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The Odeon Herodes Atticus, Athens



Introduction and Background

The use of virtual reality (VR) can be considered to be a natural evolution of educational technology (Pantelidis, 2009). VR tools have now become low enough cost to be able to implement them in educational environments, offering the potential for large scale simulation without high expense.

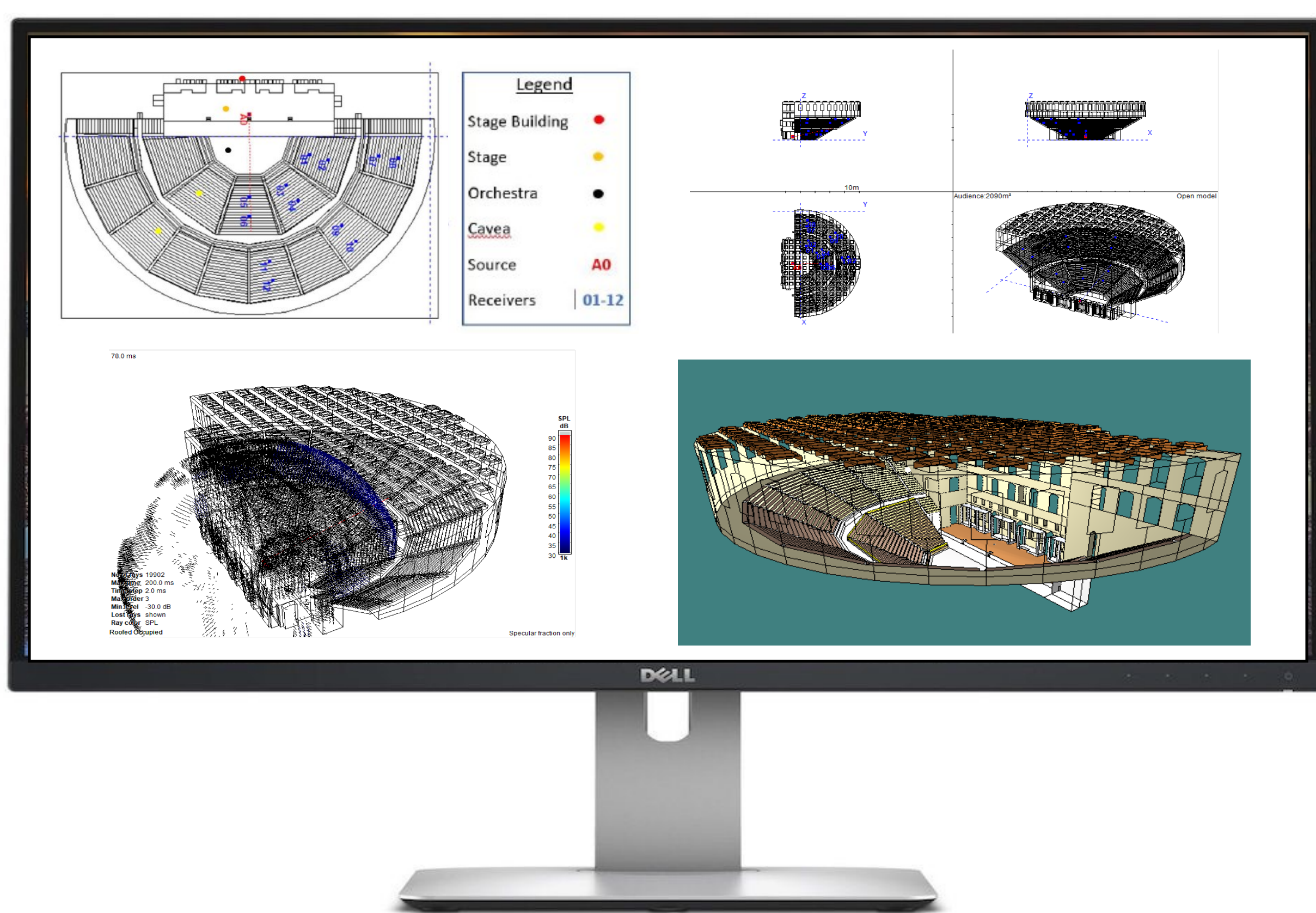
This has particular benefits for integrating experiential elements to enhance aspects of learning – for instance by the use of virtual field trips to help students experience and explore locations which would be impractical to visit (Tuthill and Klemm, 2002), or to enhance the experience and increase engagement with learning tasks (Lau and Lee, 2015).

