Karma Gerçeklik için Ses Etkileşimleri

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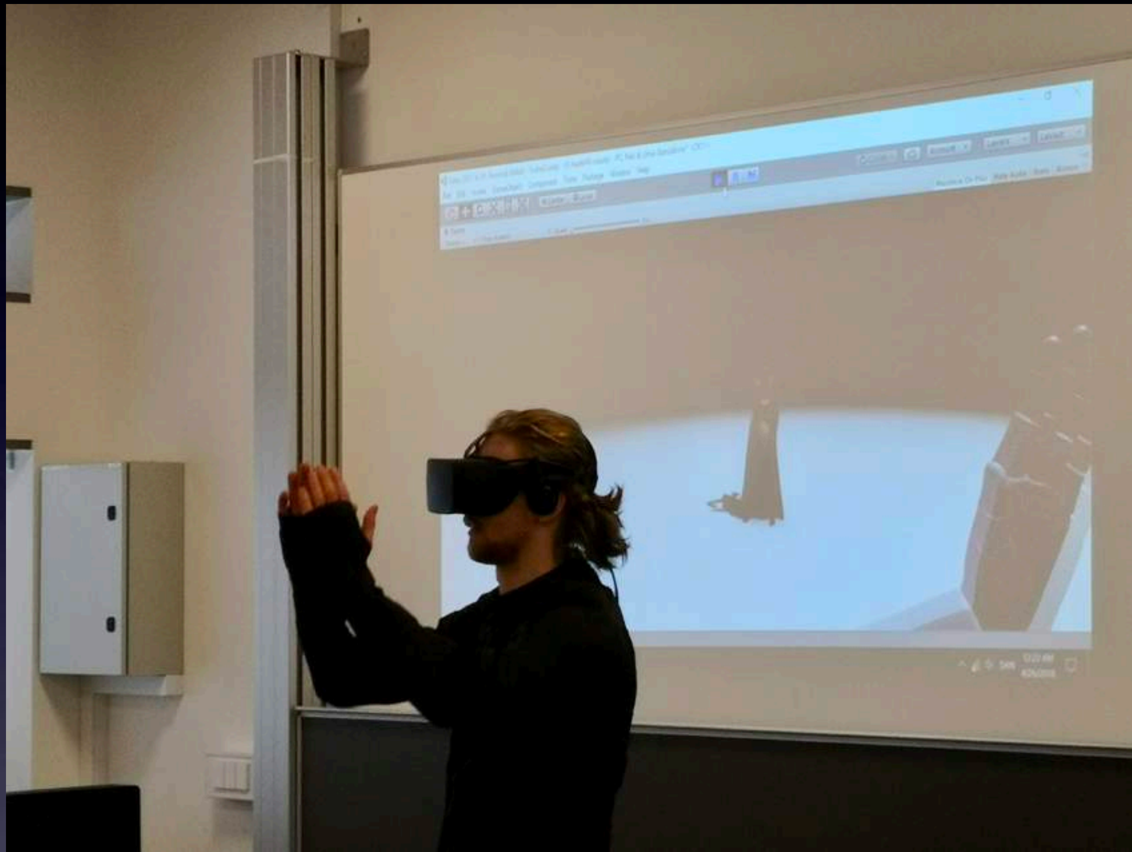
AALBORG UNIVERSITET
KØBENHAVN

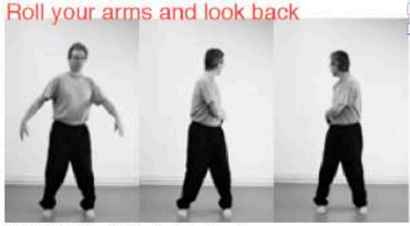


ISINMA HAREKETLERI

Opening breath movement

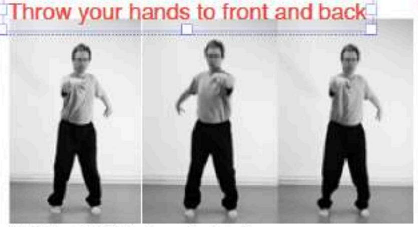
Alun laaja hengitysliike.

