Luke Bechtel

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EXPERIENCE

- **Revaly** — Remote
  Director of Engineering — *Oct 2020 - Present*
  - **Realtime Multiplayer 3D Design Review Webapp**: Collaborative, Real-time 3D Design Review Webapp (Imagine Google Docs + Github + Miro for 3D). Original author of prototype. Directed a team of 6 (across Dev & Design) to build into production-ready B2B / Prosumer SaaS product. Features include:
    * **Cross-Platform Webapp**: Supporting Desktop, Mobile, Tablet, Chrome, Firefox, Safari, Edge
    * **Real-time Multiplayer**: Real-time User Position + Cursor Sharing, Real-time UI Updates
    * **Video Chat**: Embedded live multi-user video chat up to 10 users.
    * **3D Models**: 3D Model Upload, Conversion between multiple Industry Standard 3D File Types, Secure 3D File Streaming
    * **2D Document Viewing**: Ability to view and leave 2D-positional comments on PDFs & Images
    * **Permissions**: Tiered Permissions Managment & Fine-Grained Sharing at Multiple Levels (Editor, Commentor, Viewer)
    * **Annotations**: Intuitive Feedback via 3D / Annotations, Rich Text Messaging (including @mentions, Embedded Images, & Reactions)
    * **3D Tools**: 3D Measurement – Edge and Point-to-Point, Plane Cutting, Face & Edge Selection
    * **Settings**: Customizable Settings Self-Service Billing, User Organizations, Real-time Notifications with Personal Notification Settings
    * **Notifications**: Real-time Notifications with Personal Notification Settings
    * **Organizations**: Groups of Users and Assets with Customizable Permissions and Settings
    * **Billing**: Both Self-Service & Enterprise Billing using Stripe
  - **System Design & Implementation**: Ultimately responsible for final product, overall structure, & implementation of multi-tiered real-time microservice & devops architecture including:
    * **Realtime Synchronization System**: Designed and implemented real-time synchronization system using Graphql, Postgres Real-Time Replication, and Websockets.
    * **Frontend Infrastructure**: Designed and implemented frontend infrastructure using React, Typescript, Yarn Workspaces.
    * **Database Infrastructure**: Multi-environment Postgresql database setup, including automated migrations, and read-only business analytics replica using native Postgres replication functionality.
    * **Cloud Infrastructure**: Including Cost management, service comparisons, final decisionmaking.
    * **Devops / Codebase Infrastructure**: Monorepo / Microservice codebase design, developer automation pipelines with separated development, staging, and production environments.
    * **Cluster Infrastructure**: Deploying & managing multiple kubernetes environments in AKS, including secrets management, interfaces with external data sources, cron-jobs, and monitoring with Istio & Grafana.
  - **Startup Team Leadership**: Led fully-remote product team of 6 from concept application, to production-quality product. Led many aspects of product development – including:
    * **Product Development**: Created & maintained internal / external feedback gathering systems, triage procedures, regular check-ins, sprint planning & retros. Led feedback gathering process from all parties CEO, Design, Marketing, Sales, Bizdev, Engineering to construct reasonable roadmaps given constraints, supporting both near-term and long-term bets.
    * **Team Management**: Hiring, onboarding, training, and managing a fully-remote team of 6.
    * **Product Design**: Responsible for working with Design to create a consistent, intuitive, and user-friendly experience across all platforms.
    * **Marketing / Sales**: Working with Marketing / Sales to consistently respond to customer feedback and market demand.
    * **Business Development**: Meeting with potential customers to understand their needs, and reviewing possible partnerships.
    * **3rd Party Relationships**: Negotiating with 3rd party vendors & service providers to scope and manage special projects requiring outside expertise.
    * **Customer Support**: Responding to customer support requests, and working with the team to improve the customer experience based on feedback.
  - **Key Skills Used**

∗ **React**	∗ **GraphQL**	∗ **Postgres**	∗ **Three.js**	∗ **Azure**
∗ **Typescript**	∗ **Node.js**	∗ **Kubernetes**	∗ **Redux**	∗ **AWS**

- **Cadre5 (Oak Ridge National Laboratory)**   Knoxville, TN
  Software Engineer   *Aug 2019 - Oct 2020*
  - **Ground Control System For Remote Vehicles**: Designed and implemented a "Google Earth"-style remote vehicle control interface.
  - **Waterfall Diagram for Radiation Data**: Designed and implemented an in-browser "waterfall diagram" to display live radiation data.
  - **ORNL Administrative App**: Managed backend development for an administrative app dealing with sensitive personal data.

