Benjamin Lewis

Software Engineer
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Profile

I am a hard working software engineer who enjoys striving to solve complicated problems. Many of the skills which I have acquired have been self taught. However, I have a formal education in Software Engineering at NCSU, which is ranked as one of the best Universities for Software Engineering. At this school I have learned about data structure and algorithms, along with the intricacies of operating systems specifically in linux, and formal software development workflows, along with minor introductions to artificial intelligence. I have a proven track record in system architecture and in computer graphics. My previous boss described me as someone who needs very little guidance, learns quickly, goes above and beyond, and works well with others.

Technical Expertise

My expertise is in point clouds and computer graphics associated with them. This involves using data structures and algorithms along with the GPU to perform complex actions on them, such as ICP to align similar clouds, interval trees to segment sections of 4D clouds based on time, octrees for quick location and exploration of points with object detection, and 2D projection to determine if two clouds of construction components will fit together correctly. As of late, I have been getting involved in Gaussian Splatting and creating AI algorithms for utilizing them in industrial settings.

Education

North Carolina State University
B.S. in Computer Science
Graduated May 2023
GPA: 3.5

Computer Science Honors
Graduated with a minimum GPA OF 3.5 while completing a challenging program of computer science undergraduate study, including an honors thesis with a supervising professor. Worked with Dr. Lina Battestilli to write a web application for enhancing security in child care. Had 2 notable organizations using it.

1st place MATLAB Cody Competition
Placed first place in the MATLAB Cody competition at state. Competitors were given 20 questions to solve.

Dean's List
Maintained 3.5 or better on 12 to 14 hours of coursework

1st Place In First Year Engineering Design Day (FEDD)
Spearheaded the production and design of the Bubble blower that won the FEDD bubble blower challenge against other teams of NC State engineering freshman.

Work Experience

Founder - Envision Realty Dec 2023-Present

About:
Envision Reality is a company that utilizes extremely cutting edge technology to give interior designers the ability to create photorealistic 3D renderings of rooms with no CAD experience, then utilize AI suggestions to speed up the design process through recommendations and room modification tools.

Key Responsibilities:
- Technical developer in designing and maintaining the distributed system along with its microservices.
- Reaching out to and maintaining a relationship with users.
- Researching and reading research papers relating to the tech.
- Raising money and meeting with investors.

Achievements:
- Created MVP in 2 months then conducted market research with it on potential customers.
- Integrated with Stripe to support subscription based payment plans.
- Opened communications with some of the companies that provide support API and communicate with them to help resolve bugs in their software.
- Cold call success rate of 2% conversion to customers.
- Implemented brand new technology such as AI object detection in 3D point clouds and brand new Gaussian Splat based algorithms.
- Created a distributed system that gives interior designers top notch tools.

Tech Stack:
Languages & Frameworks: TypeScript, Python, GLSL
Database: MongoDB
Tools & Services: React, threejs, AWS, S3, Lambda, Tweenjs, Python, Tensorflow, webGPU, Nextjs
Development Methodology: Agile

Software Engineer - Startup First Hire - PowerN Jan 2022-Dec 2023

About:
PowerN is a company that helps facilitate the construction and management of the construction process through 4D visualization and management tools, along with additional features to help with the efficient creation and correctness validation of prefabricated parts. I was hired as the first developer and created the core system which they use. Overtime, my role grew and I would manage others along with helping with hiring new developers.

Key Responsibilities:
- Lead the technical development of the 4D visualization engine and associated virtual windows to interact with it.
- Designed the file system that was used to allow contractors to communicate with one another through a google-doc like filing system.
- Oversaw the development of the API and back end structure with the focus on long term maintainability
- Designed highly efficient algorithms that used interval-trees and mathematical argumentation for updating multiple GBs of data to reflect in the 4D engine with colors in O(log(n)) time.
- Managed a team of contractors, and PhD researchers and conducted weekly sprint meetings to maintain company progress.
- Created an API that used AI to determine the correctness of millions of points generated from a LIDAR scan of a prefab building component

Achievements:
- Created the 4D Engine that their company is based on.

- Improved algorithms of O(n^2) complexity and reduced them to O(log(n)))
- Became well known with the company's associates as an exceptional developer.
- Designed an architecture for both the front and back end of the company that stood the test of time for the 2 years I was there.

Tech Stack:
Languages & Frameworks: Javascript, Python
Database: SQL
Tools & Services: React, Django, AWS, S3, Lambda, threejs, ifcjs, potree
Development Methodology: Agile

Founder - Advanced Security System for Child Wellbeing - Ottery Jan 2021-Dec 2023

About:
Ottery is an advanced security system designed to ensure the wellbeing of children in daycares, churches, and schools. The system was successfully implemented by two different organizations before its operations were discontinued. Its primary focus was in creating an efficient and effective pick up and drop off method that parents would not notice was being used.