A particular area of interest is the exploration of historic spaces and monuments, particularly those which have changed significantly over time through redesign or ruin. With the latest equipment, a realistic representation of and navigation within historic monuments can be achieved.

There has been a lack of development of olfactory, haptic and acoustic representations of VR spaces. This is particularly important when where the acoustic properties form an important part of the function of the space – such as houses of worship and spaces designed for musical or theatrical performance.

This project developed an educational virtual reality application, in which users are able to investigate the acoustic properties of the Odeon of Herodes Atticus, in its historic configuration.

2D and 3D CAD constructions of the Odeon



Concept

Recent investigations by Manolis Korres (2014) indicated the existence of a roof which covered the theatre in full. The restoration did not include the roof or several other structural elements, which would have a significant effect on the acoustics of the space.

To recreate the experience of the original Odeon, an architectural model was created of the suggested roofed structure, and acoustic modelling software was used to predict the acoustic performance of the space.

The Odeon of Herodes Atticus is located in Greece in the western part of the ancient Athenian city, Acropolis. It was built by Herodes Atticus, a rich Greek aristocrat and sophist, between 160-169 A.D.

The Odeon were places for the recitation of an 'Ode' (song) and so the acoustic properties would have been important.

Around 267 A.D. the Odeon burned down, and was a ruin for several centuries. A partial reconstruction took place from the 1950s, and the space is once again used for concerts.

VR development

The audio information was then integrated into a virtual reality model using the Unreal 4 engine and Wwise Audio plugin, resulting in an experience which allows the user to virtually explore the space, including listening to how music performed on the stage would sound from different locations around the auditorium.

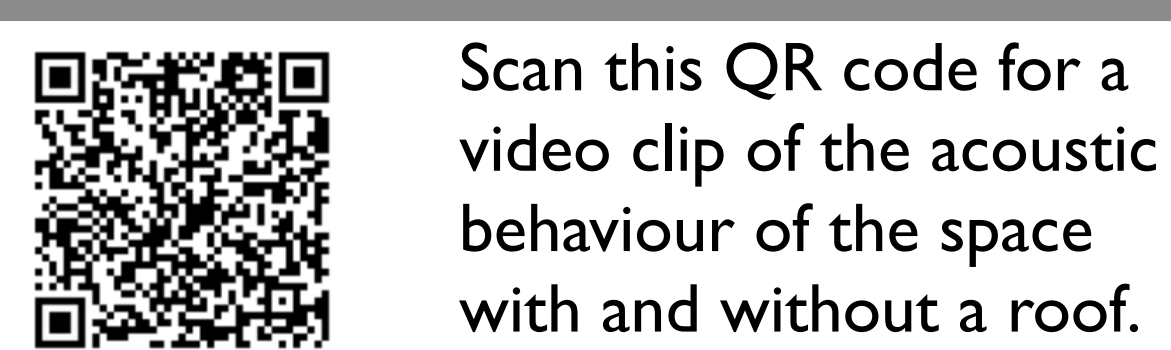
As sound is one of our most important senses with regards to the environment, the integration of accurate acoustic models with the VR environment was considered to be an important enhancement of the concept of the virtual field trip, which would allow for a wider range of discussion and educational experience, while improving the sense of realism of the space.

The model also includes some interactive elements including information points with facts about the Odeon, media players which show how sound waves travel in the different configurations, and allowing the user to listen to different traditional Odes in the space.

