

Dismental: a game for social engagement in pandemic times

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DISMENTAL

Figure 1: Game logo

ABSTRACT

The year 2020 started with a corona-virus outbreak. As a result, many people are no longer allowed to leave their home, which leads to a heavy reduction in social contact. At the same time, everyone wants entertainment at home so many people are playing games. *Dismental* is a social game explicitly designed and developed for this context. The game aims at creating a fun experience and conviviality by requiring players to communicate and work together to complete a number of mini games to defuse a bomb (see Figure 1). *Dismental* consists of two types of mini-games, for 2 up to 8 players: the first type involves two active players, and requires skillful communication, coordination and keeping your head cool; the second type involves all players and is aimed at fast reactions and chaotic situations. Completing a series of mini-games within a set time limit will successfully defuse the bomb. All players use a variety of gestures captured by their webcam to interact with the

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mini-games. The game was created with the Godot¹ game engine. The codebase is available on GitHub², and a trailer can be found on YouTube³.

CCS CONCEPTS

• **Applied computing** → **Computer games**; • **Human-centered computing** → **Gestural input**.

KEYWORDS

Social engagement, Multiplayer game, Entertainment, Communication, Quarantainment

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1 INTRODUCTION

In times of social distancing, video calling services are used more than ever [6]. People have moved their social lives online, as maintaining social relationships is important for their health [7]. Along

¹Game engine: <https://godotengine.org/>

²Repository: <https://github.com/Dismental/Dismental>

³Trailer: <https://youtu.be/rIsNeuF5104>

with the increased use of video calling services, the sales of games has increased as well [4]. This sales increase might also be related to the need for digital social interaction during times of social distancing, as gamers state that socializing is the most important motivation for playing digital games [5]. Generally, the best experience of social gaming (playing together with other people) is achieved when the players are located at the same physical location [2]. While games such as board games and video game consoles normally utilize this, social distancing rules hinder this [1] as they discourage the physical presence of players. Solving this dilemma is the goal of what we can properly call ‘quarantainment’: how can a digital game serve as a fun way to compensate for the restrictions of a pandemic, overcoming the lack of events and social interaction while observing all COVID-19 regulations? With this goal in mind, we developed the game *Dismantal*, in which a team of 2-8 people has to work together to defuse a bomb. The game gives these groups of players sets of challenging tasks to defuse the bomb that give the perfect balance of tension and fun while being able to communicate with each other to establish online fun and social interaction.

Inspiration for our game came from a game called *Keep Talking and Nobody Explodes* [3]. This game is based on a VR experience whereas our game uses head tracking. Our game also includes audio stream between players for a closer social experience. Lastly, we have multiple mini-games in order to defuse the bomb, whereas *Keep Talking and Nobody Explodes* makes use of modules.

2 GAME DESIGN

The game is about defusing a bomb. It’s story is about a professor called Sergio who went crazy due to the social isolation. He became evil and started creating bombs. When he eventually placed and activated these bombs in public places, the FBI’s BITS (Bomb Intervention Tactics squads) are called upon. The players of the game are part of such a squad and will work tightly together to defuse the bombs. The FBI provided remote controlled robots and special vision technologies on the locations to allow the members of BITS to work from home safely via their laptops without breaking the social distancing rules. The game is designed for small groups of people who miss their real-life social interaction. It is focused on combining two human factors to increase their social engagement: tension and having fun. Therefore, the theme of the game is to defuse a bomb by tightly working together. Many aspects in the design of the game have the function of giving the right amount of stress and tension to the group of players. For example, a large intimidating timer with bright red digits is always visible, showing the time remaining before the bomb will possibly explode. In order to give the players tasks and make sure the players are having fun, the game consists of concatenated mini-games which represent consecutive tasks to defuse the bomb. To increase the tension even more, supervisors could be given more tasks or face more difficulty to help the defuser.

2.1 The mini-games

In the mini-games each player is involved in at least one mini-game to equalize the engagement of each player. There are two types of mini-games. The first type involves all players and is aimed at creating chaotic situations and issuing fast reactions. At the moment

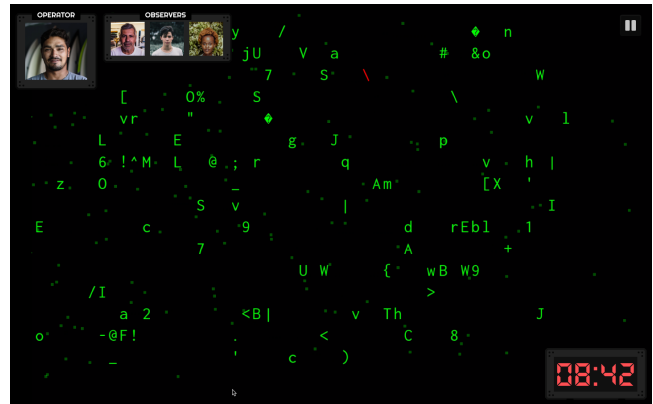


Figure 2: Screenshot of the Hack mini-game

there is only one, the mini-game “Align”: it is about opening a safe that holds a blueprint of the bomb. The lock of the safe has multiple nested rings which must be correctly aligned to open the safe. Each player has control over an (initially unknown) ring by a specific input control. During the chaos of everyone moving their rings, each player has to figure out which ring they are controlling with which input control, and correctly align it.

