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Entwicklung einer AR-Applikation zur kosteneffektiven volumetrischen Erfassung von Baugruben

2022 | *Wissenschaftlicher Artikel*  
gis.Science, 2022, 2, S. 75-83  
Jarosch, Monika; Herder, Jens; Langmann, Mathias

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**Published:** 2022

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/3831>

**Abstract**

Die volumetrische Erfassung von Aushüben auf Baustellen ist ein kostenrelevanter Faktor und wird auch heute im täglichen Baustellenbetrieb oft noch in manueller Detailarbeit durchgeführt. Kostengünstige Sensoren zur Tiefenerfassung ermöglichen die halbautomatische Erfassung von Baugruben. Augmented Reality (AR) kann für diesen

Prozess das nötige Feedback liefern. Vorgestellt wird ein Prototyp, bestehend aus einem Tablet mit integrierter Kamera und einem Lidar-Scanner. Es wird die Erfassung des Volumens bezüglich Nutzbarkeit und Genauigkeit mit Einsatz von AR getestet und evaluiert. Zur Bestimmung des Volumens wird unter Verwendung von Strahlen mit Unterstützung einer Grafik-Engine ein Algorithmus entwickelt. Der Algorithmus ist robust gegen nicht vollständig geschlossene Volumen. Die Bedienung, Überprüfung und Visualisierung findet durch praktischen Einsatz von AR statt.

#### Four Metamorphosis States in a Distributed Virtual (TV) Studio: Human, Cyborg, Avatar, and Bot - Markerless Tracking and Feedback for Realtime Animation Control

2015 | Konferenzveröffentlichung

*Virtual Realities: International Dagstuhl Seminar, Dagstuhl Castle, Germany, June 9-14, 2013, Revised Selected Papers, LNCS, 8844, S. 16-32*

*Herder, Jens; Daemen, Jeff; Haufs-Brusberg, Peter; Abdel Aziz, Isis*

**Published:** 2015

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1550>

**Digital Object Identifier:** [10.1007/978-3-319-17043-5\\_2](https://doi.org/10.1007/978-3-319-17043-5_2)

#### Multimodal interaction techniques in scientific data visualization: An analytical survey

2015 | Konferenzveröffentlichung

*In Proceedings of the 10th International Conference on Computer Graphics Theory and Applications (GRAPP-2015), S. 431-437*

*Fiedler, Jannik; Rilling, Stefan; Bogen, Manfred; Herder, Jens*

**Published:** 2015

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1551>

**Digital Object Identifier:** [10.5220/0005296404310437](https://doi.org/10.5220/0005296404310437)

#### Abstract

The interpretation process of complex data sets makes the integration of effective interaction techniques crucial. Recent work in the field of human-computer interaction has shown that there is strong evidence that multimodal user interaction, i.e. the integration of various input modalities and interaction techniques into one comprehensive user interface, can improve human performance when interacting with complex data sets. However, it is still unclear which factors make these user interfaces superior to unimodal user interfaces. The contribution of this work is an analytical comparison of a multimodal and a unimodal user interface for a scientific visualization application. We show that multimodal user interaction with simultaneously integrated speech and gesture input improves user performance regarding efficiency and ease of use.

#### SpiderFeedback - Visual Feedback for Orientation in Virtual TV Studios

2014 | Konferenzveröffentlichung

ACE'14, 11th Advances in Computer Entertainment Technology Conference, ACM, Funchal, Portugal, S. 8

Simsch, Jonathan; Herder, Jens

**Published:** 2014

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1552>

**Digital Object Identifier:** [10.1145/2663806.2663830](https://doi.org/10.1145/2663806.2663830)

#### Abstract

A visual and spatial feedback system for orientation in virtual sets of virtual TV studios was developed and evaluated. It is based on a green proxy object, which moves around in the acting space by way of four transparent wires. A separate unit controls four winches and is connected to an engine, which renders the virtual set. A new developed plugin registers a virtual object's position with the proxy object which imitates the virtual object's movement on stage. This will allow actors to establish important eye contact with a virtual object and feel more comfortable in a virtual set. Furthermore, interaction with the virtual object and its proxy can be realised through a markerless actor tracking system. Several possible scenarios for user application were recorded and presented to experts in the broadcast industry, who evaluated the potential of SpiderFeedback in interviews and by questionnaires.

Four Metamorphosis States in a Distributed Virtual (TV) Studio: Human, Cyborg, Avatar, and Bot

2013 | Konferenzveröffentlichung

10th International Conference on Visual Media Production (CVMP 2013), London

Burga, Jose; Daemen, Jeff; Djuderija, Sascha; Gnehr, Maren; Goossens, Lars; Hartz, Sven; Haufs-Brusberg, Peter; Herder, Jens; Ibrahim, Mohammed; Koop, Nikolas; Leske, Christophe; Meyer, Laurid; Müller, Antje; Salgert, Björn; Schroeder, Richard; Thiele, Simon

**Published:** 2013

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1597>

#### Abstract

The major challenge in virtual studio technology is the interaction between the actor and virtual objects. Within a distributed live production, two locally separated markerless tracking systems were used simultaneously alongside a virtual studio. The production was based on a fully tracked actor, cyborg (half actor, half graphics), avatar, and a bot. All participants could interact and throw a virtual disc. This setup is compared and mapped to Milgram's continuum and technical challenges are described.

Markerless Actor Tracking for Virtual (TV) Studio Applications

2013 | Konferenzveröffentlichung

2013 International Joint Conference on Awareness Science and Technology & Ubi-Media Computing (iCAST 2013 & UMEDIA 2013), S. 790-795

Daemen, Jeff; Haufs-Brusberg, Peter; Herder, Jens

**Published:** 2013

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1604>

**Digital Object Identifier:** [10.1109/ICAwST.2013.6765544](https://doi.org/10.1109/ICAwST.2013.6765544)

**Abstract**

Virtual (tv) studios gain much more acceptance through improvements in computer graphics and camera tracking. Still commercial studios cannot have full interaction between actors and virtual scene because actors data are not completely digital available as well as the feedback for actors is still not sufficient. Markerless full body tracking might revolutionize virtual studio technology as it allows better interaction between real and virtual world. This article reports about using a markerless actor tracking in a virtual studio with a tracking volume of nearly 40 cubic meter enabling up to three actors within the green box. The tracking is used for resolving the occlusion between virtual objects and actors so that the Tenderer can output automatically a mask for virtual objects in the foreground in case the actor is behind. It is also used for triggering functions scripted within the Tenderer engine, which are attached to virtual objects, starting any kind of action (e.g., animation). Last but not least the system is used for controlling avatars within the virtual set. All tracking and rendering is done within a studio frame rate of 50 Hz with about 3 frames delay. The markerless actor tracking within virtual studios is evaluated by experts using an interview approach. The statistical evaluation is based on a questionnaire.

