Developing Games for Socially Assistive Robotics as Companions for Older Adults and their Families

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Motivation

- The number of adults over the age of 65 is **predicted to reach 83.7 million by 2050**; Thus, there is a growing need for technologies for older adults to complement human care.
- This work is a part of the **EAGER** project, which views the family unit as a team and whose objective is to develop and integrate a Socially Assistive Robot (SAR) as a **team member** designed to **aid in the achievement of team/family goals**.

Figure 1. *Kiwi, the SAR used for the EAGER project.*

Objectives

- Develop two games to be added to an existing collection of fun, interactive games that older adults can enjoy with other family members or by interacting with a robot.
- Build games playable by human users through a Samsung Galaxy View tablet.
- Utilize technology used to develop previous games in order to ensure a smooth integration with the library of games currently available.

Approach

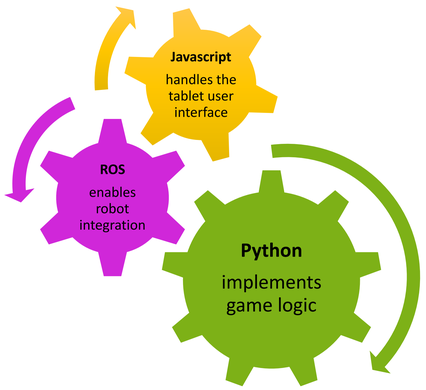

Figure 2. *Technologies used for game development.*

- The most important aspect behind the logic of the games is being able to **keep track of all of the possible moves in the board**.
- Every time a user attempts to make a move, it is validated to determine if it is acceptable or not.

Checkers

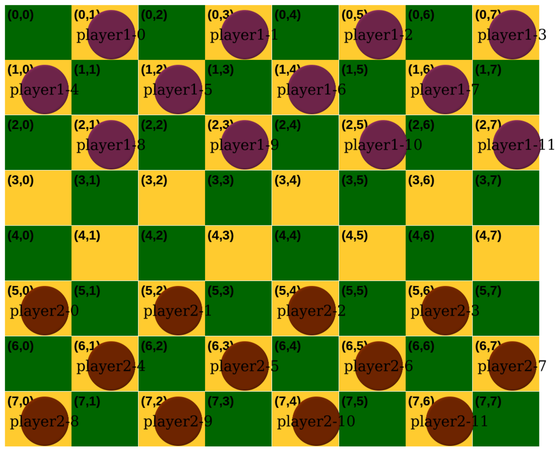

Figure 3. Checkers game user interface.

- The **objective** of the player is to capture all of the opponent's checkers or position their pieces so that the opponent has no available moves.
- **Logic** has been implemented to recognize and validate:
  - Only diagonal movements.
  - Jumps (move diagonally over an opponent's token).
  - Token becomes "king" (reaches opposite side of the board).
  - User runs out of tokens or no possible moves (game over).
- **Ongoing work** includes:
  - Have two human users to play the game in separate tablets.
  - Implement a "robot" user so that users can have the option of playing by interacting with a robot.
  - Fix bugs in order to allow a smoother user experience.

Parcheesi

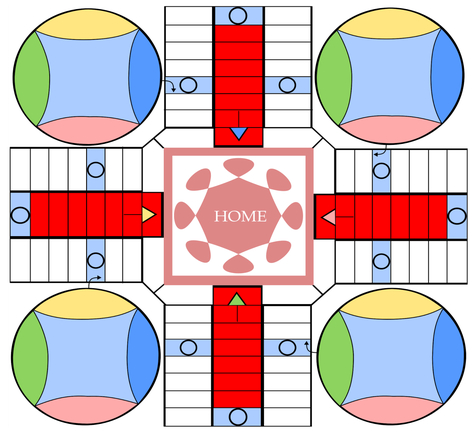

Figure 4. Parcheesi game user interface.

- The **objective** of the player is to move all of their pieces from the start to the home area using valid moves.
- **Logic** has been implemented to identify and conduct:
  - Possible moves dictated by the rolls of the dice, position of the player pieces (start area, safe spaces, and home areas), and other players' pieces.
  - Winning positions of players.
  - Piece movements (automatically by robot players and manually by human players).
- **Ongoing work** includes:
  - Implementing additional features of the game, such as safe spaces and piece blockades.
  - Improving the robot player's AI and strategies.

Future Work

- Studying the differences in game interaction between human-human players versus human-robot players.
- Understanding the interest and engagement in classic board games as a means of promoting interaction between family members.

Acknowledgements

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[1] EAGER: Studying the Dynamics of In Home Adoption of Socially Assistive Robot Companions for the Elderly. (n.d.). Retrieved July 29, 2016, from http://www.nsf.gov/awardsearch/showAward?AWD_ID=1548502