Bala Vinaithirthan

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Education

Stanford University (Stanford, CA – 2024 - 2026), M.S. Electrical Engineering – GPA 4.0

- Relevant Courses: Computer Architecture, Circuits, Digital Circuits & Systems, Convex Optimization, Digital Signal Processing

Stanford University (Stanford, CA – 2021 - 2025), B.S. Computer Science - GPA 3.73

- Relevant Courses: Parallel Computing, Compilers, Embedded Operating Systems, Computer Networks, Algorithm Design, Virtual Reality Development, Web Development, AI Principles
- Activities: CS105, CS106 Course Assistant, Resident Assistant, Stanford In Berlin

Work and Research Experience

Compiler & Performance Engineering Researcher - 06/24 - present – **Kjolstad Lab** in Stanford, CA
CUDA, Triton, MPI, OpenMP, LLVM

- *Team: Lab developing compilers to enable portability across diverse hardware architectures*
- Designed efficient CPU and GPU kernels for Needleman-Wunsch, improving **runtime** by **10x and 15x**
- Building **domain specific language** and compiler for bioinformatics recurrences
- Auto-generating high-performance code for CPU, GPU, and **hardware accelerators**

Database & C++ Intern - 03/24 - 06/24 – **Tenzir** in Hamburg, Germany
C++ 20, C++ Actor Framework, Apache Arrow, Boost

- *Team: Startup creating composable data-flow pipelines for security use cases*
- Created batched streaming execution operators for printing and parsing **Apache Feather** and **Parquet** data
- Built scalable data structures and algorithms for projection pushdown optimization
- Designed a **query language,** TQL, for security data flows

IoT & Embedded Systems Intern - 06/23 - 09/23 – **SLB (Schlumberger)** in Houston, TX
C#, C, Verilog

- *Team*: Newly-formed team building Internet of Things enabled methane sensors to identify leaks at oil wells
- Developed a **scalable** and **extensible** remote-monitoring application deployed on edge compute to detect hardware failure modes, reducing device downtime by 30% on 100+ sensors
- Employed **computer vision** to identify anomalies patterns in emission images, increasing detection rates by 70%
- Designed **firmware** on **embedded** sensors to measure rates of communication over **LoRaWAN** network

Computer Graphics Intern - 06/22 - 09/22 – **Prisms of Reality** in San Francisco, CA
Unity, C#, Blender, Objective C

- *Team: An a16z funded education technology start-up building STEM games for the Meta Quest Store*
- Independently built a statistics game, leading to **10,000+** active student users
- Collected teacher stories biweekly to iteratively build **3d assets**, **UI**, and **storyboards** for physics module
- Implemented **state machine design pattern** and modified game mechanics to improve software extensibility

Machine Learning Research Assistant - 06/21 – 09/21 – **Al Burlingame Lab** in San Francisco, CA
Python, TensorFlow, Sci-kit Learn, OpenCV

- *Team: Building software for analyzing protein data and identifying role of epigenetics on patient systems.*
- Developed a **deep learning CNN** model with a **78% accuracy** in determining drug response on cancer patients
- Processed drug information using one-hot-encoded matrices and epigenetic data using **PCA analysis**

Accomplishments

- $50,000 Grand Prize for Machine Learning Project (Davidson Fellowship), Best Natural Language Processing Project (Stanford TreeHacks), Best Preventative Health Project (Stanford HealthHacks), Russell Berman Intro Seminar Award, German Exchange Fellowship
- Conference paper in ACM CHI 2024 (Human Factors in Computing Systems), CS undergrad research fellowship