense™	24×7 structural-health monitoring for distressed bridges.
Dryersense	Industrial drying-system health and predictive maintenance.

## Appointments & Leadership

- Partner & Co-Founder, Avocate.AI — AI agents for legal evidence graphing using knowledge graphs and MoE (2025–Present).
- Interim CEO, Robolytics LLC — Edge-AI for robotics; secure OTA protocols for defense (2024–Present).
- Adjunct Research Faculty (CARDS) / Adjunct Associate Professor, UMBC — Edge-AI, IoT, autonomy (2022–Present).
- President/Co-Founder/CTO, MachineSense (Prophecy Sensor) & Opteev — 1,000+ deployments; Microsoft & Siemens partnerships (2014–2024).
- Co-Founder/CTO, Zreyas Technology — BLE/Wi-Fi/Zigbee/LoRa sensors (2012–2014).
- Principal Engineer, Ciena — Optical network design (2008–2012).
- R&D Manager, Endress+Hauser (Optical Sensor Division) — Wastewater/Biotech/Pharma/Oil&Gas sensors (2003–2007).
- Optical System Engineer, Kirana Networks — Network design tools (2001–2003).
- Optical System Engineer, ARTIS (R-Soft) — Optical simulator design (1999–2000).

## Education

- PhD, Electronics & Electrical Communication Engineering — IIT Kharagpur; dissertation on non-linear impairment in optical communications.
- MS, Physics (Solid-State & Optical Electronics) — IIT Kharagpur.
- BS, Physics — IIT Kharagpur.

## Brief Bio

Dr. Biplab Pal is a Baltimore-based technologist, serial entrepreneur, and expert witness whose work bridges optical communications, semiconductors, and Industrial IoT. He has founded multiple deep-tech companies, served as adjunct research faculty at UMBC's CARDS center, and led the development of secure OTA frameworks and edge-AI products deployed at national scale. Dr. Pal produces clear, defensible opinions and testimony in complex technology disputes.

## Contact

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