

Carol Calin

SOFTWARE ENGINEER & PRODUCT OWNER

MSc Forensic Science & MSc Data Science with hands-on expertise in verifiable cryptography (ZKML, Passkeys&WebAuthn, homomorphic encryption), Linux & AWS serverless infrastructure (Lambda, Firecracker microVMs, Fargate), hardware QA & manufacturing (fNIRS device with Bowden Lab at Vanderbilt University), and digital evidence verification at the Netherlands Forensic Institute.

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CORE SKILLS

PROGRAMMING & SMART CONTRACT LANGUAGES

Python (PyTorch, pandas, matplotlib, TenSEAL, PySyft, data pipelines), C++, Rust, Solidity (EVM smart contracts), JavaScript / TypeScript, HTML5 / CSS3, SQL, Bash scripting.

CLOUD, SYSTEMS & DEVOPS INFRASTRUCTURE

Proficient in AWS (Lambda functions, Firecracker microVMs, Fargate, S3, IAM, CloudWatch), Linux Server Administration (Ubuntu/Debian, systemd, bash automation, SSH hardening), Docker containerization, reverse proxies (Nginx/Caddy), Git / GitHub CI/CD.

DATA ANALYSIS, STATISTICS & SIMULATION

Statistical inference, Tableau, Stata, SPSS, Vensim (System Dynamics simulation of California forest fires & SARS spread).

APPLIED CRYPTOGRAPHY & VERIFIABILITY

WebAuthn / Passkeys, stealth key derivation, Zero-Knowledge ML (EZKL), Federated Learning with Homomorphic Encryption, EigenLayer Hourglass AVS for verifiable model improvement (Shapley value methods), TLS/SSL certificates & Android cryptographic AAB/APK signing.

DATA PRIVACY, GDPR & REGULATORY COMPLIANCE

Formal coursework & examination in GDPR & EU Data Protection, Privacy-by-Design principles, DORA compliance awareness, MiCA.

HARDWARE QA & BIOMETRICS

Hardware QA & testing (fNIRS brain-imaging device, discovered and reported hardware bugs to Vanderbilt University), biometric data collection (fNIRS & EEG).

TECHNICAL & RESEARCH EXPERIENCE

Self employed — Systems & Verifiable Cryptography Engineer — think2earn

Apr 2024 – Aug 2026

- **Hardware QA & Biometric Device Manufacturing (Vanderbilt formal collaboration):** Manufactured near-infrared spectroscopy (fNIRS) hardware for biometric data collection following a formal collaboration with the Bowden Lab of Vanderbilt University. Conducted rigorous hardware QA, collected optical brain data, and built cryptographic attestation software.
- **Privacy-Preserving & Verifiable ML:** Implemented ZK-ML pipelines using [EZKL](#); engineered federated homomorphic encryption training using PySyft and [TenSEAL](#) as a PoC for fair user compensation; implemented verifiable model contribution checks using EigenLayer Hourglass AVS template with Shapley data attribution methods.
- **Serverless Cloud & MicroVM Operations:** Architected and deployed [production pipelines](#) on AWS utilizing Lambda functions, Firecracker microVMs, and Fargate; managed Linux servers; automated TLS certificate provisioning; cryptographically signed Android app releases.
- **LLM & Protocol Engineering:** Trained GPT-2 on the FineWeb dataset (nocap.think2earn.com); authored smart contracts in Rust on NEAR Protocol (Diamond Tier grant) and Solidity on EVM.

Research Intern — Digital & Biometric Traces — Netherlands Forensic Institute (NFI)

Apr 2023 – Feb 2024

- **Forensic Model Training:** Fine-tuned DINOv2 Vision Transformers and frequency-domain models for explainable deepfake video detection. Classified double compression artifacts in videos under forensic expert guidance.
- **Comparative Forensic Integrity Study:** Designed and executed controlled experiments comparing algorithmic detection performance against certified human forensic examiners to evaluate statistical error bounds and whether algorithmic information improves expert performance.
- **Explainable Methods for Deepfake Detection in videos:** Authored and defended master's thesis at the Netherlands Forensics Institute of the Dutch Ministry of Justice & Security; formulated technical documentation and evidence standards for both non-technical judicial examiners and technical court-appointed experts.

EDUCATION

MSc Forensic Science

2023 – 2025

University of Amsterdam (UvA)

Courses in Forensic Biophysics, Analytical Chemistry, Law; Specialization in digital & biometric traces, Bayesian statistics double compression video analysis, chain of custody, and forensic methodology. Thesis defended at Netherlands Forensics Institute of the Dutch Ministry of Justice & Security.

