

Michael Mansour

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SUMChain: MMwxCo6U35xubBLi6N3ouktKiT7FM2gFE

EDUCATION

University of California, Los Angeles (UCLA)

Spring 2026

B.S. Mathematics of Computation — GPA: 3.70

Relevant Coursework: Network/Graph Theory, Optimization, Numerical Analysis, Deep Learning, Algorithms/Complexity, Real Analysis, Probability Theory and Statistics, Signal Processing/Fourier Analysis, Cryptography

Pasadena City College

Spring 2024

Mathematics & Computer Science — GPA: 4.00

EXPERIENCE

UCLA, Mathematics Directed Research

2026 – 2026

Researcher

- Conducting DARPA-backed research on inexact attributed subgraph matching over knowledge graphs. Developing and evaluating approximate subgraph isomorphism algorithms to identify laundering typologies in large-scale, noisy financial networks from a DARPA dataset. Directed by Prof. Paolo Climaco and Prof. Andrea Bertozzi.

UCLA, Engineering Without Borders: Uganda Water Project

2024 – 2026

Technical Lead

- Designing a water distribution infrastructure for a developing rural village in Bukonko, Uganda, from source capture through household delivery.
- Applied fluid dynamics principles (Bernoulli's equation, Darcy-Weisbach friction losses, Hazen-Williams empirical model) and used EPANET (water distribution modelling software) to model and optimize all aspects of the system—head loss across elevation changes, pipe pressures at critical nodes, volumetric flow rates, pump power requirements and efficiency curves—to satisfy community demand patterns and ensure compliance with Ugandan National Water and Sewerage Corporation standards.

Caltech, Lunar Trailblazer

2023 – 2024

Mission Operations and Ground Data Systems Intern

- Managed spacecraft simulated maneuvers and hardware/software troubleshooting for a NASA-led lunar orbiter mission to map water on the Moon's surface using an infrared imaging spectrometer (HVM3) and a thermal mapper.
- Analyzed quaternion-based spatial rotation telemetry for the attitude determination and control subsystem, specifically computing and monitoring Keep-Out Zone Violations during slew and momentum-dump maneuvers to verify that sensitive instruments were never pointed at the Sun or bright limb.
- Developed telemetry visualization applications and operator dashboards using Python, InfluxDB (time-series ingestion), and OpenMCT (NASA's open-source mission control framework), used by dozens of operators to monitor hundreds of real-time telemetry streams during spacecraft integration and test campaigns.

PORTFOLIO

SUM: Layer-1 Blockchain & Web3 Ecosystem ([SUMChain](#) / [SUMail](#) / [SNIP](#))

2025 – Present

- Co-designing a Layer-1 PoA/PoS blockchain entirely in Rust. Proposed a round-robin validator rotation for deterministic block production and protocol-level token standards.
- Fully architected a [Chrome Extension](#) using TypeScript for secure signing/authentication, featuring a private vault where keys exist only in memory after Argon2id decryption. Developed a React/Vite-based interface and a SwiftUI mobile wallet, integrating protocol-level endpoints to retrieve, verify, and display on-chain data directly from SUMChain.
- Storage Node Interface Protocol (SNIP): Designed and implemented a native decentralized file storage protocol in Rust with deterministic $3\times$ replication, BLAKE3 content addressing, Proof-of-Retrievability challenges, parallel upload/download orchestrators, a self-healing MarketSync worker, and garbage collection. Built the P2P networking layer on libp2p: QUIC (UDP) as the default transport with TCP+Noise+Yamux fallback for Circuit Relay v2, AutoNAT for NAT-status detection, and Kademlia DHT for WAN peer discovery.

GNN for Ethereum Anti-Money Laundering Detection

2026

- Adapted IBM's Multi-GNN architecture from edge-level Bitcoin AML classification to node-level Ethereum sanctions detection using transfer learning with extreme class imbalance (14,140:1 ratio) and weighted cross-entropy loss. [\[training\]](#)
- Identified distinct laundering phases — placement (high fan-out, low-value dispersal), layering (temporally compressed bursts across intermediaries), and integration (hub-spoke consolidation via high-value channels) — through ego-centric subgraph analysis and SHAP/gradient feature attribution on 2-hop neighborhoods. [\[visualization\]](#)

- Engineered a Rust data pipeline with crash recovery to collect, label, and aggregate blockchain transactions into weekly directed graphs in Parquet format (90M+ transactions, 33M+ addresses). [[preprocessing](#), [modeling](#)]

Activation-Aware Pruning for Graph Neural Networks

2026

- Adapted a weight pruning method built for large language models to graph neural networks, adding two variants that score weights by graph structure (node degree and class balance).
- Benchmarked 5 pruning methods across GCN, GAT, GraphSAGE, and GPR-GNN on 17 datasets at 10–90% sparsity using Python, PyTorch, and PyTorch Geometric. Neither structure-aware variant beat simple magnitude pruning.

hangg: Real-Time Social Platform

2025 – Present

- Developing a full-stack social platform (React Native, Next.js, NestJS, PostgreSQL on GCP) with Firebase auth, Cloud CDN and signed-cookies, cross-platform deep linking, and adaptive Socket.IO polling to balance real-time accuracy against server load. Engineered a location verification system, feeding a spatial clustering algorithm that gates feature access based on physical proximity of group members. Optimized frontend rendering and media delivery with disk caching and prefetching.

B-Plus-Tree SQL Engine (C++)

2024

- Built a relational database engine from scratch — including a SQL parser (state machines implementation), a B-Plus-Tree indexing layer with binary file storage, and a query execution pipeline supporting SELECT, INSERT, and conditional filtering (Shunting-Yard/Boolean RPN).

PUBLICATIONS

E. Scire, B. Ehlmann, . . . , M. Mansour *et al.*, “Lunar Trailblazer Ground System Development,” *Proc. SPIE 13098*, 130981K (2024).

[DOI: 10.1117/12.3027493](#)

TEACHING

Undergraduate Reader (Grader), UCLA Math 115A — Linear Algebra

2025

Graded problem sets and exams for upper-division proof-based linear algebra (vector spaces, inner products, transformations).

Mathematics Tutor, PCC Success Center

2024

Drop-in and appointment-based tutoring for linear algebra, discrete mathematics, multivariable calculus, ODEs, and introductory physics.

Mathnasium Instructor

2023 – 2024

Taught K–12 students across arithmetic through pre-calculus in a center-based tutoring environment.

SKILLS

Languages/Tools: C++, Rust, Python (PyTorch, NumPy, Pandas, scikit-learn, Matplotlib), SQL, Swift, JavaScript/TypeScript (React, Tailwind), Docker/Kubernetes, GCP (BigQuery, Dataflow, Cloud Composer), Git