Jackson Feeny

CPSC 490: Senior Thesis Proposal

Adviser: Prof. Brian Scassellati

**Background***

This fall, I will be working with Professor Scassellati and PhD student Elena Corina Grigore in the Social Robotics lab on an adaptive Human-Robot Interaction system. This project uses an adaptive robot companion to keep early adolescents engaged in physical activity. The robot companion interacts with participants once daily for five to ten minutes. In this interaction, the robot employs a motivational strategy inspired by literature on long-term behavior change. The robot adapts its motivational strategy based on results and data it collects from an off-the-shelf fitness sensor (Fitbit HR) given to participants to wear throughout the day. Each night, the robot employs a motivational strategy and attempts to determine which is most successful for the individual participant.

**Purpose***

Physical activity’s importance is well documented. Research shows its benefits range from improving cognitive and academic performance to improving physical and mental health. The U.S. Department of Health and Human Services published comprehensive guidelines on physical activity for early adolescents in 2008. The guidelines set suggested at least 60 minutes of vigorous physical activity daily. Levels of physical activity among adolescents remain low, however. Studies have revealed that only 8% of adolescents meet this benchmark, and that children tend to
become less physically active through adolescence. The importance of developing 
commitment to physical activity in early adolescence cannot be overstated. 

**My Contribution**

I will be spearheading the development of one of the four motivational strategies 
employed by the adaptive robot companion to encourage physical activity. This 
strategy is called *cooperation*. In his interaction with the adolescent, the robot 
companion claims to hail from outerspace, and he cannot return to his home planet 
because his spaceship has been wrecked. He instructs the adolescent that the 
spaceship needs energy to be repaired, and that the adolescent’s physical activity 
can be harnessed and channeled into the spaceship. The mobile application will 
show a progress bar for the spaceship’s repair. During the next interaction, the 
progress bar will be updated according to how much physical activity was recorded 
by the adolescent’s fitness tracker in the meantime.

This project has significant meaning to me personally. My two main passions are 
education and technology. I care deeply about children and their ability to reach 
their full potential, and I believe technology and this project can help achieve that 
goal.

**Deliverables/Tasks**

1. Learn Android: I have a reasonable amount of experience in mobile 
development, but my past work has only been for iOS, using Swift and 
Objective-C. I will spend the first part of the semester teaching myself the ins 
and outs of Android development.
2. Learn C#: Likewise, I have never coded in C# before, and will spend some time learning it in preparation for my work on this project.

3. Android Development: The Android application forms the interface between the adolescent and the robot. It will allow the child to communicate with the robot and provide information that will later be used to adapt the motivational strategy.

4. C# Development: The C# code will contain the logic for the robot's interaction with adolescents. It will control content of the strategy, the utterances, and physical movements of the robot.

5. Storyline: I will be writing the backstory and dialogue for this motivational strategy. It is important that the cooperation strategy be particularly engaging for the adolescent.

6. Utterances and Animations: I will be developing the full behavior of the robot for the adolescent's interaction with it while it is using this motivational strategy.

7. Demo: At the end of the semester, this motivational strategy will be in a demo-ready state.

Timeline: 1 and 2 done by Oct 15. 3 and 4 done by Dec 1. 5 and 6 done by Dec 10. 7 by end of finals.

*Adapted from Adaptive Robot Companions for Keeping Early Adolescents Engaged in Physical Activity by Elena Corina Grigore, Andre Pereira, and Brian Scassellati*