Design document - iOS/Freaky Friday

◆ GLASSES

Ready for the impossible.

Rick van Wijk, Marco Ketelaars,

Angel Hadzhiev, Raymond Hildering

Contents

Project focus

Apple will release Apple Glasses within the next couple of years. With these glasses users can experience augmented reality. This provides a ton of opportunities. Thus far, augmented reality is mostly used in combination with smartphones. With Apple Glasses, augmented reality is applied so that you can get information right in front of your eyes, and it provides a handsfree experience.

Our focus is to come up with new ideas/concepts on how the Apple Glasses can help people. The glasses could help improve an experience or speeding up certain processes.

Concepting

The project started off by coming up with concepts that use the Apple Glasses to improve something. This could be improving an experience or speeding up certain processes.

Concepts

Garden

For most people it's hard to imagine how their new garden will look like. In their heads they have some idea, but they would rather make some kind of sketch to visualize it for themselves. This app allows gardeners to plan how their garden is going to look like with the help of Apple Glasses.

Through the glasses you can see your garden. You can add plants, trees and many more objects for your garden by using drag & drop air gestures. You can simulate shadow and weather conditions by selecting this in the menu so that you can see what your garden looks like under different conditions e.g., what does the garden look like during the winter, what does the garden look like at 9 am when there is a lot of shade. Perhaps there will be shade on the terrace, because of a tree you have placed in your design.

User Interaction:
- Air/touchless gestures

Core features:
- Drag and drop 3d objects
- Select/draw area to fill it with 3d objects
- Simulate shadow and lighting of the garden or specific objects
- Simulate weather conditions
- See animations of objects (e.g. plants blowing in the wind)

https://www.connected-garden.com/homeen

Remote Game

In the last 2 years, Covid has stopped many people from spending their time with friends and family. That is especially true for children who cannot meet their friends to play together. This has led to increased time spent on computers and mobile phones. As much as this is a problem, this can also be good.
One way to use technology to help children and people in general is AR. AR has already been used for games, but it is often a game that is not played by people at the same time (multiplayer). Even in those games that people can play in multiplayer they usually only compare statistics in a leaderboard rather than sharing game time together.

Making a remote AR game where multiple people can play together while one of them uses AR to create obstacles/challenges etc. is a concrete solution of using AR for the creation of game.

Treasure hunt

Problem: kids getting bored from online classes during the Covid epidemic
Main question: How can we motivate kids to get educated during the Covid epidemic?

Solution
A treasure hunt with augmented reality where people need to find clues to discover what the next location is. On that location there is another clue etc. etc. The person that finds the final location (the treasure) the fastest wins.
Type of clues

- Hotter – Colder: On the display the game continuously tells you if the direction you're going is hot or cold. Activating this after a set amount of time could be a way to make sure people don't get stuck.
- Singular clue at previous location: A sound or a visual indicator that can be viewed in AR that leads to the next location. Ideally these indicators are related to the location they are in.
- Sound based: You can hear a sound coming from the direction of the next location.
- Follow the tracks: there are indicators interspersed between locations that you must follow to get to the next. These would be annoying on a phone but with glasses it becomes more natural to look for these.

These clues can be combined like a clue at the location that leads you to the general area of the next location but when you get close there are smaller directional clues to the exact location. Because its not clear when clues will start appear one needs to look at the world with AR constantly. With a phone this would be annoying and sometimes dangerous (Pokemon Go has seen issues in this regard as well) but with glasses you can just keep them on during the whole game.

