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DREU Final Report

Abstract

During my ten week REU at the Healthcare Robotics Lab at UC San Diego, I worked on an HRI project that aims to contextualize robots for use in hospitals. In collaboration with clinicians, I helped develop a robot that can perform tasks autonomously, such as supply delivery. Throughout the project, I was immersed in multiple aspects of the system, from the iPad interface designs and development to learning about autonomous navigation and robot development.

We designed and developed the app alongside clinicians in order to capture clinicians' needs and expectations. Our goal was to develop a low barrier interface that would support clinicians deriving utility from the robot. Through this iterative design process, we were able to identify key factors regarding how clinicians wanted to interact with the robot, and the tasks and features that would support them without infringing upon their workflows. The end-user experience was heavily taken into consideration during the design and development of every aspect of the system.

During the first six weeks of the program, I mainly worked on developing the clinician iPad interface using Swift and Xcode. The interface communicates with the robot using a web socket connection. I developed the interface using a Figma design that was created by another student on my project, which made the process a lot faster. I started by implementing features of the app one at a time in order to finally create the cohesive finished system. During this time, we conducted interviews with clinicians who gave us great feedback on the user interface design and we iterated on the app according to their suggestions. The app was tested for several days with labmates, and I spent time fixing all of the bugs they found in our app. Once the entire system was built and integrated, we ran several pilots in mapped out spaces of the lab and the hospital.

We ran a study to test our system in two different hospitals, and collected a lot of data. After conducting the study, a postdoctoral scholar in the lab conducted a quick lesson on how to do qualitative analysis of data. This was really helpful for me to conduct qualitative analysis on the data we collected during our study as this was my first time conducting qualitative analysis. I am currently helping write a paper describing our results, which we plan to submit for publication soon.

This experience not only honed in my technical skills, but it really taught me the importance of developing software with the end-user in mind with the intention of helping people. During the study, I was able to witness real reactions of healthcare workers upon seeing the robot in the hospital. I heard a lot about their opinions of artificial intelligence and technology in such a sensitive and complex space. The study allowed me to interact with a lot of

healthcare workers and helped me understand existing technology in the medical space, as well as new technologies that can be helpful to clinicians and patients.

I learned a lot about software development and robotics development from the graduate students in my lab. I also enjoyed meeting new people through this experience and found common ground with not just the undergraduate students, but also the graduate students in the lab.