

Michael Bilca

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TS(SCI Eligible) | FBI SSBI (2019) | CI Poly (2022)



temper.ai -- neuromorphic SNN playground and AI alignment research

EXECUTIVE SUMMARY

Greybeard security architect. Agentic engineer. Mentor. Technology executive and security architect with 23+ years delivering mission-critical AI and systems for DoD, IC, and federal law enforcement. Hands-on neuromorphic researcher with two decades of independent work on spiking neural networks, focused on distributed architectures as structurally safer alternatives to centralized AI models. Proven in fielding novel platforms from mathematical concept to operational deployment, advising senior government decision-makers, and building international consensus in standards bodies. Stanford mathematician. Bell Labs alumnus. Published on systemic risks in current alignment paradigms, including instruction-data conflation vulnerabilities, synthetic feedback loop collapse, and training data contamination. Passionate about ensuring powerful AI systems (indeed all systems) are deployed safely and beneficially.

KEY QUALIFICATIONS

- **23+ years in national security:** FBI technical strategy, US and international telecom security standards, lawful intercept, cybersecurity; DoD submarine and surface combat systems and defense algorithms
- **Senior technical advisor:** Presented R&D to Navy leadership; coordinated strategy across 22,000+ U.S. law enforcement agencies and represented our interests in 3GPP and ETSI international standards bodies
- **AI architecture and research:** Two decades developing spiking neural networks; published on AI alignment and safety; Stanford mathematics and computer science (statistics, optimization, group theory)
- **Novel systems from concept to fielding:** Led Anti-Torpedo Torpedo defense algorithm through Navy deployment; architected next-gen submarine combat system; architect of 5G secure lawful intercept for cloud-native platforms
- **Cross-organizational leadership:** Built and led engineering teams; coordinated across domestic law enforcement, intelligence agencies, international standards bodies, and defense contractors
- **Active TS/SCI clearance with CI Polygraph**

PROFESSIONAL EXPERIENCE

Founder & Principal Architect — *temper.ai*

2002 - present

- Independent Spiking Neural Networks researcher since 2002; launched *temper.ai* as a research platform and AI alignment publication venue.
- Built Turing, a working neuromorphic SNN demonstration platform leveraging LLM APIs, exploring distributed intelligence architectures as alternatives to centralized AI models
- Published six-part thesis examining systemic risks in centralized AI architectures — including instruction-data conflation in autonomous agents, synthetic feedback loops, and training data contamination — proposing distributed neuromorphic architectures as structurally safer alternatives
- Developed STDP learning algorithms with dopamine-modulated weight adaptation, demonstrating self-organizing dynamics and real-time temporal spike processing
- Implemented platform in Go with OpenGL visualization, demonstrating real-time neural dynamics on commodity hardware

Technical Standards Strategist — *FBI / Tridea Works*

2013 - 2025

- Served as primary technical advisor on 5G lawful intercept strategy, unifying policy and architectures for ~20,000 law enforcement and intelligence agencies
- Represented U.S. law enforcement as technical lead in 3GPP SA3, SA3-LI and ETSI NFV Security, building international consensus and driving adoption of U.S. requirements
- Led security requirements and architecture across multi-vendor cloud-native virtualized platforms, translating complex technical concepts for diverse stakeholders
- Directed cybersecurity strategy in international forums, driving USG alignment with technology modernization across satellite, 3G/4G/5G/6G, and cloud architectures

Executive Engineer — *In Depth Engineering, Inc.*

2011 - 2013

- Developed mathematical modeling, system architecture, and operational implementation of the U.S. Navy Anti-Torpedo Torpedo (ATT) Response Management System
- Created analytical approach to maximize probability of target acquisition; built carrier motion, launch, and intercept models
- Presented R&D results to Navy leadership and gained acceptance for deployment — demonstrating ability to convey complex technical solutions to senior government decision-makers
- Implemented models and operational code in Wolfram Mathematica, Java, and C++

Executive Engineer — *ASSETT*

2008 - 2011

- Built and led engineering team on the Ohio Replacement Program (Columbia-class) next-generation submarine combat system, driving technical strategy that secured a \$75M engineering services contract
- Demonstrated live code injection and zero-downtime upgrades across C/C++, Python, Java, and OpenGL on SOA substrate
- Migrated advanced architectural concepts from R&D into the Virginia-class submarine combat system
- Served as consulting member of the Submarine Navy Systems Architecture Working Group

