

# Wrath of Osiris: Surviving Boredom and Collapsing Pyramids in Times of Isolation

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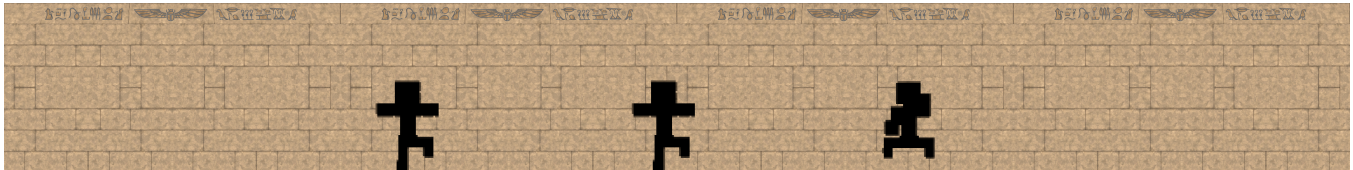


Figure 1: Players of Wrath of Osiris have to escape through walls with human-shaped cracks.

## ABSTRACT

When people need to stay quarantined at home for long periods of time, loneliness, lack of exercise and boredom tend to affect them more frequently and strongly. Games combining physical exercise, challenging gameplay, and social cooperation can combat these negative phenomena. This paper describes one such game. In *Wrath of Osiris*, actual player movement in the real world is used as an input method, in order to get some exercise. The players need to work together, to promote feelings of camaraderie and team spirit. Lastly, the issue of boredom is tackled by an increasingly challenging game setting. Commonly available technology, such as image processing via a webcam and networking are used to offer a solution to a wide range of people.

## CCS CONCEPTS

• **Applied computing** → **Computer games**; • **Human-centered computing** → *Graphics input devices*; • **Computing methodologies** → **Activity recognition and understanding**.

## KEYWORDS

Social engagement, Multiplayer exergames, Collaboration, Quarantainment

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## 1 INTRODUCTION

At times, like during the current CoViD-19 pandemic, large populations are required to be isolated for some time. This makes it harder for people to stay physically and socially active, and it prevents people from coming together and having fun with others. As a result, feelings of loneliness and depression rise [9]. Finding a solution to these problems is the purpose of what we call ‘quarantainment’, i.e. designing and deploying digital games with the goal of compensating for the social restrictions during a pandemic. Such games should overcome the lack of events and social interaction while observing all applicable regulations.

We present the game “*Wrath of Osiris*”, created to combat the negative feelings triggered by prolonged quarantine, by providing people a way of socializing with others from their homes, and staying physically active in a fun environment. In *Wrath of Osiris*, players use their body to control a team of archaeologists who are trying to escape a collapsing pyramid. They have to work together, forming the right poses at the right moments, to ultimately escape through holes in the pyramid’s walls.

Games that encourage players to exercise are also known as exergames [7]. However, exergames in general have been shown to need social cooperation to keep their players motivated [8]. This is where *Wrath of Osiris* comes in: it is not an exergame that just encourages players to exercise, but it has also a strong social enriching component. To highlight this, every player can see the other players’ avatars and their poses, making it almost a social meeting. In addition, collaboration is an important aspect of this game, to reach the collective goal of passing the most walls and reaching the highest level.

As *Wrath of Osiris* does demand players to become physically active, techniques have been researched of how to motivate players to exercise. To solve the lack of physical exercise in the case of seniors, techniques in exergames for persuading elderly to exercise have been investigated [3]. In *Wrath of Osiris*, however, the results of the investigation have been used as persuasive for all age groups.

The basic concept of *Wrath of Osiris*, the player shaping their body in such a way that it fits through the shaped hole in the approaching wall, has been executed in real life in game shows

