Sumedh Kothari

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EDUCATION

Georgia Institute of Technology **Expected May 2028**
B.S. in Chemical and Biomolecular Engineering GPA: 3.91
Minor in Computer Science - Intelligence
Minor in Quantum Sciences and Technology

- **Coursework:** Computer Org. and Programming; Data Structures and Algorithms; Differential Equations, Quantum Mechanics I
- **Honors:** PACESHIP Scholar, Symposium of Rising Scholars Presenter, Eagle Scout

EXPERIENCE

Witness.ai Mountain View, CA
Machine Learning Intern May - August 2026

- Designed and implemented a novel adversarial machine learning framework combining Generative Adversarial Networks and Reinforcement Learning to autonomously generate harmful prompts for discovering jailbreak vulnerabilities in modern LLMs (Claude Haiku, Qwen), optimizing attack generation policies through iterative reward-based learning with ongoing work toward arXiv publication
- Engineered an end-to-end agentic research pipeline in Python using PyTorch, vLLM, and HuggingFace that autonomously processed 1,000+ arXiv papers, synthesized emerging red-teaming methodologies, and generated novel adversarial attack strategies
- Built a scalable adversarial evaluation framework that generated 3,000+ adversarial prompts with benign twin datasets and benchmarked 8 state-of-the-art open-source and proprietary LLMs, producing automated customer-facing safety reports

ChemE Cube | Georgia Tech Atlanta, GA
Team Lead – Mechanical August 2025 – Present

- Leading the mechanical development of a 1 ft^3 direct air capture reactor by managing a 5-member subteam and overseeing end-to-end CAD, prototyping, and systems integration, delivering a fully fabricated and test-ready prototype
- Designing airflow distribution and sorbent containment subsystems using parametric CAD, 3D printing, and CNC machining, achieving 75% reduction of ambient CO_2 in bench-scale validation for AIChE competition (Nov 2026)

PROJECTS

PolyUMA: Semiconducting Polymers Materials Property Predictor Los Altos, CA
Machine Learning Engineer May 2026 - Present

- Developing PolyUMA, a graph neural network–based materials property prediction model inspired by Meta's eSEN architecture, trained on 6M+ OPoly26 datapoints to learn structure–property relationships in semiconducting polymers, force fields, and interatomic potentials
- Engineering a physics-informed molecular representation pipeline by augmenting OPoly26 dataset polymer graphs with domain-specific structural features, including backbone planarity (dihedral torsion profiles), π–π stacking interactions (van der Waals parameters and interchain spacing), and chain rigidity (bond-angle stiffness), improving inductive bias for electronic structure learning
- Designing an iterative adaptation and self-refinement training framework incorporating adaptive hyperparameter tuning, domain-seeded anchoring (e.g., polyacetylene, P3HT), and dataset refinement loops that progressively reduce regression loss across training cycles; submitted to the Adaptation Autoscientist Challenge

Machine Learning - Assisted Particle Swarm Optimization Atlanta, GA
Machine Learning Researcher March 2026 - May 2026

- Awarded a $1,000 PACESHIP Scholar research grant to investigate machine learning methods for black-box optimization, conducting research on surrogate-assisted Particle Swarm Optimization to improve optimization efficiency in high-dimensional search spaces
- Designed and implemented a hybrid optimization framework integrating Gaussian Process surrogate modeling, machine learning-guided particle repositioning using LightGBM model, and adaptive exploration–exploitation strategies to identify stagnating particles and dynamically steer search trajectories toward promising solution regions
- Developed an autoresearch framework inspired by iterative AI research agents that autonomously executed optimization experiments, adjusted hyperparameters, analyzed performance trends, and refined search strategies through closed-loop experimentation; built a scalable PyTorch pipeline achieving an average 28.8% improvement over baseline PSO across benchmark functions, including 97.8% on Sphere, 99.9% on Rastrigin, 90.4% on Ackley, and 58.8% on Rosenbrock landscapes

SportSplat: 4D Gaussian Splatting for Sports Teams Atlanta, GA
Lead Developer February 2026 - Present

- Developing a 4D Gaussian Splatting–based volumetric reconstruction pipeline to transform multi-view third-person sports footage into temporally coherent, player-specific first-person renderings, optimizing dynamic representation with spatiotemporal Gaussian primitives
- Training ML model to apply 3D Gaussians onto SMPL-X human frames to recreate NFL video footage from any player perspective
- Deploying a differentiable rendering pipeline with camera pose optimization (PyTorch/CUDA) to reconstruct dynamic 3D player trajectories, and optimize Gaussian parameters for real-time, personalized first-person sports video synthesis

GameSense: Winner - TechHack Valley 2026 Hackathon - Hardware Track | Georgia Tech Atlanta, GA
Mechanical/Software Engineer March 2026

- Developed GameSense, a real-time accessibility interface for deaf / hard-of-hearing gamers that converts spatial game audio → multi-channel haptic feedback, enabling directional sound perception through vibration
- Engineered a full wearable hardware stack in 36 hrs: CAD-modeled, 3D printed a custom headband + electronics enclosure (Fusion), integrated ESP32 microcontroller, 9-axis IMU, and 8-motor vibration array, and wrote C++ firmware for real-time sensor acquisition, motor PWM control, and UART serial communication with the host audio-processing pipeline
- Developed real-time signal processing and control algorithms: implemented multi-channel audio detection and amplitude → haptic intensity mapping, programmed head-tilt → WASD movement using a Kalman filter to stabilize motion input and reduce sensor noise

SKILLS

- **Technical:** Python, PyTorch, CUDA, Linux, MATLAB, CAD (SolidWorks, Fusion)
- **Communication:** Technical Writing, Multilingual (English, Hindi, Spanish)