I am not the traditional candidate for the GRFP. I have not spent years doing undergraduate research. I have not spent all of college pushing towards grad school. My GPA is not perfect. But all of that is to my strength. I have different perspectives than many grad students I know and a rich skillset. I work hard, am incredibly curious, love to learn and teach what I learn, and I am passionate about making the world a better place. I think that I am a great candidate to receive funding to be trained to push the boundaries of understanding and technology, and in doing so, advance the goals of the National Science Foundation.

I am eager to push scientific boundaries and use science and engineering to improve the world in which we live, for all people. I firmly believe that one of the best fields in which to go about this is robotics.

Why do I think this is important and why do I want to do it?

I believe that it is critical to have leaders within the general community who are scientifically driven and it is important to have leaders within the scientific community who explicitly seek to improve the condition of humanity. I seek to be both, and receiving the support given by the NSF GRFP would aid me in that goal.

I know how important this is. I grew up in New Orleans and lived in the city before and after Hurricane Katrina. I watched as engineering failures and a lack of engineers in leadership roles left the city devastated.

I have spent 4 years studying Biomedical Engineering, spending time in hospitals and private practices. I have seen the technical shortcomings in patient care that lead to people suffering. Problems like these need engineers with deep training.

After spending a significant amount of time exploring whether I should focus myself in industry or academia, it is clear that in order to have the intellectual freedom I desire to be able to question how my world works and to be able to build the next generation of technologies, I need a PhD. My long term goal is to enter academia fully, as a professor. I want to continue to be able to explore and expand the cutting edge for the rest of my career and share my findings openly. I want to take advantage of opportunities to collaborate with other researchers and with companies, wherever I can. I also love teaching, and as a student I have experienced the difference a great teacher can make. I want to grow to be a great teacher, and be in a position to enable those who come after me to do great things.

When I look at the research which I hope to conduct, I know it will be meaningful. Robotics is on the edge of changing the way we do surgery, run our homes, care for the elderly, transport ourselves, and so much more. The impact to society by developing the core technologies to enable such a paradigm shift, is clear. Surgeries will become safer, people will have more time with their families and friends, workers will get injured less often, caregivers will be freer to give personal rather than manual care, on and on.

Am I qualified?

I believe that the most critical character trait of a good researcher is curiosity. And I am curious, I have been since birth. I always question everything. My parents joke that they learned more from answering my questions as a child than they did in college. This curiosity drives me to learn and always develop my understanding further. Along with curiosity, imagination is critical. The best researchers do work that breaks the molds of what has been done, they must look to their imagination to drive innovation. I have always had a rich imagination; I am a dreamer. I also have a love for creating and building. From spending days at a time building whatever I dreamed up with Legos and blocks as a child, to designing and creating with lumber, and now high precision machining, creating has always been incredibly important to me. This again is, in my mind, critical to innovation. Dreaming a great idea, being curious about it, at the end of the day these alone won't make it real. A love for creating is key.

Am I ready for adversity?

It is also critical to be ready for adversity, to handle the failures and learn from them as much as the successes. In seventh grade, when Hurricane Katrina hit New Orleans, my family, along with millions of others, was displaced. The event changed me. I became very interested in politics, as they had shaped

and continued to shape my life in very real ways. I went from being very shy to being able to interact with others in a comfortable and effective way, something which has opened many doors to me. And I became more flexible, more capable of handling the unexpected. Few other events seem capable of really knocking me down. When something comes my way, I calmly handle it and learn from it.

Do I have the prior experience necessary to be successful?

I have a rich set of professional experiences that have shaped me into a high quality engineer.

Cognitive Robotics Lab: I am currently working in Professor Henrik Christensen's Cognitive Robotics Laboratory, under Professor Larry Sweet. I am focused on industrial applications, enabling high precision robotic interaction with non-fixed targets using computer vision. I joined the lab in August and intend to stay onboard until May, working full time from my graduation in December until May.

Eli Lilly: I spent three months working for Eli Lilly and Company, a pharmaceutical company, in the central automation and controls group. My primary project was to evaluate the methodologies and tools which can be used for offline plant simulations, for the purposes of plant design, testing, training, and validation. This involved talking to many simulation software companies, learning new software, building simulations, and evaluating the process. My managers were very pleased with my performance. I learned a great deal during my time at Lilly about simulations, something which I expect to use for the rest of my career.

Georgia Tech TEP Machine shop: My sophomore year at Georgia Tech, I became heavily involved in the Biomedical Engineering (BME) machine shop. It is not possible to design well if one does not first think of how the designs will be produced. So I sought to learn how to fabricate whatever I needed. My skills developed enough that I was able to obtain a position setting up and running a new machine shop for a BME offsite facility. In this role, I managed a $15,000 budget, maintained the shop, procured whatever was needed for the shop, and trained grad students from both the BME master's program as well as a number of labs. In the position I further developed my machining and fabrication skills as well as my teaching skills.