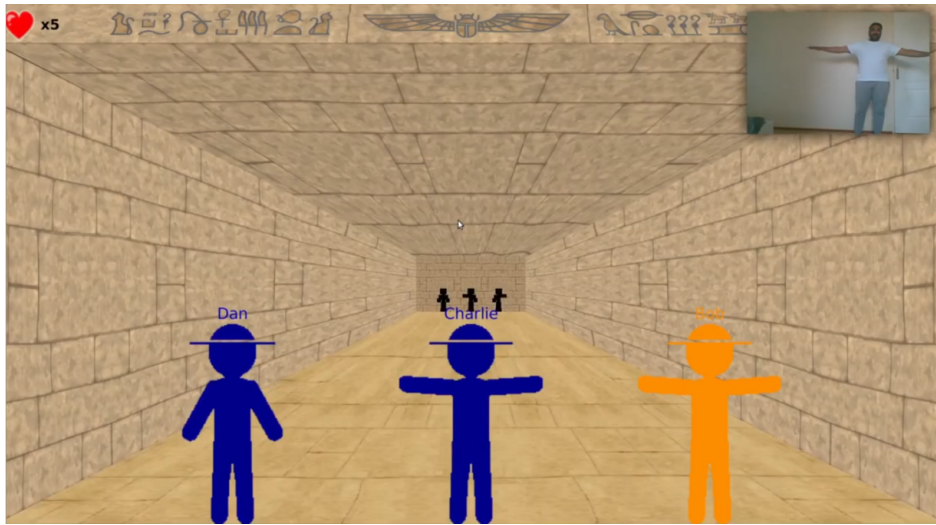


Figure 2: Game interface during gameplay.

on television [5]. As for its application in videogames, there are examples such as “*Hole in the Wall*” [4], a game crafted for the XBOX 360’s Kinect [2] accessory in 2011, and “*Fit It*” [6], a game created for virtual reality (VR) in 2018. However, making additional (expensive) accessories, like VR systems and Kinect, mandatory for playing would alienate too many people when applied in a broad social context. *Wrath of Osiris* only requires a computer and webcam, thus making it much more accessible and readily available.

## 2 GAME DESIGN

### 2.1 Story

In *Wrath of Osiris*, players take on the role of a group of archaeologists who have just uncovered an ancient sarcophagus in a pyramid. However, the moment they touch it, the pyramid starts crumbling down, and they have to run for their lives!

During the game, the archaeologists will be running through the hallways of the pyramid, desperately trying to get out. It is up to each player to guide their archaeologist through small, conveniently human-shaped holes in the pyramid’s walls. As they progress through the tombs, some holes will need specific amounts of players to pass through them, and the walls will approach the players quicker and quicker. This will result in heated gameplay, where fast-paced cooperation is needed. Every time one of the players is in the wrong place or pose, they are hit by the wall, and the pyramid further crumbles down. If this happens too many times, the pyramid collapses down on the players, and the game is over.

### 2.2 Mechanics

During gameplay, the players’ characters are automatically running forward, as in a typical endless runner [11], and walls appear approaching from a distance. When starting out, there will simply be holes in the wall in the shape of certain poses, and the players can go through any one they like. Failing to timely stand in the right pose means you are hit by the wall, and the team loses one of their collective lives.

When the players have finished the first level, consisting of some amount of walls, things get harder. Not only do the walls get closer faster, but they will now also feature holes requiring a specific amount of players to go through them: if there are too few or too many players in front of a hole, you will see that above the hole. Again, having the wrong amount of players in front of the hole upon its passage, means the team loses one life.

Subsequently, the levels get increasingly harder: walls keep going faster, and there are more holes requiring specific numbers of players —of course, this will always take into account the amount of people playing. Eventually, the team has no more lives left and it is game over: the game shows them how far they got, and invites them to play again. As this game is an endless runner, there is no win condition, and the goal is to beat your personal record and reach the highest level you can. Each level consists of 10 procedurally generated cracked walls. Levels get progressively harder until level 4, after which the level generation conditions stay the same. In the first two levels, there will be no poses where the players have to raise their legs. The chances of requesting the aforementioned amount of players (above the holes) are 0% in level 1, 30% in level 2, 45% in level 3 and 60% from level 4 on.

### 2.3 Interaction design

While playing, the player’s collective lives left are displayed in the top left of *Wrath of Osiris*’ interface, in the form of hearts. In the top right of the interface, players can see their own mirrored camera image to help them in their body positioning. An example of this interface can be seen in Figure 2.

Avatars on the screen display the poses of all players in the game. Players can identify avatars by the names hovering above them. The avatar of the current player is differentiated from the blue avatars of other players with the color orange. Besides this, the current player’s avatar is always displayed on top when multiple avatars are in the same position.

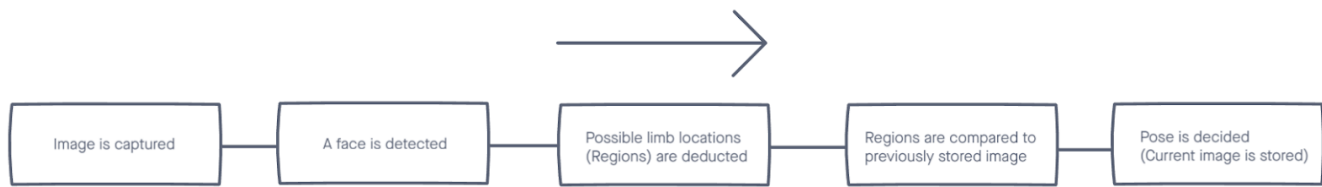


Figure 3: The steps of the posture recognition process.