Roll your arms and look back



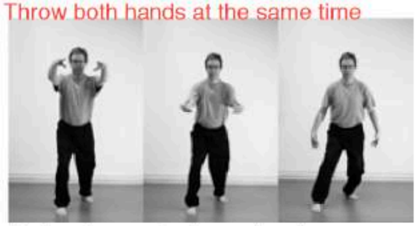
Pyöritä käsiä ja katso taakse.

Throw your hands to front and back



Heiluta käsiä eteen ja taakse.

Throw both hands at the same time

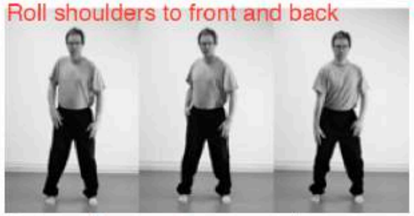


Heiluta kumpaakin kättä yhtäaikaa.

Small balancing act

Pieni tasausliike.

Roll shoulders to front and back

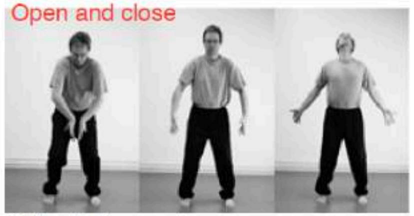


Pyöritä olkapäätä eteen ja taakse.

Roll both shoulders

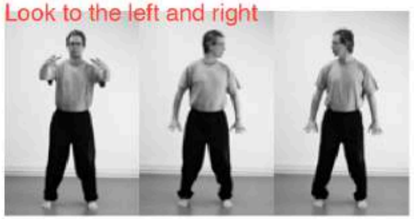
Pyöritä kumpaakin olkapäätä

Open and close



Sulkeudu ja avaudu.

Look to the left and right



Katso vasemmalle ja oikealle.

Small balancing act

Pieni tasausliike.

Lift the ball from the ground, push sideways

Nosta pallo lattialta.

Bend sideways

Taivu sivulle.

Roll the ball in front

Pyöritä palloa vartalon edessä.

Small balancing act

Pieni tasausliike.

Draw circle with foot & hand

Piirrä jalalla ja käsillä ympyrää.

Stand on the ball of your foot and toes

Seiso kantapäillä ja varpailla.

Lift the ball, push, and drop

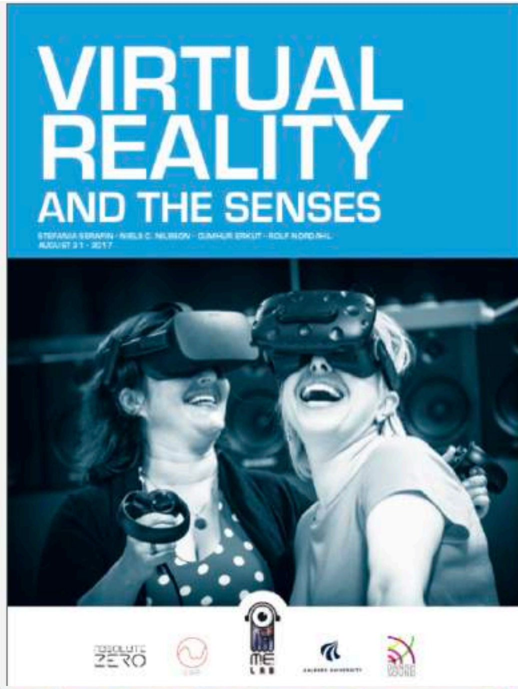
Nosta pallo, työnnä ja pudota.

