Professional Statement

Two summers ago, I worked on a project titled “Visualization of Perovskite Octahedral Tilts in Augmented Reality” under the supervision of Dr. Ratcliff at the NIST Center for Neutron Research. Although I applied to the Summer High School Intern Program (SHIP) under the impression that I would conduct research in an EE concentrated field, I came to appreciate the beauty of the intersection between two entirely unexpected fields: crystallography and computer science. Analyzing phenomenons in repeating atomic structures seemed entirely foreign to me at the beginning of the internship when I was reading introductory journals, but I now understand that research is an ongoing learning process that does not necessarily require comprehensive background knowledge for success. To elaborate, I was able to simulate an immersive user interface environment on the Microsoft HoloLens by perusing the web for tutorials and resources on programming in Unity 3D game engine. My final design allowed the user to select a perovskite from a menu and interact with it by making gestures like pinching to zoom in, or rotating by moving the hand horizontally. While there were several flaws in representing the Octahedral tilting phenomenon, I thoroughly enjoyed learning how to enhance how scientists visualize and manipulate data, a field that I know will be pertinent to all areas of science no matter what age we are in.

This summer, I returned to the same campus to develop an open source user interface built on a scientific gateway, GenApp, primarily for improving interaction with protein data files so that they can be compatible with simulation programs. While I certainly gleaned valuable software engineering skills such as high-level design, effective abstraction, version control, transparent documentation, and other nuances exclusive to JavaScript and Python, I ultimately understood the function and potential of scientific gateways. For researchers who want to modify fields in their data files to customize a protein, it is cumbersome to meticulously search through the records, even with the help of some established programs available on the web. Thus, a programmer can step in to abstract away the trivial details of the anatomy of the data file and instead present a fluid user interface to minimize effort on behalf of the researcher. At a minimum, the developed application allows customization of sub-sections in a potentially large chain of residues, but the most important functionality (still under development) streamlines a seamless workflow for assembling customized proteins after editing the individual data fields. Releasing the web application as an open source project on a scientific gateway platform was the first step towards building a flourishing community of researchers who can utilize the tool and provide feedback as well as developers who can continue contributing software.

While this project was undoubtedly unique compared to traditional internships for a typical Electrical Engineering student, I look forward to fostering these skills in future career paths where designing user-friendly interfaces are key - especially for many embedded systems applications.