

# CHASING VIRTUAL SPOOKS, LOSING REAL WEIGHT

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## AUGMENTED RUNNING AND A SIDE TRIP INTO THE HISTORY OF AUDIO AUGMENTED REALITY

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A strange voice tells me to run. My heartbeat rises as I follow the instructions without giving them a second thought. The voice's manner of speaking reminds me of my parents' TomTom. The only difference: instead of telling me to take a turn, I am instructed to accelerate, slow down, to run or – if I am lucky – to walk. I am running with my new mobile app and virtual trainer. The app tracks every move, knows when my heartbeat rises, and is supposed to help me gain speed and lose weight. Today, I run to clear my head after a mentally exhausting but physically unchallenging day. However, trying to catch my breath, my thoughts return to work. More precisely, I pore over my research topic, non-visual augmented reality.

In Augmented Reality (AR), virtual content is added to our real environment. Most often, this

happens visually. By now, probably all of us have seen some three dimensional objects popping up upon designated markers, virtual pink bunnies above augmented cereal boxes or walking directions superimposed on real streets. However, AR does not have to be visual. Sound, in particular, has already brought forth some fascinating AR applications and artworks such as Edwin van der Heide's *Radioscape*<sup>1</sup> and Theo Watson's *Audio Space*<sup>2</sup>.

Entering the latter, visitors can hear the sounds left by previous visitors, spatialized, as if they were actually still there. At the same time, they can leave their own audio messages at any point within a room. It is not just the fact that the physical space is augmented with the ghost-like presence of previous visitors that makes me term

it AR. What convinces me is that visitors can relate their own sounds and messages to those left earlier by others; thereby establishing connections between the virtual and the real. I imagine walkers, cyclists and other runners leaving their sound-trails behind on the road, leaving it up to me to add my own sounds and follow their steps, which are spread across time and space.

My favorite mobile app, *RjDj*, can also be considered AR sound art. The app remixes the sounds of the surroundings and provides you with a soundtrack to your life that blends in, makes use of and accompanies your environment. Although it is certainly no typical AR application, the relation between the sounds of the real environment and those produced by the app is so strong that often, they seem to melt into a single soundscape.

I will have to try this app while running. I can already hear the sound of my steps on the asphalt evolving, blending into a rhythmical soundscape, slowly displaced by the wind of heavy breathing, interrupted by pitched variations of my sudden greetings whenever I meet another runner.

While *RjDj* and successor apps like *Inception* and *Dimensions*<sup>3</sup> are a rather recent phenomenon, the idea of remixing the sonic environment is not new. The artist Akitsugu Maebayashi has worked with similar concepts for a long time. His portable *Sonic Interface*<sup>4</sup> was built in 1999 – years before mobile phones gained comparable sound-processing abilities. The custom built device consists of a laptop, headphones and microphones and uses delays, overlapping repetitions and distortions in order to recompose ambient sounds



in urban space. The resulting soundscapes break the usual synchronicity between what one hears and what one sees. Unsurprisingly, Maebayashi is not the only one who has been exploring sound-based augmentations of the environment early on. In fact, audio augmentations of our environment have quite a history of their own. Unfortunately, they are less known in the context of AR and are often not even considered to be part of AR history.

“Walk!”, my virtual trainer gives in to my exhaustion and I slow down. However, my thoughts keep racing. Quickly, they approach the early 1990s: Tom Caudell is believed to have coined the term Augmented Reality. It describes a head-worn display that superimposes visual information onto real objects<sup>5</sup>. In Caudell’s case, the new AR system helps workers assemble cables into an aircraft at Boeing. What usually goes unnoticed is that around the same time, Janet Cardiff started

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recording her so-called audio walks. Those walks are designed for a certain walking route and confront the listener with instructions such as “Go towards the brownish green garbage can. Then there’s a trail off to your right. Take the trail, it’s overgrown a bit. There’s an eaten-out dead tree. Looks like ants.”<sup>6</sup>. While the listener navigates the space, he gets to listen to edited mixes of pre-recorded sounds, which blend in with the present sounds of the environment. Cardiff’s virtual recorded soundscapes mimic the real physical one “in order to create a new world as a seamless combination of the two.”<sup>7</sup> By superimposing an additional virtual world onto our existing one, and thereby creating a new, mixed reality, Cardiff’s sound art explores one of the key concepts of AR. And Cardiff is not alone with this idea; as early as 1987, Cilia Erens introduced sound walks, soundscapes and sound panoramas in the Netherlands. In contrast to Cardiff, she forgoes spoken content and uses largely unmixed

everyday sounds. Yet, the effect is similar; they create “a new reality within existing realms, a form of ‘augmented reality’.”<sup>8</sup> Clearly, the developments in non-visual AR were in no way inferior to the development of its visual counterpart. Taking slow steps, I imagine being on such a walk right now... Listening to instructions on which route to take, where to look, superimposed footsteps here, sounds recorded there, on this path earlier, maybe altered with special effects. I imagine those sounds mixing in with the naturally present sounds of the river, bikes, and the occasional mopeds passing by. “Run!”, my trainer, whom I decide to call Tom, puts an abrupt end to this walk. The fact that AR sound art like Cardiff’s and Erens’ walks are not usually mentioned in the context of AR leaves me wondering what else we miss.