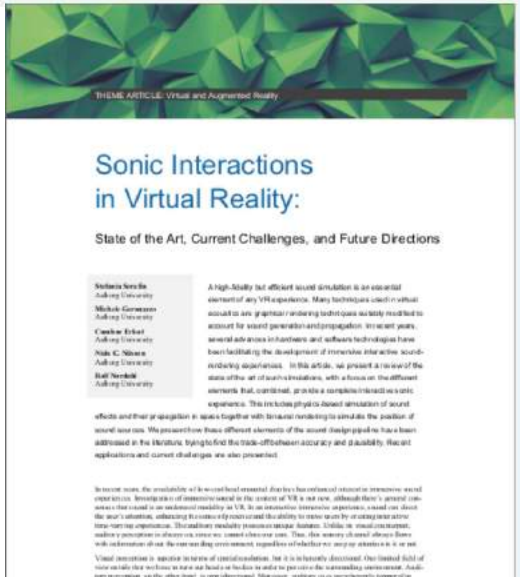
Closing balancing act

Lopun laaja tasausliike.

Stand with the ball at hand

Seiso pallo kädessä.





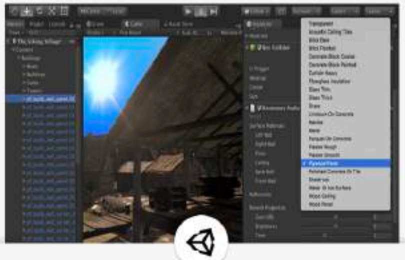
Sonic Interactions in Virtual Reality:

State of the Art, Current Challenges, and Future Directions

VIVE

oculus

Ya siz?

