

Preston Hinkle

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Dear Professor Douglas,

My name is Preston Hinkle; I am writing to you about the software engineering role posted on Hacker News. As a soon-to-be PhD grad, I often skim through the job boards, but completely stopped when I saw your posting. The specific points mentioned—the fact that the job is in the biotech domain, that it is a software engineering role, the request for experience in Python and PyQt—all speak to my interests and experience. As a quick introduction, I am a physics PhD student at the University of California, Irvine in my 5th year, where I study under Dr. Zuzanna Siwy. Our research area is experimental biophysics, and more specifically on developing nanopore applications, but we overlap with many different areas in micro-, and nanotechnology. My own personal research projects have been on fabricating nanopores with novel ion conducting properties, resistive pulse sensing, and most recently, designing a microfluidic platform for cancer cell detection. I am familiar with DNA origami from conference talks and reading literature, and it is on my group's radar due to its ability to act as a nanopore. A little while back I even created some COMSOL simulations for a PI at another university that was interested in DNA origami nanopores, since their large surface charge is expected to give them interesting conductance properties.

While I am an avid experimentalist, my greatest interest is in the application of computing to problems in the scientific domain, and throughout my PhD I have actively pursued projects that have a large computational component. These projects include writing programs to control measurement instruments, scripts to run data analyses, and a fairly large code base I wrote to analyze resistive pulse data. Aside from programming for the lab, I do a lot of casual hacking on the side, especially on data science side projects. I have extensive experience coding in C++ and Python, though these days I primarily program in Python due to its faster development time compared to C++ and for its scientific computing packages. I also have extensive experience with the Qt framework, both plain-old Qt for C++ and PyQt for Python, and several completed GUI projects under my belt.

One of the first major projects I undertook in the lab was creating a GUI program written in C++ and Qt to control our picoammeters, the workhorse of nanopore research. The program significantly improved the workflow of nanopore characterization in my lab, and is instrumental in one of our larger projects.

Early last year, my group took on a research project that uses resistive pulse, a particle characterization technique, to detect cancer cells. As part of the project, I was awarded a fellowship to support the development of an open-source software library to analyze resistive pulse data. The software is written in Python and PyQt, and consists of a GUI program that extracts resistive pulse events from the raw time-series data, and a large library of functions used to analyze the pulses themselves. Additionally, because this experiment combines resistive pulse with high-speed imaging, a significant portion of the library is also devoted to computer vision functions and to synchronizing the resistive pulse and imaging data.

As part of the cancer cell project described above, I wrote a GUI program in C++ and Qt that controls the hardware used to run the experiments. The program uses multithreading to ensure GUI

responsiveness and asynchronous control of the hardware. The project has given me experience in dealing with large volumes of data—we shoot with the high-speed camera at 100,000 fps, which ends up amounting to 10 GB of data for every second of real-time recording. Dealing with this data at every level, from storage to analysis, was a challenge that I had to overcome in order to move the project forward.

In addition to my research-related programming experiences, I've been an active member of an on-campus group called the UCI Data Science Initiative. I've gained experience by participating in workshops and attending colloquia, and I am currently the instructor for one of the Initiative's graduate-level machine learning workshops, 'Predictive Modeling with Python'. A more recent highlight is a 24-hour hackathon I participated in, where my group created a GUI program (written in PyQt!) for dynamically visualizing historical sea ice data.

I hope that I've managed to convey to you the sense of enthusiasm I have for the work I do, and also the excitement that I have in applying my skills as a programmer to biotech research. A simple portfolio is available on my website at tphinkle.github.io/portfolio, and the repositories for the projects themselves are all available on my github page: github.com/tphinkle. Thank you for taking the time to read this lengthy letter, and please contact me if you have any questions or would like additional information that might support my job application. I hope to hear back from you.

Sincerely,

Preston Hinkle