

# Curioscape: A Curiosity-driven Escape Room Board Game

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Figure 1: A player using a RFID card and interacting with the first iteration of Curioscape.

## ABSTRACT

Are you frustrated when a board game has too many rules? Do you want to jump straight into the game and just play? We created Curioscape, an escape room board game that focuses on the idea of whether eliminating a rule book is possible in a board game context. This means players can start the game without having to learn rules or understand how the game works. This paper describes Curioscape’s conception to release, along with the exploration of replicating escape rooms in a smaller space and investigates if we can use curiosity to create meaningful game design choices.

## CCS CONCEPTS

• **Human-centered computing** → **Interaction design.**

## KEYWORDS

games; curiosity; game design; tangible board game

## ACM Reference Format:

Joseph Tu and Ekaterina Durmanova. 2020. Curioscape: A Curiosity-driven Escape Room Board Game. In *Extended Abstracts of the 2020 Annual Symposium on Computer-Human Interaction in Play (CHI PLAY '20 EA)*, November 2–4, 2020, Virtual Event, Canada. ACM, New York, NY, USA, 4 pages. <https://doi.org/10.1145/3383668.3419925>

## 1 INTRODUCTION

Curiosity is a form of intrinsic motivation that plays a vital role in many aspects of human behaviour [8]. Apart from this, curiosity is a concept that is heavily used by game designers because it provokes learning and the desire to acquire knowledge and information through behaviour or emotion of being curious [3]. In 2012, game designer Peter Molyneux designed a social experiment digital game around the concept of curiosity called *Curiosity: What’s Inside the Cube?* The digital game consisted of a giant cube made of billions of smaller cubes (“cubelets”); where the goal of the game was to collectively reach the center by going through various layers of cubelets, discovering what was inside the cube [14]. In online games, curiosity is associated with seeking information or experiences [19], and social curiosity about other players [17].

As technology advances, tangible games can be played on digital tabletops that provide an embedded display and a computer to drive player interaction [7, 12, 16]. These can be tracked through tangible user interfaces (TUI) technologies such as optical cameras, RFID tags, or sound [16]. However, some players prefer board games over new genres, because it allows them to socialize with other players [16]. Therefore, we developed Curioscape an escape room board

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CHI PLAY '20 EA, November 2–4, 2020, Virtual Event, Canada

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ACM ISBN 978-1-4503-7587-0/20/11...\$15.00

<https://doi.org/10.1145/3383668.3419925>

game that uses TUI technology where users can engage through physical interactions.

## 2 BACKGROUND

The definition of curiosity is defined as ‘an appetite for information’, which can take place in various forms [4]. Certain game elements such as curiosity and uncertainty are important to make a pervasive playing application that can trigger the interest of different individuals towards the reflection and understanding of the knowledge surrounding them [11, 13, 15]. The benefits of using TUI technologies can enable collaborative interactions within digital applications for co-located users [9]. Tangible games can help us understand how we can best manipulate and derive new interface technologies in a unique way that further engage players, allowing them to focus both on the challenges of the gameplay and interactions with one another [16], interactive storytelling applications, games to stimulate learning in children, digital board games with tangible interaction in which all these systems use tangible playing pieces as a primary means of navigation within the virtual game spaces [1, 2, 5, 6, 10, 18].

## 3 CURIOSCAPE

Curioscape is an escape room board game, in which a team of 4 players cooperatively discover clues, solve puzzles, and accomplish tasks by interacting with the board in order to progress and accomplish various challenges within a limited time frame.

### 3.1 Brainstorming

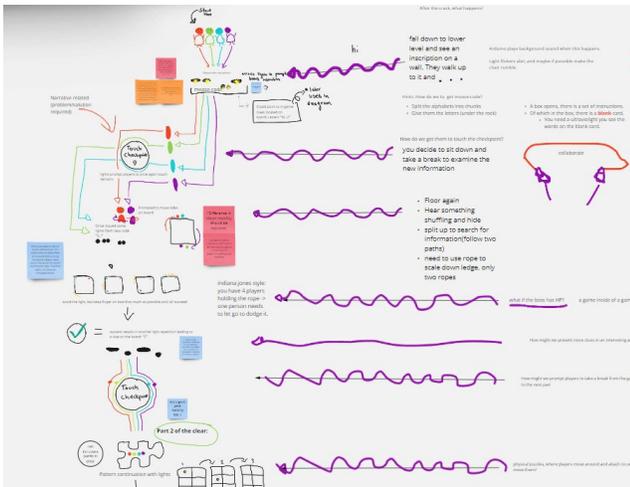


Figure 2: Brainstorming sessions on Miro

With the initial goal of building an escape puzzle board game using Arduino sensors as a game mechanic, a brainstorming process was iteratively used to create and expand on narrative, game concepts, and game mechanics Figure 2. Ten minutes were given for individual idea generation, followed by a thirty-minute discussion and analysis of ideas. The process was then repeated within the newly identified constraints, which were then developed on top of

