# *THE LASER LAMP*

Final report - DZC30

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**TEAM 08**

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# Introduction

In this report the complete design process of the laser lamp is documented. The laser lamp is a game design with the purpose of making a currently existing object (i.e., the lamp) more playful. With the laser lamp, a proposition is made to alter the everyday usage of a lamp remote into a more fun and engaging experience. This report is made in line with the design for games & play 3 course (DZC30). In this course students at the Eindhoven University of Technology (TU/e) learn about the concepts of playful interaction through the use of play theory and are given an opportunity to build their own playful experience.

The report is structured according to each step we made in the design process. First we discuss our initial brainstorm of different playful ideas, the initial experience our ideas were founded upon, as well as the playful experience we targeted with our design. Next, the playful ideas are further analyzed using the Mechanics, Dynamics and Aesthetics approach and different play scenarios are discussed. Then, one of the playful ideas is chosen to develop further and apply the user test on. In this chapter, various play theories are applied to the playful idea to form it into a clear game design. Furthermore, we then discuss how the game design was used to create a user test in order to collect data about the user experience of the playful interaction. Here, the mechanics of the game design are specified as well. After this, the game proposal is refined based on the findings of the first user test to make the playful interaction more nuanced and appealing in the long run. Finally, a second user test is applied using the game design to gain more insight and a better understanding of the effect the playful interaction has on the user experience and behavior.

In the end short individual reflections are formulated. The reflection summarizes the experiences of the students in Team 8 with regard to the course DZC30 and their group work.

*Figure 1. The Laser Lamp gun in action.*

# Chapter 1 - Initial Playful Ideas

In this chapter the brainstorm of the initial playful ideas is stated. The playful ideas are based on the gamification of an everyday lamp. The ideas are focused on a specific psychological need to increase the motivation of the player during the playful interaction. The psychological need is retrieved from the paper by Ryan et al. (2006). During the brainstorm, all group members focus on the psychological need of autonomy which is the need to control the outcome of one's choices. Furthermore, the ideas are supported by the playful experiences retrieved from the PLEX Cards, which is a technique for designers to brainstorm for playful design ideas Lucero et al. (2010).

## Playful Idea #1

For the first idea, we are targeting the playful experience of sensation and relaxation through autonomy. The idea is to have two side by side scales implemented on the base of a desk lamp, with a bowl on top of both. One bowl and scale represent decreasing intensity of the light , the other bowl and scale represent increasing the intensity of the light. The user can then move sand between the bowls to turn the lamp on, off, or adjust the intensity. If all the sand is on the decrease side, it would turn the lamp off. Contrary, if all the sand is on the increase side it would turn the lamp fully on. For example, if you put a third of the sand on the 'decrease' side and two thirds of the sand on the 'increase' side, it would result in 66% intensity.

***Why does the idea correspond to sensation and relaxation?***

This idea is appropriate for the chosen experiences because it allows the user to not only enjoy the sensation of feeling the sand fall between their fingers as they move/play with it, but can also be used as a break from studying or working. Furthermore, the sensation of playing with the sand could be seen as relaxing, giving further reasoning into this giving you a break from work.

***Why does this work for autonomy?***

It works for autonomy because it gives the user the ability to self govern the intensity of the light, by changing the amount of the sand in the two bowls. In turn, giving the user full control over the outcome.

## Playful Idea #2

For the second idea, we target the playful experience of control. In video games, having a gun can provide a strong sense of control/dominance. Translating this idea to the context of a lamp, we imagine an experience where the lights are turned off through 'shooting' the lamp. This interaction can provide a satisfying ending ritual. For example, a user could be done with their homework late at night, and this interaction would give them the satisfactory final interaction to end their study session.

Taking this idea one step further, one could imagine a room full of lamps that all need to be turned off. This style of interaction would allow for a 'sharpshooter mini-game' experience. This satisfactory final interaction also ties in with the playful experience of relaxation.

The implementation of this idea would mostly rely on infrared sensing. A trigger within the gun would ‘fire’ the infrared signal. If this signal gets picked up by a sensor in the lamp, it subsequently turns off. To provide playful feedback to the user, the turning off of the lamp is dependent on the accuracy of the shot fired. One could compare this to an ‘instant kill/ headshot’ compared to the lamp ‘bleeding out’.

## Playful Idea #3

For the third idea, we target the playful experience of nurture and humor. The idea is that we have a night lamp for children that have trouble falling asleep with no light on. The lamp would look similar to an animal or a character in order to look more appealing to children. The user can feed the lamp tokens that represent a certain amount of time (e.g. 30 minutes). By placing the tokens into the lamp, the lamp turns on for the amount of time inserted in the lamp. For example, if the user inserts 2 tokens into the lamp, the lamp will be on for 1 hour after which it automatically turns off. After the timer ends, the character ‘poops’ out the tokens, thus inducing the humor element as a playful experience.

The playful experience will be appropriate for the experience of autonomy. We define autonomy as the need to be in control of one’s own life. With the night lamp the user has the control to choose the amount of time the light is on.

The detection of the tokens could be accomplished using a pressure plate in the inside of the lamp. The pressure plate can measure the amount of tokens inserted in the lamp and then the software system of the lamp calculates the total amount of time until the tokens can be ‘pooped’ out again. If weight is detected on the pressure plate, an actuator will turn on the lamp. When time is finished an actuator will operate to open the door on the backside of the lamp, and the tokens will fall out.

# Chapter 2 - Setup for a playful interaction

In this chapter the playful ideas of chapter 1 are further discussed. The playful dynamics of each idea is described following the Mechanics, Dynamics, and Aesthetics approach discussed in Hunicke (2004). The design for playful dynamics aims at generating the defined playful experiences. Furthermore, the initial setup of the technical implementation is given.

## Playful Dynamic Idea #1

### Aesthetics

- **Sensation:** The user is able to stimulate their senses of touch by engaging with and feeling the sand. The sensation of the interaction is further enriched via the audio and visual stimuli of movement of the sand (i.e. when the user lifts the sand and releases the sand).
- **Discovery:** The sand scales on the lamp allow for the discovery of interaction with the playing field. The user is able to experiment with the sand quantities and thereby explore the visual possibilities of the lamp.

### Mechanics

Depending on the weight on a certain scale, the system adjusts the intensity of the lightning of the lamp. Two main mechanics are required for this:

- The intensity of the light increases when the weight on the ‘on/increase’ scale increases.
- The intensity of the light decreases when the weight on the ‘off/decrease’ scale increases.

### Dynamics

With the defined aesthetic interactions and possible mechanics in mind, the description of the dynamics can be described more easily. Both the sensation and discovery of the interaction can be encouraged by the mechanics of the system. The user can move sand from the ‘on/increase’ scale to ‘off/decrease’ scale and see that the intensity of the light decreases. Naturally, the user can also move the sand from the ‘off/decrease’ scale to ‘on/increase’ scale and see that the intensity of the light increases.

### Technical Implementation

To support these dynamics a few sensors and actuators are relevant. First, a load cell is needed to measure the weight of the sand placed on a scale. Furthermore, an amplifier sensor is needed to translate the output of the load cell into a digital signal. This digital signal can then be sent to a microcontroller that can calculate the exact weight of the sand. Next, an LED actuator is needed to implement the visual feedback to the user. This way the user can actually see the intensity of the light change.

## Playful Dynamic Idea #2

### Aesthetics

- **Sensation:** The action of shooting a light might be enjoyable to the user. Compared to a remote, it gives a sense of power. The light turning off provides quite strong visual feedback. The sensation of the interaction could be heightened by making the firing of the gun a more sensory experience (i.e. sound, recoil)
- **Challenge:** Through the inclusion of a timer and accuracy metric, the playful interaction becomes something one can master. Similar to a shooting range, people can become more accurate and faster over time. This creates an urge to master the interaction.