### InEarGuide - A Navigation and Interaction Feedback System using In Ear Headphones for Virtual TV Studio Productions

2012 | Konferenzveröffentlichung

9. Workshop Virtuelle und Erweiterte Realität der GI-Fachgruppe VR/AR

Ludwig, Philipp; Büchel, Joachim; Herder, Jens; Vonolfen, Wolfgang

**Published:** 2012

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1607>

**Abstract**

This paper presents an approach to integrate non-visual user feedback in today's virtual tv studio productions. Since recent studies showed that systems providing vibro-tactile feedback are not sufficient for replacing the common visual feedback, we developed an audio-based solution using an in ear headphone system, enabling a talent to move, avoid and point to virtual objects in a blue or green box. The system consists of an optical head tracking system, a wireless in ear monitor system and a workstation, which performs all application and audio processing. Using head related transfer functions, the talent gets directional and distance cues. Past research showed, that generating reflections of the sounds and simulating the acoustics of the virtual room helps the listener to conceive the acoustical feedback, we included this technique as well. In a user study with 15 participants the performance of the system was evaluated.

### TouchPlanVS Lite - A Tablet-based Tangible Multitouch Planning System for Virtual TV Studio Productions

2012 | Konferenzveröffentlichung

Proceedings of the 2012 Joint International Conference on Human-Centered Computer Environments, S. 64-67

Brosda, Constantin; Daemen, Jeff; Djuderija, Sascha; Joeres, Stephan; Langer, Oleg; Schweitzer, Andre; Wilhelm, Andreas; Herder, Jens

**Published:** 2012

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1608>

#### Abstract

This paper presents a mobile approach of integrating tangible user feedback in today's virtual TV studio productions. We describe a tangible multitouch planning system, enabling a single user to prepare and customize scene flow and settings. Users can view and interact with virtual objects by using a tangible user interface on a capacitive multitouch surface. In a 2D setting created TV scenes are simultaneously rendered as separate view using a production/target renderer in 3D. Thereby the user experiences a closer reproduction of a final production and set assets can be reused. Subsequently, a user can arrange scenes on a timeline while maintaining different versions/sequences. The system consists of a tablet and a workstation, which does all application processing and rendering. The tablet is just an interface connected via wireless LAN.

### Large-Area Moderator Tracking and Demonstrational Configuration of Position Based Interactions for Virtual Studio

2012 | Konferenzveröffentlichung

*EuroITV '12 Proceedings of the 10th European Conference on Interactive TV and Video, S. 105-114*

*Marinos, Dionysios; Geiger, Christian; Herder, Jens*

**Published:** 2012

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1609>

**Digital Object Identifier:** [10.1145/2325616.2325639](https://doi.org/10.1145/2325616.2325639)

#### Abstract

In this paper we introduce a system for tracking persons walking or standing on a large planar surface and for using the acquired data to easily configure position based interactions for virtual studio productions. The tracking component of the system, radarTRACK, is based on a laser scanner device capable of delivering interaction points on a large configurable plane. By using the device on the floor it is possible to use the delivered data to detect feet positions and derive the position and orientation of one or more users in real time. The second component of the system, named OscCalibrator, allows for the easy creation of multidimensional linear mappings between input and output parameters and the routing of OSC messages within a single modular design environment. We demonstrate the use of our system to flexibly create position-based interactions in a virtual studio environment.

### Heterogeneous binocular camera-tracking in a Virtual Studio

2011 | Konferenzveröffentlichung

*8. Workshop Virtuelle und Erweiterte Realität der GI-Fachgruppe VR/AR*

*Flasko, Matthias; Pogscheba, Patrick; Herder, Jens; Vonolfen, Wolfgang*

**Published:** 2011

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1610>

#### Abstract

This paper presents a tracking of parts of a human body in a virtual TV studio environment. The tracking is based on a depth camera and a HD studio camera and aims at a realistic interaction between the actor and the computer generated environment. Stereo calibration methods are used to match corresponding pixels of both cameras (HD color and depth image). Hence the images were rectified and column aligned. The disparity is used to correct the depth image pixel by pixel. This image registration results in row and column aligned images where ghost regions are in the depth image resulting from occlusion. Both images are used to generate foreground masks with chroma and depth keying. The color image is taken for skin color segmentation to determine and distinguish the actor's hands and face. In the depth image the flesh colored regions were used to determine their spatial position. The extracted positions were augmented by virtual objects. The scene is rendered correctly with virtual camera parameters which were calculated from the camera calibration parameters. Generated computer graphics with alpha value are combined with the HD color images. This compositing shows interaction with augmented objects for verification. The additional depth information results in changing the size of objects next to the hands when the actor moves around.

## radarTHEREMIN - Creating Musical Expressions in a Virtual Studio Environment



2011 | Konferenzveröffentlichung

2011 IEEE International Symposium on VR Innovation, S. 345-346

Wöldecke, Björn; Marinos, Dionysios; Pogscheba, Patrick; Geiger, Christian; Herder, Jens; Schwirten, Tobias

**Published:** 2011

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1611>

**Digital Object Identifier:** [10.1109/ISVRI.2011.5759671](https://doi.org/10.1109/ISVRI.2011.5759671)

### Abstract

In this paper we describe a prototypical system for live musical performance in a virtual studio environment. The performer stands in front of the studio camera and interacts with an infrared-laser-based multi-touch device. The final TV image shows the performer interacting with a virtual screen which is augmented in front of herself. To overcome the problem of the performer not seeing this virtual screen in reality, we use a special hexagonal grid to facilitate the performer's awareness of this novel Theremin-like virtual musical instrument.

