

# Sean Kennedy

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## EDUCATION

The University of Texas at Dallas, Richardson, TX  
BS in Computer Science, GPA 4.0 / 4.0

May 2021

## SKILLS

**Programming Languages:** C/C++, Python, Lua, SQL, Java, Octave, R  
**Assembly Languages:** MIPS, x86  
**Hardware Description:** SystemC  
**Graphics:** OpenGL, GLFW  
**Machine Learning:** Tensor Flow, MXNet  
**Editors:** VSCode, Emacs, Vim, XCode, PyCharm, Eclipse

## WORK EXPERIENCE

Undergraduate Researcher | DARCLab

May 2018 – Present

- **C++ Programming:** Developed synthesizable hardware systems for FPGA, written in C++ with the SystemC framework
- **Artificial Neural Networks:** Developed an ANN library from scratch

Undergraduate Researcher | Advanced Research Center for Software Testing

May 2018 – Jul 2018

- **Reward Function Hacking:** Researched the most recent developments in reward hacking, a problem in training AI systems with imperfect cost functions

Software Engineering Intern | Procedural Reality

May 2017 – Aug 2017

- **Lua Programming:** Designed and implemented an AI navigation system for a video game

Teaching Assistant | LSU Coding Circle

Jun 2017

- **Teaching Python:** Taught and mentored gifted middle and high school students learning to program in Python in a summer camp

## LEADERSHIP

Founding Secretary | The Assembly Group

May 2018 – Present

- **Teaching x86:** Help in the preparation and teaching of x86 to club members
- **Organization:** Maintained focus on agenda during officer meetings, and kept accurate minutes

## PROJECTS

Competitive Programmer | Code Burners

August 2017 – Present

- **C++ Programming:** Coded solutions to a wide variety of programming problems in C++
- **Advanced Algorithms:** Solved complex problems using experience in algorithms and data structures

Machine Learning Car | ACM Projects

Sep – Nov 2017

- **TensorFlow:** Developed an image processing system to navigate a car through a room and around obstacles

## HONORS AND AWARDS

Dean's List

Fall 2017 – Present

**CS<sup>2</sup> Scholar:** Honors program at UT Dallas for the top 10% of CS undergraduates

Fall 2017 – Present

**National Merit Scholarship:** Four-year full-ride scholarship to study at UT Dallas

Spring 2017

**USACO:** Achieved a place in the gold division of the USACO programming competition

Spring 2017

**1      How were you first introduced to Computer Science? How have you continued to develop your technical skills and seek additional exposure to the field?**

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My first exposure to the world of computer science came from a Python tutorial I did online. I loved playing around with mathematical concepts, so I would spend hours just creating mathematical sequences and printing them out to the console. From here, my interests branched specifically into Machine Learning and Algorithms.

Towards machine learning, I took an online course, “Machine Learning” by Andrew Ng, my junior year in high school. Ever since, I’ve been very interested in machine learning, and have furthered my technical knowledge of the field, studying Linear Algebra, Multivariable and Vector Calculus, as well as implementing my own neural network in C++ from scratch for a research lab. Next, I plan to apply my skills to solve problems in the medical field at a hackathon in November at UT Southwestern.

Towards algorithms, I first really started in the USACO programming competitions, in which I excelled. My coach, Josh Parnell, seeing potential in me, offered to mentor me, taking me in as an intern at his company the summer after I graduated high school. I’ve continued my education in algorithms through my honors coursework and by continuing to compete in competitive programming.

**2      What is your strongest programming language? How much experience do you have using the language? Go into detail about how you used this technical language. If talking about a group project, be specific about your role in the final product. (Examples can include projects, coursework, competitions, websites, previous internships, etc.)**

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I would say C++ is my strongest language. My most recent work using C++ is in an artificial neural network I build from scratch in C++ for synthesis on an FPGA with a research lab at my university. By from scratch, I mean I started by creating a matrix class, basic operations, an activation function, and combined those together with my knowledge and experience with machine learning to create a system that trains on the MNIST dataset that trains to 95% accuracy. If interested, check my GitHub repository “SystemCMatrix”, and make sure you install the SystemC library.

I have several years of experience using C++. I first learned C++ to make my algorithms in the USACO programming competition more efficient, and since my first semester in college, it has been my preferred language for doing anything. Beyond everything previously mentioned, I have taken coursework where I learned more nuanced details of C++, as well as the C/C++ build system, and how C and C++ are used in a Unix-Based environment. Except for cases where I would need to learn a new API, I would be very comfortable building anything in C++.

**3      At Google, we believe that a diversity of perspectives, ideas, and cultures leads to the creation of better products and services. Tell us about your background and experiences and how they make you unique.**

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I love puns, and I love pranking people. I think this aspect of my personality can really help in creating code with resilient, well-defined behavior. All good pranks demand an exploitation of a failure in design. For example, in my friend’s apartment, the light to their shower room is on the outside of the room – which presents a great opportunity to turn the lights off when they are in the shower. I love doing things like this and looking out for them is second nature to me. This comes in very useful as a programmer, as I am always looking out for ways that code can be exploited due to poorly defined behavior. Puns are similar – look for words that present ambiguity, and then promptly exploit that.

Another area where I could bring a new diverse perspective is in how much knowledge and experience I have in dealing with the “low level” of programming – specifically my work as an officer of a club teaching x86 assembly and my work with C and C++ programming. I think knowing what goes on under the hood is very valuable, and I could contribute lots to a team by having this different perspective.

#### **4 List the technical courses you will be taking next semester. If you have not registered for classes yet, please list the courses you plan on taking.**

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The courses I will take this upcoming semester may be placed into three general categories: Those that support my endeavors in advancing my skills in machine learning, ones that advance my skills pertaining to the mathematical, algorithmic side of computer science, and finally those that will support my general skillset as a software engineer.

The two that will deepen my knowledge in machine learning will my titled **Machine Learning** and **Artificial Intelligence**. By the time spring semester rolls around, I will have the mathematical foundations necessary to succeed in these courses. I’ve been looking forward to taking a collegiate level machine learning course for years, so I am particularly excited about these.

Those that will advance my career in computer science, in general, will be **Automata Theory**, as well as **Organization of Programming Languages**. Both will be honors courses part of the computer science honors curriculum that I am taking, and I expect them also to be extremely useful and challenging.

Finally, the remaining two will be Introduction to **Database Systems** and **Social Issues and Ethics in Computer Science**. While no less critical to my success as a software engineer, these courses are ones I am less excited about.

#### **5 List any clubs and/or organizations that you participate in.**

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One organization that I was once involved with is called The Assembly Group. It is a club that provides an environment for students to study and learn about assembly programming, with its initial focus on teaching x86 programming to undergraduate and graduate students. My role in the organization was as the founding secretary, and on top of organizing our meetings, agendas, and maintaining records, I prepared lessons on x86 fundamentals to teach to around 30 people.

Another club that I am loosely involved with at my university is a club called Code Burners, which is a competitive programming club that puts on weekly challenges, as well as bi-weekly programming competitions. Participating in these sorts of competitions is always a good challenge for me to apply the knowledge and skills I’ve learned through my coursework. It’s also a great opportunity to collaborate with some of my friends and classmates in a high-pressure environment.

Finally, I participated in a program led by the ACM chapter at my university called ACM Projects, wherein I, along with some team members, created a car that would use machine learning to follow a person around. My role was using OpenCV detecting objects through a video feed.