Understanding Social Queues to Participate in a Turn-Taking Interaction with Autistic Children

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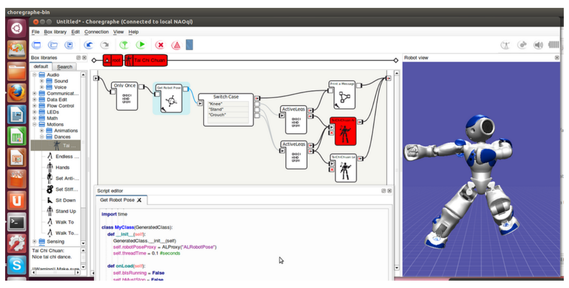
Introduction

Autism Spectrum Disorder (ASD) is a complex neurological developmental disorder that impacts a child's ability to communicate and interact with others. Studies have shown that while all autistic children share core characteristics, their specific deficits in socialization, communication, and behavior present differently depending where they are on the spectrum. With cases ranging from high-functioning to severe autism, ASD children have a harder time in becoming self-sufficient. This not only deprives them from reaching their full potential but also their ability to participate in society. I am implementing an ASD therapy tool, something I call the Shy-Robot, that reinforces a child's understanding and recognition of social queues through a turn-taking interaction. This form of interaction develops a child's ability to shift attention and engage in a shared process. I employ a humanoid robot platform to implement gesture-based instantiations of proportional emotional responses to help children with ASD label and communicate emotional states. The goal is to utilize perception, behavior selection and motor acts to engage autistic children in social interaction through robotics.

Materials & Methods

The Aldebaran NAO

The Aldebaran humanoid NAO was chosen due to its magnitude of sensors, motors, and software that allows for personalization with the use of the Choregraphe software.



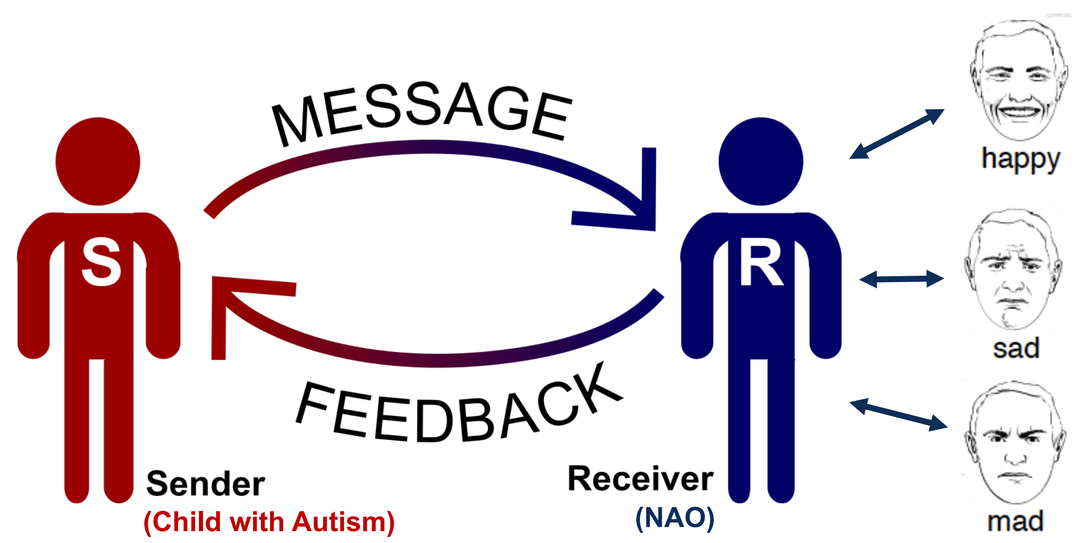
Choregraphe

Operating as a multi-platform application, Choregraphe provides us with the means necessary to create behaviors, while testing the simulation on both the virtual and actual NAO in real-time.

Antecedent Conditions	Emotion	Behavior
Presence of an undesired stimulus. (Ex: Child refuses to play/share)	Sad	• Eye color turns BLUE 1: Raising shoulders and head hangs low 2: Hands crossed and head hanging low 3 3: Nao turns around and sits down while crying
Presence of a desired stimulus (Ex: Child plays/shares with the NAO)	Happy	• Eye color turns YELLOW 1: Clapping and laughing 2: High Five and/or Hug 3: Dancing
Presence of a threatening, overwhelming stimulus (Ex: Child pushes/hits the NAO)	Fear	• Eyes color turn GREEN 1: Shaking 2: Covers Eyes 3: Cowering (Fig. 8)

Fig. 1: Example of antecedents conditions and the behavioral response that comprise the Shy-Robots responses.

Concept



Future Work

The research currently conducted provides a deeper understanding into the world of autism. With background research complete, the next steps will be to work towards teaching children with autism the understanding and meaning of emotions and expressions, and demonstrates appropriate social behavior and responses. Thus, this Aldebaran NAO, will need to utilize perception – in order to process the world around it; and then emotions, behavior selection and motor acts to create the appropriate conversation.

Acknowledgements/References

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