Board game
Chess example: Sit down at a table and a chess board is placed in front of you. Could play AI or an opponent placed on the other side of the table. Glasses allows the user to comfortable play for longer times and actually move the pieces themselves. Holding the phone for a long time would be very uncomfortable and could be inconvenient when moving pieces.
https://www.youtube.com/watch?v=ntpthBbzK70

Building game: Building something together, could be I.e. a base. After the building phase, the players can try to destroy each others base. Maybe two players can attempt to build a pre-defined model (Pyramid, Eifel tower).
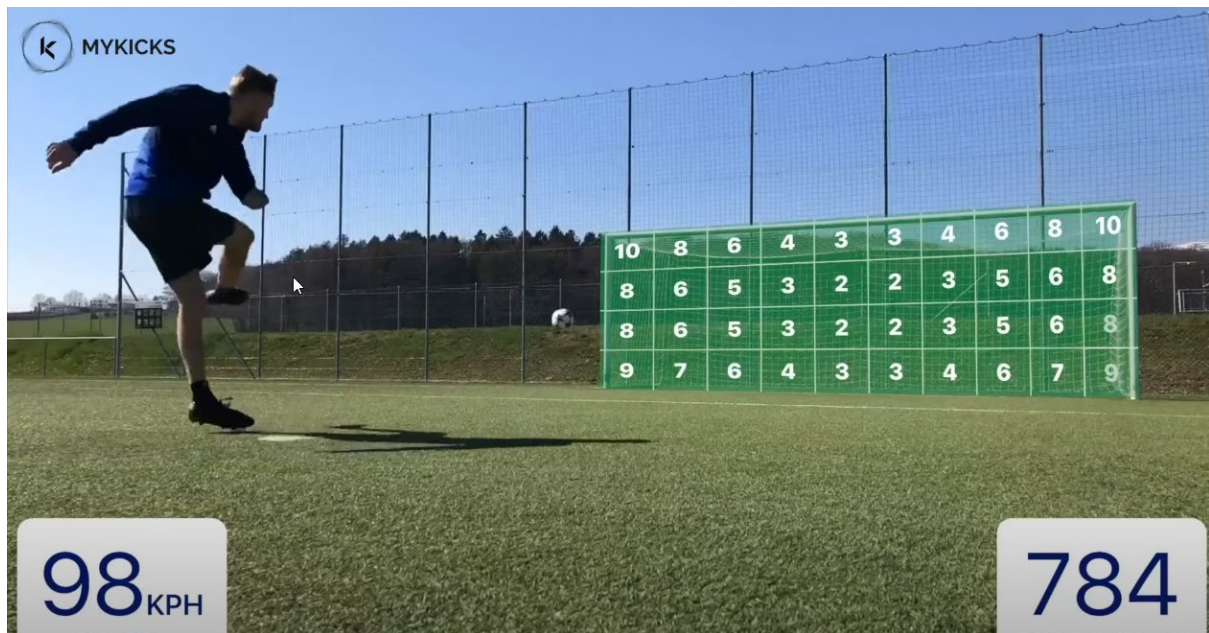

Bike Rider Navigation
Through the Apple Glasses a user can see the direction he has to go in.

Basketball/Football/Tennis/Baseball AR game
Don't have a basketball? Forgot to bring a football with you? Tennis racket too expensive for you? With this AR app you can play your favourite sport games together with your friends without needing to buy sport equipment.

Features:

- **Sound effects,** e.g. sound of hitting/kicking/bouncing a ball
- **Keep track of score**, fully focus on yourself instead of having to keep track of the score all the time.
- **Crowd support,** crowd is cheering you on, calling your name and are (if you wish) visually there

Target audience:

