Resume

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Outdoorlink

Title	Lead Software Engineer
Start	2019 February
End	2020 August
Site	smartlinkcontrol.com

Summary

I was the primary contributor to the development and maintenance of a distributed web application providing Django-based REST APIs and a React-based JavaScript frontend hosted in an AWS VPC with redundancy managed through Celery and AWS RDS for increased availability. The application was designed to manage scheduling, status, communications, and operations of an IoT fleet of utility power management devices utilizing cellular communication technologies for the control of more than 70,000 billboard structures in the US, Australia, and South America.

Being at a small company, this position was multifaceted and provided a number of opportunities to contribute across the full software stack and development lifecycle.

DevOps Engineering

- Pushed testing left by developing multistage CI/CD pipelines for automating the following tasks:
  - code static analysis, linting, formatting, style checks, test suite execution, and coverage reporting
  - dependency updates, package installation, runtime image builds, documentation builds, and deployments to test and production environments
- Maintained internal GitLab server for hosting project repositories, collaborating on feature requests and bug fixes, and reviewing code changes and deployments
- Containerized applications with Docker to support concurrent test suite executions across on-prem servers, reducing the feedback cycle for testing requested changes to the codebase

Full-Stack Web Development

- Supported development and migration from a legacy SOAP API to a modern Django-based REST API for manipulating IoT schedule settings
    - Communicated with customers for identifying API requirements and prioritizing feature requests/bug fixes
    - Created URL schema documentation with Swagger, Redoc, and Postman
    - Developed reusable Django application for logging REST API HTTP request details to multiple servers over TCP, supporting better OutdoorLink support to customers utilizing the REST API
- Supported app migration from on-prem servers to an AWS cloud deployment
    - Managed AWS infrastructure for networking, compute resources, user authorization, scaling, and deployments
    - Configured system and application logging across AWS EC2 instances for `NGINX`, `python`, and `syslog` for improved visibility and troubleshooting
- Integrated sentry.io for error monitoring, tracking, and triage
- Optimized PostgreSQL DBMS configuration to mitigate OOM conditions, stale connections, and disk space usage

IERUS Technologies

Title	Engineer
Start	2016 October
End	2019 February
Site	ierustech.com

Conformal Conductivity Probe

- Developed Python application for interactively controlling a vector network analyzer used to measure the condition of aircraft skin joints
    - Utilized Python's QT package for displaying data in realtime as RF measurements were taken
    - Created a Python connector to interface with the VNA's COM server
    - Created an emulator for the VNA's COM server to allow cross-platform development and testing until the COM-based drivers were replaced

DASH

- Developed shared C++ libraries for parsing XML configuration files and integrated the parser with the rest of the trajectory propagation application
    - Designed XML schema for storing trajectory 6 DoF satellite trajectory data
    - Used OpenCL binaries to reference GPU kernel modules to increase speed of runge-kutta derivative calculations

Third-party Tracker

- Developed test framework for verifying C++ implementations of different Kalman filter models
    - Used MatLab to build tracker program from C++ with autotools
    - Test cases in the framework ran the filter implementations on specified test data sets and then generated summary figures for quickly reviewing builds
    - Platform independence allowed the framework to be used as a manual build server

Methodologies of Accurate Assessment of Target Characteristics

- Analyzed the effectiveness of different machine-learning techniques and Artificial Neural Network (ANN) designs when used to process radar measurement data
    - Used the scikit-learn Python package for training the ANNs from CentOS machines.
    - Created visualizations of ANN performance when classifying and labeling data according to the target feature space

- Prototyped parallelization of ANN training source using bash scripts to mimic parallelized computing in Python

RMCI, Inc.

Title	Embedded Systems Engineer
Start	2012 August
End	2016 October
Site	rmci-inc.com