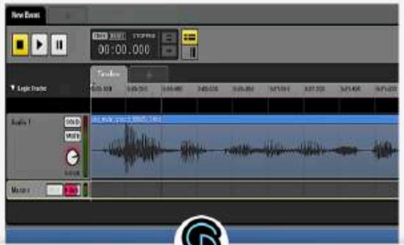


Unity

GET STARTED

Unreal

GET STARTED

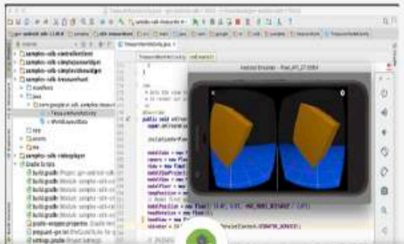


FMOD

GET STARTED

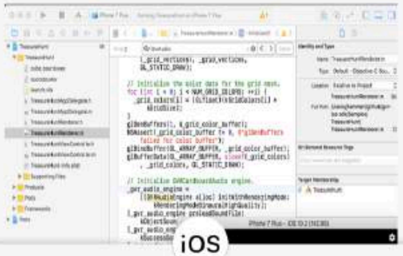
Wwise

GET STARTED



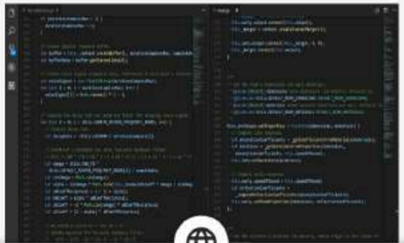
Android Studio

GET STARTED



iOS

GET STARTED

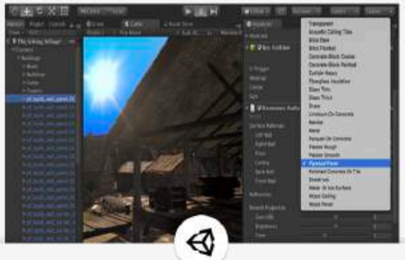


Web

GET STARTED

DAW VST plugin

GET STARTED

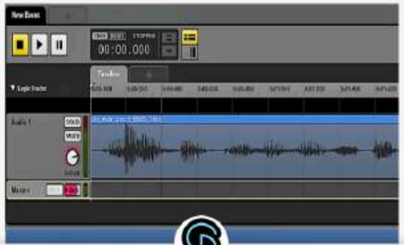


Unity

GET STARTED

Unreal

GET STARTED

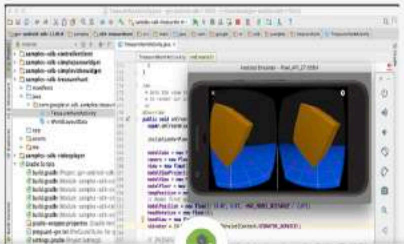