The second type of mini-game involves two players, an operator and a supervisor, while the other players are (passively suffering) observers. This type includes the following:

- (1) The first mini-game called “Hack” (Fig. 2) is about hacking into a computer to gather valuable intel. The players see a screen with a Matrix-style flow of code (from left to right): the supervisor sees which lines of code are relevant for hacking into the computer and the operator needs to execute the lines of code. Execution is done by moving the cursor to the same height as the relevant code. Clear communication is required between the supervisor and the operator to execute the correct lines of code. In this mini-game the cursor follows the position of the head of the operator; the operator therefore needs to move the face up and down to execute the relevant code.

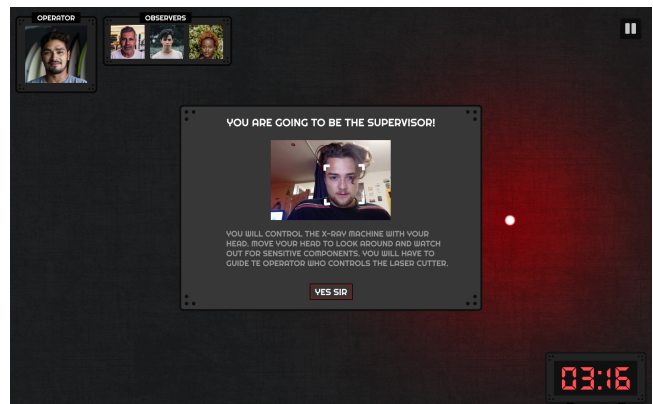


Figure 3: Screenshot of the start of the Cut mini-game

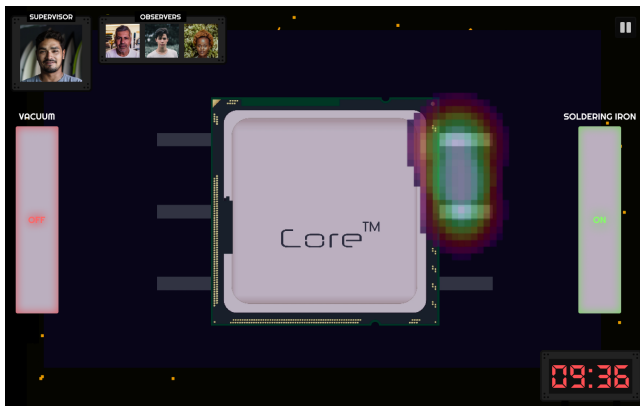


Figure 4: Screenshot of the Dissolve mini-game with a heated-up area

- (2) The mini-game “Cut” (Fig. 3) is about cutting open the casing of the bomb to access its internals. A metal panel needs to be cut open by the operator without damaging sensitive components. However, the operator cannot see the location of these sensitive components, and has to communicate with the supervisor, who has access to X-ray vision that shows the sensitive components and can thus guide the operator where to cut. In this mini-game the cutter follows the face of the operator around the screen; because wrong movements can damage sensitive components, steady movements are key.
- (3) The mini-game “Dissolve” (Fig. 4) is about removing a specific chip from the circuitry board by melting it with a soldering iron, which is controlled by the operator. However, if the soldering generates too much heat, the bomb will explode. Only the supervisor has access to a heat map of the bomb and is able to see if the connectors of the chip get too hot or not. Therefore, the supervisor needs to communicate the heat map information with the operator to prevent overheating and successfully remove the chip. In this mini-game the soldering iron can be picked up by the operator by moving his head to the side of the screen; the tool is then applied by moving the head to the position of the desired connectors.
- (4) The mini-game “Align” (Fig. 5). In the mini-game there are 4 to 6 rings. Each player controls at least one ring (possibly 2 rings, depending on the group size). The rings turn based on the movement (along x or y axis) of the pointer on the screen, which is controlled by moving the player’s head.

2.2 Interaction Design

Besides social engagement, an important aspect of the game design is to be appealing for non-gamers: people who had little or no interaction with a digital game before. *Dismental* is therefore designed to have an as natural way of interaction as possible, as well as have a very low threshold on the hardware side: no need for gaming-computers with massive computational power, just a computer with a webcam will suffice. This is achieved by using the face tracking mechanisms with the webcams of the players. In this