Unilife: I spent seven months working for Unilife Corporation, a drug delivery device company. While at Unilife, I was fortunate enough to spend time with products from concept inception to early stage manufacturing. I was able to test and make design changes to syringe components as well as delve into the manufacturing of the devices. While working in device manufacturing, I worked on simple hand assembly fixtures, automated testing fixtures, and robotic assembly equipment. I also developed multiple supply contracts with both domestic and international partners. The final project which I worked on while at the company was a custom robot cell using an Adept Cobra robot, designed to apply UV cure glue to a variety of our products in pilot production. I designed and implemented the process, control logic, and control code as well as designing the robot base, tooling, interface, and safety system. The project was highly successful, operators on similar systems which had been provided by a first class gluing equipment company requested to move to the system which I made for its ease of use and reliability. I learned a lot while at Unilife about mechanical design, robotics, industrial automation, medical device design, vendor relations, etc...

What have I done to contribute to the community?

Student Government: In high school, I was highly involved in the school's student government. By my junior year, I was tasked with maintaining the organization's budget, which exceeded $100,000 per annum, along with the organization's documentation. The tasks I took on in this role were exhausting, but highly rewarding. Seeing 200 underprivileged kids get to go shopping at Christmas with Kennesaw Mountain students. Seeing hundreds of special needs students from around the county come to the special needs dance at Kennesaw Mountain and dance with hundreds of regular high school students. Seeing hundreds of high school students go to local middle and elementary schools to talk to younger students about good values and to give them positive role models to look up to.

My senior year, I was selected as the student body president. I made a lot of mistakes leading the

student government team, and I learned a lot. Through it all, we continued to grow on our prior success helping those in the community around us, and I worked to train my successors.

Through my time in the student government, my leadership skills and public speaking improved by leaps and bounds and I developed solid budget and personnel management skills.

Habitat for Humanity: During high school I also spent a lot of time working with Habitat for Humanity.

How about community involvement in college? Since I moved on to college, the amount of time that I have had available to donate to the community has been very limited. I do view the work that I did at both Unilife and Eli Lilly as having positive impacts on the community, both companies work to improve the lives of both patients and caregivers.

Will I contribute to the community going forward? While in grad school and beyond, I hope to be able to find time to give back to the community. I believe that I am well suited to volunteer my time to educating young children on STEM topics. I love helping curious children explore their world. In addition, I aim to always work on projects which seek to help improve the condition of people and our world in general.

My Education:

My first year of college, I went to Auburn University, studying Chemical Engineering. Auburn was a great school, which enabled me to develop some really strong engineering fundamentals. However, it lacked a certain risk prone, challenge everything attitude, which I craved. So I moved to Georgia Tech.

At Georgia Tech I have studied BME, which touches broadly on a large number of topics. As a result, BME has given me a rich toolbox to draw on to be able to solve any problems which come my way. Be they mechanical, systems modeling, physiological, chemical, thermodynamic, fluid dynamic, electrical, design, regulatory, statistical, etc. I am prepared to learn to solve them.

In addition to BME, I am also a Computer Science minor, focusing on Computing and Intelligence. My minor has given me an awesome level of exposure to the intelligence side of robotics. I have learned about techniques to make robots see, process information, navigate, react to the environment, and more.

What does my GPA say about me? While at Georgia Tech, I have focused my efforts on learning, especially within the context of topics which interest me. However, that has often been done at the expense of my grades. Whilst I have some grades which are inexcusably low, by no error other than my own; I also have grades which are simply ok, as a result of focusing less on testing and more on exploring material in a deeper more curious fashion. On the surface this makes me look like a weak candidate, however I argue that is not the case. I am on a track not to be a professional student, but rather a professional researcher. In order to be successful on this track I will need to be able to focus on the real problems. On the problems which are interesting and impactful to the community and myself. I can confidently say that I am ready to do that.

My views on sharing information:

I firmly believe in the importance of publishing, and that it helps to advance research. In addition, I firmly believe that as researchers we have a responsibility to communicate our work to non-researchers. I believe that once work has been peer-reviewed, it should be made available in an easier to understand form (a shorter paper, website, infographic, etc…) to help disseminate information. This serves to build interest in STEM amongst youth, to build interest amongst funding partners, whether they be corporate or the general public, and to enable cross discipline collaboration.

Closing:

I believe that great advances are on the horizon for the field of robotics, and that they will require a blending of hardware, software, and electronics. Further, I believe that many advances will be informed by biological systems and many will need to interact with humans. With my BME major and CS minor complemented by my industry experience, I believe that I am well suited to be a part of developing those advances. I also believe that this world needs more citizen researchers, and I look forward to becoming one.