ANDREW THOMAS

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EDUCATION

Northwestern University   **Sept 2017-June 2021**
- **Major**: Computer Science, B.S (in-major GPA: 3.61)
- **School**: Robert R. McCormick School of Engineering and Applied Science
- **Courses**: Data Structures, Algorithms, Computer Systems, Computer Networking, Programming Languages, Artificial Intelligence, Machine Learning, Scalable Software Architectures, Cyber-Physical Systems

PROFESSIONAL EXPERIENCE

Left Hand Robotics (startup)   **June 2019-Sept 2019**   *Software Developer, Intern*
- Developed storage mechanism, API, models, and data migration tooling for enhanced object storage and mutation system to solve major server bottleneck using Google Protocol Buffers.
- Built client-side library for reactive consumption, in-place mutation, and upload of Google Protocol Buffer objects
- Redesigned and redeveloped GPS path editing tools to compute mutations on the client, integrate new protocol buffer object system, and meet new customer needs.
- Researched message broker alternatives for publish-subscribe and remote procedure call communications between robots, mobile clients, web clients, and servers and techniques for integrating per-message authorization to enhance system security.

June 2018-Sept 2018
- Redesigned path collection tool application and robot operations center frontend to meet new customer needs, integrating the Ant Design framework.
- Developed common package to share code between frontend applications.
- Researched area coverage and cell decomposition algorithms and implemented area coverage planning algorithm using polygon offsetting.
- Developed a complex GPS path editing web interface and server API for persistence and advanced mutations.
- Built robot monitoring page to visualize real-time robot status and progress data along programmed paths using publish-subscribe through MQTT.

Sept 2017-March 2018
- Built API for generically fetching object model descriptors, object data, and links between objects using the Java Reflection API.
- Built web application for viewing and mutating data stored in server's object system for internal use by developers and support staff.

May 2017-Sept 2017
- Built robot operations center web application for managing inventory, collected GPS path data, robot tasks, and reports, for customer and internal support usage.
- Researched and evaluated potential maps services and APIs.
- Designed and developed registration, token-based authentication, and role-based access control (RBAC) authorization systems.
- Implemented internal microservice oriented message consumption and routing system on top of RabbitMQ using custom message protocol for HTTP and WebSocket requests.
- Discussed and researched robot path planning and control algorithms with team members.
- Built web application for custom path collection tool hardware utilizing Google Maps API and real-time sensor data from an embedded Python server.
- Evaluated potential candidates for hire and onboarded junior front-end developer.

Workday   **June 2016-Aug 2016**   *GW Software Engineering Intern*
- Worked closely with senior developer to build a real-time collaborative document editing web application.
- Implemented operational transformation algorithm to correctly and efficiently reconcile concurrent edits without additional coordination from the server.
- Demoed minimum viable product to product developers and senior management executives.

June 2015-Aug 2015
- Refactored core service classes written in CoffeeScript to modern JavaScript (ES2015) and performed testing to ensure correctness.
- Collaborated with a junior developer to refactor and rework a reusable modal wizard component.
- Debugged and implemented fixes for user-reported bugs for bi-weekly releases.

SKILLS

- **Programming languages**: TypeScript, JavaScript, Java, Go (Golang), Dart, Python, SQL
- **Web**: React, Vue.js, MobX, RxJS, Redux, InversifyJS, Google Maps API, HTML, CSS, LESS
- **Mobile**: Flutter, React Native
- **Server**: Gin-Gonic, Node.js, Express, Grizzly NIO
- **Network**: WebSocket, JSON, GraphQL, MQTT, RabbitMQ
- **Storage**: MySQL, Redis, Elasticsearch
- **Tools**: webpack, npm, Babel, Docker, Gradle, bash, git
- **Robotics**: OpenCV, path planning, motion profiling, localization, feedback loops

EXTRACURRICULAR

Litterbox (Northwestern startup)   **Sept 2019-Current**   *Chief Technology Officer (CTO)*
http://litterboxstorage.com - a startup that provides affordable, convenient and secure summer storage.

- Leading a team to build a customer-facing application and internal administration application to improve company performance and user experience.

EPIC (Northwestern club)   **Sept 2017-June 2018**   *Tech Team Co-director*
https://epicnorthwestern.com - Northwestern's undergraduate entrepreneurship club.

- Co-directed Tech team; held team meetings, taught software development technologies including React, Node.js, pugjs, and Flask, and oversaw and provided mentorship for student projects.
- Led .io, a program that aimed to provide students an experience comparable to that of working in a software-oriented startup while in a forgiving environment with an emphasis on learning (*http://andrewt.io/.io*).

FRC 1619 Up-A-Creek Robotics   **Jan 2014-Sept 2017**   *Software Lead*
https://www.team1619.org – a high school FIRST Robotics Competition team.

- Led development of software for several competition robots, developing effective teleoperated controls and complex autonomous routines (*https://github.com/Team1619*).
- Taught students of various skill levels Java programming, basic control theory, path planning algorithms, trajectory generation for motion profiling, computer vision, and object-oriented design including S.O.L.I.D. principles.
- Taught Java programming, web development, and computer security to middle schoolers in team-sponsored summer camps.

PROJECTS

- **News search engine**: a simple news search engine using articles scraped from the Common Crawl project datasets, utilizing Amazon EC2, AWS Lambda, Amazon SQS, Elasticsearch, and Tomcat. *Source not publicly available due to academic restriction*
- **Northwestern academic planner**: a mobile app to facilitate finding and scheduling courses using course data provided by a university API built using Flutter, GraphQL, and a Golang server.
    - *https://github.com/andrewmthomas87/nu_classes_mobile*
    - *https://github.com/andrewmthomas87/nu_classes_server*
- **MASM video game**: a video game inspired by Overcooked programmed in 32 bit Microsoft assembler using the MASM32 SDK. *Source not publicly available due to academic restriction*
- **Racket visualizer**: a web application that parses Racket/Lisp code and renders a tree visualization.
    - *http://andrewt.io/racket-visualizer*
    - *https://github.com/andrewmthomas87/racket-visualizer*
- **FRC clock**: a web application that displays a clock and information about the FIRST Robotics Competition team corresponding to the current time using data from The Blue Alliance API.
    - *http://andrewt.io/frc-clock, http://andrewt.io/frc-clock?team=1619*
    - *https://github.com/andrewmthomas87/frc-clock*
- **rx-bloc**: a TypeScript/JavaScript state management library using RxJS, based on the Business Logic Component (BLoC) Pattern designed by Paolo Soares and Cong Hui and an accompanying TodoMVC implementation.
    - *https://github.com/andrewmthomas87/rx-bloc*
    - *https://github.com/andrewmthomas87/rx-bloc-todomvc*

For more projects and information, see my personal website or GitHub:
- *http://andrewt.io*
- *https://github.com/andrewmthomas87*