FMOD

GET STARTED

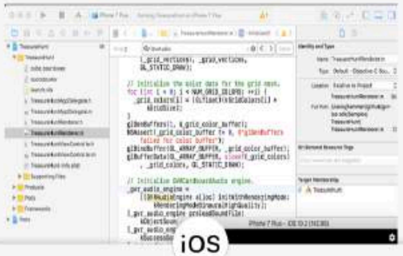
Wwise

GET STARTED



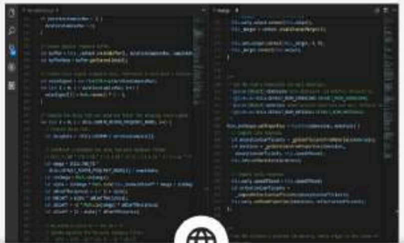
Android Studio

GET STARTED



iOS

GET STARTED



Web

GET STARTED

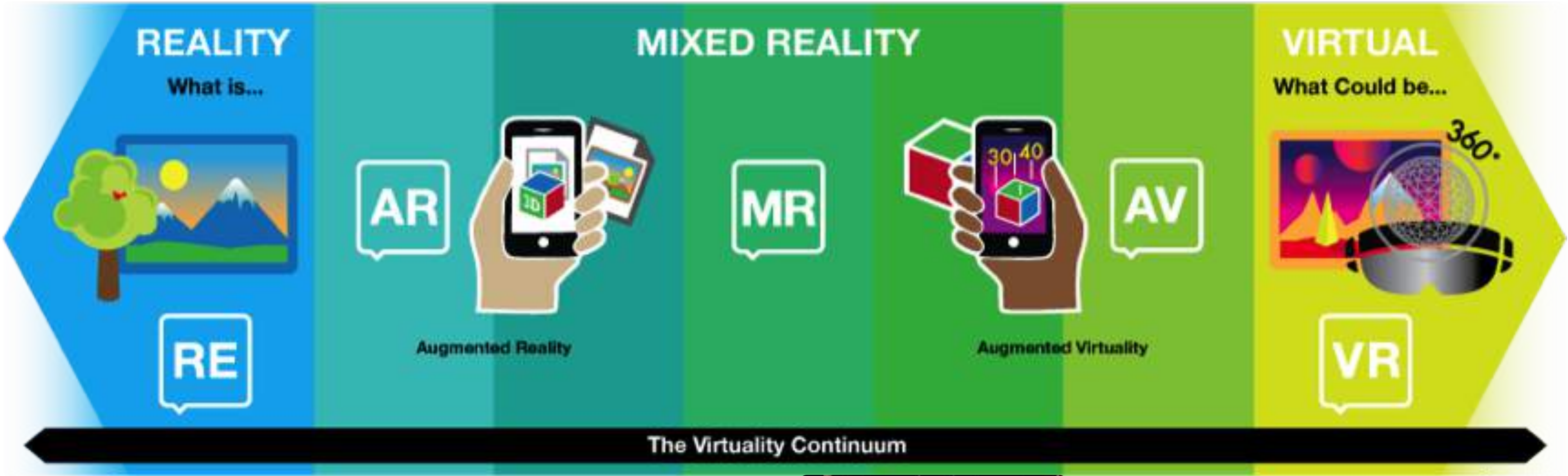
DAW VST plugin

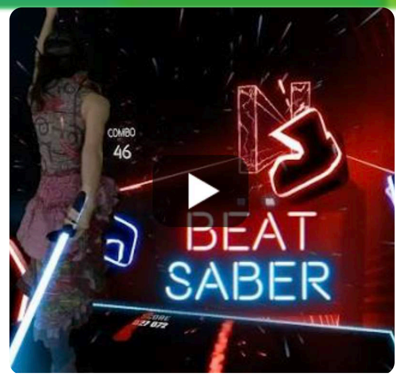
GET STARTED

Karma Gerçeklik: ilk önemli ses etkileşimleri

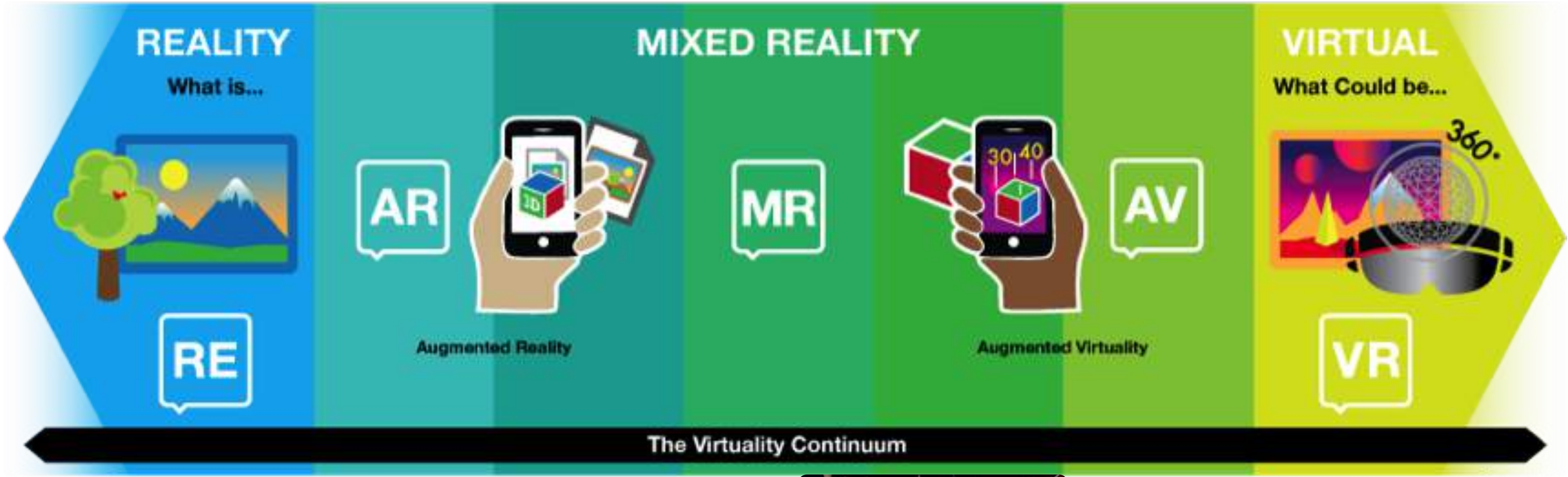
https://youtu.be/ET2CKUqdPCo

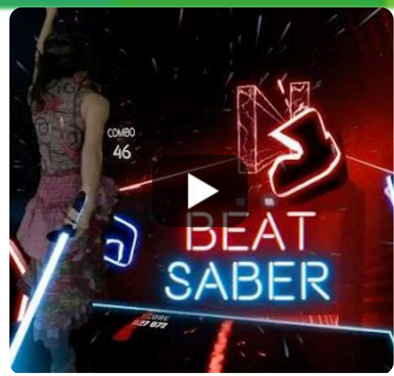
Karma Gerçeklik?

