Keith Chester

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Purpose

Senior software engineer with over a decade of experience and an education in robotics seeking to continue career building unique technological solutions.

Career

Brain Corp

Senior Software Engineer 2018 - Present

Architected and developed numerous systems responsible for the management, coordination, and control of a global fleet of over ten thousand robots

- Led a team of engineers to produce an efficient and scalable pipeline for data collection across Brain Corp's robotic fleet while providing tooling for application-level real time reaction to data
- Responsible for key improvements and architecture decisions to increase scalability of the robotic fleet's cloud platform from a few hundred robots to tens of thousands
- Implemented an authorization system to provide multi-tenancy to our APIs and data collection

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Fusion Marketing

Senior Developer 2013 - 2018

As one of the original hires of the nascent Digital Team, I guided defining the place of the division within the company and expanded its reach. What was originally a value-add website-focused group developed to a unique technology development team that created custom technologies to empower customer events and interact with consumers. During this time I held numerous roles within the company - Developer, Research and Development Lead, Product Developer, and Senior Developer.

- As Research and Development Lead, created novel applications of technologies such as BLE beacons, virtual and augmented reality, computer vision, and IoT solutions towards client-oriented marketing products and services
- As a Product Developer, created reusable microservice backends for quicker deployments and white-labeling of products
- Created numerous unique and odd technological solutions for consumers to interact with at clients unique marketing events

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Hub City Media

Application Developer 2010 - 2013

Consulted with clients to design and develop identity management solutions for large enterprise businesses

- Coordinated teams (including international remote developers) in developing customized enterprise solutions
- Created, updated, and maintained several enterprise Java and C# applications in finance, healthcare, and government industries

Education

Masters in Robotics Engineering **2021-present**
Worcester Polytechnic Institute (WPI)

- Recently began attending online night courses to earn my Masters in Robotics Engineering while continuing my career

Bachelors of Science in Robotics Engineering **2005 -2009**
Worcester Polytechnic Institute (WPI)

Noteworthy Projects

Brain Corp

GCP Architecture Migration

Involved in a complete architecture redesign to support the migration of all services and data from the AWS cloud to GCP.

- For development velocity, adopted hosted services in GCP to power previously cloud agnostic designs.
- Developed a data reactive architecture to allow services to react and respond to data from our fleet of robots in real time

Data Pipeline

Architected a solution for and then led a team of engineers to create a data pipeline system for the vast amount of data collected by our robotic fleet

- Key features allow easily indexing generated data to allow our internal application and R&D teams to search for data across the fleet, even a robot never uploaded the data
- As our robotic fleet works over LTE, features to minimize bandwidth consumption were developed to minimize costs
- The new system can handle significantly more data throughput than prior avenues
- Data is passed through an evented stream system allowing real time data transformation or function triggers based on what the robot fleet encounters

Scaling Improvements

To rapidly bring a product to market, Brain Corp's initial cloud efforts had growing pains during its fleets' explosive growth. When brought on board, I sought to improve performance

- Over the course of several internal projects took a rapidly developed prototyped system from struggling to deal with scale of a few hundred robots to a system that can handle tens of thousands
- Custom database pooling and thresholding logic to handle database replica traffic loads

Multi-Tenant Authorization

Brain Corp provides robotic solutions to a number of manufacturers; this creates a need to securely silo and provide data to manufacturers while maintaining scalable systems

- Gathered requirements to match business use cases and design an appropriate authorization system around it
- Designed automated query filtering to prevent data leaks and to provide secure virtual isolation of customer's and manufacturer's data

Fusion Marketing

GigaSnap

Created a white label brand-able product that would create dynamic zooming selfies. which consisted of an animated image ranging from a close up shot to a half-mile wide-angle shot by stitching together an array of automated cameras.

- Created a reliable half-mile range network using ZigBee radio to allow remote execution and automation of target camera systems
- Developed and deployed a series of automated cloud services that would quickly generate these images by automating Adobe Suite products such as Adobe After Effects

Launchpad

Fusion regularly deployed dozens of tablets across multiple clients for simultaneous activations with custom software built for each tablet. Maintaining each tablet with the appropriate software and most recent version was a tedious time consuming task for developers. To solve this, I created Launchpad as a side project.

- Launchpad is a series of node.js powered applications that streamlined the deployment process of Fusion's site-deployed applications
- Provided development tools for marking what tablets should have what copies of software - on-tablet software would sync with the cloud and begin installing and updating all necessary software upon establishing a network connection

Open Source and Personal *https://github.com/hlfshell/*

Evolving Cars

To explore evolutionary algorithms on problem solving, I created a rudimentary racing game in Python and then created an algorithmic approach to evolve neural networks to solve the racing game.

Deep Q Network

Recently I have been exploring deep reinforcement learning - DQNs, REINFORCE, and A3C. The Deep Q Network repository is my recent in-depth exploration for training techniques for DQNs specifically. It has mastered several OpenAI gyms.

SafeStop

A golang module for handling multiple safe-shutdown procedures for large applications with multiple operating services. SafeStop allows a singular shutdown call to proliferate to each service and safely await (with timeout) for each service to wind down.

serial-synapse

For several projects - both professional and personal - the ability to coordinate multiple microcontrollers with a host embedded Linux system with a network connection became necessary. To this end I developed *serial-synapse* to modularize this process

- *serial-synapse* allows node.js users to bridge communication to and coordinate several microcontroller devices while being able to maintain time-critical local code execution on the microcontrollers
- Handles asynchronous communication between devices and automatically generates a dynamic and easy to use API for developers
- Powered dozens of real world products and projects during my time at Fusion Marketing
- When paired with *serial-synapse-socket* - another open source module - the generated dynamic API is exposed automatically via websockets for easy networking and IoT-ization of electronic projects

CanThey

- *CanThey* is an authorization library that compares provided ACL style strings against permission objects to determine access allowance
- Used in several production applications during time at Fusion Marketing
- Optional express plugin allowed easier integration for node.js developers

Technologies and Languages

- Golang
- Python
- Linux
- node.js
- electron
- Typescript
- Embedded C
- SQL
  - PostgreSQL
  - MySQL
- NoSQL
  - DynamoDB
  - Redis
  - MongoDB
  - Couchbase
  - CouchDB
  - Firestore
- Kubernetes
- AWS Services
- GCP
- Microsoft Azure
- Apache Kafka
- Terraform
- GRPC