

Collaborative Visit with Sandia National Laboratory

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For my Immersive Experience, I visited Sandia National Laboratory in Albuquerque, New Mexico for a week. Over the last year and a half I have been working on a collaboration project with them optimizing the synthesis of electronic ink utilizing multimodal characterization data throughout the synthesis process, but this was the first time meeting the team in person and being able to see the lab. Sandia has access to a Big Kahuna, which is an autonomous workstation that allows for high-throughput synthesis and characterization, which is invaluable for materials optimization in which due to the number of experimental parameters that can be tuned, many samples are required. These samples are expensive and time-consuming to synthesize, however, so developing an optimization campaign would be extremely helpful in designing and optimizing new materials.

As I have more of an experimental electrochemistry and material science background and only recently pivoted towards machine learning and autonomous laboratory research, it was nice to be able to be back in the physical lab and be able to see the abilities and limitations of the experimental process which helps me design a better optimization system. While technically my work did not change much, being able to do the machine learning component of the project with just my laptop, working at the lab was very helpful in seeing how the autonomous system worked and how the different parts of the project fit together. This is also my first time collaborating with another group for a research project, so being on-site and able to discuss various problems and solutions regarding the different parts of the project was novel and exciting. Instead of constant back and forth discussions via email and hard-to-schedule video calls, I was able to talk face-to-face regarding the direction of the project, possible concerns and solutions, and what the next

steps would be that would be. This also being my first project collaborating with another lab is very helpful for the connections to people doing work in autonomous research, which I'm grateful for.

This visit was also a great insight into what research at national laboratories looks like. The three options generally discussed after graduate school include academia, industry research, and national laboratories, and while the difference between academia and industry research is easy to understand and made clear, national labs fall somewhat in between and I was not the most familiar with what that path would look like for me should I choose it. Being able to work with the group and seeing how they do research, even for only a week, was very helpful for me to see what the national lab environment is like and what that might look like if I choose to work in one after graduation.

Overall, this trip was a great opportunity for me to work on-site with the people at Sandia and be able to see and appreciate the different parts of the autonomous lab project I am currently working on. Furthermore, it has better introduced me to what research at a national lab looks like, and I had a great time working there.