Caleb Key

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Education

Texas A&M University **August 2018 – May 2022**
BS, Computer Engineering *College Station, TX*
- Graduated *Cum Laude,* GPA: 3.5

Work Experiences

Air Force - 90th Cyber Operations Squadron **June 2022 – Present**
Cyber Capabilities Developer GG-11 *San Antonio, TX*
- Active Top Secret security clearance
- Developed advanced cyber capabilities in support of offensive and defensive cyberspace operations, including:
  - Malware replication software with real-time command execution and user interface for operators
  - Locally hosted LLM platform supporting information security and personalized use cases
  - AI powered translation tools with custom interfaces
- Contributed to developing **NIPRGPT**, DoD's primary LLM platform utilized by over 360k active users
  - Spearheaded development of 'Shared Workspaces', enabling RAG-driven collaboration and file sharing
  - Installed the high-performance AI compute systems powering NIPRGPT and identified optimizations that improved benchmark throughput by 30%
  - Researched and implemented novel pre-training methodologies utilizing synthetic datasets
- Top 1% selectee for the **DAF - MIT AI Program**, an Air Force research fellowship with MIT
  - Worked on an established FastAI team that specializes in portable, high-performance AI applications
  - Researched advanced CAG techniques to optimize the performance of the NIPRGPT RAG pipeline

Portfolio Projects

Handwritten Digit Recognition
- Built a handwritten digit recognition system with a custom neural network from scratch, achieving 95% accuracy on the MNIST dataset
- Developed a Tkinter-based grid editor in order to draw digits for real-time inference by the neural network

Optimization of CPU Cache Eviction using Genetic Algorithms
- Created a C++ program implementing genetic algorithms to optimize CPU cache eviction strategies, experimenting with various crossover types and mutation rates
- Simulated CPU cache to benchmark the genetic algorithm's performance

Card-Based Strategy Game
- Developed a full-stack strategy card game with React frontend, Python/Flask backend
- Integrated multiple reinforcement learning models to autonomously play the game against each other

Skills & Interests

- **Skills:** Python, C, C++, Large Language Models, Retrieval-Augmented Generation, RL Algorithms
- **Interests:** Evolutionary Algorithms, Computer Graphics, Reinforcement Learning, Computer Hardware