Key Responsibilities:
- Led the development process, including designing a scalable architecture to handle numerous HTTP requests for secure communication between organizations.
- Conducted monthly customer meetings to align the application's progress with client needs.
- Performed cold calls and onboarded two clients, ensuring a smooth implementation process.
- Utilized Figma for designing a user-friendly UI interface.
- Developed an email automation system to keep parents informed and engaged.
- Hired and managed two contractors, utilizing Agile methodology to accelerate the development process.

Achievements:
- Successfully implemented the system for two organizations, enhancing child safety and communication.
- Developed a scalable and secure architecture, ensuring reliable and safe data exchanges.
- Improved client satisfaction and engagement through regular meetings and a robust email automation system.

Tech Stack:
Languages & Frameworks: JavaScript, TypeScript, React-Native, ducktyper, nestjs
Database: MongoDB
Tools & Services: AWS (Amazon Web Services), S3, Nodemailer, Figma
Development Methodology: Agile

Matlab Teaching Assistant - North Carolina State University Aug 2020-Dec 2021

About:
I help the teacher with grading, and brainstorming on ways to improve class time. Hosted office hours to help students learn. And ran one of the lab sections in which I taught and assisted students in hands-on learning.

Key Responsibilities:
- Taught Lab sections of 50 students to help them better understand material.

- Made decisions to make the lab time a more efficient environment for learning.
- Effective communication skill to both type and teach at the same time.

Achievements:

- My best achievement was making sure that I helped people see that through hard work, they can improve dramatically. I helped many students with their self confidence and watched their mood go from disappointed in themselves to excited and happy to learn.
- Taught 50+ students in lab sections.
- Help many students in the late night lab enjoy and love the class.
- Helped many students see an increase in test scores of up to 20%

Facilities Assistant - The Shepherd's Church May 2021-Aug 2021

About:
Offered support in general and electrical handyman projects and repairs. Added exterior lighting to the building, became lift certified, ran fiber throughout the building to allow for high speed streaming.

Landscaper - The Shepherd's Church May 2019-Dec 2020

About:
A Summer job in which I worked outdoors to improve landscape features. Trim trees and bushes, apply mulch, and make holes for planting flowers, trees, and bushes. Also offered specialized assistance for various hardscaping tasks such as patio construction and bricklaying.

Open Source Contributions/Modifications:

Threejs - DragControls: added rotate mode - https://github.com/mrdoob/three.js/pull/27689

- Added a rotate mode to DragControls that allowed people to manipulate 3D objects in threejs without using the gizmo-based variation called TransformControls
- Uses complex linear algebra and geometry to determine, based on user mouse movements, object rotation.
- Created a custom class, then through communication with the maintainer we decided it was best to combine it to another existing tool.
- Created specifically for my own program in Envision Reality but made the PR since it was not any of my core intellectual property.

IFCjs - Raycaster improvements - https://github.com/ThatOpen/engine_components

- Frequently contributed to fixing bugs in this repository since it was used by PowerN and was in a stage of growth when I started working on it.
- However, improving the raycaster was one of my bigger improvements.
- This was done to give PowerN a better interface to extend the core component that we were using to help increase our code speed since we were dealing with speed issues.

Lumaapi - Updated client to work with aws lambda - https://github.com/envisionreality/lumaapi-python

- The original client is not able to run in lambda. To create a cheap microservice I needed to use it in lambda.

- Updated the temp data that is used to store the api key and also any temp data I updated the code to store it in a place that lambda expects.

Projects

Wakescrape - Web Scraper for Property Records - https://github.com/lewibs/wakescrape

- Developed a web scraper for Wake County property records using Beautiful Soup.
- Utilized curl requests to access web pages.
- Implemented multi-threading to speed up data extraction.

Tech Stack: Python Beautiful Soup, curl, Multi-threading

6_Card_Golf_ai - AI Models for 6 Card Golf - https://github.com/lewibs/6_card_golf_ai

- Developed and trained 4 AI models using PyTorch to play 6 card golf as a single agent.
- Initial training on random data, followed by fine-tuning with Q-learning.
- Achieved competitive performance against human players in this probability-based game.

Tech Stack: Python, PyTorch, Q-learning

Alien Invasion Experience - https://github.com/lewibs/AlienInvasionExperience

- Developed a 3D web engine using Three.js as a proof-of-concept for PowerN.
- Utilized Tween and Three.js libraries to create an interactive experience depicting an alien ship attacking Earth.
- Designed architecture capable of efficiently loading and managing multiple assets.
- Created animations and explosions using threejs objects.

Tech Stack: JavaScript, React, Three.js, Tweenjs

Guarded Components - https://www.npmjs.com/package/guarded-components

- Contract based method of protecting pages, or components in react without having to reimplement complicated business logic.
- Utilized by a NCSU Senior design team that I heard was having issues determining how to solve the problem of hiding buttons.

Tech Stack: Javascript, React

DuckTyper - DTO validation tool - https://www.npmjs.com/package/ducktyper

- DTO schema tool for maintaining large software projects and protecting http requests from bad data by ensuring front and back end consistency.
- Heavily tested using JUnit test of both fictional use cases and real world bugs.
- Leverages styled-components like structure and class-validator for decorators on JS classes.
- Provides support for both JS and TS projects.
- Leverages duck typing for flexible yet robust validation.
- Uses a functional architecture to allow for easier testing with Jest.