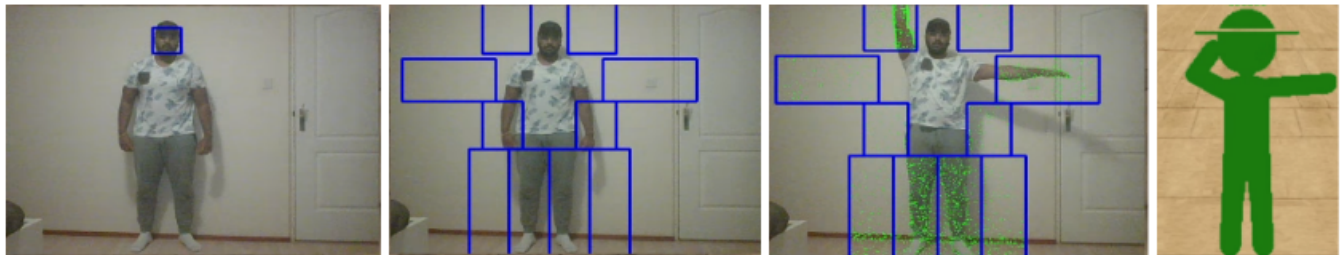


Figure 4: Footage for the steps 2-5 of the diagram in Figure 3

## 2.4 Audience

Many players of *Wrath of Osiris* will have experience with video games, but a considerable fraction will have little to no experience. In order to also include them, the game design is deliberately kept simple, and is developed to be easy to pick up: there is only one main mechanic, which is the moving and positioning of one’s own body. Players with prior experience with action games may be better at such complex spatial tasks [10], but since *Wrath of Osiris* is a cooperative game, this means they could help their fellow players understand it. In addition, the group’s performance is determined by the worst player, as a life is subtracted from the group whenever one of the players hits the wall, so teamwork is essential.

Besides experience, motivational techniques [3] have been addressed to make the game enjoyable for all age groups. As feedback shows that *Wrath of Osiris* is not too tiring, the game can be enjoyed even by players with a lowered physical fitness. The game is advised for people of age seven and up. This is not because of scary or inappropriate content, but because the game might be too difficult to master and understand for younger children, with the danger that they might hurt themselves while trying to perform the poses.

## 3 IMPLEMENTATION

The Java platform [1] was used for implementation, resulting in Windows, Linux, and macOS cross compatibility.

### 3.1 Network communication

To ensure players have a smooth experience, it is necessary to provide an elegant, lightweight protocol for client-server transmissions. To this end, we’ve implemented a networking protocol. When the client starts and wants to join or start a game lobby, they perform a handshake with the central server, and state their request. After the

server answers affirmatively, the client checks every 500 milliseconds if any other players have joined the lobby, and displays their names, until the game gets started. Currently, there is a maximum of five players, to avoid the game feeling too crowded.

When the game starts, the server first sends the first level: a batch of walls. The client and server will then periodically communicate important information. Several times a second, each client will send its current pose, and the server will send the other players’ poses, as well as the amount of lives left. Once a level is completed, the server will send all clients a new level, unless there are no lives left, which would mean that the game is over.

### 3.2 Pose recognition

Figure 3 demonstrates the five steps of our pose recognition algorithm. From a captured image, the player’s face is detected using a cascaded Haar classifier. Based on the location of the face, the algorithm surmises where the arms and legs should be in a certain position: for example, if the arms are to the side, they should be in a horizontal rectangle extending horizontally outward from the body, below the face. Once the classifier regions are determined, the player’s arms and legs are decided based on the amount of recent movement in these regions. These steps are demonstrated in Figure 4.

The game recognizes players to be either in the left, middle or right of the wall. This is deducted purely from the position of the detected face: If the face is (largely) in the left (or right) 37.5% of the image, it is recognized in the left (or right) position, if the face is in the center 25% of the image, it is recognized in the middle position.

## 4 EVALUATION

Throughout the development lifecycle, there have been weekly playtesting sessions, to gauge how well *Wrath of Osiris* was succeeding in its goals. Playtesters were mainly sourced from the authors' colleagues, family, and roommates.

Every playtest consisted of two stages: first, the playtesters would play the game for a while. Then, they were asked to fill in a questionnaire, in which they had to rate game elements like pose recognition or player cooperation.

After letting players test *Wrath of Osiris*' pose recognition, we came to the following results: in general, people found using pose controls quite natural, and thought the arms were recognized quite well. However, they found the recognition to be slow at times, and their legs were not always recognized correctly.