### Mechanics

- When the IR gun hits the light sensor in the lamp, the lamp gets turned off, this can provoke a user's interest as it creates a challenge or obstacle they have to overcome. Moreover, once this challenge is completed it could create a sense of gratification for overcoming a “difficult” task. Thus playing into the sensation the game could create for the user.
- The system keeps track of the accuracy of a shot. The lamp turns off quicker when the shot is more accurate (akin to a headshot). This gives the user an incentive to complete the challenge quickly and accurately.
- A timer measures the total time needed to turn off the lights; this could be implemented by having a holster. Once the gun is taken out from the holster the timer will start. This also plays into increasing the difficulty of the challenge, and thus making the reward more sensational.

### Dynamics

The mechanics and aesthetics described give rise to various dynamics. Due to the timer mechanic, users might try and turn off all the lights as quickly as they can. This helps create a challenging aesthetic. Furthermore, strategy might emerge from the timer mechanic, since players would want to turn off all the lamps as quickly as they can. They will have to consider what is the quickest path to turn off all the lights.

The ‘accuracy’ mechanic in combination with the timing mechanic provides an inherent tradeoff between speed/accuracy. Players will need to choose which one they prefer. To solidify this tradeoff, a points system could be used that combines speed and time. (similar to sports like Cross-country skiing). The aesthetic of a gun (as opposed to a magic wand for example) further solidifies this dynamic.

### Technical Implementation

Wireless communication needs to happen between the gun and the lamp to create the illusion of shooting. Further research needs to be done on which sensors are needed to create these desired interactions. Possible sensors/actuators include IR emitters/sensors, light sensors, voltage controllers, wireless communications devices (esp32), and a button for triggering the gun.

## Playful Dynamic Idea #3

### Aesthetics

- **Fantasy:** the lamp can be designed to look like any character, animal or a robot. Through the interaction of ‘feeding’ the lamp, the user (a child) can become attached to the object and even see it as a friend. This lamp promotes creativity and abstract thinking as the child can create a fantasy world that revolves around the lamp. This is a behavior seen in most kids, as they always create their own games and rules.
- **Narrative:** the lamp is ‘fed’ an amount of tokens and after a specific period of time it ‘poops’ the token out. The user then has to feed the lamp again.

### Mechanics

- Insert the token into the lamp and the light turns on.
- When the button is pressed, the lamp automatically turns off and ‘poops out’ all the tokens.
- When time is up, the light turns off and ‘poops out’ all the tokens.

### Dynamics

- The user inserts one token into the lamp’s ‘mouth’. Each token represents a specific amount of time(e.g. one token represents 30 minutes). If the user wants the lamp to be turned on for a longer period of time, they can insert more tokens.
- Once the time runs out, the lamp ‘poops’ the tokens out.
- The user takes the tokens and repeats the cycle.
- The user can also press a button if they want to turn off the light before the timer ends. When the button is pressed, the lamp ‘poops’ out all the tokens.

### Technical Implementation

In terms of components needed, we believe that the detection of the tokens could be accomplished using a pressure plate in the inside of the lamp. The pressure plate can measure the amount of tokens inserted in the lamp and then the software system of the lamp calculates the total amount of time until the tokens can be ‘pooped’ out again. If weight is detected on the pressure plate, an actuator will turn on the lamp. When time is finished an actuator will operate to open the door on the backside of the lamp, and the tokens will fall out.

An RTC (real-time clock) module could be used for the timer inside the lamp. The RTC can also show a countdown of the time, if the lamp has an LCD. Another option for implementing a timer is to use the delay function which is part of arduino. When the pressure plate senses the token, the  light is turned on and then the delay function starts which waits a set amount of time and then stops. For the lamp to ‘poop out’ the token, a motor could be used to push the token out.

# Chapter 3 - User testing I

In this chapter, one of the playful ideas of chapter 2 is chosen and various theories are applied to the game design. This way more detailed design decisions regarding the game design could be made. After this, a user test is conducted using the refined design proposal in order to collect feedback and insight on the experience of the playful interaction. At the end of the chapter, a renewed and more elaborated description of the technical implementation is given.

## Design Decisions

### Theory 1 - Stages of Interaction

An important part of designing for new interactive play is understanding what dynamic social circumstances the play takes place in. Based on the study of de Valk, et al. (2015), the second design proposal will be analyzed in order to achieve a better insight of how the design would fit the social context in which it is used.

Following the paper of de Valk and colleagues, there are three stages in which interaction with a playful design takes place over time. The Stages of Play model describes: (1) the invitation stage, (2) the explorations stage, and (3) the immersion stage. These stages are used to analyze the current design case.

#### *Invitation Stage*

The invitation stage presents the stage in which the potential users are intrigued by and attracted to the design. With the use of senses, expected feedback and feedforward as well as perceived affordances are elicited and potential possibilities of interaction with the play are communicated. If we implement this in our design, we can make the audience curious with the following approach: the lights of the gun can start to flicker as soon as an interaction should take place. For example, when the lamp operates as a wake up lamp, the lights start to flicker when the user is supposed to wake up and turn off the light. A small vibration could be implemented in the gun in order to also trigger the player via sound. Both these implementations can cause the player to intuitively pick up the gun. At the same time, the lights of the lamp can also start flashing, which insinuates that an interaction between the gun and the lamp must take place.

*Exploration Stage*

When the interaction with the design takes place, the user enters the exploration stage. In this stage the player explores the possibilities of interaction. Considering the shooting device resembles the shape and mechanics of a gun, the affordance of shooting is highly supported. In the exploration stage the user can start shooting with the device. Initially the play might shoot in any direction, but with the use of positive and negative feedback the play might begin to learn to aim at the lamp. For example, with the use of sounds the play can communicate a failed attempt and a successful attempt. The lamp may also show a certain color in line with the status of the attempt (i.e. red for failure and green for success).

*Immersion Stage*

Eventually, when the rules of the game are developed and the player follows the rule, the player enters the immersion stage. In this stage the player might experience a state of flow, in which the player is totally engaged in the game. From this stage, the player might still go back to the invitation or exploration stage when new possibilities of interactions are explored. However in this section we will not focus further on these possibilities.

This layered approach of analyzing the playful interaction not only helps us in understanding the interaction process, but also helps in achieving a better guidance of the players through the interaction process.

## Theory 2 - Forms of Play

Following the stages of interaction, another important theory that helps develop and have a better understanding of the design idea is the Forms of Play Theory. To analyze this, we use the paper by Bekker, et al. (2014), which evaluates and describes multiple forms of play, based on different social, emotional and cognitive dimensions, but also based on the different play contexts and behaviors.

Following this paper, three main forms of play are relevant to our game idea. These are: pretend play, games with rules and games with invented rules.

In pretend play, the user, in this case a small child, can play pretend when interacting with the lamp. The child can act out roles, pretending to be a policeman, thief, secret agent, and invent a game around the action of shooting to turn off the lamp. This develops creativity and abstract and representational thinking.

The game with rules is a form of play which refers to any kind of game played with fixed predetermined rules. For our idea, the “rules” of the interactive lamp are pretty straight forward: the player has to aim the gun at the lamp and shoot to turn it off.

Lastly, there are games with invented rules in which the player(s) can change and set invented rules by themselves. So, besides the main “rule” and objective of the lamp, the user can formulate new ways of playing. This develops abstract thinking. For example, with the use of a chronometer, the player can time how fast the lights get turned off, thus creating a more challenging way of interacting with the lamp.

The game is single player: one user turns off the lamp. However, it can also become player vs player, by modifying the initial rules and adding new ones. For example, the players can take turns to shoot and see who is fastest. It can become a team competition as well by forming teams and taking turns shooting. The team with the fastest total time wins.

