Implementing Preemptive Feedback Behavior when using SAR to Aid Children with ASD

Bryan Pyo - gbryanpyo@gmail.com
Los Angeles Center for Enriched Studies, Class of 2019
USC Viterbi Department of Computer Engineering, SHINE 2018

Introduction

• My partner, Ashley Perez, and I worked in Dr. Maja Matarić's lab under PhD student Caitlyn E. Clabaugh to help research socially assistive robots and the role they can play in helping children with autism spectrum disorder (ASD) develop more sophisticated social skills.
• We worked specifically in Clabaugh's project, which used a fully autonomous robot named Kiwi to interact with the children through educational games in month-long sessions.
• We analyzed and annotated the video recordings of the children through ELAN to create a model for robot behavior.
• We assisted in refining the robot's speech to make the dialogue more comprehensive and efficient.
• We also programed new behaviors into the robot with ROS and Amazon's Polly.

Figure 1. Kiwi. This is the robot with whom the children interact with while playing the educational space games. Its design is inspired by owls, symbols of knowledge and wisdom. <https://www.kcet.org/shows/town-hall-los-angeles/dr-maja-mataric-robots-that-care>

Figure 2. Sample Set-up. This is an example of what the robot system may look like in the homes.

Objective and Impact of Professor's Research

• The primary objective of Professor Matarić's research is to give robots the ability to help people.
• Her research focuses on gaining novel insights into human behavior and cognition through interactions between humans and robots and developing robotic systems capable of offering personalized assistance to people.
• Her Interaction Lab focuses on systems that provide aid through social interaction rather than physical contact.
• This involves researching intelligent robot behavior that can react to complex and dynamic environments through the integration of perception, representation, and interaction.

Figure 4. Professor Maja Matarić. This is Professor Maja Matarić with one of her earlier robots. <https://psmag.com/environment/makes-smart-maja-mataric-80865>

Figure 5. Interaction Lab logo. This is the logo for the Interaction Lab, which displays a human and a robot facing each other. < http://robotics.usc.edu/interaction/people/>

Figure 3. Sample Game Screens. These are examples of some of the screens the children will see when playing the educational games.

Skills Learned

• How to navigate and exploit the Terminal
• How to use ELAN to annotate videos
• How to use text editors such as Vim and Sublime Text
• How to use GitHub
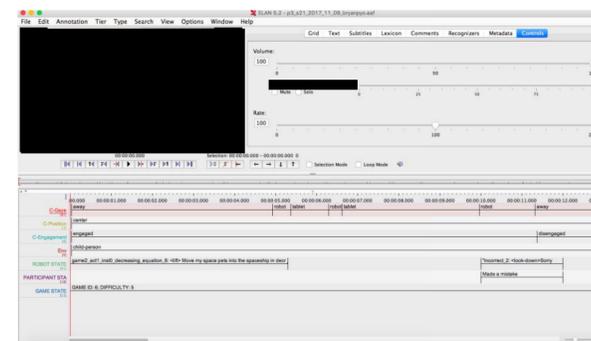• How to use ROS and Amazon's Polly
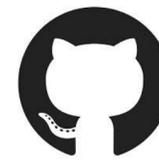
Terminal **GitHub** **Amazon Polly**

ELAN GUI

How This Relates to my STEM Coursework

This experience primarily relates to my STEM coursework in Computer Science. I was able to use much of the logic and principles from my Computer Science classes to help me with Terminal, GitHub, and ROS. Conversely, I can apply the additional knowledge I gained to help me with future college coursework and the various computer science related clubs I participate in.

Next Steps

I plan on majoring in Computer Science and applying to schools with strong programs in this field. Although I am not sure if I want to pursue a PhD, I want to at least acquire a Master's degree in computer science and use my abilities to make a positive impact in the world in some manner. Currently, I wish to develop systems that can provide children with personalized education as to ensure that every child can develop to their greatest potential and that each successive generation can help improve the world in some manner, through innovation or fixing the mistakes of prior generations.

Advise to Future SHINE Students

Make the most of your time in the SHINE program. Pay attention to the weekly informational sessions because you can learn a lot about what you are truly interested in and want to study more of in depth in college. Meet new people and really talk to them. Get to know them better because a lot of them are similar to you and they might be the ones you spend your college life and onwards with.

Acknowledgements