## TouchPlanVS - A Tangible Multitouch Planning System for Virtual TV Studio Productions



2011 | Konferenzveröffentlichung

2011 IEEE Symposium on 3D User Interfaces (3DUI), S. 103-104

Herder, Jens; Brosda, Constantin; Djuderija, Sascha; Drochtert, Daniel; Genc, Ömer; Joeres, Stephan; Kellerberg, Patrick; Looschen, Simon; Geiger, Christian; Wöldecke, Björn

**Published:** 2011

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1612>

**Digital Object Identifier:** [10.1109/3DUI.2011.5759226](https://doi.org/10.1109/3DUI.2011.5759226)

### Abstract

This article presents a new approach of integrating tangible user feedback in today's virtual TV studio productions. We describe a tangible multitouch planning system, enabling multiple users to prepare and customize scene flow and settings. Users can collaboratively view and interact with virtual objects by using a tangible user interface on a shared multitouch surface. The in a 2D setting created TV scenes are simultaneously rendered on an external monitor, using a production/target renderer in 3D. Thereby the user experiences a closer reproduction of a final production. Subsequently, users are able to join together the scenes into one complex plot. Within the developing process, a video prototype of the system shows the user interaction and enables early reviews and evaluations. The requirement analysis is based on expert interviews.

## Visual Acceptance Evaluation of Soft Shadow Algorithms for Virtual TV Studios

2010 | Konferenzveröffentlichung

HC '10 Proceedings of the 13th International Conference on Humans and Computers, S. 66-71  
Ayten, Hüseyin; Herder, Jens; Vonolfen, Wolfgang

**Published:** 2010

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1613>

### Abstract

Shadows in computer graphics are an important rendering aspect for spatial objects. For realtime computer applications such as games, it is essential to represent shadows as accurate as possible. Also, various tv stations work with virtual studio systems instead of real studio sets. Especially for those systems, a realistic impression of the rendered and mixed scene is important. One challenge, hence, is the creation of a natural shadow impression. This paper presents the results of an empirical study to compare the performance and quality of different shadow mapping methods. For this test, a prototype studio renderer was developed. A percentage closer filter (pcf) with a number of specific resolutions is used to minimize the aliasing issue. More advanced algorithms which generate smooth shadows like the percentage closer soft shadow (pcss) method as well as the variance shadow maps (vsm) method are analysed. Different open source apis are used to develop the virtual studio renderer, giving the benefit of permanent enhancement. The Ogre 3D graphic engine is used to implement the rendering system, benefiting from various functions and plugins. The transmission of the tracking data is accomplished with the vrpn server/client and the Intersense api. The different shadow algorithms are compared in a virtual studio environment which also casts real shadows and thus gives a chance for a direct comparison throughout the empirical user study. The performance is measured in frames per second.

## Vibrotactile Pitfalls: Arm Guidance for Moderators in Virtual TV Studios



2010 | Konferenzveröffentlichung

HC '10 Proceedings of the 13th International Conference on Humans and Computers, S. 72-80  
Klapdohr, Monika; Wöldecke, Björn; Marinos, Dionysios; Herder, Jens; Geiger, Christian;  
Vonolfen, Wolfgang

**Published:** 2010

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1614>

### Abstract

For this study, an experimental vibrotactile feedback system was developed to help actors with the task of moving their arm to a certain place in a virtual tv studio under live conditions. Our intention is to improve interaction with virtual objects in a virtual set, which are usually

not directly visible to the actor, but only on distant displays. Vibrotactile feedback might improve the appearance on tv because an actor is able to look in any desired direction (camera or virtual object) or to read text on a teleprompter while interacting with a virtual object. Visual feedback in a virtual studio lacks spatial relation to the actor, which impedes the adjustment of the desired interaction. The five factors of the implemented system which are mounted on the tracked arm give additional information like collision, navigation and activation. The user study for the developed system shows that the duration for reaching a certain target is much longer in case no visual feedback is given, but the accuracy is similar. In this study, subjects reported that an activation signal indicating the arrival at the target of a drag & drop task was helpful. In this paper, we discuss the problems we encountered while developing such a vibrotactile display. Keeping these pitfalls in mind could lead to better feedback systems for actors in virtual studio environments.

## Design and Virtual Studio Presentation of a Traditional Archery Simulator

2010 | Konferenzveröffentlichung

*Proceedings of the Entertainment Interfaces Track 2010 at Interaktive Kulturen, Duisburg, Germany, September 12-15, 2010, S. 37-44*

*Geiger, Christian; Herder, Jens; Göbel, Sebastian; Heinze, Christin; Marinos, Dionysios*

**Published:** 2010

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1615>

### Abstract

In this paper we describe the design of a virtual reality simulator for traditional intuitive archery. Traditional archers aim without a target figure. Good shooting results require an excellent body-eye coordination that allows the user to perform identical movements when drawing the bow. Our simulator provides a virtual archery experience and supports the user to learn and practice the motion sequence of traditional archery in a virtual environment. We use an infrared tracking system to capture the user's movements in order to correct his movement. To provide a realistic haptic feedback a real bow is used as interaction device. Our system provides a believable user experience and supports the user to learn how to shoot in the traditional way. Following a user-centered iterative design approach we developed a number of prototypes and evaluated them for refinement in sequent iteration cycles. For illustration purposes we created a short video clip in our virtual studio about this project that presents the main ideas in an informative yet entertaining way.

## Improved Direction Signalization Technique Employing Vibrotactile Feedback

2009 | Konferenzveröffentlichung

*11th Virtual Reality International Conference, VRIC'2009, S. 1-8*

*Vierjahn, Tom; Wöldecke, Björn; Geiger, Christian; Herder, Jens*

**Published:** 2009

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1616>

### Abstract

Vibrotactile feedback via body-worn vibrating belts is a common means of direction signalization - e.g. for navigational tasks. Consequently such feedback devices are used to guide blind or visually impaired people but can also be used to support other wayfinding tasks - for instance, guiding actors in virtual studio productions. Recent effort has been made to simplify this task by integrating vibrotactile feedback into virtual studio applications. In this work we evaluate the accuracy of an improved direction signalization technique, utilizing a



body-worn vibrotactile belt with a limited number of factors, and compare it to other work. The results from our user study indicate that it is possible to signalize different directions accurately, even with a small number of factors spaced by 90°.