- **Collider**   Chattanooga, TN
  Cofounder, Head of Scientific Computing   *Dec 2015 - Present*
  - **Orchid**: Next-Generation SLA-hybrid 3D printer. Wrote firmware for Orchid, including calibration interface, state machine manager, time-sensitive systems, interfaces with motors, light-engines, and other actuators/transducers. Firmare described was responsible for printing hundreds of customer parts over many machines.
  - **Meshprep**: Core processing pipeline of geometric preparation algorithms for hybrid 3D print process, and associated webservice. Researched, iterated on, designed and implemented algorithms for converting arbitrary 3D geometries into material-efficient molds, generating injection network geometries given fluid constraints, identifying surfaces in need of structural support, and generating structural supports. Additionally, designed and implemented algorithms to recommend user-selected part orientations and feature placement. Described work resulted in a pipeline which automatically processed hundreds of 3D models into printable files which were printed into customer parts, representing tens of thousands of dollars in revenue.
  - **Smithy**: Wrote in-browser interactive 3D print preparation UI, with custom WebGL shaders, part rotations, and 3D model feature selection tools. Resulted in a qualitative increase in user print preparation successes.
  - **Gardener**: 3D printer management API for print job tracking, model management, and print preparation. Was responsible for managing data and operations for hundreds of print jobs, from file upload to final layer printed.
  - **Raw-to-Repaired 3D Model Pipeline**: Pipeline and associated service to repair and compress "dirty" user 3D model inputs. Negotiated with vendors, implemented webservice, configuration, and scripts around vendor-provided API. Allowed hundreds of customer geometries to be cleaned automatically, without user intervention.
  - **Dynamic Mesh Test Suite**: Test suite for Collider's geometry pipeline, involving determination of user-like input parameters dynamically per-model, and input/output sanity-checks. Resulted in pre-deployment identification of several geometry pipeline regressions.
  - **Rowbot**: Slackbot used for notifications and tracking status of printer fleet. Allowed 24/7 monitoring for staff.

- **Vortext**   Oak Ridge, TN
  Software Engineer   *March 2015 January 2016*
  - **Document Clustering API**: API for server-side document clustering algorithm developed at ORNL. The resultant app was accepted into a startup accelerator, in which I participated as technical representative.

- **University of Tennessee**   Knoxville, TN
  Research Assistant   *May 2014 - September 2016*
  - **FPGA-Accelerated Neural Network Research**: Implemented memory-swap optimization for Neural Network-on-FPGA architecture. Coauthor of *Extensions and Enhancements for the DANNA Neuromorphic Architecture* , performed background research and wrote IEEE-style synopsis of findings.

- **Keurig**   Knoxville, TN
  Controls Engineering Co-Op   *May 2013 - December 2014*
  - **Industrial Visualization System**: Lead developer on large-item inventory management and physical signaling system for high-throughput production facility. Resulted in ROI of 400% over 1 year period, and was adopted by other Keurig facilities.

Other Notable Projects

- **Google Research Football: Multi-Agent PPO Reinforcement Learning**: A project for school in which I used PPO (Proximal-Policy Optimization) to train a two-agent system to consistently beat the computer players in Google Research's Football implementation.

- **Trimesh**: Early contributor to the primary Open-Source 3D Mesh processing library in python. Used by Pytorch3d, Blender, and many other libraries.

- **Supabase**: Open source contributor.

- **Interrogato**: Open-Source webapp using OpenAI's GPT-3 which assists users in researching academic papers.

- **Lab Grad**: An open-source Typescript-reimplementation of Pytorch, complete with an in-browser network visualizer using Cytoscape.JS.

- **Visualisa**: Open-Source in-browser 3D Audio Visualization website.

Technical Skills *(ordered by desc. mastery)*

- **Langs**: : Python, Typescript, Kotlin, C#, C++, C, Ruby, Golang, Bash, SQL, PHP, GLSL

- **Tech**: : Numpy, Three.js, React (+360), Pytorch, Django, Trimesh, Scipy, Pandas, Graphql, WebGL, Rails, Keras, Tensorflow

- **Infra**: : Git, Docker (+Compose), Kubernetes (+Helm), Postgres, Pytest (+Pylint, +Cov), CircleCI, Cucumber, Jest

- **Hardware**: : I2C, Beaglebone Black, Motor Control, Basic Circuit Design (VHDL), Raspberry Pi, Arduino

- **Concepts**: : Reinforcement Learning, Proximal Policy Optimization (PPO), Random Forest, Deep Learning, Neural Networks,

- **Web Technologies**: : HTML, CSS, ...

- **Platforms**: Azure, AWS (Lambda, EC2), Google Cloud, Stripe, Twilio, Supabase, Azure Devops, Heroku, Vercel

Education

- **Georgia Institute of Technology**   Remote
  Masters in Computer Science, Machine Learning Specialization;   *August 2020 - Present*

- **University of Tennessee**   Knoxville, TN
  Bachelor of Science in Computer Science;   *Aug 2011 - May 2016, Aug 2019 - May 2020*