One of the deciding factors when I chose my undergraduate institution was the availability of undergraduate research. The University of Tulsa did not disappoint. The summer after my freshman year, I conducted research on the phenomenon of single bubble sonoluminescence. This occurs when an air bubble become trapped in a standing pressure wave and glows. The mechanism behind the glowing of the bubble is still unknown. This became my research focus for the rest of my undergraduate career.

The project had been started by two graduating seniors as their senior design project. Another freshman and I decided to continue the project. I spent the first summer learning how to use the equipment, as well as improving the experimental setup. One issue that came up was that the circuitry needed to be reworked to minimize noise in our signal. With the help of a professor**,** the other student and I designed a circuit using PSpice and then etched a circuit board. Next, we concentrated on solving problems that had kept the other students from collecting data. We wanted to take readings regarding the magnitude of emitted light, but there was too much light pollution in the room. To combat this problem, I created a lightproof tent. By the end of the summer**,** we had corrected all of the problems and felt we were ready to start data collection. I was unable to continue work through the school year because I was taking 18 credit hours as well as holding down a job to pay for school. During the academic year, I did apply for and receive a grant which provided funding for the project.

The next summer was plagued with problems. The apparatus had stopped working. After performing several tests on the circuitry, we determined that some of the components had worn out. We replaced the worn out transistors**,** which was no easy task. When we had the apparatus working again**,** we had to recalibrate our experiment because any slight changes on the placement of the transistors or the hardness of the epoxy attaching them to our flask greatly changed the resonant frequency of the system. During all of this**,** we began spending grant money on equipment which would help make data collection easier. We spent the rest of the summer working on setting up and calibrating the new instruments.

After the second summer**,** the department chair decided to end the project because he wanted to use the space for a class. I continued to study the phenomenon of single bubble sonoluminescence as my senior design project. I attempted to create a computational fluid dynamics model of my experimental setup using Fluent. I used SolidWorks to create a 2-D sketch of the flask which I then imported into Gambit for meshing. I created a meshing function which would allow for a finer grid in the center of the flask where the bubble would be and at the piezo walls where the motion was very fine. Then I ran my simulation as a steady state discrete phase model. I was successful in creating a simulation of the water in the flask under the piezo motion. My simulation gave me the expected results of a standing pressure wave with the node in the center of the flask where the bubble was trapped. However when a bubble was seeded in the center of the flask, my solution failed to converge, which I believe was due to computational limits of the computer system I was using and the complex nature of the motion. I was unable to resolve these issues before my graduation.

My research was challenging because this was a completely student-driven project. There was very minimal faculty support**,** which made the research of an advanced topic by freshmen a very challenging task. Despite the difficulty, the project did help me develop the skills needed by a researcher. I learned my way around a real lab and had to learn how to use equipment I had never encountered before. I had to create solutions to problems by building new components or augmenting ones we had purchased to fit into our setup. I was also required to give presentations on my project to my peers, faculty and university donors.

My previous research experiences played a vital role in my decision regarding an area of study in graduate school. Since I wanted to use modeling for my senior project, I took a computational fluid dynamics class. Part of the class focused on the governing equations behind the code and the evaluation of the validity of numerical results. This class helped me to see that I really enjoyed studying the area of fluid dynamics. I also learned that, while computational modeling is extremely helpful, I want to concentrate more on the experimental aspects of my research. The final way that my research helped me pick a project for graduate school was that it made me realize that I wanted to conduct application-driven research. While it is important to further human understanding in the abstract, I prefer to see exactly how my research will help everyday people. This is why I chose biofluidics, which focuses on improving health through understanding fluid flow through the body. I want to use my research to help people live longer and fuller lives and at the same time bring about new understanding as to how our body works.