## Steering actors through a virtual set employing vibro-tactile feedback



2009 | Konferenzveröffentlichung

*TEI '09 Proceedings of the 3rd International Conference on Tangible and Embedded Interaction, S. 169-174*

*Wöldecke, Björn; Vierjahn, Tom; Flasko, Matthias; Herder, Jens; Geiger, Christian*

**Published:** 2009

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1617>

**Digital Object Identifier:** [10.1145/1517664.1517703](https://doi.org/10.1145/1517664.1517703)

### Abstract

Actors in virtual studio productions are faced with the challenge that they have to interact with invisible virtual objects because these elements are rendered separately and combined with the real image later in the production process. Virtual sets typically use static virtual elements or animated objects with predefined behavior so that actors can practice their performance and errors can be corrected in the post production. With the demand for inexpensive live recording and interactive TV productions, virtual objects will be dynamically rendered at arbitrary positions that cannot be predicted by the actor. Perceptive aids have to be employed to support a natural interaction with these objects. In our work we study the effect of haptic feedback for a simple form of interaction. Actors are equipped with a custom built haptic belt and get vibrotactile feedback during a small navigational task (path following). We present a prototype of a wireless vibrotactile feedback device and a small framework for evaluating haptic feedback in a virtual set environment. Results from an initial pilot study indicate that vibrotactile feedback is a suitable non-visual aid for interaction that is at least comparable to audio-visual alternatives used in virtual set productions.

## Simple Actor Tracking for Virtual TV Studios Using a Photonic Mixing Device

2009 | Konferenzveröffentlichung

*12th International Conference on Human and Computer*

*Herder, Jens; Wilke, Michael; Heimbach, Julia; Göbel, Sebastian; Marinos, Dionysios*

**Published:** 2009

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1664>

### Abstract

Virtual TV studios use actor tracking systems for resolving the occlusion of computer graphics and studio camera image. The actor tracking delivers the distance between actor and studio camera. We deploy a photonic mixing device, which captures a depth map and a luminance image at low resolution. The renderer engines gets one depth value per actor using the OSC protocol. We describe the actor recognition algorithm based on the luminance image and the depth value calculation. We discuss technical issues like noise and calibration.

## Spatial Audio for Augmented Reality

2007 | Konferenzveröffentlichung

10th International Conference on Human and Computer, S. 53-58

Garbe, Katharina; Herbst, Iris; Herder, Jens

**Published:** 2007

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1665>

#### Abstract

Using spatial audio successfully for augmented reality (AR) applications is a challenge, but is awarded with an improved user experience. Thus, we have extended the AR/VR framework \sc Morgan with spatial audio to improve users orientation in an AR application. In this paper, we investigate the users' capability to localize and memorize spatial sounds (registered with virtual or real objects). We discuss two scenarios. In the first scenario, the user localizes only sound sources and in the second scenario the user memorizes the location of audio-visual objects. Our results reflect spatial audio performance within the application domain and show which technology pitfalls still exist. Finally, we provide design recommendations for spatial audio AR environments.

### HDR-based lighting estimation for virtual studio (TV) environments

2007 | Konferenzveröffentlichung

10th International Conference on Human and Computer, S. 111-117

Herder, Jens; Neider, Christian; Kinuwaki, Shinichi

**Published:** 2007

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1666>

#### Abstract

Two high dynamic range HDR environments maps based on video streams from fish-eye lens cameras are used for generating virtual lights in a virtual set renderer. The task of realistic virtual light setup of scenes using captured environment maps might be eased as well as visual quality improves. We discuss the light setting problem for virtual studio tv productions which have mixed scenes of real objects, actors, virtual objects and virtual backgrounds. Benefits of hdr interactive light control are that the real light in the studio does not have to be remodeled and the artistic impression by using the light in the studio is also captured. An analysis of system requirements identifies technical challenges. We discuss the properties of a prototype system including test production.

### Zweihändige Interaktion in VR-Umgebungen



2007 | Sammelbandbeitrag / Buchkapitel

Augmented & Virtual Reality in der Produktentstehung, 209, S. 315-332

Rattay, Oliver; Geiger, Christian; Herder, Jens; Goebbels, Gernot; Nikitin, Igor

**Published:** 2007

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1667>

#### Abstract

Einfach benutzbare VR-Anwendungen erfordern andere Interaktionstechniken als konventionelle Desktop-Anwendungen mit Maus, Tastatur und Desktop-Metapher zur Verfügung stellen. Da solche Ansätze in Konzeption und Realisierung deutlicher komplexer sind, müssen diese mit Sorgfalt ausgewählt werden. Folgt man der Argumentation, dass VR eine natürliche Interaktion mit virtuellen Objekten ermöglicht, so führt dies fast zwangsläufig zu zweihändigen Interaktionstechniken für virtuelle Umgebungen, da Benutzer in realen Umgebungen gewohnt sind, fast ausschließlich zweihändig zu agieren. In diesem Beitrag geben wir eine Übersicht über den Stand der Technik im Bereich zweihändiger Interaktion, leiten Anforderungen an eine Entwicklung zweihändiger Interaktionstechniken in VR ab und beschreiben einen eigenen Ansatz. Dabei geht es um die zweihändige Interaktion bei der Simulation flexibler biegeschlaffer Bauteile (z. B. Schlauchverbindungen).

## Charakteristiken einer netzgestützten wissenschaftlichen Kommunikation und Umsetzung in Infrastruktur und Publikationsformen

2007 | Konferenzveröffentlichung

*German e-Science Conference 2007*

*Schirrwagen, Jochen; Herder, Jens; Uwe Möbius, Michael; Regulski, Katharina*

**Published:** 2007

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1674>

### Abstract

Neue Formen der wissenschaftlichen Kommunikation basieren auf Fortschritten in den Informations- und Kommunikationstechnologien. Das dadurch mögliche kollaborative wissenschaftliche Arbeiten liefert Ergebnisse, die in vielfältigen Formaten, als Text, Simulationsdaten oder multimediale Elemente vorliegen. Daraus ergeben sich besondere Anforderungen an Publikations- und Kommunikationsinfrastrukturen, wie Interoperabilität, Repräsentation, Verteilung und Archivierung derartiger komplexer digitaler Objekte. Mit der Initiative Digital Peer Publishing existiert eine Infrastruktur für das Publizieren in elektronischen Zeitschriften. Dieses Publikationsformat erlaubt neben einem schnellen Wissenstransfer eine umfassende Repräsentation wissenschaftlicher Ergebnisse. Das Journal of Virtual Reality and Broadcasting als Teil dieser Initiative zeigt am Beispiel des elektronischen Publikationsprozesses den Stand der Wissensvernetzung in seiner Community, sowie aktuelle Entwicklungen um die Erweiterung innovativer Funktionen.