### Theory 3 - Interaction Rules

In this section we discuss possible elements or rules that could be instituted to increase the appeal of the interaction. One possibility is increasing the auditory feedback the user receives, such as adding SFX or voice lines. For example when firing the gun it could make a SCI-FI like laser sound, or when you complete a gamemode the device could say “Good work soldier” or “Mission failed! You’ll get them next time” depending on how the user performed. Additionally by implementing togglable settings to the gamemodes, such as bomb diffusal mode, we could pull the user further into the interaction. In this “bomb diffusal mode”, the lamps could flash and create an auditory ticking sound that gets increasingly faster the longer the user takes to shoot the lamp. Thus, manipulating the time pressure to feel more dangerous to the user.

### Parameters of Time, Place & Action

#### *Time*

When is the game played? Originally, we envisioned our design as a playful way to turn off the lights after a work session. However, as we continued through the design process we discovered a secondary context our design could apply to. In this context, we see our game being played as more of an arcade game or activity to pass the time. We believe this works as our game allows users to compete against themselves or friends to get the fastest time, which we believe is an experience within itself.

#### *Place*

The place of the playful interaction might also change the interaction a bit. Originally it was imagined to be an office space, since there are a lot of lights to turn off. Additionally the product could be placed in the home, however we believe in this scenario it would see much more use. Potentially  allowing some of the novelty to wear off.

#### *Social action*

We believe the competitive element could make the interaction more social. It could serve as a kind of team bonding tool when applied in an office context. To further explore this, a cooperative element could also be ideated. Interesting dynamics might emerge when two players play on the same team and against each other. This is interesting in theory, but to further test this it would require the creation of a secondary gun prototype.

## User Test Findings

Upon entering the user test, the participants read a short description of it and were asked to give their consent to participate (see Appendix II.I).  Once the consent was provided, the participants were briefed about the design proposal in order to have a better feel of what the game would look like in real life. Next, the participants were able to experience the playful interaction with a Wizard of Oz version of the game. After this, the participants were asked to fill in an online survey (see Appendix II.II). In the survey, the participants fill in their demographic information and indicate their player experience regarding the game. For assessing the player experience, a selection of the player experience inventory was used. The selection was made based on item relevancy for the Wizard of Oz version of the game. In the end, the selection consisted of 22 items from the inventory, including 21 multiple choice questions and 1 open-ended question.

## Participants Data Summary

From the data gathered, it was discerned that the pool of testers only comprised male students between the ages 20 and 25. All participants followed different bachelors at the TUe, the bachelors differing between Psychology & Technology, Computer Science and Electrical Engineering. In total, three students participated in the user test.

## Findings and Recommendations

In the following section, the major findings and recommendations are detailed.

## Functional Consequences

Overall, the participants show to have experienced most of the constructs regarding the functional consequences of the game (see Figure 1). This can be concluded for the majority of their answers ranging from ‘slightly agree’ and ‘strongly agree’. The constructs that were experienced most were the Ease of Control of the game, followed by the  Goals and Rules of the game. The Progress Feedback of the game was experienced slightly less. This, however, was expected due to the simplicity of the user testing game. Participants experienced the Challenge of the as mediocre. Additionally, the participants were asked to give their opinion on their prefered Audiovisual Appeal of the game. One participant commented that they enjoyed the sound effect and the idea of having a weapon as a tool. Another participant commented that they ‘would like to have a semi-realistic control that is fun to interact with’. The last participant remarked that they prefered to have the game operate on sign language.

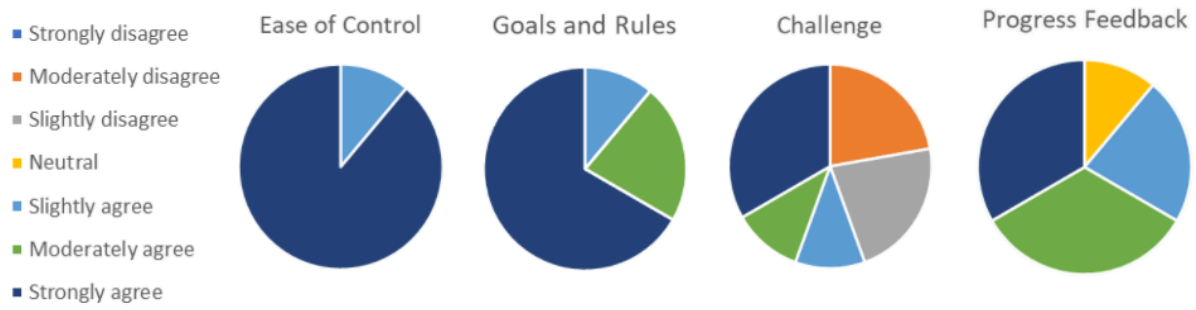



*Figure 2. Results Functional Consequences Player Experience Inventory*

In conclusion, the appearance of the game will not change. The game will still include a gun-like feature that users can operate to turn off the lights. Implementing the biometric feature would be too complex for the purpose of this course, and therefore we will not implement that into the design. Design decisions that emphasize the Progress Feedback and Challenge of the game are recommended to be incorporated into the design. For example, by having the game record the score and implementing visuals and sounds to communicate with the users about their progress.

### Psychosocial Consequences

From the data gathered regarding the psychosocial consequences, it becomes clear that the opinions diverge slightly more (see Figure 2). The Mastery and Immersion of the game were mostly by the participants. This can be concluded since the majority of their answers ranged between ‘Strongly agree’ and ‘Moderately agree’. Furthermore, the Meaning and Curiosity of the game were experienced slightly less. Both these constructs can be emphasized in the continued design proposal. Lastly, the Autonomy of the game was experienced very differently by the participants, with the answers ranging between ‘Moderately disagree’ and ‘Moderately agree’.

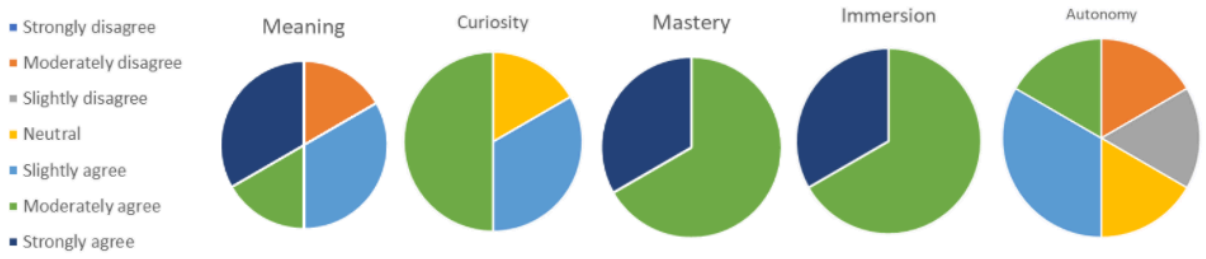



*Figure 3. Results Psychosocial Consequences Player Experience Inventory.*

In conclusion, the design proposal already includes a sufficient feeling of Mastery and Immersion (according to the data). The construction of the actual design proposal will integrate more complexity, thereby making it a more coherent play. A recommendation is to smoothen the coordination between the gun and the lamp, to create a clearer understanding for the user of what they are doing (i.e. implementing Progress Feedback). This will emphasize the Meaning and Curiosity of the game, but also the Autonomy of the game, since players will have a more clear idea of the choices they can make.

## First Setup Mechanics

After doing the user test and looking at the results gathered, the rules and mechanics of our game did not change. The rules of the game are simple: with the use of a gun, the player has to accurately aim at the light and “shoot” in order to turn the light off. A timer will then give the user feedback on how quickly they shot.

The mechanics of the game are the same as before:

- When the IR gun hits the light sensor in the lamp, the lamp gets turned off, this can provoke a user's interest as it creates a challenge or obstacle they have to overcome. Moreover, once this challenge is completed it could create a sense of gratification for overcoming a “difficult” task. Thus playing into the sensation the game could create for the user.
- The system keeps track of the accuracy of a shot. The lamp turns off quicker when the shot is more accurate (akin to a headshot). This gives the user an incentive to complete the challenge quickly and accurately.
- A timer measures the total time needed to turn off the lights; this could be implemented by having a holster. Once the gun is taken out from the holster the timer will start. This also plays into increasing the difficulty of the challenge, and thus making the reward more sensational.

