I am pursuing a graduate degree in Robotics. If I could work on any project, it would be creating a group of small robots capable of mimicking the way ants gather food. The number of robots and artificial intelligence systems is drastically increasing each year. Communication between autonomous systems will be crucial. I think that a robotic colony would provide insight into how autonomous communication in cities would realistically be accomplished. For example, autonomous vehicles will certainly be communicating with other vehicles, stoplights, and GPS to efficiently direct traffic.

A research project I worked on in my undergrad was the development of a COVID detecting robot. The goal of the robot was to find areas where COVID was present within houses and disinfect them. The project involved teams of five students working together to complete one of the robot mechanisms. My group was responsible for the method and mechanism for detection. Our group decided on a method called Surface-Enhanced Raman Spectroscopy. Essentially, a gold nanoparticle is attached to an M13 virus with an antibody capable of attaching to the COVID virus. The gold particles allow for absorption of Raman scattering which when measured with spectrometers shows higher Raman intensity. I did not see the project through to the next semester because I had to work on my Coop.

In my mechatronics class, we study the intersection of mechanical, computer, and electrical engineering. For the first half of the semester, we familiarized ourselves with the Arduino, data collection from sensors, PID control, etc. The second is spent on a final project. The goal is to play basketball autonomously. This is the most time I have ever spent on a school related project. Even through the final all-nighter of completing the robot, I thought I would not mind working in robotics for the rest of my life. At the end of the competition, our robot demolished every other robot in the class.

In my free time, I have worked on several long-term projects. One project was a videogame rendition of a Dungeons and Dragons like board game called Gloom haven. I used the Monogame XNA Framework to create this game as it is about as close to the ground up as possible without it being unbearable to program. A problem I had to solve was the algorithm behind movement of players. The player moves through hexagons which make up each room. The map has many doors and enemies, so the movement had to track all these entities. I solved the problem by implementing an algorithm that works like the way water would if you poured it into a maze. Documentation for the game is found on my website. Despite only having a semester of research experience, I believe I have put in more hours than most through personal projects.

I want a PhD because it would allow me to work on projects, I can be enthusiastic about. I believe I would be a valuable PhD candidate because of my research experience, passion in robotics, and initiative to start my own projects. Dimitra Panagou's research is the most in line with my interests. Any of her model agent projects would be something I would be ecstatic to work on.