# Alp Efe Karalar

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Full-Stack Developer with experience in machine learning, embedded systems, and operating systems looking for a full-time job

## Education

**The Pennsylvania State University**, BS in Computer Engineering **Graduation:** December 2024

**Dean's List:** FA20, SP21, FA21, SU23 **Awards:** Defne-Muhtar Kent Scholarship

**Relevant Coursework:** Communication Networks, Computer Architecture, Data Structures & Algorithms, Digital Design, Digital Image Processing, Exploratory Data Mining, Neural Networks, Operating Systems Design & Construction,

## Skills

**Languages:** C/C++, Python, Bash, Java, JavaScript, Kotlin, C#, SQL, Verilog, MATLAB

**Technologies:** LLM-Integration, AWS, PyTorch, NumPy, .NET, SQL, Android Studio, Linux, Embedded Systems, React, Docker

## Experience

**Head of Machine Learning** DementiAnalytics – State College, PA February 2025 - Current

- Leading machine learning initiatives to develop AI-powered dementia detection and assessment technology, focusing on processing and analyzing audio/text samples with Whisper AI and in-house LLMs
- Architecting neural network models that identify cognitive impairment indicators from speech patterns
- Collaborating with cross-functional teams to integrate AI solutions, ensuring alignment with clinical requirements

**Software Engineer Co-op**, Bakkal Co. – Pleasanton, CA July 2023 – October 2023

- Leveraged Agile methodologies to collaborate in SCRUM sprints for optimizing BAKKAL's ethnic food delivery applications
- Enhanced the performance and features of BAKKAL's mobile applications through proficient use of Java and Android Studio

**Software Engineer**, Advanced Vehicle Team – University Park, PA January 2024 – December 2024

- Engineered sophisticated computer vision algorithms for self-driving cars, leveraging Python and YOLO models
- Achieved 3rd place for the "Overall Year 3 Winners" in the Auto Drive Challenge II, backed by GM & SAE International
- Optimized FLIR camera image processing, achieving a 50% increase in object detection accuracy by enhancing the algorithm

## Projects

**ResearchTLDR.xyz - Research Paper Summarizer** **Tools Used:** Python, React, LLMs

- Deployed a full-stack academic research platform integrating React, Python, FastAPI, and PostgreSQL with multi-provider LLM capabilities (DeepSeek, OpenAI, etc.) that processes complex scientific papers into comprehensive, structured summaries
- Engineered a responsive web application with asynchronous processing pipeline for extracting research insights

**Music Generation Using Recurrent Neural Networks (RNNs)** **Tools Used:** Python, PyTorch

- Developed a deep learning system for generating piano music using PyTorch, implementing an RNN architecture trained on 1200+ classical pieces (7M+ notes) from the MAESTRO dataset
- Incorporated data processing pipeline featuring custom dataset classes and caching mechanisms for memory optimization

**Computer Vision for Self-Driving Car** **Tools Used:** Embedded Systems, Python

- Engineered and deployed a real-time YOLO-based computer vision system for autonomous vehicle object detection, successfully identifying critical objects including pedestrians, animals, traffic signs, and traffic lights
- Led the computer vision development that contributed to securing 3rd place in the Auto Drive Challenge II

C **Systems Programming Course Project** **Tools Used:** C

- Designed and implemented a systems programming project that simulates industry-standard operations through a 5-stage process, incorporating concepts like bit manipulation, cache optimization, and server communication/networking protocols.
- Implemented read and write functions for simulated hardware disks using bit-shifted 32-bit commands, developed a cache and converted these commands for seamless client-server operations over a proprietary network protocol.

**Guitar Amplification Simulation using Raspberry Pi** **Tools Used:** Bash, C, Embedded Systems

- Customized Arch Linux distribution for optimal real-time audio processing, utilizing BASH scripting and low-level system optimization to create a responsive and reliable embedded audio platform, with a framework supporting 25+ audio effects.