- Kids (mainly boys) between 6-12 who want to play outside
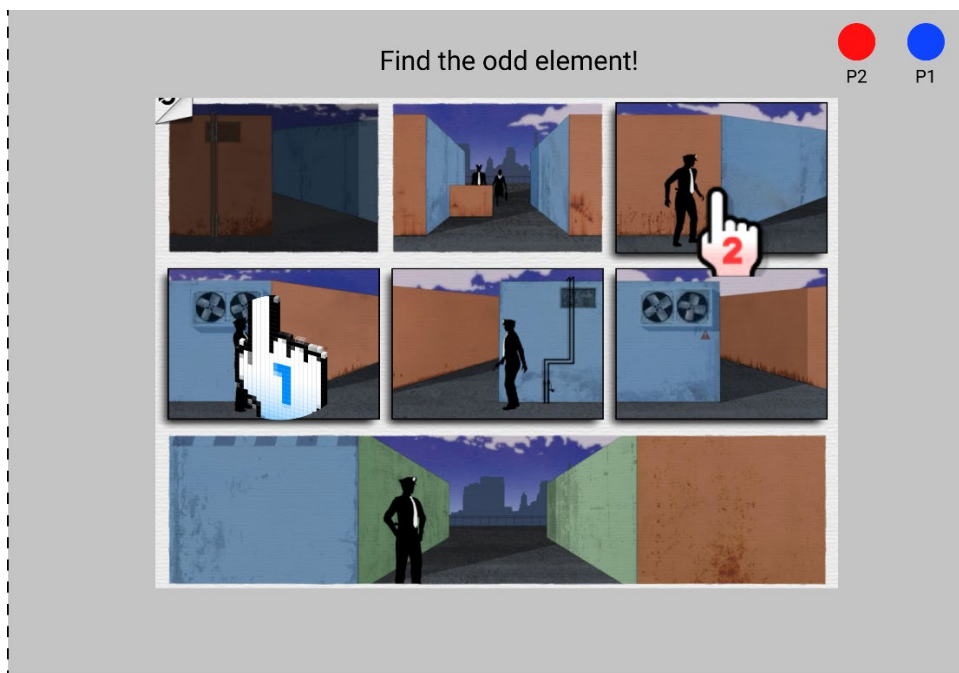
Storyboarding

During the ideation process we decided it would be a good to visualize our ideas by storyboarding them. This was because we kept on typing and telling our concept, which made it hard to visualize what someone had in mind.
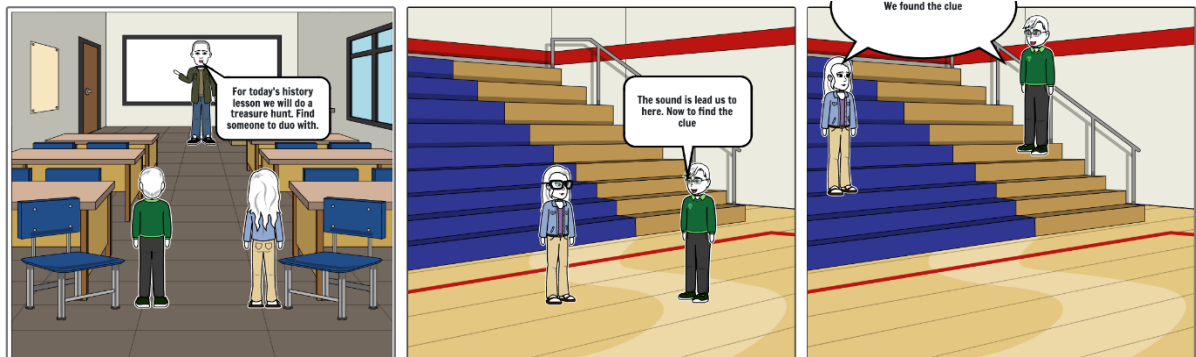