Tech Stack: Typescript, Class-validator, Jest

Metamadness - Blackeye cyber attack variant - https://github.com/lewibs/metamadness

- This is my own variation of the blackeye attack method used by hackers
- Creates a legit looking login screen that sends the username and password back to the host based on target websites html
- Added metadata injection to make hyperlinks look legit like they are being directed to a legitimate post on websites like instagram

Tech Stack: shell scripts, Html, Javascript, Nodejs

Usability-Tracker - https://github.com/lewibs/usability-tracker

- This was created to see how people interact with websites.
- Tracks user actions and mouse movements and then allows the user to replay and visualize where the user's mouse was.
- This was created for my website just to see how people interact with it and what they look at and click on to better understand what people are interested in.

Tech Stack: Javascript

Eventador - Additional JS event options - https://www.npmjs.com/package/eventador

- This was created to add more actions to the event classes in the base JavaScript program to allow for more complicated user action events.
- Allows for actions that are based on multiple keys being pressed, and then trigger actions based on that.

Tech Stack: Javascript, lewibs-keylogger

Keylogger - https://www.npmjs.com/package/lewibs-keylogger

- Keylogger that can be used in any js based web program
- Keeps track of current keys pressed.
- Used by PowerN.

Tech Stack: Javascript

Wackamon - online whack a mole game - https://lewibs.github.io/wack_a_mon/

- A web based project that I did in school to better understand Finite State Machines.
- Keeps track of user high scores and uses axios to store them in a backend database.

Tech Stack: Javascript, HTML, CSS

Tic-Tac-Toe - machine learning matlab agent - https://github.com/lewibs/tic-tac-toe

- Implemented with Matlab in preparation for a TA interview.
- Utilizes Machine Learning to determine optimal actions in Tic Tac Toe

Tech Stack: Matlab

Sheet-O-Matic - automated clue sheet - https://lewibs.github.io/CLUEsheet-o-matic/

- Data analyzer to use while playing the game Clue.
- Keeps track of all guesses made to quickly determine who did the crime.
- Will accurately guess the killer significantly faster than a human.

Tech Stack: Javascript, HTML, CSS

Movie Night Etc. - Blog - https://github.com/lewibs/MovieNightEtc

- Blog made with PHP
- Allows for commenting on posts.
- Reads a list of files to display onto the screen.
- This has been taken down due to security concerns with js injection attacks.

Tech Stack: Cpanel, PHP

Functional Array - https://github.com/lewibs/FunctionalArray

- This was a fun project just to see how far I could take functional programming.
- Javascript implementation of an Array.
- Uses only functions and does not use objects or arrays.

- Uses functions to create a reverse order linked list to create structure that has the same interface as a JS Array.

Tech Stack: JavaScript

Quick Casher - https://github.com/lewibs/lewibs-cache

- Converts functions into caching functions, improving performance by storing and retrieving output based on specified options.
- Particularly beneficial for optimizing computationally expensive functions frequently called with the same arguments.
- Offers a lightweight caching solution for scenarios where a more comprehensive tool like react-query might be excessive.

Tech Stack: JavaScript

pytorch_tic_tac_toe

- Created to learn how pytorch works.
- Uses Q_learning to train an AI Model against itself.

Tech Stack: python, pytorch

More projects can be found at: https://github.com/lewibs

Recommendations

“Benjamin was my first employee who started as a co-op and became our first full-time software developer after graduating from college. He was very independent from the beginning, especially considering that he was still a student. Although he was new to computer graphics at the time he was hired, he picked up quickly and found solutions independently with little to no guidance. He always went beyond what was told and suggested new designs and better ways for long-term development. Moreover, his quality of work was very high and our senior architect was very impressed. Benjamin also worked well with his team members and never hesitated to help and guide new hires. He also did not mind taking on non-developer duties, such as making marketing videos, which is much needed for my startup to be successful. As an early-stage startup with limited resources, I really appreciate what he has done for us. I have no doubt that he will have a good career at any company he may work for.”

- **Kevin Han, CTO, PowerN**

“I first met Benjamin as a freshmen in my Intro To Programming MATLAB course and hired him as a Teaching Assistant for the course because he was competent, friendly, organized and dependable. In 2022/2023, I also advised him on an independent study in Computer Science where he worked on his own entrepreneurial project. Benjamin is a hard worker, deep thinker and very skilled programmer.”

- **Lina Battestilli, Associate Professor at North Carolina State University**

“I am highly impressed with Benjamin on multiple counts.
As his industry advisor, he impressed me with the way in which he completed his NCSU CSC Senior Design Project. He created an API and a consuming client with very little direction or oversight.
During that collaboration I noted his keen discernment and insight, aptitudes which are doubtless honed by his voracious reading. He asks wonderful questions.
I recommend Benjamin for any software role in which he might have an interest.”

- **Doug Axtell, Senior Design Advisor/SecDevOps Senior Developer**