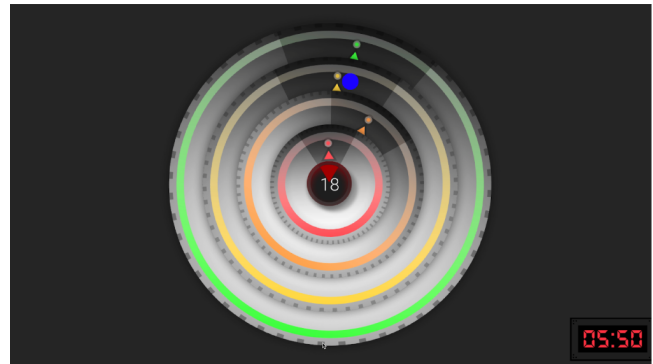


Figure 5: Screenshot of the Align mini-game

way, players can use just physical movement as input for the game instead of using other external devices. With this input, players have control over the tools they are given during a mini-game. To use a tool, a player can move it by displacing their face in front of the webcam. As an example, Figure 4 shows the position where the head currently is heating up because the player is holding a soldering iron in the game. The webcam input of involved players, used by the tracking mechanism, is always displayed during the mini-games, so that everyone can follow the course of action. Together with using the microphone, this provides the basis for communication and social interaction for the game in the same way video calling does. Above all, the game aims at creating a fun experience and conviviality. Completing the sequence of mini-games within a set time limit will defuse the bomb successfully.

To make the game more accessible and because players may have different skill levels or physical ability, a difficulty setting was included in *Dismental*. Players can choose to play the game in an easy, medium or hard mode. These difficulty modes set a specific duration for each mini-game, and adjust the speed of some of them.

3 IMPLEMENTATION ASPECTS

The game was designed to have a peer-to-peer (P2P) network connection. This type of network has multiple benefits for our game, the most important being that we do not have to process nor store information on the server-side. This makes the game more scalable by design.

To keep the game as user-friendly as possible, we did not want to require players to look up their IP address and to go into their router’s settings to be able to connect with other players. For this, the game needed to be able to automatically set up the peer connection. Because connecting clients without predetermined addresses is less than trivial, we make use of the WebRTC framework. To connect the players, one player has to first create a room; this player is then the host until the connection is sealed. The host receives from the signalling server an ID of a room, and has to send this ID to all other players, after which every other player can establish a connection with the signalling server. When the game starts, the room is closed and clients can directly send messages to other clients that contain the information needed for a peer connection.

We used Godot as our game engine because it is relatively lightweight and has most tools needed for a 2D game. Unfortunately,

Godot did not easily support implementing head tracking based on webcam frames. Therefore, we used OpenCV to track a player's head position and display in the game. OpenCV is a computer vision library focused on real-time implementations, with built-in tracking capabilities.

4 EVALUATION

The playtesting for this game consisted of three different sessions with a total of 14 participants. Each session started with a briefing about the setup of the playtest, playing the game and concluded with an interview.

The first session included all the six team members as participants, where each team member took turns as operator or supervisor. This session tested the playability of the head tracking mechanics and the interaction between the supervisor and operator. The other sessions had two pairs per session, adding to an additional eight participants for the playtesting. The pairs switched roles as supervisor and operator. In contrast to the first session, the players of the later sessions had no prior knowledge of the game. The only instructions provided were related to the setup of the playtesting session, such as the instruction to use the 'Thinking Aloud' method. These sessions focused on how the players interpreted the game. For this, the following questions were investigated: Do the participants know what the game is about? Can the participants figure out how to solve the mini-games? Do the participants understand how the input mechanic works? Are the mini-games playable? The results from the playtests are a combination of observing the players and the answers provided during the interviews.

We learned from the first session that accuracy of head tracking as an input mechanic was sufficient for the mini-games and even exceeded our expectations. A drawback was that errors with tracking could lead to instantaneously losing the game. A takeaway from the communication between the supervisor and the operator is that the supervisor requires visual feedback from the operators actions. Otherwise it is very challenging for the supervisor to guide the operator. The conclusion of the other sessions was that the story of the game should be emphasized, as it was sometimes difficult to figure out what the goal of a mini-game was: the participants often understood how to use the head tracking but not its limitations, and a player could get confused when they could not comprehend what other players are seeing.

The final design of the game addresses these results in the following ways. First, we introduced a 'pick up' mechanism which separates the head tracking from interaction with the game if unexpected movements occur. Second, the game narrative is shown in between the mini-games and also provides context for the next mini-game. The context of a mini-game helps the players figure out what needs to be done. UI elements are emphasized or added as hints to aid in clarifying the task for the players. Explicit instructions for the mini-games are kept to a minimum on purpose, to stimulate player interaction. Finally, on screen feedback of the head tracking was added when a player is too close to the webcam or if there are tracking difficulties due to low lighting or rotation of the head.

5 CONCLUSION

Dismantal is a game specifically designed and developed for social engagement in pandemic times. It requires players to remotely collaborate under time constraints to solve mini-games that, when completed successfully, defuse an activated bomb. Player's input is handled by face tracking, performed locally using webcam footage. In addition, voice chat is included to facilitate player communication, which combined with having fun, is instrumental in making people more socially engaged. Finally, by presenting a common challenge and goal, the game also strengthens a group feeling.

Interviews and questionnaires were used to evaluate the game's tension, engagement and level of social interaction. By doing multiple playtesting sessions the game was improved by using the feedback from the participants. This resulted in better game mechanics with the head tracking and a more immersive story-line. From the evaluation we conducted, we can conclude that *Dismantal* effectively facilitates communication and social engagement, despite the remote interaction. This makes it a successful game for promoting social interaction in pandemic times.

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