MSc Information Studies: Data Science

2021 – 2023

University of Amsterdam (UvA)

Thesis: Emotion classification from time-series EEG brain signals. Coursework in advanced statistical examinations and Vensim system dynamics simulation (California forest fires & SARS spread).

BSc (Honours) Politics, Psychology, Law and Economics (PPLE)

2018 – 2021

University of Amsterdam (UvA)

Specialization in Psychology & Quantitative Methods; Minor in Amsterdam Data Science & AI. Coursework & passed examinations in EU Data Protection & GDPR law, empirical research methodology, and regulatory frameworks.

DATA SCIENCE COMPETITIONS - PRIZES AND GRANTS

2026

- **Hyperagent Founding 500** (\$20k credits) - "Founding 500" grant for engineering using containerized frontier models and harnesses.
- **Thinking Machines Lab** (\$5k credits) - Researcher grant for model fine tuning and RLHF for "mirrored-self" agents.

2025

- **NEAR Protocol Developer Rewards** (\$17.5k) - Diamond Tier Grant Staking mechanism: users lock funds, earn rewards when contributed data provably improves model performance.
- **ETHGlobal Cannes** (\$10k AWS credits + \$3,000) - Main track [Finalist](#) (top 2%) and ENS prize and grant for a privacy preserving **Passkey Authentication Protocol (POAPPrivacy)**: Researched and architected utilizing WebAuthn / Passkeys and stealth address key derivation (ERC-5564), ensuring private cryptographic verification without exposing private keys on client devices.
- **Repository Risk & Impact Modeling** (\$3,000): Analyzed core open-source repositories in the Ethereum ecosystem to evaluate codebase evolution, maintainer dynamics, dependency risk; predicted hidden jury data as part of a competition in which I won [3rd place](#) out of 12,000+ participants, challenge sponsored by Vitalik Buterin and the Ethereum Foundation.
- **EigenLayer Vibescore Prediction** (\$3,000): Developed predictive models for testing software verifiability infrastructure, highest prize amount on leaderboard.
- **ETHGlobal Buenos Aires** - Prize from Curvegrid for Best Use of MultiBaas - created a privacy-first [proof-of-sleep mobile app](#). Gyroscope data stays on-device; Groth16 ZK proof of "stillness" submitted via MultiBaas to a Solidity verifier that mints reward tokens. Created as an Expo Go app, cross mobile device.
- **Zuiterland** - Logos Prize - for work on [NFT-gated decryption](#) for Codex storage, I made it so that files are only decryptable by wallets holding a seller-chosen NFT on Amoy Polygon Testnet. Also won separately for [NIRDuino metabolic state classifier](#).
- **The Vault Berlin** - invited to build on top of EigenLayer's Hourglass AVS template. Collected CGM + NIRDuino data, proved on-chain that new data improved model performance
- **Pimavera Hacker** - invited to host a talk on biometric data sharing, the use of cryptography in politics, and peer to peer coordination

2024

- **Ocean Protocol Foundation Research Grant** (\$8,000) - Surveyed open hardware fNIRS devices, wrote a paper, manufactured NIRDuino from published schematics, collected first public paired light-and-glucose dataset.
- **ZuVillage Georgia** (\$3,000) - Best Startup and Best Idea prizes for designing an EEG data collection frontend and creating a business plan for manufacturing open hardware BCI devices. Starting point for think2earn as a hardware project.
- **ZuThailand** - Chosen as Fellow (full month scholarship) - received [EZKL Prize](#) and a main track Honorable Mention for an end-to-end ZKML pipeline: EZKL proofs over a BCI model so inference results are verifiable on-chain without revealing raw data.
- **MegaZU Builder Residency** - Month-long residency (full month scholarship) hosted by EigenLayer + MegaETH. Presented to MegaETH and EigenLayer judges in a panel alongside Vitalik Buterin, inventor of Ethereum. Created onchain attestations for fNIRS data, experiments with homomorphic encryption (PySyft, TenSEAL) for [federated training](#) on private biometric data.
- **ETHDam** (\$1000) - Waku Prize for a Data Bounty Marketplace - created a smart contract and frontend for posting and claiming bounties on datasets, with decentralized messaging via Waku, using ETHScaffold
- **ETHGlobal Bangkok** - Prize from Linea for biometric data sale contracts on Linea. Homomorphic encryption (PySyft, TenSEAL) with federated training. Invited to Linea [Community Call](#).