Nathan Litzinger

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EDUCATION

The Pennsylvania State University Expected: May 2023
Bachelor of Science in Computer Engineering *4.00 GPA*

RELEVANT WORK EXPERIENCE

Software Engineering Intern - Qualcomm (San Diego, CA) May 2022 - August 2022

- Designed Python framework for the collection and analysis of Snapdragon power analysis data.
- Applied object oriented design techniques to create flexible and extensible Python components.
- Employed multithreading and multiprocessing to maximize performance of framework components responsible for collecting, processing, and analyzing log data.
- Enabled team members to analyze performance parameters across tens of thousands of logs.

Software Engineering Intern - IAM Robotics (Pittsburgh, PA) June 2021 - August 2021

- Extended functionality in fleet management Python microservices used to interface with, manage, and control autonomous mobile robots.
- Designed new front-end and back-end features to save developers' time and increase simulation productivity.
- Built async endpoints for Flask REST API and front end features using jQuery and Bootstrap.
- Implemented and tested robot software features in C++ to support new fleet management features.
- Collaborated with teams of developers in an agile development environment.

RELEVANT PROJECT EXPERIENCE

Malloc Implementation January 2022 - February 2022

- Designed a dynamic memory allocator to manage the heap of a process's virtual memory space.
- Maximized heap utilization by using block headers only and split blocks to reduce internal fragmentation.
- Optimized malloc performance using a set of segregated free lists to locate adequately sized blocks.
- Built and heavily unit-tested low-level memory interfaces for managing blocks and free lists.

Jetson GStreamer Powered Bird Feeder Live Stream December 2021 - January 2022

- Developed gstreamer pipeline for encoding and broadcasting live video stream on NVidia Jetson Nano
- Leveraged NVidia gstreamer modules to decode MJPEG source and re-encode using H.264 compression.
- Streamed encoded video to a Docker RTMP server where it was rebroadcasted to YouTube and Twitch.
- Later rebroadcasted with OBS and controlled via Python automation scripts using OBS websockets API.

Distributed File System September 2021 - December 2021

- Architected a Linux-like file system to abstract away raw disk interactions as POSIX file IO.
- Built disk controller instructions with bitwise operations and sent them to the disk using system calls.
- Implemented Unix OS API operations read and write by leveraging the file's inode data structures and instructing the disk to seek to tracks and read/write to sectors as required by the read/write call.
- Added an LRU cache as a doubly linked list with a node-address lookup table to reduce access latency.
- Integrated optional remote file system access using TCP stream sockets and subsequent network IO.
- Profiled file system performance using gprof to identify and refactor slow modules.

Server Utilization Indicating LED strips May 2020 - July 2020

- Leveraged Netdata REST API to obtain Unix system load metrics from server using ESP8266.
- Developed algorithm to interpret Unix load value and calculate a corresponding color hue.
- Utilized FastLED library to render color reflecting system load on WS2812B LED strips.
- Observed continuous-processing techniques with FastLED to create smooth color fading transitions between each API call.

VEX Robotics Challenge September 2017 - February 2018

- Collaborated with team members to design autonomous driving algorithm for VEX robot.
- Utilized encoders, gyros, IR, sonarr, and other digital sensors to adapt behavior based on surroundings.
- Placed first in three regional VEX competitions.

TECHNICAL SKILLS

Languages

Python, C, **C++**, **JavaScript**, Visual Basic, Bash
Java, HTML, CSS, SQL, GoLang

Software/Tools

Linux, Git, Regex, GDB, GProf, Make, Docker, Kubernetes, Proxmox, InfluxDb, Telegraf, GCP, Nginx, Arduino, ESP32, Vivado, MQTT, VSCode