

Using gestures with AR

Goal

The goal is to find out how we can let the user interact with AR generated dice.

Motivation

Some parts of the concepts require the user to interact with virtual objects. For instance, in a game of Monopoly some dice must be rolled by the user. How would this interaction work with AR? In this research we'll find out how it can be done.

Research questions

Main question

How can we let the user interact with AR generated dice in the most natural feeling way?

Sub questions

- What technology (libraries, frameworks, API's, etc.) can be used to make the interaction work?

Approach

The research questions will be answered by applying desktop research and workshop research.

A list of possible ways to let the user interact will be made. After this, POC's will be made to test how such an interaction works.

Result

Ways to interact:

- Air gestures; the user's arm (including the hand) will be tracked to see if they make a throwing gesture
- Shaking; with the built-in accelerometer, movement of the user can be tracked so that if their device is shaken, an event can be triggered.
- Button press/touch: physical buttons or a touchpad can be pressed to trigger an event
- Voice control: voice commands could be used to trigger an event

Air gestures

- + Handsfree (with glasses)
- + Natural way to throw dice
- More unreliable

Shaking

- + Handsfree (with glasses)
- + Natural way to throw dice if you wear smart rings
- Not a natural way to throw dice if you use glasses, because you must shake your head

Button press/touch

- + Reliable/easy way for the user to interact
- Not handsfree
- Possibly too boring compared to other interaction ways

Voice control

- + Handsfree
- Not a natural way to throw dice
- Possibly too boring compared to other interaction ways

iOS libraries/frameworks/api's:

- **Vision:** this framework allows you to detect and classify human activity in real time. It uses computer vision and machine learning. This could be used to track when users perform a typical dice throwing gesture. The disadvantage is that it's hard to make the tracking accurate.
- **Core motion:** this framework processes accelerometer, gyroscope, pedometer, and environment-related events. This could also be an option to track when the user wants to throw a dice. The Apple Glasses are [rumored](#) to have an accelerometer, but this means that the user would have to move their head to throw a dice which is unnatural. Another option is to let the user interact through the Apple Smart rings. This way the user can perform a dice throwing gesture in a more natural feeling way.

Conclusion & Recommendations

The research question was: "How can we let the user interact with AR generated dice in the most natural feeling way?"

We can let the user interact with AR generated dice by detecting certain gestures. This can be achieved by making our own gesture detection points with the Vision framework. The disadvantage of this method is that tracking is often unreliable/inconsistent which can lead confusion and frustration for the user.

The alternative is to make use of the accelerometer built into hardware devices. We can track how fast the user shakes the device and based on that data the dice can be thrown with a certain velocity and arc. Ideally the user wears Apple Smart rings for this so that they can perform the gesture with their hand which is the most natural.

Both of these options will need to be tested by making POC's.