I have gained knowledge of computer science over the past few years in programming languages such as Java and Python and increased my interest in computer programming. My participation in SIP 2020 also significantly enhanced my interest in Computer Science. I have participated in Synopsys science fairs for the last five years and presented my work to judges. For example, I have recently combined my data science and application development skills to create an application in Java that identifies trends in climate patterns and temperature changes from two large data sets across 197 countries of Planet Earth from 1750 to 2015. I have learned machine model design, simulation, and manufacturing using Autodesk Inventor Professional as part of the Board of my FIRST Robotics Competition robotics team. While working with other people, I have gained experience in designing and performing stress analysis on parts. After taking the Intro to Computer Science class at my school and using tools like Git and Maven and software frameworks, I have learned how to automate workflow, dependencies, and builds. While working on a computer science or engineering project, I can use these skills to enhance efficiency and workflow. The SIP 2021 program has multiple computer engineering projects, and I hope to learn better ways to code and apply my knowledge in real-world lab projects.

The SIP 2021 program has projects related to electrical engineering which greatly appeals to me. Building skills in electrical engineering is something I look forward to. I have built some foundational knowledge in electrical engineering through my interest in high school robotics. In our robotics club’s annual “soccer bots” event, I learned how to generally assemble an electronic board using different tools in the lab including band saws and hand drills. In our high school FIRST Robotics Competition team, I have gained experience working with electronics by grouping key components to identify an electrical current path. I have seen the progress of modeling the electronics board on Autodesk Inventor and assembling it. For the high school robotics club, we built the electronics board out of a clear polycarbonate to reduce the weight on the robot and attached electronic components using double-sided foam tape. After becoming a board member of the robotics club, I have acquired insight into the process of building a robot from start to finish. Through the SIP program I would like to enhance my knowledge of electrical engineering and striking the balance between needs for electrical power and the weight of the items to be powered.

Through the SIP program I would like to enhance my knowledge of environmental studies and identifying humans’ impact on the environment. Chemistry Honors has been a fun and interesting class as I have learned about stoichiometry, thermochemistry, gas laws, the effects of toxic compounds on the environment, radioactivity of elements, and chemical reactions. I have gained experience performing labs and conducting lab reports in Biology Honors along with my classmates and virtually in chemistry by myself. I have conducted a Synopsys science fair project to analyze climate change of Earth by identifying trends and patterns in global and regional data. Through this project, I formulated many conclusions as well as equations for rising temperature models. After researching and comprehending articles from various sources, I have learned how to assess and incorporate information into a study. By visualizing the data, I have understood the causes of climate change, which include the rise in greenhouse gases, and the effects including droughts and more intense hurricanes. I can apply the same skills of research and analysis by working with a mentor from UCSC, and I would also like to learn and perform field studies and conduct statistical analysis from environmental data.

As a SIP intern you will be conducting and contributing to cutting-edge research. This process is inherently fraught with challenges that may ultimately lead to null results. What do you hope to gain by participating in research if selected as a SIP intern? What experiences, skills, and/or resources do you have to overcome these potential challenges? Maximum 500 words.

Thomas Edison once said, “I have not failed 10,000 times—I’ve successfully found 10,000 ways that will not work.” An important inventor in history, Edison attempted several times to devise new creations. Even when he couldn’t, he persevered onwards. As a SIP intern, I hope to understand how researchers in the real world persevere and build deep insights from raw data. I have done several science experiments since middle school for both science fairs and class assignments and it has required a great deal of patience, working with repetitive tasks, and dealing with the unknown. By learning from mistakes and failures, new pathways have allowed me to experiment and overcome new challenges. For example, in the data science project I recently conducted for Synopsys science fair, I overcame several challenges with the different libraries implemented. My goal was to analyze global and regional temperature data. The first dataset contained 265 years of warming data globally while the second consisted of ~265 years per region for ~240 regions. I established two regression models for global data and compared them with those of regional data, finding similar results. Optimizing the runtime of the application step-by-step after sorting and filtering the data for different visualizations demanded patience, which I was willing to exercise to overcome the challenge. Robotics is another activity that has taught me to overcome challenges using Autodesk Inventor for modeling and simulation. For example, when one stress analysis had to have a safety factor greater than 2, I had to re-design and test multiple times. This has taught me to use collaborative tools such as GrabCAD to work in groups and seek ideas from other people. Last year, as the deadline for completing the robot approached, I made sure I went to the robotics lab every day after school and even on Saturdays to finish it. I am now a part of the robotics board for the high school club and have adapted the team to internal competitions such as sumo bots since FRC was canceled. I am aware that the projects at SIP could be fraught with challenges and prepared for setbacks in order to learn from my mistakes. Conducting labs last year with others and this year by myself has helped me gain the skill of working flexibly on a task with or without partners. I hope to seek inputs from UCSC mentors and other fellow SIP participants to improve on my research skills. As a SIP intern, I would like to know the challenges faced in professional research and how scientists overcome them. Many areas in the fields of computer science and environmental studies remain unexplored, and I hope to connect to those areas. The SIP program is an opportunity for me to gain experience while also learning to control emotions when things don’t go the way they are intended. One never knows what will happen unless he or she makes a sincere attempt to accomplish it, and that is the spirit with which I will approach this internship.