## Lighting an Interactive Scene in Real-time with a GPU and Video Textures

2006 | Wissenschaftlicher Artikel

*Journal of the 3D-Forum Society, 20, 1, S. 22-28*

*Juttner, Carsten; Herder, Jens*

**Published:** 2006

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1668>

### Abstract

The presentation of virtual environments in real time has always been a demanding task. Specially designed graphics hardware is necessary to deal with the large amounts of data these applications typically produce. For several years the chipsets that were used allowed only simple lighting models and fixed algorithms. But recent development has produced new graphics processing units (GPUs) that are much faster and more programmable than their predecessors. This paper presents an approach to take advantage of these new features. It uses a video texture as part of the lighting calculations for the passenger compartment of a

virtual train and was run on the GPU of a recent PC graphics card. The task was to map the varying illumination of a filmed landscape onto the virtual objects and also onto another video texture (showing two passengers), thereby enhancing the realism of the scene.

## Matching Light for Virtual Studio TV Productions

2006 | *Sammelbandbeitrag / Buchkapitel*

*9th International Conference on Human and Computer, S. 158-162*

*Herder, Jens*

**Published:** 2006

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1671>

### Abstract

High dynamic range environments maps based on still images or video streams are used for computer animation or interactive systems. The task of realistic light setup of scenes using captured environment maps might be eased as well as the visual quality improves. In this article, we discuss the light setting problem for virtual studio (tv) layout and system become more complex to handle this new feature of studio light capturing. The analysis of system requirements identifies the technical challenges.

## Haptische Interaktionen in Testumgebungen für Produktpräsentation in Virtuellen Umgebungen

2006 | *Sammelbandbeitrag / Buchkapitel*

*Augmented and Virtual Reality in der Produktentstehung, 188, S. 87-99*

*Herder, Jens; Jaensch, Kai; Garbe, Katharina*

**Published:** 2006

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1672>

### Abstract

Durch den vermehrten Einsatz von multimedialen Technologien werden in der Marktforschung die Möglichkeiten der Durchführung flexibler und kostengünstiger Studien gegeben. In sehr frühen Phasen des Innovationsprozesses als Teil der Marktforschung können durch Einsatz von Virtuellen Umgebungen die Markteinführungskonzepte für neue Produkte getestet werden. Mittels Anwendungen der Virtuellen Realität können neue Produkte einschließlich des Marketingkonzeptes auch haptisch getestet werden, ohne dass dieses Produkt bereits physisch vorhanden sein muss. Informationen werden dem Benutzer in Virtuellen Umgebungen hauptsächlich visuell und ergänzend auditiv übermittelt. Verbreitete Benutzerschnittstellen sind Interaktionsgeräte wie Stylus und Wand. Durch die haptische Wahrnehmung werden Informationen menschengerechter, effektiver und intuitiver wahrgenommen. Objekte in einer virtuellen Umgebung können durch den Einsatz haptischer Interaktionsgeräte ertastet und empfunden werden und machen dadurch eine differenziertere Beurteilung und Einschätzung durch den Benutzer eben dieser Objekte möglich. Der Fokus des vorliegenden Projektes liegt daher auf der interaktiven haptischen Produktpräsentation in einer virtuellen Einkaufsumgebung, die in Online-Befragungen mit zusätzlichen Werbefilmen eingebettet ist. Als Nebenprodukt wurde das Werkzeug Open Inventor um Knoten zur Modellierung von haptischen Szeneneigenschaften erweitert.

## Interaktive Echtzeit-3D-Visualisierung Webbasierte Darstellung: Mobilisierung und Homing von Blutstammzellen

2006 | *Sammelbandbeitrag / Buchkapitel*

*Mensch and Computer 2006: Mensch und Computer im Struktur Wandel, S. 405-409*

*Herder, Jens; Kronenwett, Ralf; Lambertz, Simone; Kiefer, Georg; Freihoff, Johann*

**Published:** 2006

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1673>

### Abstract

Die interaktive Echtzeit 3D-Visualisierung Mobilisierung und Homing von Blutstammzellen wurde konzipiert, um ein sehr komplexes medizinisches Wissen mit den Mitteln der 3-dimensionalen Visualisierung in Echtzeit und des Internets sowie der daraus resultierenden Interaktivität aufzubereiten. Dies musste auf einer Ebene geschehen, die es hinterher auch jedem Nicht-Mediziner erlaubt, die grundlegenden biologischen und medizinischen Sachverhalte nachzuvollziehen. Das Resultat: Eine informative und didaktische Anwendung, aus einer Mischung von interaktiven 3D-Stationen und erklärenden 3D-Animationen. Diskutiert werden die Methodik der Konzeptionsphase und die Interaktionstechniken.

## Sound radiation simulation of musical instruments based on interpolation and filtering of multi-channel recordings

2006 | *Wissenschaftlicher Artikel*

*Journal of the 3D-Forum Society, 20, 1, S. 41-47*

*Struchholz, Holger; Herder, Jens; Leckschat, Dieter*

**Published:** 2006

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1675>

### Abstract

With the virtual environment developed here, the characteristic sound radiation patterns of musical instruments can be experienced in real-time. The user may freely move around a musical instrument, thereby receiving acoustic and visual feedback in real-time. The perception of auditory and visual effects is intensified by the combination of acoustic and visual elements, as well as the option of user interaction. The simulation of characteristic sound radiation patterns is based on interpolating the intensities of a multichannel recording and offers a near-natural mapping of the sound radiation patterns. Additionally, a simple filter has been developed, enabling the qualitative simulation of an instrument's characteristic sound radiation patterns to be easily implemented within real-time 3D applications. Both methods of simulating sound radiation patterns have been evaluated for a saxophone with respect to their functionality and validity by means of spectral analysis and an auditory experiment.