XRDS™ Software Development

- Developed and tested vibration data analysis algorithms for condition-based maintenance from an embedded OS
  - Implemented the algorithms in C for utilization by an `ARM cortex 335x series` microcontroller. The focus of the algorithms was on time domain, frequency domain, and synchronous domain analyses
  - Developed a high-level framework in C incorporated with the Yocto project for handling onboard processing
    - Designed and integrated communication functions with an embedded SQLite database for retrieving algorithm parameters, as well as loading and storing both raw and processed data
    - Interfaced with low-level routines for collecting raw data and monitoring system state via a watchdog timer
    - Established communications protocol for system-wide integration in order to perform all onboard data acquisitions and processing upon triggers either by the user or by flight regime
  - Performed software verification testing by comparing results from the data analysis framework with a Python transliteration of the original `MatLab` scripts. The results were displayed and analyzed
- Designed and tested firmware for the `PIC24F08KL301 MCU` using `MPLAB X` , Eclipse, and `PICKIT3`
  - The microcontroller was used to emulate tachometer signals with two 8-bit timers and to translate between `RS-485` and `RS-232` message protocols for interfacing with a rotor blade tracking system
  - The two `UART` peripherals were utilized for the serial communications: one dedicated to `RS-485` communication with the controlling OS, and the other was dedicated to `RS-232` communication with the tracking system
  - Implemented a communications protocol for responding to various control bytes transmitted over `RS-485`
  - Developed a boot loader for executing firmware updates over serial traffic: created host side in Python using minimal packages for ease of deployment on the embedded Linux system, and tested the MCU side written in C
  - Phase 1 development was done on the `SAMD21G18A MCU` with Eclipse and the Arduino IDE for programming

Rotor Blade Tracking System Design

- Led a multidisciplinary team to design a new product for tracking helicopter rotor blades
  - Performed individual research and bench-marking, theoretical modeling using linear algebra and geometry, and data visualization for demonstrating theoretical system performance characteristics. Provided the recommendation for the selected design and continued to lead the development of this design
  - Conducted electro-optical radiometric modeling of solid state sensors for blade detection
  - Completed optical design of system hardware using matrix ray tracing in MathCAD, Python, and Matlab
  - Developed opto-mechanical design of illuminator and sensor to minimize space requirements while considering reliability, affordability, and maintainability
  - Reviewed materials and manufacturing processes for component design and selection
    - Design criteria included the following: overall size, weight, and cost; IR safety compliance according to `IEC 60825-1` and `IEC 62471` ; insensitivity to environmental lighting conditions; environmental qualification according to `DO-160` and `MIL-STD-810` ; hardware reliability, aesthetic appeal, and convenience of operation to the end user
  - The system is currently entering the prototype stage and is estimated to cost less than existing systems while improving performance and reducing maintenance costs
- Performed all engineering analysis, design, and fabrication of a stand for testing developmental systems
  - The stand replicated a scaled rotor of approximately `8 ft.` diameter, capable of rotational speed over `300 rpm`

- Used finite airfoil drag analysis to model the transient and steady-state speed based on input power. Total cost was under `$1,000`, and the test stand was used for rotor track and balance tests

Rotor Blade Tracking System Integration

- Developed and integrated shared libraries in C for communication and control of third-party tracker system
  - Libraries utilized two communications channels over `RS-485` and `RS-232` for configuration transmission and data retrieval
  - Protocols included `ASCII` and non-`ASCII` binary packets with checksums and `ASCII` hex representations
  - Configuration parameters were retrieved from SQLite Database and `ASCII` configuration file
  - Developed and integrated libraries for tokenizing and parsing `ASCII` file contents with comments
- Integrated tracker communications, acquisition, and processing libraries with framework for collecting RTB data
  - Developed lightweight logging library using variadic functions for creating and writing to log files, as well as writing messages to `stdout` for real-time feedback during developmental testing of framework libraries
  - Assisted with aircraft installation and testing on the airframes `OH-58C` and `OH-6A` of the entire embedded system in aspects of vibration data collections and rotor track height data collections

University of Alabama in Huntsville

Title	Research Assistant
Start	2012 February
End	2012 December
Site	uah.edu/smap

Research Assistant

- Designed a mechanism for releasing non-lethal grenades from multirotor UAVs to assist SWAT teams
- Built, repaired, and maintainedquadrocopter and hexacopter UAVs as part of a team. Used SolidEdge to design replacement parts, and integrated imaging payloads with existing systems
- Wrote code for the Evr2est project, which is a system that processes and disseminates imagery from satellites or aircraft for government use in first response and wartime scenarios
- Worked on the design of a VTOL UAV for image acquisition; contributed to CAD modeling, stress analysis, and aerodynamics calculation

Title	PASS Leader
Start	2010 August
End	2012 December
Site	uah.edu/ssc/pass

PASS Leader

- Formed group study sessions for students of all levels of ability in the following classes: Differential and Integral Calculus; Engineering Mechanics: Statics; and Engineering Mechanics: Dynamics
- Organized and administered group study sessions, engaging students reinforcing understood class material and teaching class material that was not understood
- Derived representative practice problems for test preparation
- Identified and communicated fundamental course concepts to foster student learning
- Individually tutored students in engineering, math, and physics classes