Most playtesters did not find the game too physically intensive. However, all of them rated the controls as more intensive than sitting still and using a keyboard and mouse, which is positive in regards to the goal of making people move.

The social aspect was well-received among all players. Although most found that the level of cooperation needed was not very high at all times, players did report having fun chatting about the game using external voice chat programs while playing, giving each other tips and celebrating when they did well, among other things.

## 5 CONCLUSION

The game *Wrath of Osiris* was developed to provide people in isolation with an active, social and fun activity in the comfort of their own home. Players' physical movement and poses are used as input to guide their avatars through human-shaped holes in walls moving towards them. Social cooperation is needed when a hole requires a certain number of players to pass through.

From our playtest results so far, we can conclude that *Wrath of Osiris* succeeds at its goals. Players reported being entertained, because of the challenge that *Wrath of Osiris* offers, thereby reducing their boredom; they said they had fun with their fellow players and needed to cooperate, thereby reducing feelings of isolation and loneliness; and they reported being required to move more than they would normally, thereby reducing their lack of exercise.

We believe that, in addition to serving quarantined people, *Wrath of Osiris* is also a very fitting means to bring together participants of so many conferences that are nowadays being organized online: it contributes to their social engagement, while acting as a fun surrogate for traditional conference social activities.

The current version of the game could be improved and extended in a number of ways, e.g. the accuracy of the pose recognition algorithm could be improved, and additional features could be added, such as a global leader-board to compare players, or a system where one can add other players as "friends", etc.

Finally, our findings could also be used as a base to design other games around "quarantainment": other approaches than ours might be viable, and our results might inspire finding alternative directions to explore.

*Wrath of Osiris*, its trailer and its source code can be found in the project's repository<sup>1</sup>.

## REFERENCES

- [1] [n.d.]. Java | Oracle. <https://www.java.com/en/>
- [2] 2010. Xbox.com | Kinect. <https://web.archive.org/web/20100912154547/http://www.xbox.com/en-us/kinect>
- [3] Ellen Brox, Luis Fernandez-Luque, Gunn Evertsen, and Juan González-Hernández. 2011. Exergames For Elderly: Social exergames to persuade seniors to increase physical activity. In *Proceedings of the 5th International ICST Conference on Pervasive Computing Technologies for Healthcare*. IEEE, Dublin, Republic of Ireland, 1–4. <https://doi.org/10.4108/icst.pervasivehealth.2011.246049>
- [4] Ryan Clements. 2011. Hole in the Wall Review. <https://www.ign.com/articles/2011/08/26/hole-in-the-wall-review>
- [5] Chris Kincaid. 2012. Nokabe – Brain Wall. <https://www.japanpowered.com/japan-culture/nokabe-brain-wall> Library Catalog: [www.japanpowered.com](http://www.japanpowered.com).
- [6] Lukas Litinskas. 2018. Fit It on Steam. [https://store.steampowered.com/app/951450/Fit\\_It/](https://store.steampowered.com/app/951450/Fit_It/)
- [7] Nels Numan, Ayla Kolster, Niels Hoogerwerf, Bernd Kreynen, Jeanique Romeijn-ders, Tomas Heinsohn Huala, Nestor Z. Salamon, J. Timothy Balint, Stephan G. Lukosch, and Rafael Bidarra. 2019. Star Tag: A superhuman sport to promote physical activity. In *2019 IEEE Conference on Virtual Reality and 3D User Interfaces (VR) - Workshop on Superhuman Sports*. IEEE, Osaka, Japan, 1826–1830.
- [8] Gume Osorio, David Moffat, and Jonathan Sykes. 2012. Exergaming, Exercise, and Gaming: Sharing Motivations. *Games for health journal* 1 (June 2012), 205–210. <https://doi.org/10.1089/g4h.2011.0025>
- [9] Anneloes Prins. 2020. De gevaren van lang thuiszitten: 'Eenzaamheid en depressie liggen op de loer'. <https://www.rtlnieuws.nl/nieuws/nederland/artikel/5067991/corona-virus-covid-19-eezaamheid-depressie-thuiswerken-verveling> Library Catalog: [www.rtlnieuws.nl](http://www.rtlnieuws.nl).
- [10] Ian Spence and Jing Feng. 2010. Video Games and Spatial Cognition. *Review of General Psychology* 14, 2 (June 2010), 92–104. <https://doi.org/10.1037/a0019491>
- [11] TV Tropes contributors. 2020. Endless Running Game - TV Tropes. <https://tvtropes.org/pmwiki/pmwiki.php/Main/EndlessRunningGame> Library Catalog: [tvtropes.org](http://tvtropes.org).

<sup>1</sup><https://github.com/tudelft-cse-cp-cg-2/wrath-of-osiris>