Perspective Taking Survey for SAR System

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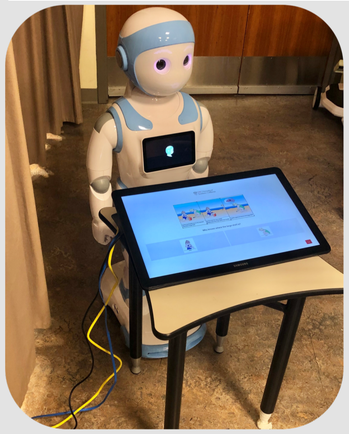
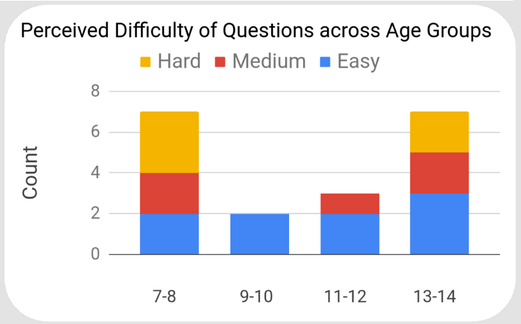
Introduction

The Interaction Lab focuses on developing computational methods to enable socially assistive human-robot interaction. The Socially Assistive Robotics (SAR) field was defined by Professor Matarić in 2005 and consists of the robot interacting, not physically, but socially with the human user. This is helpful for projects like those of my PhD mentor, Jessica, where a robot is used to assist in the development of empathy-related skills for children with Autism Spectrum Disorder (ASD). This is achieved through a web-based survey and leverages the robot embodiment, which is the state of the body, such as posture, arm movement, or expressions. A SAR system provides social interaction for the children, enhancing their ability to learn empathetic social skills.

Objectives & Impact of Professor's Research

Professor Matarić's Interaction Lab works to improve human-robot interactions. The lab develops techniques to allow robots to interact through socialization. This allows robots to fulfill certain consoling or socialization needs to augment current human caregiving capabilities. My PhD mentor's project aims to assist children with ASD by using a SAR system to measure their perspective taking abilities. Children with ASD often have difficulty understanding differences in perspective. It is important to understand their level of perspective-taking abilities to allow for further intervention, such as practicing new perspective-taking skills with the robot. Further experimentation without the robotic element will also demonstrate the effectiveness of embodied robotics.





PC: Jessica Lupanow

The setup of the survey. The subject sits in front of the tablet opposite of the iPal

PC: Junzhe Huang

Skills Learned

I have learned many important skills while at SHINE. There was a large learning curve from learning in class to applying my knowledge as well as other more advanced techniques. It was very exciting to explore so many new types of programming. During my time at SHINE I learned these skills:

HTML, and by extension, CSS and Bootstrap for web development. The above three elements make up the content and visuals of a web page.

JavaScript, and in extension, jQuery, Ajax, and Node JS. JavaScript makes up the logic behind web pages, like what happens when a button is clicked. jQuery, Ajax, and Node JS are JavaScript extensions that allow a simple web page to transform into a more capable and complex website.

Python, and by extension, Flask. More complex algorithms are written in Python that process the data from the web page. Flask is a Python framework that creates a local server to host the survey. This is how our different programming languages communicate.

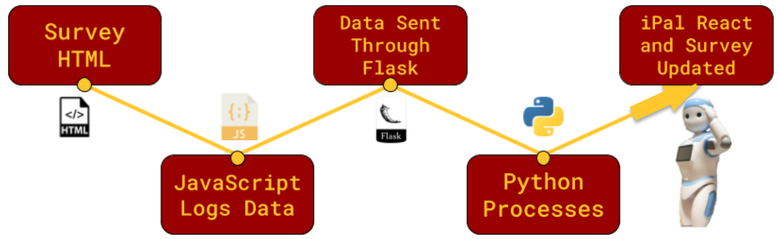
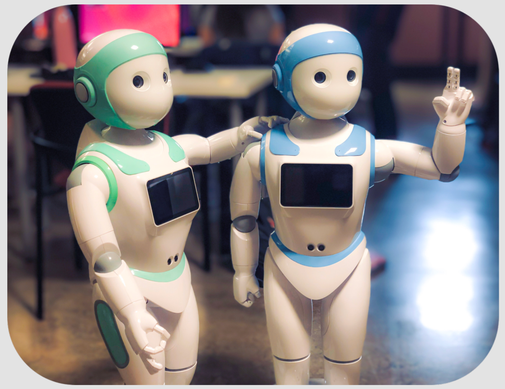


Diagram of how the survey processing works

PC: Junzhe Huang

Apart from programming skills, I have also been exposed to other robotics related skills like ROS (Robot Operating System), Terminal, and text editors. Additionally, there are many equally important soft skills and other take away from SHINE. This includes reading scholarly literature, how university level research is conducted, and how a research lab functions.



Our iPal robots Lu and Kai. Both with moving arms, facial expressions, and speakers

PC: Junzhe Huang

How This Relates to My STEM Coursework

My experience in Professor Matarić's lab meetings showed me that robots can do much more than I had ever thought and that it is definitely a field to look into further. The computer science I was exposed to through SHINE is more advanced than any high school curriculum. My work in SHINE will help me excel in my computer science courses and give me a more advanced understanding of robotic systems. SHINE will also help me with understanding engineering design from what I learned about the robots in the lab.

My Next Steps and Advice for Future SHINE Students

I will definitely look for more college level computer science courses in the future as well as get into more of the programming side of things in my FIRST robotics team. Regardless of which major I choose in college, I will keep computer science in mind and continue robotics research as an undergraduate.

Future SHINE students should look into the lab's website before applying to one.

Acknowledgements

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