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General Audience Abstract

Throughout my experience in the Department of Energy’s Science Undergraduate Laboratory Internship with Lawrence Berkeley National Laboratory, I have gained a wealth of knowledge, developed invaluable skills, and established a depthful network within a welcoming community of scientists. In the summer of 2024, I had the privilege of collaborating with my mentor Prabhat Kumar within the Applied Mathematics and Computational Research (AMCR) division on a project centered around FerroX, a simulation code that models low-power microelectronics to combat high levels of computational energy consumption via differential-equation-based calculations through time integration.

To improve FerroX’s performance, my goal was to lengthen the time step size such that the program took fewer steps per computation in an effort to reduce the overall runtime. Our approach involved systematically implementing and then validating powerful time integration features from the *SUite of Nonlinear and DIfferential/ALgebraic equation Solvers* (SUNDIALS). As a rising sophomore with a strength for coding, yet no background in differential equations, each week was an opportunity for me to understand the mathematical reasoning for the tests we ran on FerroX after implementing a new SUNDIALS method into the source code. On another note, partaking in LBNL’s first *Ignite Off!* competition with the encouragement of mentors and coworkers alike helped me become more comfortable with public speaking and the art of concise scientific communication. This event also helped me broaden my network as I worked closely with individuals other than my mentor to design and practice the presentation.

While the technical work shaped my understanding of the cyclical process of computational science, the mentors and fellow interns I interacted with everyday instilled a fondness for collaborative research. This program has given me first-hand exposure to the breakthrough applications of computer science and is a memorable first step into the research community.