Nathan Nakkapalli

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EDUCATION

The University of Michigan - Ann Arbor **August 2024**

- **Bachelor of Science & Engineering (B.S.E), Computer Engineering + Physics (minor)**
- UM Regents Merit Scholarship, MHousing Honored Instructor Award; 3.5/4.0 GPA
- Co-Founder and Former VP, Michigan Forensics Speech and Debate
  - Made club website, recruited 150+ members, and hosted grant-funded public speaking tournament
- **Won 2nd place** in **P&G (Proctor and Gamble)** Employer Challenge **(Consulting Case Competition)**
  - Produced actionable recommendations to **increase** P&G's Hispanic shopper growth with **$12M budget**
- Courses: **Machine Learning,** Data Structures & Algorithms, Embedded Systems, Quantum Mechanics, **Computer Vision,** Compiler Construction, Logic Design, **Systems and Signals**, Operating Systems

WORK EXPERIENCE

Stealth Startup **August 2024 – Present**

Lead Research & Development Engineer *Bay Area, CA*

- Building out original, creative projects utilizing Artificial Intelligence in an startup-like capacity
- Architected a **vision-based AI Agent** and Framework using multimodal LLMs to control a computer
- Demonstrated **proof-of-concept** of AI Agent scroll/read Linkedin profile info & generate/send personalized connection messages, resulting in **+95% automation rate** (no human intervention) & **+15% faster** than human
- Built an Open Source Youtube Comment & Associated Subreplies Scraper (no API key needed) using Selenium

The University of Michigan - Ann Arbor **August 2023 – December 2023**

Instructional Aide, College of Engineering Course Staff *Ann Arbor, MI*

- Co-taught a course (Engineering 110: Design Your Engineering Experience) to **40 first-year** students
- Led engaging activities to foster student discussion & helped students navigate engineering opportunities

Intrepid Control Systems Inc. **June 2023 – August 2023**

Embedded Systems Intern, Performance Hardware Applications Team *Troy, MI*

- Intrepid Control Systems makes hardware for analyzing/testing onboard computer networks in vehicles
- I worked on firmware validation, product data collection, and custom-developed connector cables
- Developed an **internal testing tool in C++** (with GUI) to **automate firmware validation** by parsing and error-checking gigabytes of **Automotive Ethernet** packets, **saving countless hours** of manual labor
  - Created documentation including User Guide, design choices, flow chart of execution, etc
- Engineered **12 custom Automotive Ethernet** adaptor cables (Matenet to Mini50) using **PCB schematics**, wire strippers, **soldering**, & digital multimeters (**DMMs**) to support **testing & troubleshooting** across products
- Documented & **collected voltage and noise data** from **new PCBs** using **oscilloscope** & Altium Designer
- Reworked a **PCB board** by desoldering a fried resistor, **extending** the life of the board for **testing operations**
- Discovered and **rectified subtle bug** in existing company codebase during code review, increasing test coverage

COOL PROJECTS

Mad Money Summaries Website | Generative AI, Python, Javascript, Cloud, Frontend **Present**

- AI-generated **bulleted summaries** for new episodes of the popular weekday investing show "Mad Money"
- Architected **scalable** Python backend data pipeline to **preprocess** episode transcripts, generate insightful summaries using **Llama3 LLM** API, and automatically update frontend with aesthetically styled summaries
- Experimented with **RAG** (Retrieval-Augmented Generation) using **LlamaIndex** to enhance summary quality
- Currently **mitigating hallucination** by adding verbatim transcript evidence & timestamp for summary claims

Famous Landmark Detection (using Deep Learning) | Pytorch, CNNs **November 2023**

- 4-layer multi-class model classifies images of famous landmarks with **87.1% accuracy** in validation
- Experimented and visualized combinations of ML techniques including Dropout (regularization technique), image rotation (data augmentation), and transfer learning in order to obtain robust model

Spark Electric Racing | Electric Motorcycle Project Team **August 2022**

- Conducted code review of **Python** script that parsed data from the **CAN bus protocol** (connecting the

subsystems on the bike), assessing the correctness of the **bit shifting** & adding comments for understandability

Wearable for Hand Gesture Recognition | Research, Real Time Machine Learning, IoT **April 2024**

- Wrist wearable that detects 3 static hand gestures in real time with **~75%+ mean accuracy** in user study
- Created **data visualization** tool in **Python** to compare raw signal data and featurized data (like MFCC or FFT) from multiple experiments to aid in finding the **best signal and model parameters**
- Configured **ESP32 microcontroller** to continuously read/send data via from sensor to laptop via **Wifi** for ML
- Fine tuned real time ML parameters, **optimizing trade off** between inference speed and prediction accuracy

Tic-Tac-Toe Robot (Embedded Systems Project) | C, Stepper Motors, SPI **December 2023**

- AI-driven robot physically plays tic-tac-toe against human at various difficulty modes, driven by **STM32 MCU**
- Assisted in **hardware bring up** of 2D axis plotter using motor controllers & Pulse Width Modulation **(PWM)**
- Troubleshooted **UART data** communications between camera and STM32 using high speed **Logic Analyzer**
- Designed and wrote clever **audio device driver** in C to play .WAV files at 44.1kHz using only FLASH & SRAM
- Configured **hardware** (GPIO pins, timer interrupts, DAC, audio jack breakout board, stereo speakers)

Remote Multi-threaded File System Server | C++, Network Sockets, TCP **August 2024**

- Resilient TCP file server that concurrently handles thousands of client requests to store files on disk
- Maximized throughput using threads & readers/writer locks, minimized disk I/O, maintained crash consistency

Multi-threading Library | C++, Concurrency, Synchronization, Operating System Internals **June 2024**

- Designed & implemented CPU scheduler and multi-threading library (including mutexes and condition variables) to create, join, and run threads while **minimizing** context swaps and **memory** overhead

SKILLS & INTERESTS

- **Languages/Frameworks:** PyTorch, TensorFlow, Python, C/C++, SQL, Javascript, HTML, CSS, Bash
- **Concepts:** Natural Language Processing, Scalable Applications, GCP, Deep Neural Networks, Recommender Systems, Storage, Networking, Cloud, Git, Regression Testing, Docker, Devops
- **Interests**: basketball; football; hiking; reading, teaching, inventing