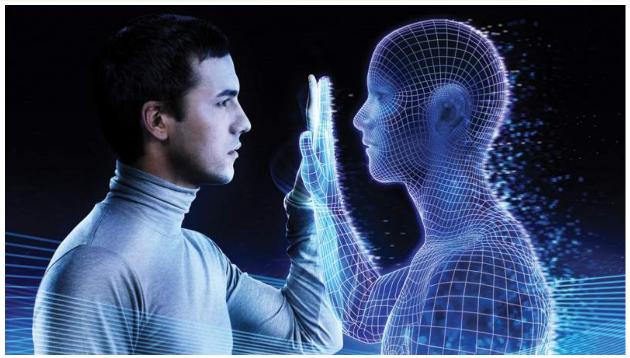




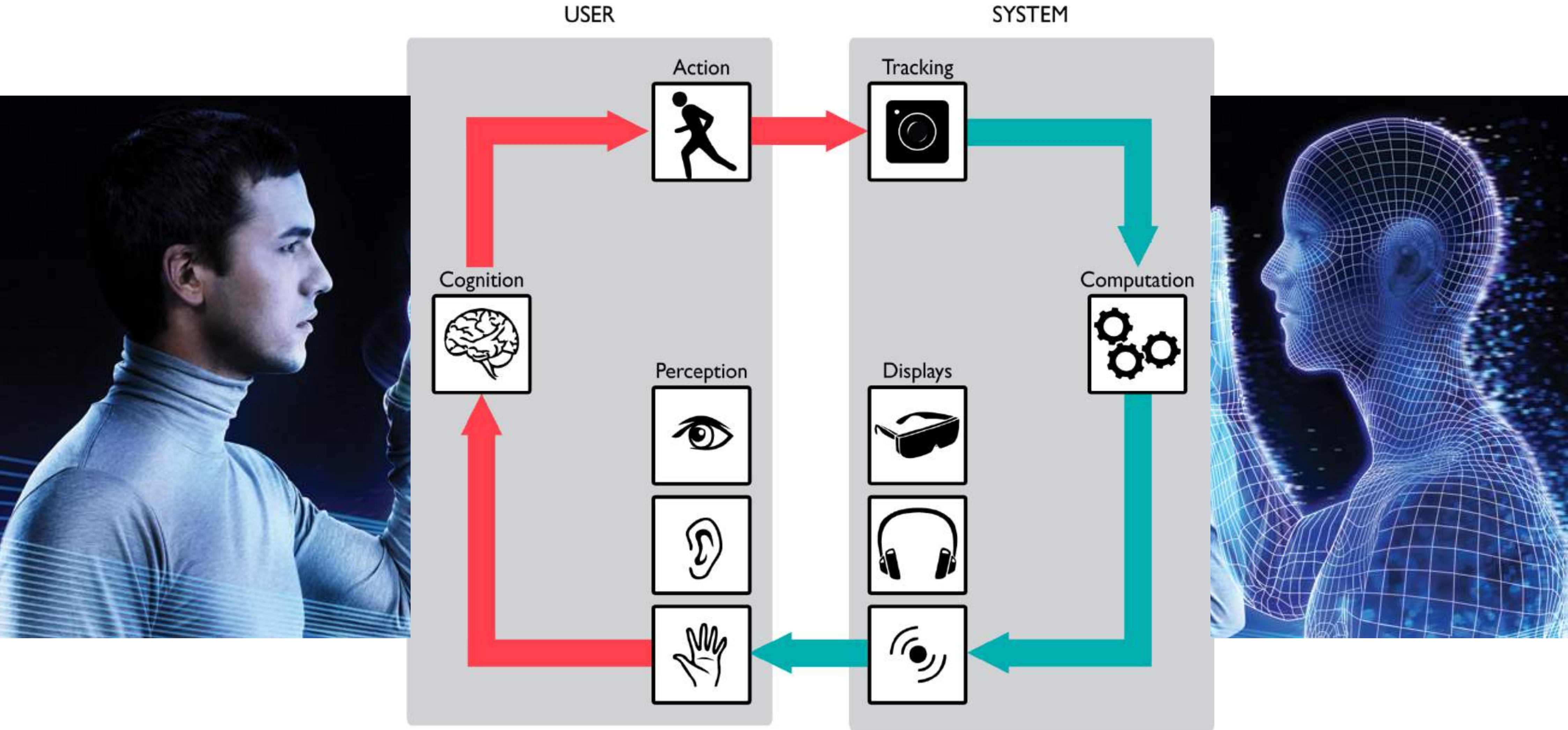
Karma Gerçeklik?



