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Dear hiring manager,

I am a PhD student in Computer Science at Georgetown University, and I am highly interested in your position for Scientific Software Developer for Automation, Analysis, and Software Infrastructure. I am attracted to the potential and opportunities offered by the position and the creative environment at Oak Ridge National Laboratory. I believe there is a match between the requirements and my qualifications, motivating me to apply for the position. I am interested in education, and how to utilize new technology to help students and teachers improve their learning and teaching experiences.

My current research topic is distributed algorithms, specifically, resilient distributed optimization algorithms, including fault-tolerant and asynchrony in the distributed system. For example, machine learning is usually an optimization problem. Consider a system solving machine learning tasks involving multiple computers working collaboratively – federated learning, for example, and some of the participants might be faulty, due to hardware failures or adversarial attacks. My research focuses on designing resilient algorithms against these faulty participants so that they can still output usable outcomes, and showing how resilient the algorithms can be. As cloud computing becoming increasingly popular these days, this topic is gaining interest and attention from researchers and from industry. The problems we are solving can also be appreciated from a security point of view, considering the faulty participants as malicious. Research in this line of work involves mathematical analysis of algorithms, as well as simulations of the algorithms with Python, and a list of my publications can be found in my resume and on Google Scholar.

My other research experience is my graduate thesis on social media privacy. I studied a type of privacy breach on social media websites, where an attacker could discover a user's hidden information through public information of the users that he/she is connected to. This research involved data collection, data mining, analysis, and creating a demo website for users to check their possible social media privacy issues. It is a part of a larger project in the lab and we used Python, Java, PHP, and other coding languages in the whole project.

In addition, I also have two software engineering internships at Google and Meta, which provided me with exposure to engineering in industrial standards, and experience in handling work in unfamiliar topics and tasks. My project at Google was on creating a metric of staleness for evaluating recommendation systems using machine learning and mathematical methods, and serving an internal tool to replace the current crowdsourcing-based method. This project was a whole procedure of applied machine learning, from data collection to training to evaluation and model selection, also involving fine-tuning of a BERT-like LLM model. My project at Meta involved building a verification step for the transfer learning workflow to speed up the overall procedure and enable early detection of error in inputs. The work was done on an internal version of PyTorch. These experiences complement my PhD research experience which is more theoretical, and would come in handy if any of my research tasks required implementations in the future.

I am interested in creating tools that enable scientific researches, and fascinated with what you are doing at Oak Ridge. My training and experience during my pursuit of graduate degrees and intern experience allow me to positively contribute to the position. Thank you in advance for your consideration of my application. I look forward to hearing from you soon and I would appreciate an opportunity for an interview.