the existing brainstorming session. These sessions yielded promising game mechanics that revolved around collaborative interaction, sound, sense of space, and touch as game mechanics. We then migrated to brainstorming multiple narrative ideas in which would enhance the gameplay by immersing players within the narrative-driven through suspense and excitement. These themes included adventure, action, and fantasy tropes that are familiar to escape room players, however, this would also remain flexible throughout the game design process to accommodate for puzzles that are embedded in the narrative.

### 3.2 Level Design

When designing the game levels, we wanted to ensure that the tutorial and the stages of the game to be engaging and self-explanatory as possible. The concept relies heavily on establishing the amount of unknown mechanics in which it does not surpass the amount of known mechanics. This allows the players the opportunity to continuously build on previously acquired knowledge, from the previous game mechanic. For example, players would learn that a green-led-lights will only turn on when the team clears the puzzle. We designed our puzzles and physical board game space to specifically encourage player collaboration. Some of these examples include; completion of puzzles requires specific actions by two or more players; story and lore are designed to be team-oriented, and clues are spaced out on the board game to encourage key moments in participation for each player.

### 3.3 Playtesting

Avid board game players from the Games Institute located at the University of Waterloo playtested Curioscape at various stages of the game; iterative changes were made throughout the game design. To maintain proper feedback from playtesting, players were only allowed to playtest a specific stage of Curioscape once. A think-aloud method was used to gather data in testing the game design and development. Participants were asked to say whatever comes into their minds as they played the game. We tested puzzles by observing how participants interacted with the board game and adjusted the difficulty based on the average time it took the participants to solve each puzzle.

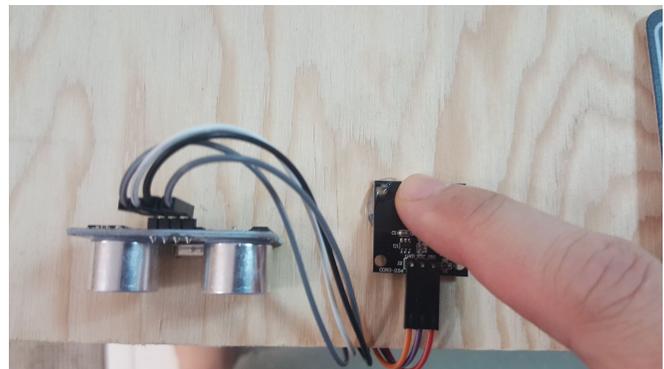


Figure 3: Early stage development of using a touch sensor as a game mechanic

### 3.4 Development

Curioscape relies on the combination of multiple Arduino sensors for meaningful design choices; such as a puzzle, design within the game space, and narrative (story and lore). Initial design choices were based on *Scott Nicholson's Peeking Behind the Locked Door: A Survey of Escape Room Facilities* living document [14].

**3.4.1 Arduino Sensors and Externals.** To ensure smooth gameplay, we needed to ensure the Arduino sensors were meaningful to our game design choices. The purpose was not to include all possible sensors, however, to encourage and remove the necessity of a physical rule book.

- Touch Sensor (used for detecting and recording physical touch, see Figure 3)
- Ultrasonic Sensor (used to measure the distance of a target object or person)
- Digital Pad (a numeric pad, used for players to enter lock/pin combinations)
- Haptic Driver (provides haptic feedback on certain tangible objects within the game)
- Led Lights (used an indicator for clues, hints and successful puzzle clears)
- Speaker (used to play the narrative and background music)
- Modified Ikea Chairs (combination of ultrasonic sensor and haptic driver to detect if player is sitting, standing or standing at a specific location in the game space)

### 3.5 Gameplay

To start the game, all four players must sit down on their self-selected seats. A narrative will begin stating *"Listen carefully to the audio, which could provide hints. Don't over complicate things, the puzzles are simple enough. Search the board thoroughly, make sure you observe everything. Divide tasks and conquer, working together is part of the key"*. As the team clears each puzzle, a new narrative will appear including clues and hints reaching the final puzzle. The game ends, when the timer runs out or when the team clears the final puzzle.