## Verwendung von Grafikkarten-Prozessoren (GPUs) für eine interaktive Produktvisualisierung in Echtzeit unter Verwendung von Shadern und Videotexturen

2005 | *Sammelbandbeitrag / Buchkapitel*

*Augmented and Virtual Reality in der Produktentstehung, 167, S. 23-36*

*Herder, Jens; Wörzberger, Ralf; Juttner, Carsten; Twelker, Uwe*

**Published:** 2005

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1669>

**Abstract**

Die Visualisierung von Produkten in Echtzeit ist in vielen Bereichen ein hilfreicher Schritt, um potentiellen Kunden eine Vorstellung vom Einsatzgebiet und einen Überblick über die finale Anwendung zu erlauben. In den letzten Jahren haben neue Technologien in der Grafikkartenindustrie dazu geführt, dass früher nur auf teuren Grafikkarten verfügbare Möglichkeiten nun auch mit relativ kostengünstigen Karten, welche für den Einsatz in Standard-PCs konzipiert wurden, realisierbar sind. Es wird an einem Modellentwurf des Innenraums des People Cargo Movers gezeigt, wie die Beleuchtung innerhalb einer Echtzeitvisualisierung durch Shader realisiert werden kann. Als Lichtquelle wird dabei eine Landschaftsaufnahme herangezogen, welche als eine von mehreren Videotexturen eingebunden wurde. Außerdem werden real im virtuellen Studio gefilmte Personen im Innenraum gleichermaßen über Videotexturen dargestellt und ebenfalls durch die Landschaft beleuchtet.

**A Database Driven and Virtual Reality supported Environment for Marketing Studies**

2005 | *Wissenschaftlicher Artikel*

*Journal of the 3D-Forum Society, 19, 4, S. 95-101*

*Novotny, Tom; Jaensch, Kai; Herder, Jens*

**Published:** 2005

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1670>

**Abstract**

In today's market research mechanisms multi modal technologies are significant tools to perform flexible and price efficient studies for not only consumer products but also consumer goods. Current appraisal mechanisms in combination with applied computer graphics can improve the assessment of a product's launch in the very early design phase or an innovation process. The combination of online questionnaires, Virtual Reality (VR) applications and a database management system offers a powerful tool to let a consumer judge products as well as innovated goods even without having produced a single article. In this paper we present an approach of consumer good studies consisting of common as well as interactive VR product presentations and online questionnaires bases on a bidirectional database management solution to configure and manage numerous studies, virtual sets, goods and participants in an effective way to support the estimation of the received data. Non-programmers can create their test environment including a VR scenario very quickly without any effort. Within the extensive knowledge of consumer goods, marketing instruments can be defined to shorten and improve the rollout process in the early product stages.

**Testmärkte in einer Virtuellen Umgebung - Die Bestimmung von Preisabsatzfunktionen zur Unterstützung des Innovationsmanagements**

2004 | *Sammelbandbeitrag / Buchkapitel*

*Augmented and Virtual Reality in der Produktentstehung, 149, S. 97-110*

*Herder, Jens; Jaensch, Kai; Horst, Bruno; Novotny, Thomas*

**Published:** 2004

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1677>

#### Abstract

Multimediale Technologien werden in der Marktforschung immer stärker eingesetzt, um flexible und kostengünstige Studien durchzuführen. Im Innovationsprozess kann dabei auf die langjährigen Erfahrungen zurückgegriffen werden, die durch den Einsatz der Computersimulation in der technischen Produktentwicklung zustande gekommen sind. In sehr frühen Phasen des Innovationsprozesses können durch Einsatz der neuen Technologien die Markteinführungskonzepte für neue Produkte getestet werden. Die Applikationen der virtuellen Realität bieten ein einzigartiges Potential, neue Produkte einschließlich des Marketingkonzeptes zu testen, ohne dass dieses Produkt bereits physisch vorhanden sein muss. Am Beispiel eines Elementes des Marketingkonzeptes, der Preispolitik, zeigt die vorliegende Studie auf, welches Potential die virtuelle Kaufsituation von Produkten bietet. Der Fokus des Projektes liegt auf der interaktiven Produktpräsentation in einer virtuellen Umgebung, die in eine Online-Befragung mit zusätzlichen Werbefilmen eingebettet ist. Visuell hochwertige 3D-Produktpräsentationen versetzen den Probanden in eine virtuelle Einkaufsumgebung, die einem realen Szenario entspricht. Die virtuellen Produkte werden in mehreren Kaufentscheidungsrunden zu unterschiedlichen Preisen angeboten. Der Preisuntersuchung geht eine Präsentation ausgewählter Werbespots sowie eine produktbezogene Befragung voraus. Im Anschluss an die virtuellen Preisentscheidungen werden die Eindrücke sowie einige Kontrollgrößen abgefragt. In weitergehenden Studien dieser Art können die Wirkungen mehrerer Marketing-Instrumente zu einem Zeitpunkt untersucht werden, in dem sich die Produkte noch im Entwicklungsprozess befinden. Auf diesem Weg lassen sich auch Wettbewerbsvorteile bestehender Produkte effizienter erkennen und nutzen. Mit den hoch entwickelten Computer- und Visualisierungstechnologien ist ein mächtiges Werkzeug entstanden, das bereits für kommerzielle Präsentationen und Produktstudien eingesetzt wird. Zukünftig kann es auch in Kombination mit Internetanwendungen und klassischen Methoden der Marktforschung zu einem sehr frühen Zeitpunkt umfassende Erkenntnisse über ein Produkt liefern.

### Interactive Virtual Set Applications for Post Production

2004 | Konferenzveröffentlichung

University of Aizu 2004 – Seventh International Conference on Human

Herder, Jens; Vonolfen, Wolfgang; Griesert, Arnfried; Heuer, Stefan; Hoffmann, Ansgar; Höppner, Bernd

**Published:** 2004

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1678>

#### Abstract

Virtual set environments for broadcasting become more sophisticated as well as the visual quality improves. Realtime interaction and production-specific visualization implemented through plugin mechanism enhance the existing systems like the 3DK. This work presents the integration of the Intersense IS-900 SCT camera tracking and 3D interaction into the 3DK virtual studio environment. The main goal of this work is the design of a virtual studio environment for post productions, which includes video output as well as media streaming formats such as MPEG-4. The systems allows high quality offline rendering during post production and 3D interaction by the moderator during the recording.

