

A 'Haptic Chair' to Help People with Hearing Impairments Enjoy Music



What?

The Haptic Chair provides sensory input of vibrations via touch. This system was developed based on an initial concept guided by information obtained from a background survey conducted with hearing impaired people from multi-ethnic backgrounds and feedback received from two profoundly hearing impaired musicians.

How?

Haptic Chair has four contact speakers linked to a music source, enabling it to vibrate in intensity according to the sound signals it receives. A hearing impaired person sitting in the chair is able to experience the music and their experience is qualitatively similar to a normal person. No particular frequency bands of the sound signal are amplified, so it is left to the user to work with the entire information stream.

In fact, Shibata (2001) has found that some hearing impaired people process vibrations sensed via touch in the part of the brain used by other people for hearing. This provides one possible explanation for how hearing impaired musicians can sense music, and how hearing impaired people can enjoy concerts and other musical events.



Really?

A series of rigorous user studies carried out with 43 hearing impaired students at a special school for the deaf in Sri Lanka strongly suggested that the system is capable of significantly improving the experience of listening to music by the hearing impaired community.

One of the comments received from a profoundly hearing impaired user when the Haptic Chair was brought back to Singapore was, "I am going to be deaf again". This poignantly expressed the impact made on individual users of the system.

Future?

The research team is currently studying the potential of the system to be an aid for speech therapy and to provide a sense of the general acoustic environment for the hearing impaired; and who knows, a row of such chairs could be provided for the hearing impaired at concert halls in future.



Haptic Chair Team

Dr. Suranga Nanayakkara, now an Assistant Professor at SUTD, designed this system as a part of his doctoral research topic. His thesis advisors Dr Elizabeth Taylor, Associate Professor Lonca Wyse, and Associate Professor Ong Sim Heng from NUS are co-leading the project.

Publications and Patents

Nanayakkara S. C., Wyse L., Ong S. H. and Taylor E. "Enhancing Musical Experience for the Hearing-impaired using Visual and Haptic Inputs", Human-Computer Interaction, (Accepted)

Nanayakkara S. C., Taylor E., Wyse L., and Ong S. H. "An enhanced musical experience for the hearing impaired: Design and evaluation of a music display and a haptic chair", in Proc. 27th ACM Conference on Human Factors in Computing Systems (CHI'09), 2009, pp.337-346.

Taylor E., Nanayakkara S. C., Wyse L., Ong S. H., Yeo K. P. and Tan G. H. "Haptic Chair with Audiovisual Input", US Patent No. WO 2010/033086 A1, Mar. 25, 2010