## Technical Implementation

For the technical implementation of the design, a few things need to be done. First and foremost we need to purchase components to build the circuits for each lamp and the gun. The following list summarizes the components needed:

- 3x ESP-32 Arduino microcontrollers
- Buzzer for auditory feedback
- OLED Screen for timer
- Laser sensor
- Eye-safe low power laser emitter
- 3D printed or foam core housing for the gun
- 2x 3D printed or foam core housing for the lamp
- Button to act as a trigger
- 2x LED's to represent the lightbulb in each lamp prototype

Next we needed to properly wire all the components to each microcontroller so that nothing was receiving too little or too much voltage. This part proved problematic as we lacked an electrical engineer in our group. However, through the use of the internet we found many guides and tutorials on how to use resistors to drop the voltage to a level that is safe for our components.

Now confident that we would not damage any of our components by supplying too much power, we were ready to move onto the programming of the microcontrollers. The code for turning off and on the LED's and turning off and on the laser emitter was quite straightforward. It was as simple as checking whether the laser sensor was receiving a signal or not and then using that information to supply or not supply power to the LED. Then, for the laser emitter, we simply checked if the button was being pressed or not, and then correspondingly supplied power to the laser emitter or not.

The more difficult part of the programming phase was getting the lamps and gun to communicate between each other. This was essential because we needed to relay information from the lamps to the gun in order to implement the timer. Fortunately, a professor at TU/e developed a server/client called OOCSI. This made the process a lot less burdensome as we did not have to deal with any of the backend of our server. We just needed to host a Wi-Fi network off one of our phones, then connect a laptop to said network, and run the OOCSI jar file, in turn creating a server on the Wi-Fi network that is reachable at said laptop's IP address. Then, we could connect all three ESP's to that same Wi-Fi network and inform them of the laptops IP address. The rest was very straightforward as OOCSI has built-in functions that allow you to send and receive variables through the server.

*Figure 4. Prototyping of the laser and sensor.*

# Chapter 4 - Concept Refinement

In this chapter, the design decisions of chapter 3 are implemented and the design concept is refined. The playful interaction is explored further using design for varying numbers of users, more than one object and designing for different stages of interaction de Valk, et al. (2015).

## Refined Description of the Game Design

Our main purpose with the game is to make use of an existing object and integrate it into a playful interaction that the users can experience. For this, we decided to turn the “boring” remote of a lamp into a fun and engaging game.

The concept is as follows: the users use a gun-like remote to turn the lights off in a playful way. Initially, this action was seen as a satisfying “ending ritual” (e.g. user “shoots” to turn light off after finishing homework), which gave the user a feeling of achievement, similar to ticking an item off of the to-do list. The playful experience has since expanded past this simple concept, such that the user can interact with the lamp in a more challenging and interactive way. For this, we designed four different “game modes” that the user can play.

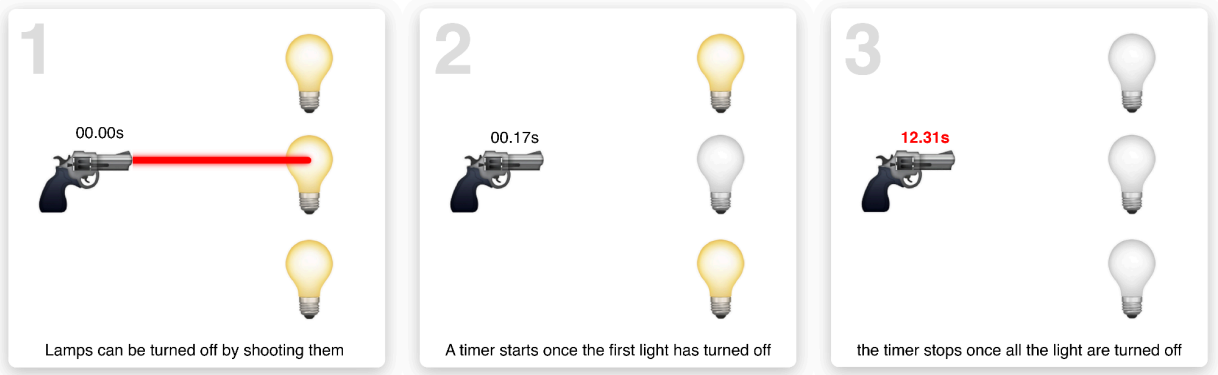



*Figure 5. Visual overview of the game’s core mechanic*

### Increasing Play Time

One issue that arises with the original concept is that shooting all the lamps in an average room might lead to a quite short interaction. To counteract this, lamps could turn back on after a period of time, in a random order. This helps increase the playtime drastically and gives new possibilities of interaction with the lamps. In this case, play time is decoupled from the amount of lamps, and could be coupled to either a set amount of time (i.e. hit as many targets within 60 seconds), or to a set amount of targets (i.e. hit 10 targets in the quickest amount of time).

### Movable Targets

The next design concept is to implement movable targets, the player being able to detach the lamp from its stand and move it to a different location. This “game mode” creates a completely different experience than the ones described above. In the case of multiple players, this can be seen as a tactical game, where players have to place lamps strategically such that they are at a perceived advantage.

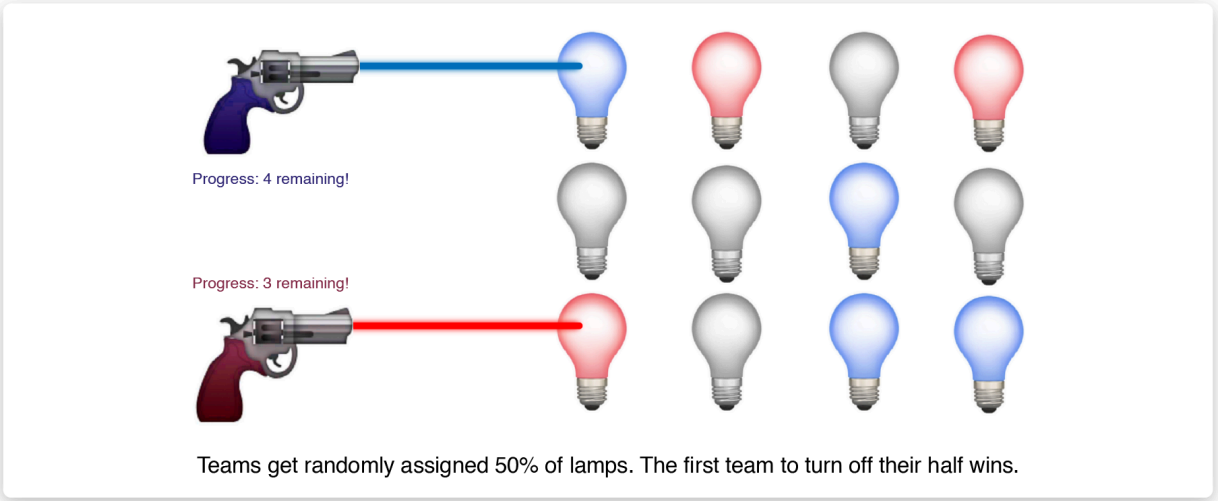
### Multiplayer Experiences

The initial idea was intended for one player that shoots to turn off one or more lamps. Incorporating multiple player possibilities in our game helps create a better experience. For this, multiple guns and lamps are needed. We have designed two sets of rules for accommodating multiple players. These ideas are as follows.

#### *Versus Mode*

The first idea represents the versus mode. For this concept, each player has a gun with a different unique color, corresponding to multiple lamps of the same color. The players then try to shoot/turn off all their lamps as fast as possible.

