Nathan Lilienthal

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Dear reader,   **July 30, 2021**

I'm applying for the position of Technology Education Lead at IBM Research because consuming, internalizing, and finally producing useful kernels of knowledge from research is a passion of mine. I believe strongly that information accessibility is one of the most crucial elements of good R&D, despite the necessary depth. I often hear fellow researchers brush off an explanation due to overwhelming complexity, or fuzzy results. The great Richard Feynman once said, "I couldn't reduce it to the freshman level. That means we really don't understand it."

During my undergraduate years, I had the opportunity to TA for the freshman Fundamentals of Computer Science course. In doing so I was able to test my understanding through teaching quite rigorously. Every week I'd give a prepared lecture to my lab section and assist students as they went through the material. I also took it upon myself to write a JSON lab using a parser I had written, so students might be inspired to take a look under the hood. You can read the lab (please excuse the HTML to PDF conversion) and source code here if you wish: `https://github.com/nixpulvis/parser-combinator`.

In my role as a research programmer at Northeastern Univeristy's Cybersecurity and Privacy Institute, much of my work was to take knowledge from Programming Language research and connect it to the work of my colleagues in Cryptography. This included writing a large collection of examples, which would guide the design of the future work. When I started I only had a surface level understanding of Cryptography, so it was a crucial aspect of my job to be able to read papers and extract meaningful and useful concepts quickly. As part of this process, I kept notes which you can read some examples of starting here: `https://nixpulvis.com/research/2019-10-13-achilles-8`.

In addition to my experience in academia, I have been part of a handful of teams in industry. Software engineering requires technologies with clear and concise examples and documentation so you can do your job reliably. On the flip side, having a playground to experiment in is crucial to learning new tools. At Apple, one project was to assist with large data sets for electrical engineers. This is where I first learned how valuable a Jupyter notebook could be. Instead of forcing the EEs to learn how to integrate with our full software stack, they could experiment in Jupyter quickly and easily, without the risk of breaking things. Meanwhile, we managed the database.

If I am accepted to this job at IBM, I'm confident my experience in both academia and industry will be put to good use. My previous experience with both software engineering practices and the pedagogical process makes me a strong candidate. I am particularly eager to reach that freshman level of understanding in Quantum Computing and divulge this knowledge to our potential customers in an accessible way.

Thank you for your consideration,

Nathan Lilienthal