

Academics, Research, and Leadership: A Balanced Formula for Innovation

Balance between academics, research, and leadership has defined my engineering career. Academically, my major in Mechanical Engineering and minor Computer Science have driven me to challenge conventions in areas where these fields intersect. Unsolved questions in the field of Micro-Robotics have motivated my research in resource-constrained controls, where I have been able to leverage my interdisciplinary background. Additionally, throughout experiences in my internships, research lab, and my leadership in student societies focused on diversity issues, working as part of successful teams has shown me the amazing potential of engineering among diverse people. Pursuing graduate studies will allow me to continue to participate in groundbreaking and exciting research in robotics, leading to a future career as a professional robotics researcher. At the same time, this pursuit will allow me to utilize my communication and leadership skills to leave a broader impact on our society.

Academic and Research Ambition

Motivated by ideas from these two distinct fields, I have been inspired to solve engineering problems that are critical to the future of robotics. Studying both Mechanical Engineering and Computer Science has represented, for me, a choice to explore a new and novel area of engineering systems. The potential for innovation drives me to constantly explore new possibilities on this **boundary of hardware and software systems**.

In both my internship with the U.S. Army Corps of Engineers Research Center and in my undergraduate research at the University of Maryland Micro-Robotics Lab, I have been able to effectively leverage my unique set of engineering knowledge and communication skills. At the Corps, I learned the necessity of clear and concise communication of complex scientific principles. Working independently on the software and testing of our wireless sensor networks research, I had to efficiently discuss the **solutions I developed** with the rest of my team. Conversely, in both meetings and casual interactions, I had to learn and interact with my team as part of a large group. Both situations developed my awareness of leadership in engineering concurrently with my ability to thrive intellectually.

My cross-disciplinary background, combined with my leadership ability, has allowed me to become a crucial team member in the University of Maryland Micro-Robotics Lab. While working in teams with both graduate and undergraduate students, all of our individual skills have contributed to building systems more successfully than we would have achieved individually. As both a mechanical engineer and a computer scientist, I have contributed to **both the software and hardware** systems of our research, all while learning enormous amounts about circuitry, micro-scale systems, and electronics, from other students. By leveraging our combined knowledge, our teams have continuously produced exciting progress in autonomous mobile robotics platforms. Our recently-submitted work on a centimeter-scale autonomous robotic platform [1] has left me in awe of the potential breakthroughs brought by future cross-disciplinary teams. These experiences have prepared me for future research by imparting techniques and methods for research work, as well as specific knowledge about robotics and controls.

Passion for Involvement and Broader Impacts

Outside of my research relationships, my passion for leadership is just as strong, and continuously motivates me to strive toward personal and professional excellence. In my involvement with various **diversity student societies**, I have worked toward equality and openness for all students. After seeing firsthand the amazing advances that diversity creates, I have been motivated to bring diverse groups together in order to facilitate innovation. I've served as the **chapter president** of Out in Science, Technology, Engineering, and Mathematics at Maryland (oSTEM @ Maryland), a student group for LGBT (Lesbian, Gay, Bisexual, Transgender) scientists and engineers, for the past two years. Becoming involved with oSTEM has catalyzed my mission to incorporate the well-being and inclusion of the engineer as a whole into the mission of engineering disciplines. After experiencing the difficulties of being out as a gay person in engineering, I have committed myself to working towards building a collaborative community in my discipline where all people are treated equally.

Additionally, my own experience with marginalization has made me aware of the difficulties of **other underrepresented people in engineering**. Leading oSTEM in collaborating with Maryland's chapters of the Society of Women Engineers and the National Society of Black Engineers has reaffirmed my resolve to work toward all types of diversity in engineering and science fields. Our organizations' co-sponsored events over the past two years, where engineers of all genders, ethnicities, and identities come together to celebrate our common goals, have been truly moving experiences.

Career Aspirations and Future Goals

As I continuously challenge myself to become a better engineer and contribute to our society, I know my future will show this same balance of academics, research, and leadership. I intend to become a **professional robotics researcher**, whether in an academic setting or another research lab. In either instance, I intend to continue to serve underrepresented engineering students through volunteering with oSTEM, alongside NSBE and SWE, to champion diversity.

Performing research in a graduate setting would allow me the opportunity to contribute to society both with the content of the research itself, and as a role model – someone committed to diversity. Developing robotics applications that increase the body of knowledge of the scientific community as a whole, while doing outreach, would allow me to continue to incorporate these multiple ideals into my life. This NSF grant would allow me the ability to pursue these goals through the direct funding of my graduate education. I would be able to concentrate more fully on professional innovation and community involvement, thereby continuing to uphold my strong balance of academics, research, and leadership.

References:

[1] Gateau, G.M.; Mirsky, D.; Sabelhaus, A.P.; Bergbreiter, S. "TinyTeRP: Tiny Terrestrial Robotic Platform with Simple Control." In Review at *IEEE ICRA 2012*. **2011**.