*Figure 6. Visual overview of the 'versus mode'*




#### *Conquest Mode*

The second idea for a multiplayer experience is the "conquest mode". In this gameplay, players are divided into two teams (or more depending on the number of players). Each team has a corresponding color for their gun and lamps, and has an equal percentage of the lamps colored in their respective colors (e.g. if two teams are playing, red vs. blue, 50% of the lamps are red, while the remaining 50% are blue). Then, the teams try to turn all the lights into their color. Whichever team has managed to color all the lights wins.

Another way of playing "conquest mode" is to start a timer at the beginning of the game. Whoever has the higher percentage of lights when the timer runs out wins the game. This way the players have to protect the current lamps they have and try to "steal" the lamps from the opposing team (similar to Team Tail Tag game from Fall Guys).

## Final Design Decisions

From the essay assignment, and the findings, we can conclude that the versus mode is an essential feature to improve the user experience. The versus mode enhances not only the psychological needs, giving the user a better sense of relatedness and presence, but also improves the social interaction between the users. Furthermore, adding the versus mode allows for more freedom for the players, allowing them to explore the game and also create their own rules, but there is also more freedom as to where to locate the game (i.e., at home or in a public

space). The conquest mode is somewhat an extension of the versus mode, giving the user a suggestion of how they can play and interact differently with the game. From the analysis, it was also found that the movable targets feature of the game limited the freedom in location of the game and was not as relevant for the game as first thought. Therefore, it was decided to leave this feature out of the game.

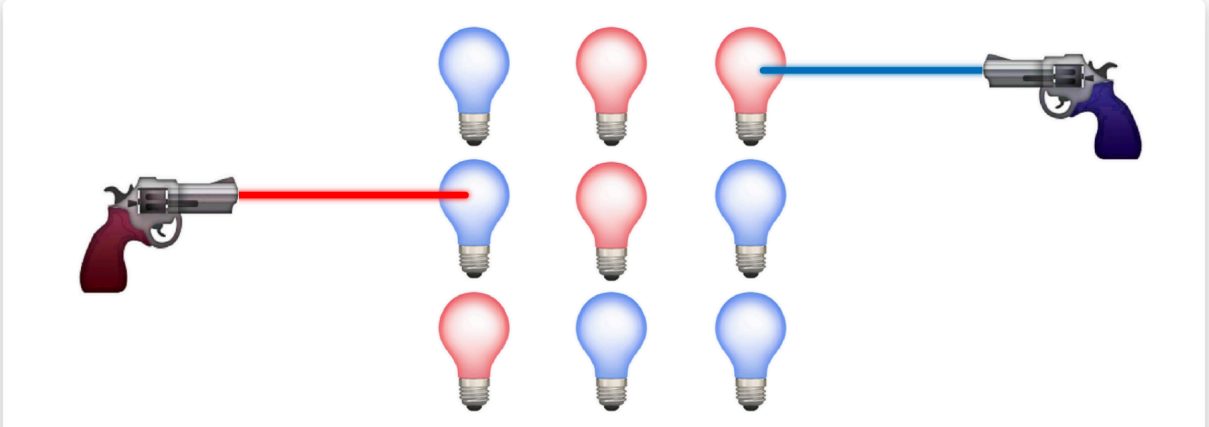
In a separate essay assignment, we evaluated our designs' psychological needs and asserted ties to autonomy, relatedness, competence and presence. We established that the physical play setting and the progress feedback currently allow for a higher social presence during the player interaction. A higher social presence subsequently also ensures a higher feeling of enjoyment for the player in the game. Finally we concluded that the expressive effects of the game allow for a big sphere of engagement. By making the manipulations and effects as clear as possible, bystanders can be converted to new players through observation of the gameplay.

## Refined: Stages of Interaction

From here, a more detailed user scenario was depicted according to the three stages of playful interaction by de Valk, et al. (2015). The scenario entails the single player mode in which the duration of the game is increased (game mode 1).

For the invitation stage, the shape of the gun incentivizes the player to pick up the gun. After this the player enters the exploration stage. Due to the shape of the gun, the player will be curious to press the trigger. In an ideal situation, it would be valuable to add additional features to this. For example, when the player picks up the gun, the lights of the lamp can start blinking or changing colors, in order to communicate to the player that a possible interaction can take place. However, due to the limited time and resources available we will not implement this in the prototype. After the player pulls the trigger, the timer on the gun goes off. The player will now know that the following action needs to take place. The player will continue to explore the possible interactions of the game, by pulling the trigger multiple times. If the player presses the trigger for a second time, the player will receive feedback: the gun vibrates and depending on if the player hits the target, the lamp will turn off. After this another lamp (or the same) turns on. The player now enters the immersion stage. The player now knows the rules and realizes they will have to shoot the lights off, similar to a fast reaction game. After all the targets have been hit, all the lights will blink and turn off and the timer stops. The player can now see their score in the game. In the next interaction, the player can try to improve their score.

*Figure 7. Visual overview of the 'conquest mode'*



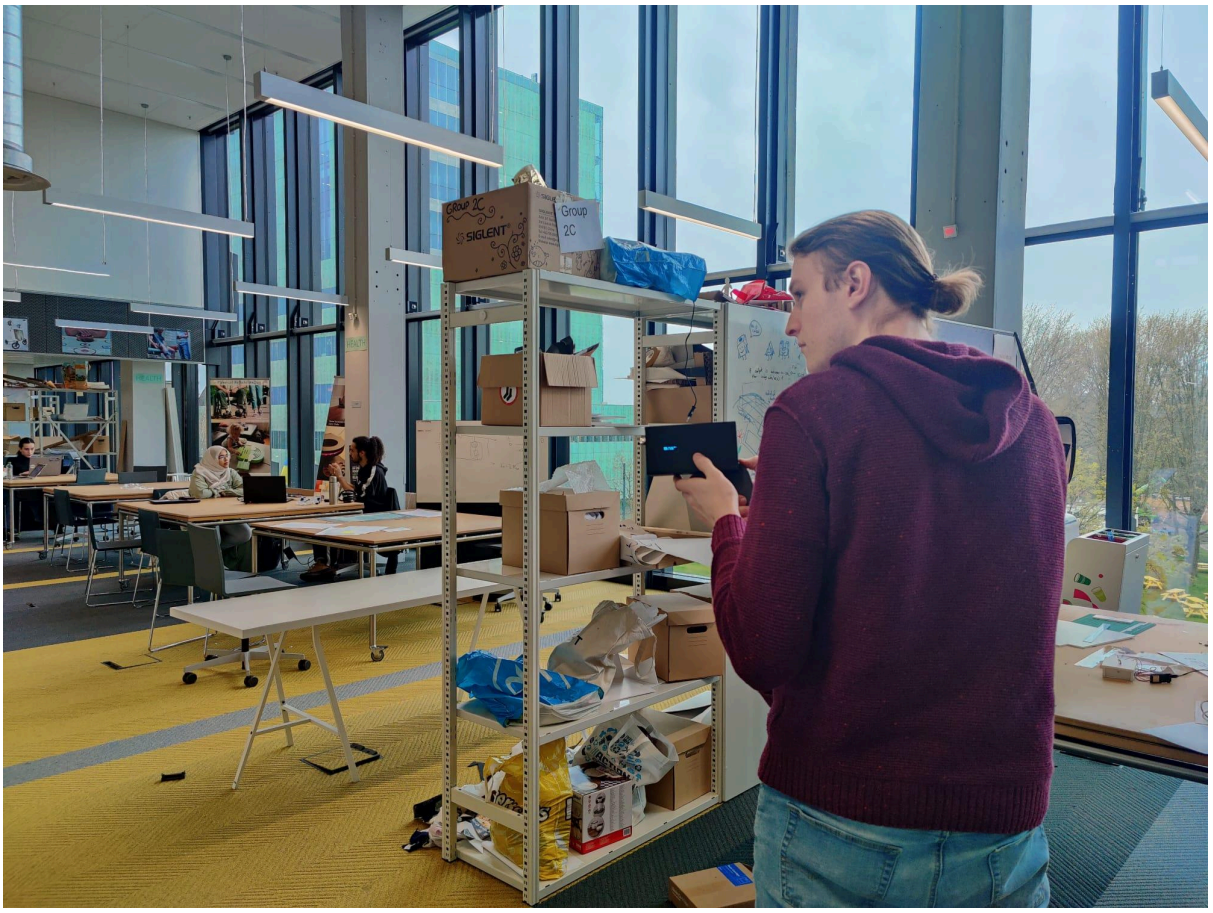
Players try to 'conquer' as many lamps before time runs out. The team with most lamps in their color wins.