### Interactive Realtime Terrain Visualization for Virtual Set Applications

2003 | *Wissenschaftlicher Artikel*  
*Journal of the 3D-Forum Society, 17, 4, S. 20-26*  
 Griesert, Arnfried; Walczak, Oliver; Herder, Jens

**Published:** 2003

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1679>

**Abstract**

Virtual set environments for broadcasting become more sophisticated as well as the visual quality improves. Realtime interaction and production-specific visualization implemented through plugin mechanism enhance the existing systems like the virtual studio software 3DK. This work presents an algorithm which can dynamically manage textures of high resolution by prefetching them depending on their requirement in memory and map them on a procedural mesh in realtime. The main goal application of this work is the virtual representation of a flight over a landscape as part of weather reports in virtual studios and the interaction by the moderator.

Spatial Sound Design and Interaction for Virtual Environments in the Promotion of Architectural Designs

2003 | *Sammelbandbeitrag / Buchkapitel*  
*Third International Workshop on Spatial Media, S. 7-11*  
 Herder, Jens; Novotny, Thomas

**Published:** 2003

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1680>

**Abstract**

Virtual environment walkthrough applications are generally enhanced by a user's interactions within a simulated architectural space, but the enhancement that stems from changes in spatial sound that are coupled with a user's behavior are particularly important, especially within regard to creating a sense of place. When accompanied by stereoscopic image synthesis, spatial sound can immerse the user in a high-realism virtual copy of the real world. An advanced virtual environment that allow users to change realtime rendering features with a few manipulations has been shown to enable switching between different versions of a modeled space while maintaining sensory immersion. This paper reports on an experimental project in which an architectural model is being integrated into such an interactive virtual environment. The focus is on the spatial sound design for supporting interaction, including demonstrations of both the possibilities and limitations of such applications in presenting and promoting architectural designs, as well as in three-dimensional sketching.

The Helical Keyboard: Perspectives for Spatial Auditory Displays and Visual Music

2002 | *Wissenschaftlicher Artikel*  
*Journal of New Music Research, 31, 3, S. 269-281*  
 Herder, Jens; Cohen, Michael

**Published:** 2002



**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1681>

### Abstract

Auditory displays with the ability to dynamically spatialize virtual sound sources under real-time conditions enable advanced applications for art and music. A listener can be deeply immersed while interacting and participating in the experience. We review some of those applications while focusing on the Helical Keyboard project and discussing the required technology. Inspired by the cyclical nature of octaves and helical structure of a scale, a model of a piano-style keyboard was prepared, which was then geometrically warped into a helicoidal configuration, one octave/revolution, pitch mapped to height and chroma. It can be driven by MIDI events, real-time or sequenced, which stream is both synthesized and spatialized by a spatial sound display. The sound of the respective notes is spatialized with respect to sinks, avatars of the human user, by default in the tube of the helix. Alternative coloring schemes can be applied, including a color map compatible with chromastereoptic eyewear. The graphical display animates polygons, interpolating between the notes of a chord across the tube of the helix. Recognition of simple chords allows directionalization of all the notes of a major triad from the position of its musical root. The system is designed to allow, for instance, separate audition of harmony and melody, commonly played by the left and right hands, respectively, on a normal keyboard. Perhaps the most exotic feature of the interface is the ability to fork one's presence, replicating subject instead of object by installing multiple sinks at arbitrary places around a virtual scene so that, for example, harmony and melody can be separately spatialized, using two heads to normalize the octave; such a technique effectively doubles the helix from the perspective of a single listener. Rather than a symmetric arrangement of the individual helices, they are perceptually superimposed in-phase, co-extensively, so that corresponding notes in different registers are at the same azimuth.

## Use of Virtual Environments in the Promotion and Evaluation of Architectural Designs

2002 | *Wissenschaftlicher Artikel*

*Journal of the 3D-Forum Society, 16, 4, S. 117-122*

*Herder, Jens; Wörzberger, Ralf; Twelker, Uwe; Albertz, Stefan*

**Published:** 2002

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1682>

### Abstract

Virtual environments can create a realistic impression of an architectural space during the architectural design process, providing a powerful tool for evaluation and promotion during a project's early stages. In comparison to pre-rendered animations, such as walkthroughs based on CAD models, virtual environments can offer intuitive interaction and a more life like experience. Advanced virtual environments allow users to change realtime rendering features with a few manipulations, switching between different versions while still maintaining sensory immersion. This paper reports on an experimental project in which architectural models are being integrated into interactive virtual environments, and includes demonstrations of both the possibilities and limitations of such applications in evaluating, presenting and promoting architectural designs.

## Panel: Eartop computing and cyberspatial audio technology

2001 | *Konferenzveröffentlichung*

*IEEE-VR2001: IEEE Virtual Reality, S. 322-323*

*Cohen, Michael; Herder, Jens; Martens, William*

**Published:** 2001

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1684>

### Applications of Spatial Auditory Displays in the Context of Art and Music

2001 | *Konferenzveröffentlichung*

*Human Supervision and Control in Engineering and Music*

Herder, Jens

**Published:** 2001

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1685>

### Interactive Content Creation with Virtual Set Environments

2001 | *Wissenschaftlicher Artikel*

*Journal of the 3D-Forum Society, 15, 4, S. 53-56*

Herder, Jens

**Published:** 2001

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1686>

#### **Abstract**

Digital broadcasting enables interactive \sc tv studios with virtual set environments. This presentation reviews current technology and describes the requirements for such systems. Interoperability over the production, streaming, and viewer levels requires open interfaces. As the technology allow more interaction, it becomes inherent difficult to control the quality of the viewers experience.

### Interactive Content Creation with Virtual Set Environments

2001 | *Konferenzveröffentlichung*

*Fourth International Conference on Human and Computer*

Herder, Jens

**Published:** 2001

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1853>

**Abstract**

Digital broadcasting enables interactive \sc tv, which presents new challenges for interactive content creation. Besides the technology for streaming and viewing, tools and systems are under development that extend traditional \sc tv studios with virtual set environments. This presentation reviews current technology and describes the requirements for such systems. Interoperability over the production, streaming, and viewer levels requires open interfaces. As the technology allow more interaction, it becomes inherent difficult to control the quality of the viewers experience

## Challenges of Virtual Sets: From Broadcasting to Interactive Media

2000 | *Konferenzveröffentlichung*

*Seventh International Workshop on Human, S. 13-17*

*Herder, Jens*

**Published:** 2000

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1687>

**Abstract**

Virtual sets have evolved from computer-generated, prerendered 2D backgrounds to realtime, responsive 3D computer graphics and are nowadays standard repertoire of broadcasting divisions. The graphics, which are combined with real video feed becoming moresophisticated, real looking and more responsive. We will look at the recent developments and suggest further developments like integration of spatial audio into the studio production and generating interactive media streams. Educational institutes recognize the demands of the rising media industry and established new courses on media technology like the Duesseldorf University of Applied Sciences.

