Spatial Design For Beginners

A Playful Journey Through The Virtuality Continuum

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ABSTRACT

This beginner hands-on class introduces participants to AR and VR interaction design problems. The class draws from a workshop format where participants engage with three exercises, taking them from configuring objects in physical space to augmenting physical space with virtual objects, and onto designing spaces with objects in Virtual Reality. For the conference, the class was partially redesigned to facilitate remote delivery.

CCS CONCEPTS

• **Human-centered computing**; • **Interaction design**; • **Interaction design process and methods**;

KEYWORDS

Augmented Reality, Virtual Reality, User Experience, Interaction design, Prototyping

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1 THE PARADIGM SHIFT TO SPATIAL DESIGN

We are seeing an increasing number of use cases where AR and VR are adding value in solving specific problems. When designing elegant solutions to such problems, conventions from the "flat screen" design domain of PCs, mobile phones, information displays, etc. do not always help. Designing interactions with virtual 3D objects requires new skill sets [Miesniks 2019].

While AR enables us to see virtual objects and interact with them in physical environments, VR transports us into a virtual world and its objects. The "virtuality continuum" [Milgram et al. 1994] has become a common concept to explain these nuances, while discussion about definitions continues [Mann et al. 2018]. Regardless of terminology, these domains introduce design problems of spatial and embodied nature: spatial computing applications enable users to move around the objects, reach them with their hands, and the objects to move and shift their shapes around the users.

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Consequently, interaction designers need to embrace the spatial nature of such design practices and understand the embodied nature with which users engage with their design outcomes. Besides designers, commissioners of immersive work can benefit from a better understanding of spatial design practices. The proposed class aims to inspire these target audiences to kickstart their readiness towards spatial design. It addresses skills gaps around immersive specialisations, as identified in industry reports [Brigante 2019].

2 WORKSHOP APPROACH AND PIVOT TO REMOTE DELIVERY

The workshop format and exercises are a result of iterating an accessible entryway to the specific problems of spatial design. To implement this into practice, the workshop adapts pedagogical approaches to creativity, such as scaffolding information and threshold concepts [Meyer and Land 2005] across the three domains covered through the exercises.

The workshop also aims to make participants reflect on the process of the design activity. With the exercises, it is the process that is more important than the end result. To contextualize this goal, the author draws from an explanation of design as "rendering of intent": "The designer imagines an outcome and puts forth activities to make that outcome real" [Spool 2013]. The exercises aim to make the participants more aware of their intents through creative exploration of the spatial design domain, and highlight the design activity as a process of rendering intent.

The author's delivery of workshops was disrupted in early 2020 due to the Covid-19 pandemic. Therefore, exercises based on physical prototyping in particular had to be redesigned for remote delivery. The redesign was based on the notion of "brownboxing", a low-cost rapid prototyping technique promoted by VR designers [Patton 2019]. Applying brownboxing principles, the author redesigned a set of printouts that enable participants to craft simple objects.

3 THE FIRST STOP ON THE VIRTUALITY CONTINUUM: PHYSICAL SPACE

The first exercise, playfully titled "My first spatial design" takes inspiration from physical prototyping approaches. In the physical workshop setting, we use wooden blocks to create a simple course for a marble to run through (see Figure 1). In the remote delivery, participants are instructed to download the printout set and prepare it according to instructions before the workshop. Both versions of the task engage the participants in spatial thinking with a highly accessible set of elements. They present brief warm-up exercises but their outcome feeds to the next ones.

Figure 1: Workshop participants in London, January 2020, working on the first exercise.

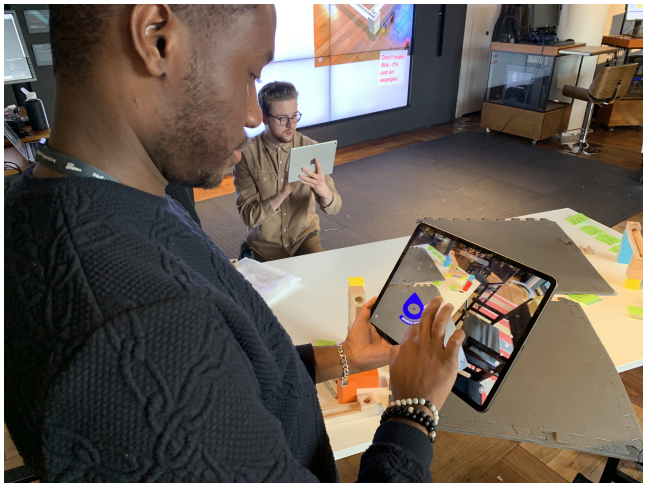

Figure 2: Workshop participants in London, February 2020, working on the AR design exercise.

4 SECOND STOP: AUGMENTING SPACE

To align with the scaffolding approach, the participants are asked to keep the design they have just built intact. Then, they are introduced to Torch, an AR prototyping tool that was available for iOS devices (discontinued as of September, 2020 – the author is exploring other options to facilitate this exercise in the future).

The author has prepared a project with reproductions of the physical assets as 3D models. The participants are asked to rebuild their course in AR (see Figure 2). In doing so, participants are grasping the UX challenges that designers are facing with mobile AR.

5 THIRD AND FINAL STEP: VIRTUAL OBJECTS IN VIRTUAL, HUMAN-SCALE ENVIRONMENTS

Finally, the participants are invited to complete their design journey along the virtuality continuum. The author has prepared a scene for VR with the same marble course assets, but this time in a setting of a fantastical tropical island, to underline the capabilities of VR to induce a sense of presence. The 3D assets are now in human scale, which is another deliberate choice to consistently apply the scaffolding approach and tailoring each exercise to the unique capabilities of the medium. Through the Unity3D game engine, there is also physics, and the participants are asked to use virtual marbles to test if their course design takes the marble from the starting point to the finish. This gives the exercise a playful flavour, which feeds into engagement with the task.

6 AN INNOVATIVE AND ENGAGING FORMAT FOR BEGINNERS

While the workshop does not employ the very latest technology in ways that are customary to SIGGRAPH content, the innovation emerges from the format, which is a combination of emerging off-the-shelf tools and design practices across the spectrum of spatial computing platforms. Also, the workshop targets participants to whom the tools employed are largely unknown.

This hypothesis has been proved during running the workshops internally for colleagues at the author's place of work, where employees are generally very knowledgeable about technology but do not necessarily practice design hands-on.

The format will be iterated going forward, and more complex spatial design problems having to do with ergonomics, field of view, and haptic interactions will be explored through a new set of exercises which still utilize similar pedagogical approaches.

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