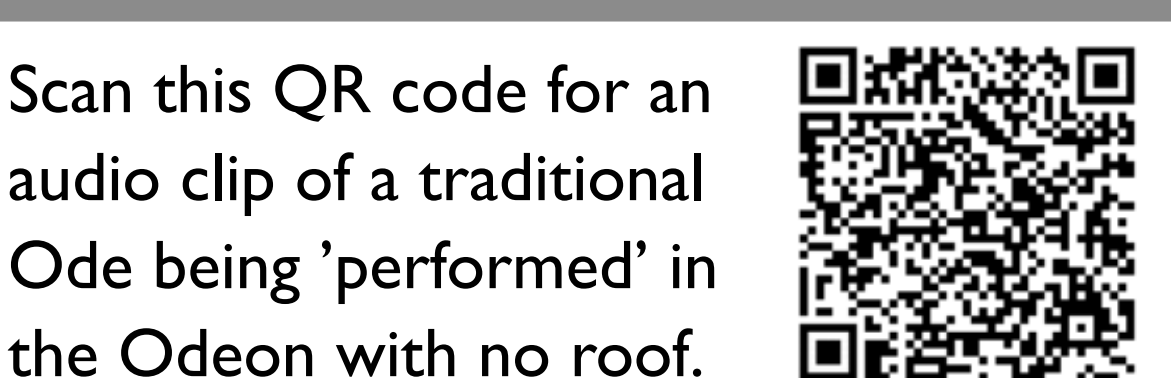
Screenshot from inside the VR model



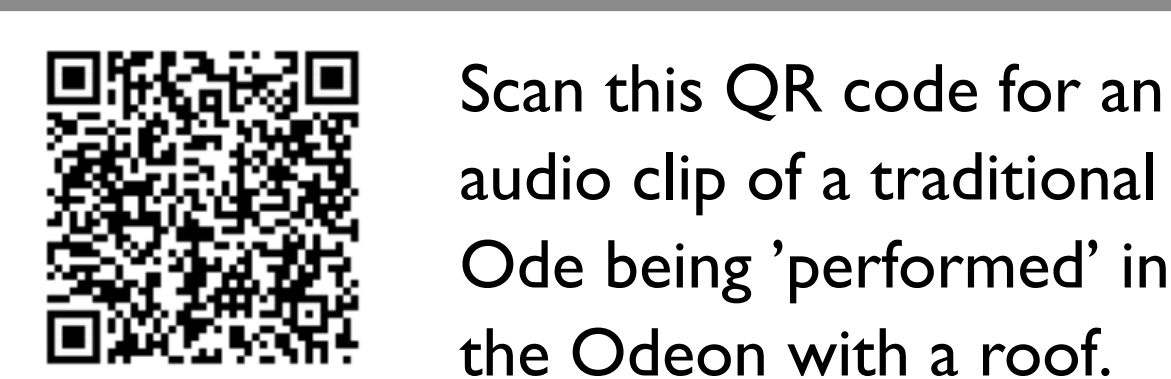
Demos



Scan this QR code for a video clip of the acoustic behaviour of the space with and without a roof.



Scan this QR code for an audio clip of a traditional Ode being 'performed' in the Odeon with no roof.



Scan this QR code for an audio clip of a traditional Ode being 'performed' in the Odeon with a roof.

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References

Beach, J. Wendt, J. (2015) Using Virtual Reality to Help Students with Social Interaction Skills. *Journal of the International Association of Special Education*, v16 (1) p26-33 2015

Farnetania, A., Prodi, N. & Pompili, R. On the acoustics of ancient Greek and Roman theaters. *The Journal of the Acoustical Society of America* 124, 1557 (2008)

Korres, M. (2014) *I stegi tou Irodiou kai alles gigadies gefiroseis*. Athens: Melissa.

Lau, K.W. & Lee, P.Y. (2015) The use of virtual reality for creating unusual environmental stimulation to motivate students to explore creative ideas. *Interactive Learning Environments*, 23:1, 3-18

Pantelidis, V.S. (2009) Reasons to Use Virtual Reality in Education and Training Courses and a Model to Determine When to Use Virtual Reality. *Themes in Science and Technology Education*. pp59-70

Psotka, J. (2013). Educational Games and Virtual Reality as Disruptive Technologies. *Educational Technology & Society*, 16 (2), 69–80.

Rindel, Jens. (2011). The Erato Project and its contribution to our understanding of the acoustics of ancient theatres. *The Acoustics of Ancient Theatres Conference*, Patras, 2011.

Stavroulia, K., E., Christofi, M., Baka, E. Michael-Grigoriou, D. Magnenat-Thalman, N. Lanitis, A. Assessing the emotional impact of virtual reality-based teacher training. *International Journal of Information and Learning Technology*, 36: 3 (pp. 192 - 217).

Tuthill, G., & Klemm, E. B. (2002). Virtual field trips: Alternatives to actual field trips. *International Journal of Instructional Media*, 29(4), 453–468.