After being introduced to this prestigious program by professors and fellow researchers at Stony Brook University, I became very interested in many of the research projects currently being worked on due to the similarities between these projects and my own research interests and career goals. I believe I can contribute significantly to the research being conducted and excel in many of these labs due to my hard-working mentality, desire to overcome any challenge presented to me, and passion to succeed. Additionally, my previous coursework, work experience and leadership roles make me an ideal candidate for the 2020 NSF REU program in Nanoscience and Nanoengineering at Vanderbilt University.

Not only have I been fascinated my entire life with how machines, computers, electronics, and other gadgets work, but I have also been extremely interested in human physiology and biomechanics. At a young age, it occurred to me that many of the key mechanisms driving all of these fascinations were not viewable by the human eye. I soon learned that, in fact, these mechanisms are on much smaller length scales. The concept of such incredibly complex, yet minute, networks and systems has enthralled me ever since and has helped shape my current interest in nanoscience and specifically nanomaterials. Not only are nanoscience fields and nanomaterials intriguing, but the creation, characterization and modeling of nanostructured materials for biological applications are of great importance to biomimetic and biocompatible materials.

With all of these interests in mind, I thought that pursuing an engineering degree at Stony Brook University would satisfy my deep interest within the previously mentioned fields. In pursuing a degree in Biomedical Engineering during my undergraduate academic career, I have learned about and been exposed to numerous innovations in this new and quickly growing field that are benefitting the quality of life. From this, I have dreamt of being on the forefront of engineering innovation related to biomedical science and contributing to the collective knowledge within the field to then help individuals stricken with illness or those who unfortunately cannot carry out the normal functions of life. As a current junior continuing to study and conduct research at Stony Brook, I can now safely say that one of the best decisions I have made in my undergraduate academic career was choosing to study Biomedical Engineering. More specifically, I have chosen to specialize in biomechanics and biomaterials because some of the key areas of research that intrigue me include bionics, biocompatibility, assistive device design, robotic surgery and the creation of artificial organs. Interest and fascination in these areas are not only supported by the multiple review papers I have written during my undergraduate academic career that focus on limb deficiency, innovations in robotic surgery, amputation and exoskeleton design and development, but are also supported by and reflected in my coursework and grades.

I believe that participating in the 2020 NSF REU program in Nanoscience and Nanoengineering at Vanderbilt University is an amazing opportunity to learn more about the nanoscale mechanisms and networks that contribute to the viability of artificial organs and tribological factors impacting implantable devices. These concepts are beneficial in the overall understanding of my engineering specialization and would help me in pursuing my career goals. Some of the most interesting research projects being conducted at VINSE that would enhance my understanding within these disciplines include 3D printing of sacrificial smart materials to make artificial vascular networks (Bellan) and developing computational tools to design lubrication systems at the nanoscale (Cummings). Not only do these projects coincide with my Biomedical Engineering specialization, but these projects also highlight some of the key areas of research that appeal to me. Additionally, the software tools I have become proficient in through undergraduate courses and research experience (e.g. MATLAB, FreeCAD, ParaView, CalculiX, BIOPAC, etc.) would help me excel in research opportunities such as the ones mentioned prior.

Overall, I know that I am capable of learning and exceling in any research opportunity I have the pleasure to be a part of. From this success, I believe that I can acquire some of the necessary skills needed to pursue a career in designing artificial organs, prosthetics or exoskeletons. Participating in this extremely successful and prestigious REU program would be an amazing opportunity to begin achieving these career goals. Additionally, having the opportunity to be a VINSE undergraduate researcher would not only allow me to work and connect with fellow students around the country, but it would also allow me to learn about and use state of the art engineering equipment and work on cutting-edge nanoscale research along with some of the most world-renowned researchers in this field. After having the honor to participate in the VINSE REU program, I believe the hands-on experience and skills gained from the program would enhance my capabilities as a biomedical engineer, allow me to fulfill many of my future career goals, and also allow me to contribute meaningfully to the field as a leader in biomedical innovation.