## A Chatspace Deploying Spatial Audio for Enhanced Conferencing

2000 | *Wissenschaftlicher Artikel*

*Journal of the 3D-Forum Society, 15, 1*

*Herder, Jens; Yamazaki, Yasuhiro*

**Published:** 2000

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1688>

## Distance and Room Effects Control for the PSFC, an Auditory Display using a Loudspeaker Array

2000 | *Wissenschaftlicher Artikel*

*Journal of the 3D-Forum Society, 14, 4, S. 146-151*

*Honno, Kuniaki; Suzuki, Kenji; Herder, Jens*

**Published:** 2000

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1689>

**Abstract**

The Pioneer Sound Field Controller (PSFC), a loudspeaker array system, features realtime configuration of an entire sound field, including sound source direction, virtual distance, and context of simulated environment (room characteristics: room size and liveness) for each of two sound sources. In the PSFC system, there is no native parameter to specify the distance between the sound source and sound sink (listener) and also no function to control it directly. This paper suggests the method to control virtual distance using basic parameters: volume, room size and liveness. The implementation of distance cue is an important aspect of 3D sounds. Virtual environments supporting room effects like reverberation not only gain realism but also provide additional information to users about surrounding space. The context switch of different aural attributes is done by using an API of the Sound Spatialization Framework. Therefore, when the sound sink move through two rooms, like a small bathroom and a large living room, the context of the sink switches and different sound is obtained.

## Implementation of Aural Attributes for Simulation of Room Effects in Virtual Environments

2000 | *Sammelbandbeitrag / Buchkapitel*

*ACM Multimedia 2000, S. 439-441*

*Suzuki, Kenji; Nishoji, Yuji; Herder, Jens*

**Published:** 2000

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1690>

**Abstract**

The audio design for virtual environments includes simulation of acoustical room properties besides specifying sound sources and sinks and their behavior. Virtual environments supporting room reverberation not only gain realism but also provide additional information to the user about surrounding space. Catching the different sound properties by the different spaces requires partitioning the space by the properties of aural spaces. We define soundscape and aural attributes as an application and multimedia content interface. Calculated data on an abstract level is sent to spatialization backends. Part of this research was the implementation of a device driver for the Roland Sound Space Processor. This device not only directionalizes sound sources, but also controls room effects like reverberation.

## Exploring Spatial Audio Conferencing Functionality in Multiuser Virtual Environments

2000 | *Konferenzveröffentlichung*

*The Third International Conference on Collaborative Virtual Environments, S. 207-208*

*Yamazaki, Yasuhiro; Herder, Jens*

**Published:** 2000

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1691>

**Abstract**

A chatspace was developed that allows conversation with 3D sound using networked streaming in a shared virtual environment. The system provides an interface to advanced audio features, such as a "whisper function" for conveying a confided audio stream. This study explores the use of spatial audio to enhance a user's experience in multiuser virtual environments.

### Interactive Sound Spatialization - a Primer

2000 | *Wissenschaftlicher Artikel*

*MM News, University of Aizu Multimedia Center, 8, S. 8-12*

*Herder, Jens*

**Published:** 2000

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1696>

#### Abstract

Sound spatialization is a technology which puts sound into the three dimensional space, so that it has a perceivable direction and distance. Interactive means mutually or reciprocally active. Interaction is when one action (e.g., user moves mouse) has direct or immediate influence to other actions (e.g., processing by a computer: graphics change in size). Based on this definition an introduction to sound reproduction using DVD and virtual environments is given and illustrated by applications (e.g., virtual converts).

### A Chatspace Deploying Spatial Audio for Enhanced Conferencing

2000 | *Konferenzveröffentlichung*

*Third International Conference on Human and Computer, S. 197-202*

*Herder, Jens; Yamazaki, Yasuhiro*

**Published:** 2000

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1697>

### Distance and Room Effects Control for the PSFC, an Auditory Display using a Loudspeaker Array

2000 | *Konferenzveröffentlichung*

*Third International Conference on Human and Computer, S. 71-76*

*Honno, Kuniaki; Suzuki, Kenji; Herder, Jens*

**Published:** 2000

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1698>

#### Abstract

The Pioneer Sound Field Controller (PSFC), a loudspeaker array system, features realtime configuration of an entire sound field, including sound source direction, virtual distance, and context of simulated environment (room characteristics: room size and liveness) for each of two sound sources. In the PSFC system, there is no native parameter to specify the distance

between the sound source and sound sink (listener) and also no function to control it directly. This paper suggests the method to control virtual distance using basic parameters: volume, room size and liveness. The implementation of distance cue is an important aspect of 3D sounds. Virtual environments supporting room effects like reverberation not only gain realism but also provide additional information to users about surrounding space. The context switch of different aural attributes is done by using an API of the Sound Spatialization Framework. Therefore, when the sound sink move through two rooms, like a small bathroom and a large living room, the context of the sink switches and different sound is obtained.

## Optimization of Sound Spatialization Resource Management through Clustering

1999 | *Wissenschaftlicher Artikel*

*Journal of the 3D-Forum Society, 13, 3, S. 59-65*

Jens Herder

**Published:** 1999

**Weblink:** <https://opus4.kobv.de/opus4-hs-duesseldorf/1695>

### Abstract

Level-of-detail is a concept well-known in computer graphics to reduce the number of rendered polygons. Depending on the distance to the subject (viewer), the objects' representation is changed. A similar concept is the clustering of sound sources for sound spatialization. Clusters can be used to hierarchically organize mixels and to optimize the use of resources, by grouping multiple sources together into a single representative source. Such a clustering process should minimize the error of position allocation of elements, perceived as angle and distance, and also differences between velocity relative to the sink (i.e., Doppler shift). Objects with similar direction of motion and speed (relative to sink) in the same acoustic resolution cone and with similar distance to a sink can be grouped together.

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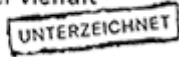
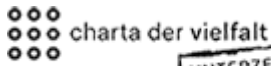
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