The storyboard above is about using the Apple glasses to 'treasure hunt'. Children of primary school have to find the hidden treasure in the school by solving clues together. Clues will be visible through the AR glasses. This can be very educational in a fun way. However, the main goal of this concept is to learn young children how to cooperate with each other.
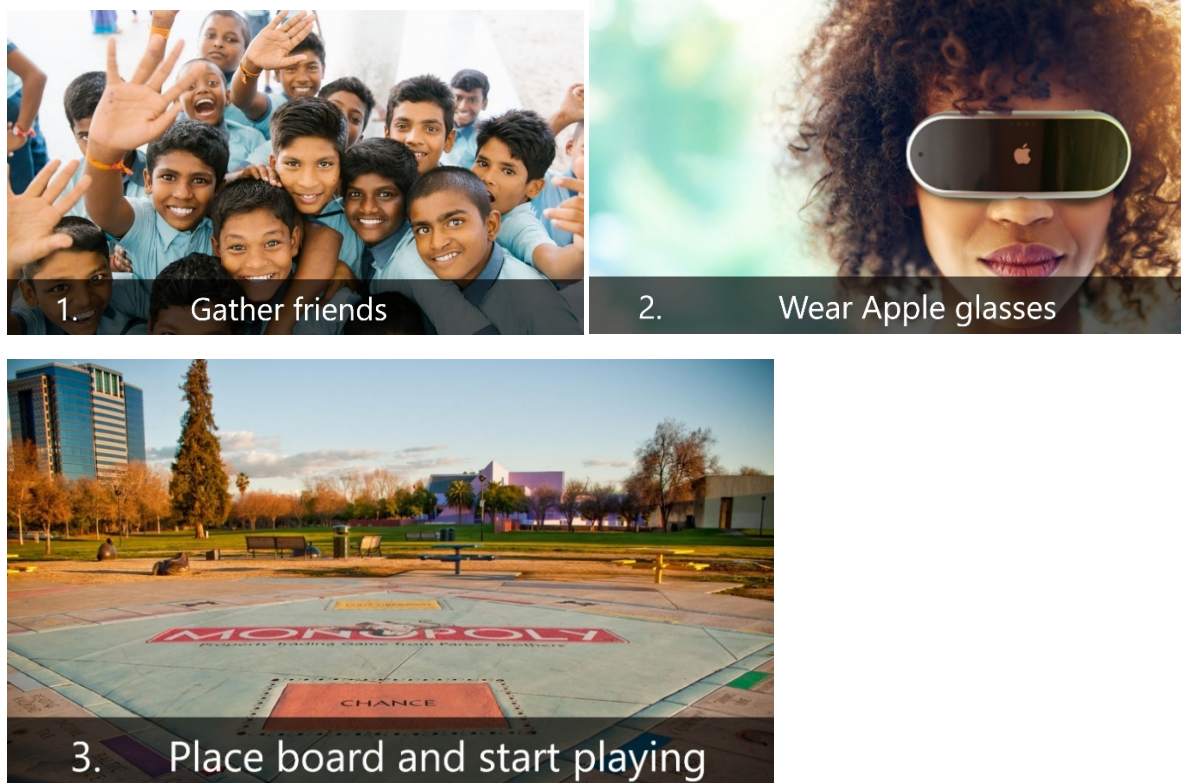