# Chapter 5 - User Test II

## Procedure and measurements

For the second user test, the participants recruited were not only from the course Design for Games and Play III DZC30, but also friends outside the course. This was done so that we gathered feedback from different perspectives. As per the first user test, the participants read a short description of the procedure and were asked to give their consent in order to participate (see Appendix II.I). Once the consent was provided, the participants were asked to fill in an online survey (see Appendix II.III). The survey contained 4 sections, one for each game mode of the game. In each section, the participants were asked a total of 8 linear scale (answer from 1 to 5) questions and one open-ended question. The participants also had the possibility to interact with the game (see Figure 8).

*Figure 8. Example of person interacting with the game prototype.*




## User Test Findings

In this section, the findings of the survey are described and analyzed. In total we have gathered 6 responses from various students. The participants were asked a series of questions, such as how fun each game mode is, how clear are the rules and objectives, how often they would play the game and if they would inform people about it. The questions are based on a linear scale, with answers from 1 to 5, 1 representing strongly disagree and 5 strongly agree.

Overall, the results of the survey are positive and show a great interest in the different game modes. From the results we can conclude that the “versus mode” is considered the most entertaining, as 66.7% of the participants picked 5 and the rest 33.3% picked 4 when asked “How fun do you think this idea is?”. The rules and objectives of the different modes were also well explained, as the majority of participants voted 4 or 5 at the respective questions.

The following are some of the other important findings from the survey:

- “Conquest mode” is the mode participants would least recommend, with one vote not recommending it (16.7%).
- “Conquest mode” is the game that would be played most often, with 50% of the participants voting 5 on this respective question.
- “Versus” and “conquest mode” are considered the most challenging modes, with 83.4% of people voting in agreement.

Besides these questions, the participants also had to complete an open-ended question which asked if there are any possible improvements for each mode. Some of the feedback received specified that the gun was difficult to control, as the laser was flashing. Therefore, improving this would allow for better aiming. Another suggestion was to add a sound when the lamp gets turned off, in order to have auditory feedback. A participant proposed that the lamps of the other players could be turned back on in “versus mode” thus making the game more challenging.

## Reflection and Discussion

Through the feedback obtained, we can conclude that the game is seen as a fun and innovative way of interacting with a lamp. Having come up with different game modes for the game was highly appreciated as it gives more opportunities to play. Lastly, the game could be improved by adding more audiovisual feedback.

# Conclusion

The step-by-step design process ensured that our initial idea was quickly expanded to a well-considered game proposal. The application of the play theories shaped the design process as each theory brought a new perspective on the construct of the game proposal. Whereas the initial idea was rather broad, the application of the play theories compelled us to think further about what a possible user scenario could look like, what choices we have to make and why we have to make those choices. This way, a more detailed description of the game proposal could also be presented to the participants during the first user test to receive as much useful feedback as possible.

From the data of the user test and the applications of the play theories the final game prototype was built (see Figure 9). The prototype was created to resemble a simplified version within the ‘Increasing Play Time’ mode, where a single player has to shoot off two lamps (i.e. targets) as fast as possible. Once the player pushes the button on the gun, the time starts running. As soon as both targets are off the time stops and the duration time is displayed on a screen on the gun (see Figure 9). The following rules were implemented to ensure the prototype resembled an ideal version of the game more: (1) the player has to reach the goal within 60 seconds and (2) the laser is visible in pulses (this way the feeling of a real gun with bullets is replaced more).

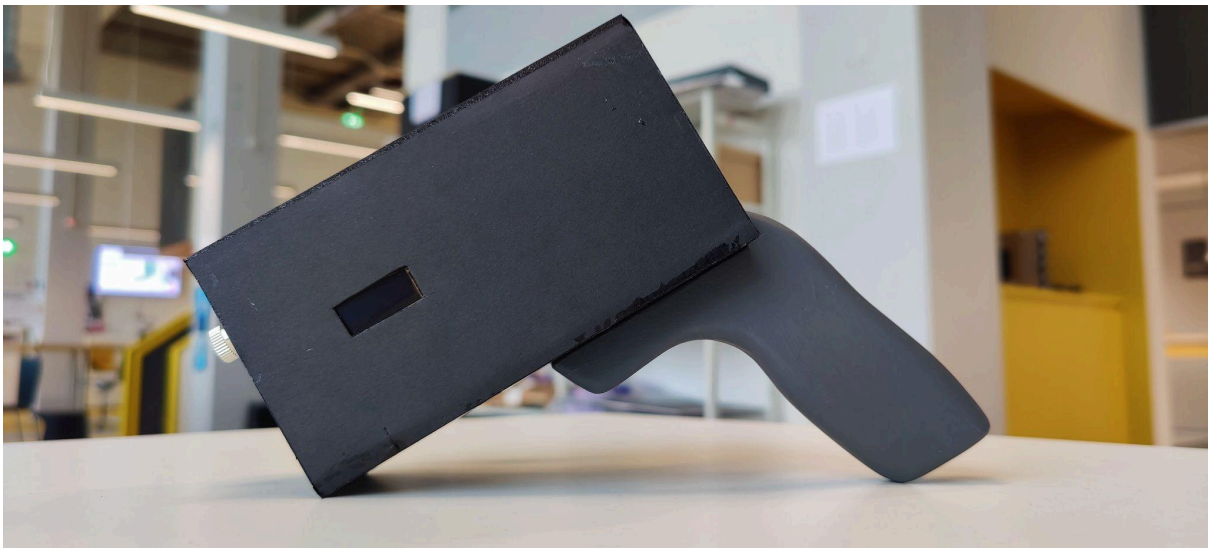
The prototype was presented during the demonstration session on campus. During this session, we immediately noticed that our game was popular among our classmates as more and more

people joined our table. We set up a leaderboard with time scores of the game play and soon plenty of classmates were very eager to set the best time. The classmates that interacted with our prototype were given the chance to provide us with feedback. In total 15 users shared their feedback with us via a sticky note. Overall, the users of our game prototype thought that the idea was original and that the prototype was fun and well-constructed. In their opinion, the playfulness of the game, especially the competence experience and user spectator relation, was established very well. Furthermore, the time tracker was well reviewed as it encouraged the element of challenge in the game. The main tips were related to the physical appearance of the game. For example, several users would have liked it better if the target were bigger, or the laser was brighter. Some users prefer a reset button and/or a trigger on the gun, sounds in the gun or a scoreboard on the screen of the gun. Furthermore, it was mentioned that the game could be improved by implementing open-ending game play, which is to say that there is a need to design the game for differences in interaction (or in different contexts).

From this feedback, as well as the data collected from the second user test, we concluded that there is great interest in the game concept. A suitable future step would be to choose one of the modes (versus mode or conquest mode) and to develop a game design for that specific mode further. With a bigger time frame and a bigger budget, the game design can be enriched with more feedback, such as bigger targets, colored lights and the implementation of vibration, and sounds in the gun. The scoreboard could also be elaborated by displaying previous scores or the overall high score as well. The operation of the game rules can be improved for a next prototype, so that we can have lights turning on again after they have been shot off or having a target be shot multiple times before it finally turns off. Furthermore, it would be interesting to conduct further research into the different contexts of the game design. We have explored the different modes of interaction, but paid less attention to the design for different contexts. In the future we could look more closely at which modes would fit in which context, but also at which contexts our game could appear as well.