Senior Consulting Engineer — *Tridea Works (FBI/CALEA Implementation Unit)*

2003 - 2008

- Senior Consulting Engineer — Tridea Works (FBI/CALEA) 2003 – 2008
- Served as IP network intercept technology specialist at the Federal Bureau of Investigation, supporting the CALEA Implementation Unit
- Developed standards strategy and technical contributions for U.S. electronic surveillance standards across ATIS, CableLabs, IETF, WISPA, and WiMAX standards bodies
- Developed U.S. buffered data intercept requirements; drove implementations across multiple standards organizations
- Served as editor of numerous ATIS PTSC standards and technical reports, including T1.678, Lawfully Authorized Electronic Surveillance for Internet Access Services, and Technical Report on Buffering
- Monitored IETF MANET and Autoconf groups for surveillance impact on mobile ad-hoc networks; integrated findings into FBI intercept strategy
- Drafted petitions to the FCC challenging deficient published lawful intercept standards
- Served as Facility Security Officer, implementing DSS facility and personnel clearance regulations
- Evaluated, trained, and mentored new hires

Systems Architect — Lucent Bell Labs

2000 - 2002

- Represented Lucent in ITU-T Geneva Study Group 11 on ISUP/BICC/SIP interworking, contributing to international VoIP standards
- Led “skunk works” team that architected and delivered a Java/SWING/JDBC/XML client-server application for managing telephony announcements across networked SoftSwitches — delivered one month ahead of schedule
- Represented Lucent in customer technical engagements with Deutsche Telekom, Telefonica, and AT&T; aligned product roadmap with customer requirements
- Designed redundant subsystem architecture that was subsequently adopted system-wide
- Responded to RFPs and RFIs — including requirements authored in prior role at AT&T Labs
- Published articles and gave labs-wide seminars on VoIP standards; mentored junior developers

Systems Architect — AT&T Bell Labs

1999 - 2000

- Analyzed and recommended Voice over Packet network solutions (IP/ATM/MPLS) for evolving the AT&T long-distance circuit-switched network
- Performed network topology mathematical studies and recommended optimal configurations
- Innovated throttled, self-adaptive packet architecture for bearer traffic; initiated patent application process
- Published RFPs/RFIs and evaluated vendor responses

EDUCATION

B.S., Mathematical & Computational Science

— **Stanford University** Mathematics/Group Theory, Computer Science/AI, Statistics, Operations Research/Optimization | Hoefler Prize in Mathematics

Graduate Coursework, Electrical Engineering, Advanced Mathematics

— **Princeton University** Game Theory, Wireless Systems

TECHNICAL EXPERTISE

- AI / ML: Spiking Neural Networks, STDP learning algorithms, temporal coding, distributed intelligence, genetic algorithms, LLM fundamentals
- Languages: Python, Go, C/C++, Java, Wolfram Mathematica, Bash
- Architecture: SOA, cloud-native (Kubernetes), high-availability systems, secure-by-design, VoIP/IMS
- Security: NIST frameworks, zero trust, 3GPP SA3, ETSI NFV Security, lawful intercept architectures

SELECTED AWARDS & RECOGNITION

- ETSI NFV Outstanding Expert Contribution Award — Security (2016)
- ASSETT Award for Teamwork (2008)
- ATIS Award for Outstanding Contributions to an ATIS Forum or Committee (2004, 2006)
- AT&T Labs Comet Award — Outstanding Contributions and Teamwork (2000)
- Hoefler Prize in Mathematics — Stanford University (1999)
- President’s Distinguished Honor Award — Los Angeles Valley College (1996)
- Outstanding Mathematics Student awards (1986, 1995, 1996, 1999)

THOUGHT LEADERSHIP & PUBLICATIONS

Multi-part article series on AI alignment, safety, and security — bilca.ai/articles

- “Original Sin” — How computing’s instruction/data conflation scales to catastrophe with autonomous agents: <https://www.bilca.ai/articles/original-sin.html>
- “Two Tones” — The idea for the fix for prompt injection already exists: <https://www.bilca.ai/articles/bell-labs.html>