After Tom’s instruction, my music fades back in. The song is intended to get me to run even faster.

After my footsteps have adapted to the new rhythm it hits me: these instructions about how fast to run, the information about my heart rate, distance covered and calories burned and options such as racing against a virtual running partner in real physical space – this is just like AR. In fact, my virtual running trainer shares most of the characteristics commonly found in AR applications. It adds another layer of content to my running. It is interactive and operates in real-time. Just like many other GPS based AR applications, it reacts to my position in the world. Most importantly, Tom fulfills my own, personal requirements for an AR experience: something is added (the instructions), something is augmented (the running), and most importantly, there is a relationship between the two.

When another runner passes me slowly, my heart rate drops. I wonder whether it might be his heart rate that is mistakenly reported back to me. I am astonished, that without the sensor’s help, I cannot even accurately perceive such basic and vital

facts as my very own heart rate. Maybe this is far-fetched, but with respect to that, the running app relates to the kind of AR applications which allow us to perceive things about the world that we normally cannot perceive, such as seeing heat, feeling magnetic fields or hearing ultra-high frequencies.<sup>9</sup> So why are virtual Tom and his colleagues not considered to be AR? Perhaps because there are also numerous differences between running apps and common AR applications. To begin with, this running app does not augment the environment. Rather, it augments an activity – my running. And to be honest, despite the fact that Tom follows my every move – chasing a virtual competitor or running with a virtual trainer – it still feels like they are running on my phone while I have to tackle the real road. What is more, location-based AR applications usually display content related to the user’s absolute position in the world. Tom, on the other hand, is only interested in the change of my position over time.

“Stop!”, apparently my position has changed enough. My run is over. The result: 583 kcal burned, 5 miles run and the revelation that the combination of the virtual and the real encompasses much more than just adding virtual visual objects to the real physical environment. There is a whole field of augmented activities as well! I cannot wait to jam with virtual bands, to try augmented eating or to take an augmented nap. As if to approve, my heart rate makes a last excited jump. Who knows, in the future, Tom might learn from existing AR. He might then have a look at my environment and direct my turns so that I discover new routes, point out sights or, when needed, help me find a shortcut home. Considering current developments in lightweight AR glasses, I guess it cannot be long until we can also see our virtual competitor passing by, are asked to design avatars representing our personal best time in races against other runners and are challenged to chase visual virtual spooks. I would not mind that. And I bet that that is when augmented running will be truly considered to be AR. ■

## References

- 1 An article about Radioscape by Edwin van der Heide is featured in this magazine on pp. 18-23
- 2 Theo Watson, Audio Space (2005), [http://www.theowatson.com/site\\_docs/work.php?id=15](http://www.theowatson.com/site_docs/work.php?id=15)
- 3 For RjDj, Inception and Dimensions see <http://rjdj.me/>
- 4 Akitsugu Maebayashi, Sonic Interface (1999), <http://www2.gol.com/users/m8/installation.html> and <http://www.v2.nl/archive/works/sonic-interface>
- 5 T. P. Caudell, and D. W. Mizell, “Augmented Reality: An Application of Heads-Up Display Technology to Manual Manufacturing Processes”, Proceedings of 1992 IEEE Hawaii International Conference on Systems Sciences, 1992, pp 659-669.
- 6 Janet Cardiff, Forest walk (1991), <http://www.cardiffmiller.com/artworks/walks/forest.html>
- 7 Janet Cardiff, Introduction to the Audio Walks, [http://www.cardiffmiller.com/artworks/walks/audio\\_walk.html](http://www.cardiffmiller.com/artworks/walks/audio_walk.html)
- 8 Cilia, Erens, The Audible Space, <http://www.cilia-erens.nl/cilia-erens-2/?lang=en>
- 9 The course ‘Perceptualization’ which is taught by Edwin van der Heide and Maarten Lamers as part of the MSc Media Technology at Leiden University discusses such translations of information to our human modalities. See <http://mediatechnology.leiden.edu/programme/curriculum/perceptualization/> and <http://www.maartenlamers.com/PZ/>