In conclusion, we are satisfied with the prototype we have made and the positive feedback we received about it.  In our opinion, the game has a lot of potential, but next steps need to be well-considered. More research will have to be done on the contexts of our game and further prototypes should be built in order to gain more insight in the user experience of the different modes we developed.

*Figure 9. The Laser Lamp gun*



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# Appendices

## Appendix I : Individual Reflections

### Individual Reflection - Adriana Radu

The main learning objectives of this course were to be able to analyze existing playful applications using theories, such that we can apply the learned design methodologies and design, build and program a playful interaction. At the end of the course, we managed to successfully apply all the studied theories and papers and create a very engaging experience that people enjoyed interacting with at the final presentation.

Having taken the previous two courses from this package helped me in some sense, as I had learned about some of the theories in those courses. This also helped me have an overall idea of how this course was going to be. Still, the course was very differently structured and the learning process was different than the other courses. In the beginning I found it a bit hard to fully understand and come up with ideas for playful interactions, but as the course progressed we managed to develop our idea into something better than I had imagined. Performing user tests was also something quite new to me, but I enjoyed learning the correct way of performing one and shaping the design process such that it matches the suggestions.

As for the team work, I believe that our group dynamic was very good and we managed to collaborate well. Having a multidisciplinary group was crucial as the course required different skill sets. Through the course, we managed to combine our knowledge and learn from each other. The communication in the group went well, we had no problem in arranging meetings and discussing the assignments. Moreover, we had no problems dividing tasks and everyone worked equally.

### Individual Reflection - Charlie Mitchiner

Going into this course I expected a similar structure to the previous two courses, with half the course focusing on theory and the other half on implementation. I am personally a hands-on learner and really enjoyed making computer games, however I was pleasantly surprised with the outcome of this course. I realized that by learning the theory behind how to develop games I actually grew a greater appreciation for the topic, moreover expanding my knowledge of MDA was one of my favorite parts of the course. I also enjoyed the structure as it led us to making smart decisions and creating a product I am genuinely proud of. Additionally, my extensive background in soldering, arduinos, and programming also played a role in developing such a playful product.

One struggle we faced were the time constraints. We really wanted to make our experience as good as we imagined, but struggled to get every last detail done in time. Subsequently, our design actually did extremely well during the presentations, many people stood in line to try and beat each other's scores. This helped me realize that it isn't solely the way things are implemented that makes them playful, but the theory behind the design is what truly fuels the interaction. While I've always had a passion for computer science and engineering I also love sociology and psychology. Thus my expectations were exceeded when I discovered we would be doing user tests and analyzing them. Thanks to my group mate Latisha, a psychology and technology major, I got to dive a bit deeper into the psychology behind the user tests and properly use the outcomes to adjust our design.

Overall, I enjoyed every aspect of this course, even more so than previous renditions. I believe my group also played a large role in my enjoyment of the course. Everyone was eager to participate and contribute their unique skill set. Another positive aspect of our group was everyone was always on the same page which made it extremely easy to agree on decisions. One thing that could be improved was our organization, we had a really laid back structure to our group and tended to finish deadlines at the last minute. Despite our exemplary grades, it would have been less stressful to be a bit more organized.

### Individual Reflection - Latisha Boor

During the course the main learning objectives were to be able to analyze playful applications with the use of play theory, to explain and apply design methodologies, to design, build and program, to plan, execute and interpret and to apply one's own capabilities in the team project. Due to my background in Psychology and Technology I could easily show my added value in the group in analyzing papers and carefully documenting the analyses in the report. I also had sufficient experience in conducting user tests so I was able to share my knowledge in building informed consent forms and reporting the findings. I find myself to be quite the organized person, so I took the organizational role on me to make sure the assignments were handed in on time and make sure the progress of the group was communicated clearly. During the project I was bothered by my lack of knowledge in the technical implementation of the game design. I tried to compensate for this by contributing in the design and vision of the game. Because building the vision and design concept was done in a multidisciplinary team, therefore I still felt like I have learned a lot regarding the development of a tactile playful interaction. In the future I would like to start programming earlier so I can have more meetings with the group where I can learn from the people with more programming experience.

Overall, the collaboration between all team members went well. I feel like all members contributed equally during the project. In the beginning I knew that the communication in the group would be very important since some members had more experience in certain areas than others. However, sometimes I still struggled keeping track of what was going on. In the future I would therefore prepare myself better during the meetings, to make them more efficient and to get the most information out of them. This way, my leadership skills can be accomplished better as well.

### Individual Reflection - Mats Erdkamp

Game Design III was a nice change of pace compared to the first two courses in the series. As an industrial designer, I focus on designing physical products. This course has given me great insights in how to apply research originally meant for games (MDA, etc..) in other design contexts. My learning goal was to use the provided frameworks to design better games, but the usefulness of the tools provided reaches far beyond just playful interactions. Even within my current ID design project. I am very proud of the final demonstrator, and I think that the amount of use the prototype saw during the demo day shows that people quite liked our idea. I would've really liked to have the more advanced game modes included as well, but that was simply not achievable within the timeframe. In future projects I will try to better estimate the time needed for technological realization.

As far as the group goes, I think that the collaboration between team members was very streamlined. Everybody contributed where they could, and all members played to their strengths. The group got along quite well, which resulted in quick, fun, and streamlined meetings. The organizational skills of the team members definitely helped the design process

quite a lot. But, in the last week before the demo day, Charlie and I were very involved with the creation of the prototype. The time crunch led to a lack of communication towards other team members, obfuscating what we were actually doing. This could definitely be improved upon in further projects.

I have found the papers discussed within this course to be of great use. So, even if I don't end up making (video) games, this series of courses has taught me a lot of tricks that can be applied within the broader context of design. Furthermore, I am very grateful for these courses since they rekindled my love for game design; I used to design games when I was twelve, and these courses have shown me how fun it (still) is!

# Appendix II : User Test Resources

## Appendix II.I: Informed Consent Form

### Consent Form

**Title:** DZC30 Design for Games & Play III; Playful Interactions User Test

**Supervisor:** Max Birk, Assistant Professor, Department of Industrial Design, Eindhoven University of Technology, m.v.birk@tue.nl, +49 174 750 52 45
**Researcher(s):** Mats Erdkamp, Master Student, Eindhoven University of Technology, m.w.g.erdkamp@student.tue.nl, Latisha Boor, Bachelor Student, Eindhoven University of Technology, l.a.m.boor@student.tue.nl, Adriana Radu, Bachelor Student, Eindhoven University of Technology, a.radu@student.tue.nl, Charlie Mitchiner, Bachelor Student, Eindhoven University of Technology, c.l.mitchiner@student.tue.nl

**Purpose(s) and Objective(s) of the Research:** The purpose of the research is to improve interaction experiences with playful objects. Our objectives are to observe how users interact with the presented playful object and gain insights into the user's experience.

**Procedures:**
1. The context of the playful experience is explained.
2. You will be asked to engage with a playful object.
3. We will observe your behaviour
4. You will be asked to fill in several questions about your experience

**Funded by:** -

**Potential Risks and Benefits:**
There are no known or anticipated risks to you by participating in this research. Your participation will help the education of students and improve the quality of their work.

**Confidentiality**:
- Confidentiality will be maintained throughout the study. The entire process and data will be anonymized. Data will only be presented in the aggregate and any individual user comments will be anonymized prior to presentation in class.
- Only the researcher will have access to the data to ensure that your confidentiality is protected.

