31375 Playware Technology

Project in Playware Technology
(Memory Game)

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1 Game Rules

In figure 1, The final game produced is a type brain game that uses memory, physicality, and distance as mechanics for play.

Game Contents:

- 1 tablet
- 3-6 module tiles

Game Setup Rules:

- Player must open the android app
- Player may select PrettyActivityList button which is a API that allows the players to play remotely.
- Player may select MainActivity to begin the game.
- When choosing the game, the user will need to clarify how many tiles they will play with, the time restrictions they will have for their game, and lastly if they are connected to each other or spread out across the room.
- The tiles will then create a sequence by lighting up the tiles in the order they need to be pressed.
- The user will then then to step on the tiles to complete the sequence in the order they are presented on the tiles.
- On the tablet screen, the score will be updated and increased by one for each completed sequence round.
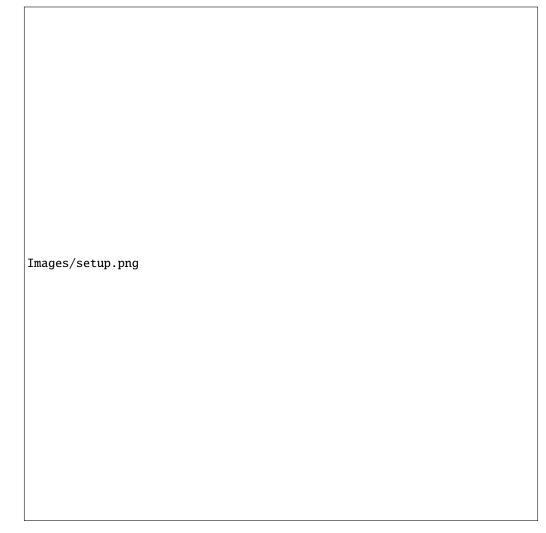
Figure 1: The image above is an example of tile setup location.

2 Game Implementation

2.1 Introduction

A memory game was chosen for this playware project because of the large possible player base. Brain games are also highly popular games on mobile devices and as mini games in larger games. A memory game is easily modifiable to suit with those with skilled working memories and those with less developed working memories. Furthermore this game can be easily shared and played with those of varying physical ability in a relatively easily understood and fun game. Thus this sequence game is designed for multiple ages and cognitive abilities to participate.

2.2 User Group

The user group for this sequence game ranges from those of all ages, from toddlers to elderly adults. Most setting require the user to step on the tiles to complete the memory game. However, these tiles may also be placed in close quarter formats; within an arms reach. The game can be used to enhance both mental and physical capabilities of the user. It can be used as a memorization/ pattern recognition tool for those who wish to sharpen their pattern memorization skills and may also be useful as an athletic tool if the tiles are placed far apart or around an obstacle course so that player must run to press tiles in time. So this game may be most useful as a tool for those who seek to improve working memorization skills or physical agility and endurance of all ages.

2.3 Player Motivation

As motivation to complete the level and move forward to new rounds, the game gets progressively challenging with short lights flashing as a reward. These rounds are relatively short and provide positive feedback to the player as motivation to continue playing. Furthermore the combined mental and physical stimulation serves as motivation to improve skills at brain, puzzle, and physical games more generally. This game uniquely combines physical and mental challenges than traditional games on a mobile screen. More specifically the modularity of the Moto tiles makes the game more engaging to users as they can be formatted into a new game for each player after each game when players send remote challenges onto physical tiles.

Game is designed to be fun, engaging, and stimulative with a variety of difficulty levels that arise from modifying time limits between pressing tiles, changing tile orientations, and number of tile pieces for sequence building. Since a final score is revealed during and after the game is completed, the user may be motivated to improve their score and abilities. Furthermore the versatility of this game allows for a large range of user groups and thereby competitions between players to achieve higher scores.

2.4 Modularity and Adaptivity

Modularity is used to change game settings with physical, self-reconfigurable modifications to the tile position. Tiles around a single room, together or, in an obstacle course format to create unique set up styles. Additionally the addition/reduction of tiles may add mental confusion and physical stress to the player which increase/reduce difficulty. Each orientation opens possibilities for more challenging and unique games.

The adaptivity of the game also involves changes to time limits imposed on the user depenig on their selection. The longer the player plays, the progressively more difficult the game becomes. As player advances, more skill is required to remember the correct tiles position due to repeat tile positions.

2.5 Evaluation Methods

To success of the understand the implementation of the game various factors were measured in user testing:

- degree of fun

- degree of challenge
- accessibility (different ages, physical strength, and cognitive abilities)
- variety of setup options in different environments
- effects of game on other aspects of wellbeing (i.e. memory, mental fatigue cardio, heart rate, soreness)

After giving the game to test to various friends, the game was proven to be fun and engaging on some level with these adaptivity mechanics.

3   Brain Games

3.1   Cognitive Skills

The progress in cognitive skills in this sequence game can be measured using the score function of the game which measures the number of correct tiles selected in the sequence (i.e player's memory).

4   Reflection

4.1   Features for Future Projects

These modular changes allow for increased gameplay challenge in different game modes. This self-configurable property of the tiles allows for more flexible setup up location and spatial arrangement. This is great for environments that many be small or crowded. Furthermore, the game is lightweight, natural, and engaging. The immediate feedback from the tiles after being pressed (light flash with wrong response) is great for motivation. There is a form of tangible interaction that can be used in other games as a form of non-verbal signal communication between game and player.

4.2   Role of Artificial Intelligence

Traditional artificial intelligence is more closely aligned with machine learning, where machines use decision trees and logic to perform tasks like a human. Modern learning is more geared towards allowing a machine to learn on the spot, without preconceived rules. Examples include deep learning, where AI learns how to perform tasks by accumulating experience. If AI were used in this game, it would more resemble traditional AI, where the game will adapt its difficulty based on decisions made by the player. The possible changes would be altering light color, light, location and speed.

4.3   Distributed Processing

This project implements distributed processing to allow for communication between tiles. When one tile is pressed, other tiles communicate and receive commands to change color and speed. A distributed processing system is a system as each tile has its own battery, processor and capability

to communicate with other tiles. With this system, tiles can be placed anywhere desired e.g., in the different corners of a room and the system will still communicate with itself.

4.4   User Evaluation

Introducing more users to test the project reveled more levels of adaptivity that could be implemented (such as color repetition and tile location) to make the game more challenging. Futhremore, the API feature was not clear to most users at first. The more vulnerabilities found in the project, the more that were later eliminated. Most users were happy with their results and seeing progress. Seeing results gave them motivation and challenged them to play more. They said we improved quickly because user evaluation was getting more and more accurate.

4.5   Theories in Adaptivity

The use of capturing the user's provisory attitude could be useful in evaluation. In other words adapting the software implementation so that it is possible to modify the user's behavior the game may be able to increase physical exertion or create especially difficult or confusing patterns with repeat colors. This would also offer new adaptive measures for different groups of users.