

Personal Statement

I grew up in a house full of gamer girls. My childhood habitat happened to have an arcade, where my four younger sisters and I would constantly be exploring virtual worlds together. We traversed volcanoes, built castles, slayed dragons, and commanded armies together in an afternoon, all without ever leaving the house. I fell in love with these worlds and the beings that inhabited them, and I continue to maintain extremely tight-knit relationships with my siblings, forged through these simulations. I'm one of the only people that I know of who describes experiencing the bulk of their formative years in a massively multiplayer online role-playing game.

I became interested specifically in mixed reality (MR) around fall 2016. I had always wanted to go into interactive media, in other words, games, and recent commercial advancements in the field seemed to make focusing on MR both a viable goal and career path, and potentially an even more impactful and meaningful one. MR experiences have the potential to give everyday life and objects a user interface. Why flip back and forth between a manual and the object it's referencing, when a MR display can show you how to use it and how it works, referencing and highlighting specific parts as the world teaches you?

While I've always been interested in game development, MR felt like the natural next level of that interest. Immersive experiences are why I went into computing as a field, and the beautiful pieces that other people make are a constant reminder of why I'm in it and what I'm learning to craft. When it comes down to it, I love this art form and want to one day make things that impact other people as much as I've been impacted by this field.

Relevant Background

My undergraduate work has been recently focused on virtual reality (VR) software development. In spring 2017, I had an internship at SmartyPal, an NSF-funded startup based in Philadelphia. This work sharpened my Unity and software development skills and was the first time I had a chance to use them in a collaborative professional environment. Afterwards, in summer 2017, I worked on a game development project funded by the Delaware National Estuarine Research Reserve (DNERR) to create an interactive educational game for display in the St. Jones Reserve lobby. I worked with a programmer and an artist in a team and continued to deepen my coding ability.

In addition to my university's computer science curriculum, I received the Summer Scholars award in June 2018. Under the supervision of Andy Novocin, I spent an intense ten weeks researching and learning about how other people create immersive experiences. So far, I've learned a lot about useful MR tools, specifically game development engines such as Unity, and some related Software Development Kits (SDKs) such as SteamVR, OpenVR, and Google Cardboard. I've learned about the area in a couple of different ways, but the majority of my learning has been self-taught via reading manuals and articles from other people in the industry online. Besides reading, there have been a couple of Game Developer Conference (GDC) seminars by industry leaders that have also been helpful.

Over the summer I prototyped a North Star, an open source MR headset designed by Leap Motion, who published the schematics in June 2018. Utilizing their existing hand tracking technology, the North Star may turn out to be one of the most cost-effective MR headsets to date, costing only \$100 when produced at scale.

As of September 2018, I began leading the undergraduate research project Vertically Integrated Projects: Virtual Reality (VIP: VR) with minimal supervision. After spending the prior spring semester assembling other interested undergraduates, we began work on our own immersive experience, working as a group to learn the relevant technologies, such as Unity, not covered in existing classroom-based courses at the University.

Earlier this October, I was invited to speak at a VR webinar for Rewriting the Code, a non-profit dedicated to empowering a community of college women with a passion for technology. I was one of two invited panelists alongside Ming Zi, a technical artist at Facebook, and a maximum of 36 people were in attendance.

In addition to this, I've also recently begun working with a newer faculty member, Leila Barmaki, as part of her Human-Computer-Interaction (HCI) lab. She began her tenure at the University of Delaware as I was starting my senior year, and I hope to work under her for the duration of my PhD due to our aligned interests in human-computer-interaction, MR, and machine learning.

Future Goals

Broadly, I want to work on creating new applications for VR, augmented reality (AR), and MR technologies. I feel that this technology is going to massively redefine industries from education to medicine to entertainment, and that a graduate research program will give me the expertise to contribute to and direct the future of this blossoming industry. We are beginning to determine how the next generation of human-computer interaction feels and functions, and there are many unanswered questions I want to work on.

There is a vast amount of potential for MR to impact the way we live our lives. For example, AR-backed music skills training will be able to help people learn how to play guitar, piano, or other instruments on the fly, and could help explain complex 3D mathematics with interactive virtual graphs. MR applications will bring all the power and information of computers directly into our hands and into our world.

I'm also interested in eventually bringing this technology to market and making it more accessible to end-users. While it's all fascinating and useful in a purely academic setting, bringing it out of the lab and into people's hands will mean a lot more for the public at large. Upon completing a PhD, I'm interested in starting a MR firm, developing the technology for the masses in a sustainable way. To enable me to do this in the future, I've been working on an entrepreneurship minor in addition to my major in computer science.

Intellectual Merit

I believe I'm the right person for this fellowship due to my work thus far as part of a team, as leader a team, and independently. I'm constantly learning about things on the cutting edge of my field and have ideas about how to push the boundaries of it even further, given the resources to do so. I'm confident that graduate studies will give me the opportunity to explore these boundaries, and in the long term empower me to found my own venture within my chosen field.

Broader Impacts

Mixed reality applications are the next level of human-computer interaction. We're beginning to tap into another dimension and moving from simple 2D touchscreens to full 3D

experiences. This technology is going to add entirely new depths to our interactions both with computers, and each other.

Specifically, I believe that the impacts on education will be far-reaching. We will be more able to have information spring to life, interactive not just with our minds, but also our bodies.