The storyboard above shows how the Apple glasses can help making a board game more interactive. Children can get together (in a park, at a square, a playground, etc.) and play a board game like Monopoly. The children are the pawns. They can move around the board, be put in jail, buy properties, etc. (just like standard Monopoly) by generating AR content.

The storyboard below shows how kids can play cooperative multiplayer games together from their homes by using the Apple Glasses.

After all the first storyboards were made, we decided to swap concepts with each other. For example, Marco who came up with the treasure hunt concept now had to come up with more ideas for Angel's concept and visualize those ideas in a new storyboard. Below are the new storyboards.
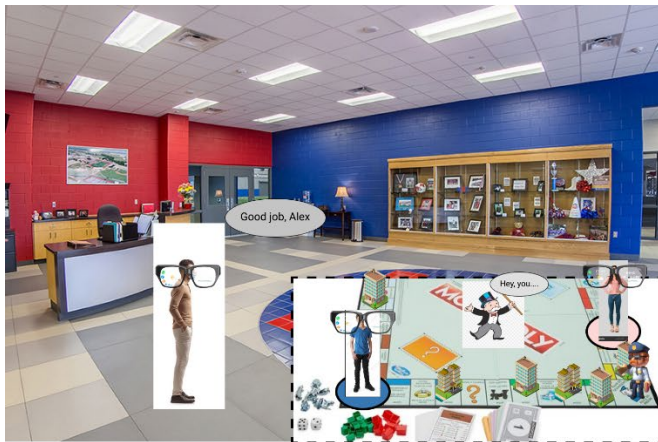
The storyboard above shows what features the monopoly/board game can have. A player could be put in jail, the player can see 3D models of the buildings/properties and the player can pull Chance cards. The game can be saved if it takes too long so that players can keep playing later on.
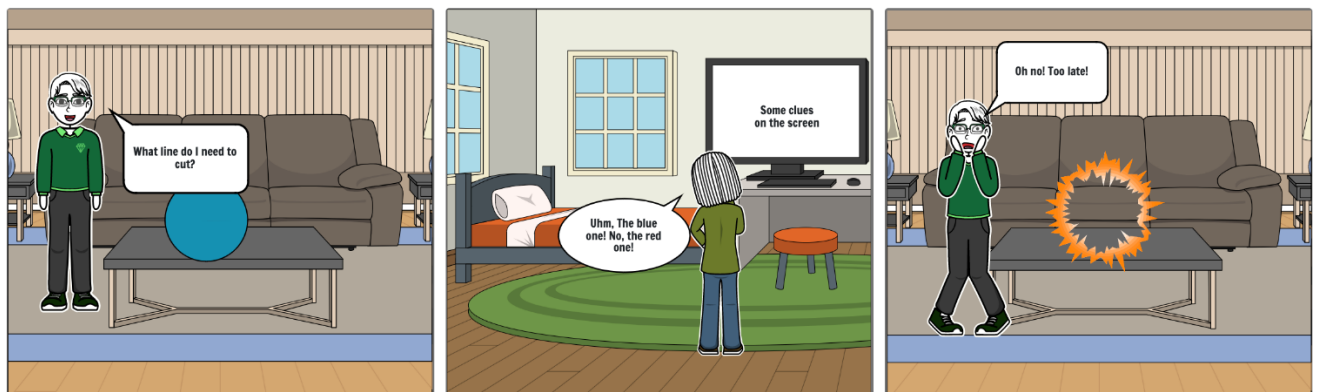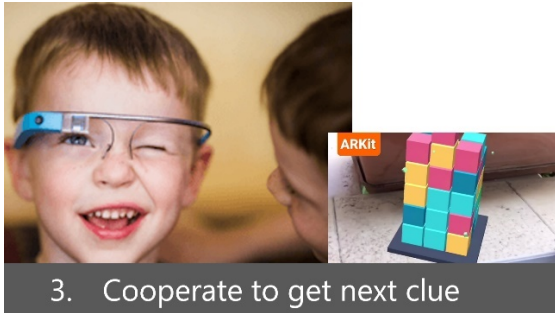

The storyboard above is about students diffusing a bomb together via the glasses. One student has to diffuse the bomb and the other student can watch along and help. This storyboard is all about cooperation which the glasses enable while working from home.

1. First clue

2. Location for next clue

3. Cooperate to get next clue

The storyboard above shows how children have to solve interactive puzzles. They can solve these by using hand gestures to interact with the puzzles. Solving the puzzles will give them clues on where the treasure is located.

The concept

Out of all the concepts we came up with, we saw the most potential in the 'monopoly/AR board game' concept so decided to continue expanding that concept.

Augmented Monopoly

Opportunity

Apple Glasses can create a more immersive and interactive experience. This is especially useful when playing games. Players can get audio feedback through the speakers Apple Glasses provide and can always use their hands for their own activities. By using Apple Glasses, you don't need to hold your smartphone anymore so that you can enjoy a more natural interactive experience through the advanced hand gestures the glasses provide.

Concept

Kids (6-12 years old) or young families can play as their own pawn in a game of augmented Monopoly with friends or family.

1. Gather people who want to play
2. All players make sure to put on and power on their Apple Glasses
3. One of the players (the host) opens the Monopoly app and starts a new game.
4. Players nearby can find the game session and can join the game session.
5. The host meanwhile places the board on a suitable area on the ground e.g., at a park, at a playground or in a garden. The host selects the area where they want the board to be placed by using hand gestures. Once the board is placed, all players can see the board.
6. Game starts by letting the first player roll the dice '

Features

- 3D animations: for example, dice get thrown on board, players get put behind bars when landing in jail/prison.
- Sound effects: for example, when throwing dice, spending money
- Saving a game: players can continue with the game if they can't finish it

Sources

- https://silo.tips/download/augmented-reality-in-a-monopoly-type-game

Features:
Board
- What kind of layout will the map have? Will it be 3D? Height differences?
- How big should the map be?