**Video data, audio data, and pictures:** With your permission, we would like to record videos, audio and take pictures during the study. The video material will be used to analyse behaviour and draw conclusions about how to improve the current prototype. The audio would be used to further analyse user comments and interview data. Pictures are used to document and report the study. Please indicate if we are allowed to record video/audio/pictures and if the material can be presented in the course:

| | **Be recorded** | | | **Be used for presentations in the course** | |
|---|---|---|---|---|---|
| **Video**: | Yes [ ] | No [ ] | \| | Yes [ ] | No [ ] |
| **Audio:** | Yes [ ] | No [ ] | \| | Yes [ ] | No [ ] |
| **Pictures:** | Yes [ ] | No [ ] | \| | Yes [ ] | No [ ] |

**Storage of Data:**
- Data (including survey and interview responses, logs of computer use, and videos of interaction) will be stored on a secure password-protected server until 6 month after the end of the course and then destroyed.

**Right to Withdraw:**

- Your participation is voluntary. You may withdraw from the research project for any reason, at any time without explanation.
- Should you wish to withdraw, you may do so at any point, and we will not use your data; we will destroy all records of your data.
- Your right to withdraw data from the study will apply until the data have been aggregated (one week after study completion). After this date, it is possible that some form of research dissemination will have already occurred and it may not be possible to withdraw your data

**Follow up:**

To obtain results from the study, please contact Max Birk (m.v.birk@tue.nl)

**Questions or Concerns:**

- Contact the researcher(s) using the information at the top.
- This research project has been approved on ethical grounds by the Eindhoven University of Technology Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office, ethics@tue.nl, +31 40 - 247 6259.

_____ _____

Date, place Signature

## Appendix II.II: Online Questionnaire User Test I

*Demographics*

1. What is your age group?
    a. 17-19
    b. 20-22
    c. 23-25
    d. 26-28 >28
2. Gender
    a. Woman
    b. Man
    c. Non-binary
    d. Prefer not to say
3. Current education? (Bachelor/Master in ...)
    a. [open question]

*Player Experience Inventory*

Reflect on your play experiences and rate your agreement with the following statements: *

| | Strongly disagree | Moderately disagree | Slightly disagree | Neutral | Slightly agree | Moderately agree | Strongly agree |
|---|---|---|---|---|---|---|---|
| The game gave clear feedback on my progress towards the goals | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| The game was not too easy and not too hard to play | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| I was immersed in the game | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| I felt eager to discover how the game continued | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| I thought the game was easy to control | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| I grasped the overall goal of the game | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| I felt I was good at playing this game | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| I understood the objectives of the game | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| I felt free to play the game in my own way | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| I could easily assess how I was performing in the game | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| I felt a sense of mastery playing this game | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| I felt a sense of freedom about how I wanted to play this game | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| I wanted to explore how the game evolved | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| The goals of the game were clear to me | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| It was easy to know how to perform actions in the game | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| The game was challenging but not too challenging | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| The actions to control the game were clear to me | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| The challenges in the game were at the right level of difficulty for me | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| The game felt relevant to me | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Playing the game was meaningful to me | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| The game informed me of my progress in the game | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

I would appreciate the look and feel of the game if it was designed like this: *

# Appendix II.III: Questionnaire User Test II

## User testing

Main concept:
For our project, the object we picked was lamp. In order to create a playful interaction with this object, we decided to turn the boring remote of a lamp into a fun and engaging game. The main concept is as follows: the users use a gun-like remote to turn the lights off in a playful way. In order to make it more challenging and fun, a timer is implemented to track how fast the user aims and shoots/turns off the lamp.

Further developing this idea, we thought a great enhancement to our game would be to have an increased play time. This can be achieved by having multiple lamps. The user then shoots the lamps off one by one but, there is a twist. To make it even more fun, the lamps randomly turn back on after a while, similar to reflex games used to practice certain sports. There could be 2 game rules for this concept:
1. Player wins when they hit a set threshold value (e.g. hit 8 lamps in the span of 60 seconds).
2. Player tracks their speed and reaction time (e.g player took 74 seconds to hit 8 lamps).

*Vereist

1. How fun do you think this idea is? *

Markeer slechts één ovaal.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

2. How clear are the rules of the game mode? *

Markeer slechts één ovaal.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

3. How clear is the overall objective of the game mode? *

Markeer slechts één ovaal.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

4. How challenging do you think this game is? *

Markeer slechts één ovaal.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

5. How interested would you be in playing this game? *

Markeer slechts één ovaal.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

6. How often would you play this game mode? *

Markeer slechts één ovaal.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| not too often | ◯ | ◯ | ◯ | ◯ | ◯ | very often |

7. How long would you like the interaction to be? *

Markeer slechts één ovaal.

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| very short | ◯ | ◯ | ◯ | ◯ | ◯ | very long |

8. Would you tell people about this game? *

Markeer slechts één ovaal.

- ◯ Yes
- ◯ No

9. Is there anything you would change to this game mode? *

## Movable targets

Another concept improvement is to have movable targets. This way the player can detach the lamp from its stand and place it in a different location.
This creates a new dynamic where players have to tactically choose the exact location of their lamps in order to have an advantage. Whoever manages to turn off the oponent's lights first wins. This is similar to a hide and seek game where whoever has the best hiding location wins.

10. How fun do you think this idea is? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

11. How clear are the rules of the game mode? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

12. How clear is the overall objective of the game mode? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

13. How challenging do you think this game is? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

14. How interested would you be in playing this game? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

15. How often would you play this game mode? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| not too often | ◯ | ◯ | ◯ | ◯ | ◯ | very often |

16. How long would you like the interaction to be? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| very short | ◯ | ◯ | ◯ | ◯ | ◯ | very long |

17. Would you tell people about this game? *

*Markeer slechts één ovaal.*

- ◯ Yes
- ◯ No

18. Is there anything you would change to this game mode? *

## Versus Mode

This is the perfect mode for a large group of players. Each player has their own gun with a unique color and multiple lamps of the same color. The players try to shoot their corresponding lamps as fast as possible. Whoever turns off all their lamps first wins.

19. How fun do you think this idea is? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

20. How clear are the rules of the game mode? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

21. How clear is the overall objective of the game mode? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

22. How challenging do you think this game is? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

23. How interested would you be in playing this game? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

24. How often would you play this game mode? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| not too often | ◯ | ◯ | ◯ | ◯ | ◯ | very often |

25. How long would you like the interaction to be? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| very short | ◯ | ◯ | ◯ | ◯ | ◯ | very long |

26. Would you tell people about this game? *

*Markeer slechts één ovaal.*

- ◯ Yes
- ◯ No

27. Is there anything you would change to this game mode? *

Conquest Mode

This game mode is similar to Domination in Call of Duty. The players split into equal teams, each team having a respective color. In the begining of the game each team has an equal percentage of the lamps in their color (e.g. if there are 2 teams, red vs blue, 50% of the lights are red and the other 50% are blue). The game then begins and each team has to try and turn all the lights into their respective color but also "protect" their lamps. The game can end in 2 ways:
1. Whichever team has 100% of the lamps in their color wins.
2. The teams have a set amount of time to play. When the timer runs out whoever has the highest percentage of the lamps in their color wins (e.g. 2 teams red vs blue; if 65% of lamps are red and 35% are blue then team red wins).

28. How fun do you think this idea is? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

29. How clear are the rules of the game mode? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

30. How clear is the overall objective of the game mode? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

31. How challenging do you think this game is? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

32. How interested would you be in playing this game? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| strongly disagree | ◯ | ◯ | ◯ | ◯ | ◯ | strongly agree |

33. How often would you play this game mode? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| not too often | ◯ | ◯ | ◯ | ◯ | ◯ | very often |

34. How long would you like the interaction to be? *

*Markeer slechts één ovaal.*

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| very short | ◯ | ◯ | ◯ | ◯ | ◯ | very long |

35. Would you tell people about this game? *

*Markeer slechts één ovaal.*

- ◯ Yes
- ◯ No

36. Is there anything you would change to this game mode? *