EMBEDDED AND UBIQUITOUS SYSTEMS

"The Game"

Ariza Pérez, José Ramon
Buturuga, Mihaela Alexandra
López Seguí, Eric

University of Lleida

Escola Politècnica Superior

Master's Degree in Computer Engineering

Game Definition and Rules

Overview

In this 4x4 board game, players move meeples across a cyclic board filled with different types of cells. Each cell impacts the players differently, offering points, penalties, mini-games, or other unique events.

The first player to reach **100 points** wins the game.

Game Board Setup

- **Board Dimensions**: 4x4 grid, a cyclic board where players move in a predefined path.
- **Cell Distribution**: The board's cells are organized to ensure a balanced mix of events, challenges, and points, as follows:

Cell ID	Name	Description	Count
ST	Start	Starting point for all players. No effect.	1
GP	Gain Points	Grants a random amount of points (range: 5-20).	2
LP	Lose Points	Subtracts a random amount of points (range: 5-20).	1
MG	Mini-Game	Initiates a random mini-game between two players.	3
RE	Random Event	Triggers one of the existing random events (excluding mini-games and death cell).	2
MF	Move Forward	Moves the player forward by a set number of cells (1-3).	2
MB	Move Backward	Moves the player backward by a set number of cells (1-3).	2
SK	Skip Turn	Causes the player to lose their next turn.	2
DE	Zero Points (Death Cell)	Resets the player's score to zero.	1

Game Board Design

3 (MF) →	4 (MG) ↓	9 (MG) →	10 (GP) ↓
2 (LP) ↑	5 (RE) ↓	8 (MB) ↑	11 (MF) ↓
1 (GP) ↑	6 (DE) →	7 (LP) ↑	12 (MB) ↓
0 (ST) ↑	15 (MG) ←	14 (SK) ←	13 (RE) ←

Mini-Games

Minigames allow players to compete against other players.

A random mini-game is selected when a player lands on a mini-game cell. The following mini-games are available:

1. **Hot Potato**

   - **Objective**: Avoid being the player holding the button when time runs out.

   - **Rules**: The control base generates a hidden countdown time. Players press the button to decrement time, not knowing the exact time remaining. The buzzer beeps faster as the timer approaches zero, and the player holding the button when it reaches zero loses the game.

     It's reminiscent of the classic "Hot Potato" game.

2. **Blind Timer**

   - **Objective**: Estimate a target time without a clock.

   - **Rules**: The control base generates a target time (in seconds). Each player holds the button for the time they believe matches the target. The player closest to the target time wins.

     This game tests players' internal sense of time.

3. **Number Guesser**

   - **Objective**: Guess a hidden target number without going over.

   - **Rules**: Players have to guess a number between a specified range, without knowing the control base's hidden number. The player with the closest guess, without exceeding the target, wins the round.

     It's reminiscent of the classic "The Price is Right" game ("Precio Justo" in Spanish).

4. **Tug of War**

   - **Objective**: Pull the virtual rope onto your screen.

   - **Rules**: Players repeatedly press the button to move a virtual rope closer to their side on the control base LCD screen. The first player to pull the rope past a threshold wins.

     It's reminiscent of the classic "Tug of War" game ("Tira y Afloja" in Spanish).

5. **Rock, Paper, Scissors**

   ○ **Objective**: Outplay the opponent in a classic Rock, Paper, Scissors match.

   ○ **Rules**: Both players select Rock, Paper, or Scissors. Standard Rock, Paper, Scissors rules determine the winner.

6. **Last Stick Standing**

   ○ **Objective**: Be the player who removes the last stick.

   ○ **Rules**: The game starts with a random number of virtual sticks (e.g., 10). Players take turns removing 1 or 2 sticks each. The player who removes the last stick wins the game.

     The LCD screen displays the remaining sticks as lines.

     It's reminiscent of the classic "Nim" game.

7. **Quick Reflexes**

   ○ **Objective**: Be the fastest to react when the buzzer sounds.

   ○ **Rules**: Players wait for an audio cue from the control base. As soon as the buzzer goes off, players must press their buttons as quickly as possible. The first player to react and press the button wins the game. However, if a player presses too early, they're disqualified from the round.

Here's a summary table of the mini-games:

Mini-Game	Objective	Rules
Hot Potato	Avoid holding the button when time runs out	Hidden countdown timer. Players press button to decrement time; buzzer beeps faster as timer nears zero.
Blind Timer	Estimate target time without a clock	Control base sets a target time (in seconds). Players hold button for time they believe matches the target.
Number Guesser	Guess a hidden number without going over	Players guess a number within a range. Closest guess without exceeding the target wins.
Tug of War	Pull the virtual rope onto your screen	Players repeatedly press button to pull a rope on LCD screen; first to pull past threshold wins.
Rock, Paper, Scissors	Outplay opponent in Rock, Paper, Scissors	Both players select Rock, Paper, or Scissors. Standard rules determine the winner.
Last Stick Standing	Be the player to remove the last stick	Random number of sticks; players take turns removing 1 or 2. Last to remove a stick wins.
Quick Reflexes	Fastest reaction to buzzer	Wait for buzzer; first to press button wins.

Turn Mechanics

The game follows a turn-based system, where players take turns moving their meeples along the board. The turn mechanics are as follows:

1. When a player's turn starts, their meeple LED lights up.

2. Then, the player rolls a random movement (1-6 squares) for their meeple.

3. The player moves their meeple cell by cell, following the path on the board. As they advance, the LCD screen displays the current cell's number and the number of movements remaining.

   Moving through cells <u>does not</u> trigger their effects until the player lands on the final cell of their movement.

4. When the movement count reaches zero, the LCD screen displays the cell's event and its effects on the player.

   ○ If the player lands on a mini-game cell, a game is chosen randomly from the available mini-games and its name appears on the screen, and the game starts.

   ○ If the player lands on a win/lose points cell, or the zero points cell, the player's score is updated accordingly on the screen.

   ○ If the player lands on a move forward/backward cell, the counter is updated accordingly, and the player continues their turn, moving forwards or backwards the specified number of cells. The last cell they land on triggers its event.

   ○ If the player lands on a skip turn cell, the player loses their next turn.

   ○ If the player lands on a random event cell, a random event is chosen from the available events, and its name appears on the screen, following the mechanics described above.

Different sounds and animations accompany each event, mini-game, or action, enhancing the player's experience.