**3.5.1 Setup of the Game.** The game is a unit that just presented to the players. Curioscape will start automatically on its own once it has detected 4 players sitting in the assigned seats. The game itself will have sound telling the players what to do. No further instructions are needed. We utilized the modified Ikea Chairs and incorporated as part of game design. Hidden clues and riddles are placed around the game space. Curioscape requires at least 7 feet by 7 feet in space and a table. It comes with the following:

- Four modified Ikea Chairs (1.5 feet by 1.5 feet x 4 feet)
- The board game to be placed on the table (3 feet x 3 feet x 0.5 feet)

**3.5.2 Puzzles and hints.** Puzzles and hints in the game include the following:

- Unlocking certain boxes with a physical RFID Card (such as tapping on various articles within the board game space)
- Synchronized teamwork (such as standing within a certain area of the board game space)

- Riddles, ciphers and pattern identification (such as visualizing a unique logo, identifying symbols or letter substitution)
- Abstract logic (such as pressing the right combinations on a keypad)
- Searching for clues and hints within the board game space (including chairs, board game, and etc)
- Sound and narrative are based on a timer (if the players are spending 5 minutes or more on a stage, sound and key hints will be provided)
- Placing certain artifacts in a designated location (by blocking certain sensors, or touching certain objects)

### 3.6 Example of Gameplay

In *Level 2*, the narrative begins *"Come now, there are a few things I must show you before you begin. One of the most important things to keep in mind is that there are many dangerous tremors within the cave. As Deliria (a character from the game) has grown, she has caused instability within the mountain's caverns. You must keep moving, and dodge demons who you cannot see. Staying in one place for too long can result in dangerous situations"*.



Figure 4: Modified Ikea Chair of Curioscape

After two minutes of inactivity, the narrative will play *"I would consider trying it out and moving around."* The narrative will keep looping every two minutes until the players proceed to clear the first puzzle; that is to have at least one player stand up from their chair (detected by the ultrasonic sensor) and move behind their chair. In addition, the player's chair will light up if the right action is completed.

However, if all players stand up and move outside of the ultrasonic sensor, a narrative will play *"You cannot leave the Beacon of Life unattended (the touch sensor), team synergy is important. Split your resources evenly."* As result, it requires two players to trigger the touch sensor, see Figure 3 and two players to stand up.

### 3.7 Limitation

There are few design limitations in regards of our gameplay. We understand that there is a delay of 100ms response time to trigger certain events via the Arduino sensors, which might disrupt the gameplay. In addition, the sensors are currently placed on a fixed position, thus requires the player to move within a specific area, or

use their hands to block the sensors for puzzles, clues, sound and narratives to be activated (and vice versa).

#### 4 IMPLEMENTATION AND FUTURE WORK

Curioscape plans to be a standalone board game canvas (platform) where multiple narratives can be played on the board. In *Castle Zombie Catacombs* our next edition, we plan to make the gameplay more adaptive by using physiological measures as a game mechanic. For example, one game mechanic could be heart rate, in which the player's heart rate can change the dynamic of the gameplay. These can include enemies moving faster, slower, or different obstacles and challenges to appear. We plan to explore the replayability of our standalone platform. We hypothesize that Curioscape could have the possibility of eliminating the need for rule books, by making tutorial levels take part in the gameplay. However, we did not perform any research to confirm our hypothesis.

#### 5 CONCLUSION

We designed Curioscape as a collaborative team game with a focus on the idea where players can jump straight into the game without the need for a rule book. We paid attention to intuitive game design elements that builds on existing escape room game design. We found that players enjoy playing our game with just minimal aesthetic design involved and the ability to get players curious is an area we want to continue exploring through our game design choices. Lastly, vibrations on the chair was slightly 'strange' for some players.

#### 6 ACKNOWLEDGEMENTS

We thank all the participants who gave feedback and playtested our game. We thank our supervisor, Dr. Lennart E. Nacke in the HCI Games Group. This work was made possible by the NSERC CREATE SWaGUR grant, Lennart Nacke's NSERC Discovery Grant 2018-06576, the Canada Foundation for Innovation John R. Evans Leaders Fund 35819 "SURGE—The Stratford User Research and Gameful Experiences Lab," Mitacs, and the Social Sciences and Humanities Research Council (SSHRC) Canada Grant 895-2011-1014 (IMMERSe). Special thanks to the members at the Games Institute at the University of Waterloo for all their support.

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