Money of each player
- How can we inform each player of their amount of money

Properties of each player
- 3d objects

Camera effects
- Jail door slams shut, -> camera shakes

Animations
- Going to jail
- Money drops when earning money; special money animation for when a player lands on the 'start' square
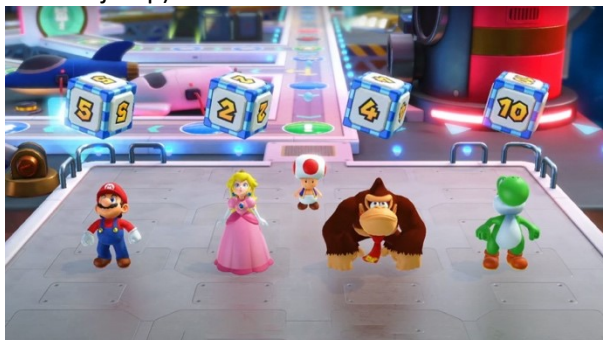
Customizing players
- Players get filters put on them -> clothing, hats, shoes, makeup
- Each player has a unique visual attribute -> players can't have the same hat for example

Throwing dice
- Just like in Mario Party a dice gets place above the player and the player has to time their jump to get the number they want (**disadvantage:** handicapped players can't jump)

Sound effects

- Add sound effects while animations are being played -> money sound effect

Research & POC's

We came up with a lot of features for the board game. In order to develop this, research had to be done in the form of desktop research and workshop research. We planned to research the following:

- How can we create a grid model so that the users can walk over a board?
- How can we let users interact with chance cards?
- How to let the users roll dice?
- How to optimally generate good-looking 3D models?
- Research ways for users to "carry" digital items.

POC's are uploaded to the gitlab repo: https://git.fhict.nl/I378011/smartmobileminoriosprojectar

Research 3D modelling

After defining the concept we started researching how 3D modelling works so that we could add content for the board game. Our teacher recommended using Reality Composer from Apple which allows you to add and create 3D models to your app and add animations to them.

We tried some of the functionality of Reality Composer (adding animations, properties, importing 3D models, etc.).
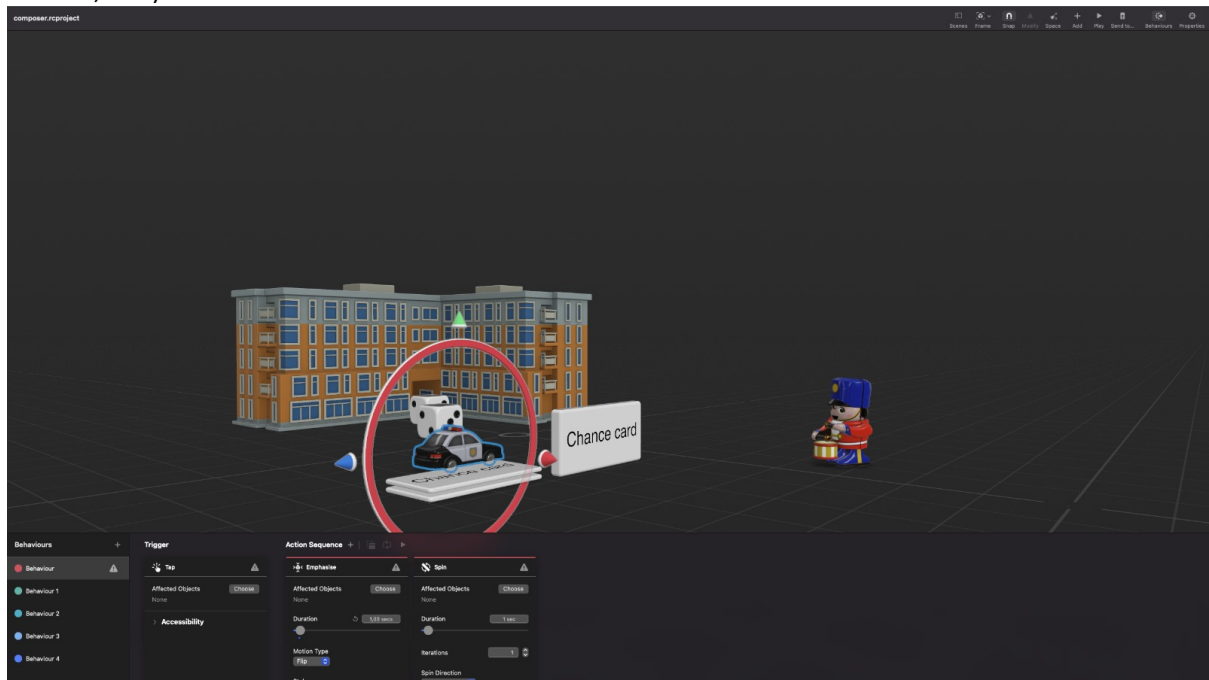
After playing around we realised we had to find a way to make more complicated 3D models since there aren't a lot of usable, free 3D models available. Apple has a so-called photogrammetry sample app that allows you to turn photos into 3D models.

The only thing that we had to add is the path to the images, the path of the output folder and the type of detail (low, medium, full, or raw) we wanted the 3D models to be:

Create the Photogrammetry Session

Begin by creating a `PhotogrammetrySession.Request` with a URL that points to the desired output location for the generated USDZ file and the desired level of detail for the model. Next, use that request, along with a URL pointing to the directory containing your images, to create the `PhotogrammetrySession` object.

```swift
let inputFolderUrl = URL(fileURLWithPath: "/tmp/MyInputImages/")
let url = URL(fileURLWithPath: "MyObject.usdz")
var request = PhotogrammetrySession.Request.modelFile(url: url,
                                                      detail: .full)

guard let session = try PhotogrammetrySession(input: inputFolderUrl) else {
    return
}
```

We made a lot of photos from different angles and submitted this into the photogrammetry app.
The first results were bad:

Photos

We researched [how to improve](#) the quality of the 3D models.

Apple advises to:

- Get a tripod and camera
- Put the object on a turntable and keep shooting images while the object is turning

- Make sure there's enough natural looking lighting
- Make sure there's no reflections
- Make sure the background has a high contrast with the object, preferably a dark background

We didn't have all these resources so we tried to find a different way to make the photogrammetry more accurate.

Qlone

Qlone can track objects better. We printed the QR mat (see the above image) that Qlone requires and placed an object on it. The outcome was a lot better looking than the photogrammetry method. Unfortunately, the Qlone app's export function didn't work so we couldn't download the 3D models. We searched for more apps that are similar to Qlone, but the apps we found used the Lidar technology which is only supported by the newest iOS devices and the ISSD didn't have these devices yet.
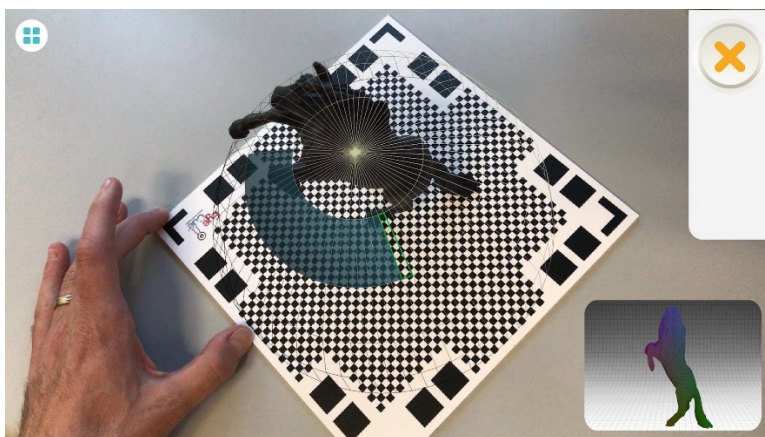
Qlone in action

One of the photos we took so that we could generate a 3D model

The result with Qlone