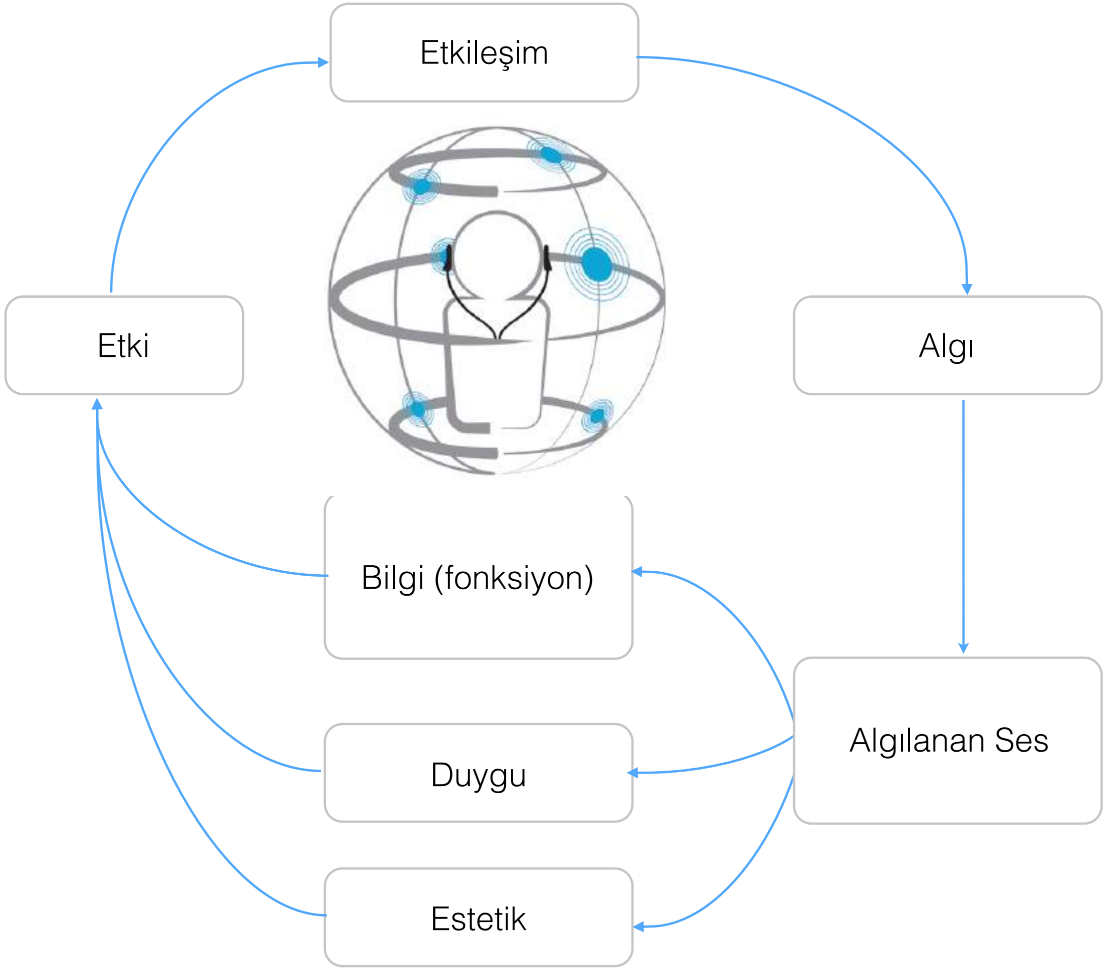




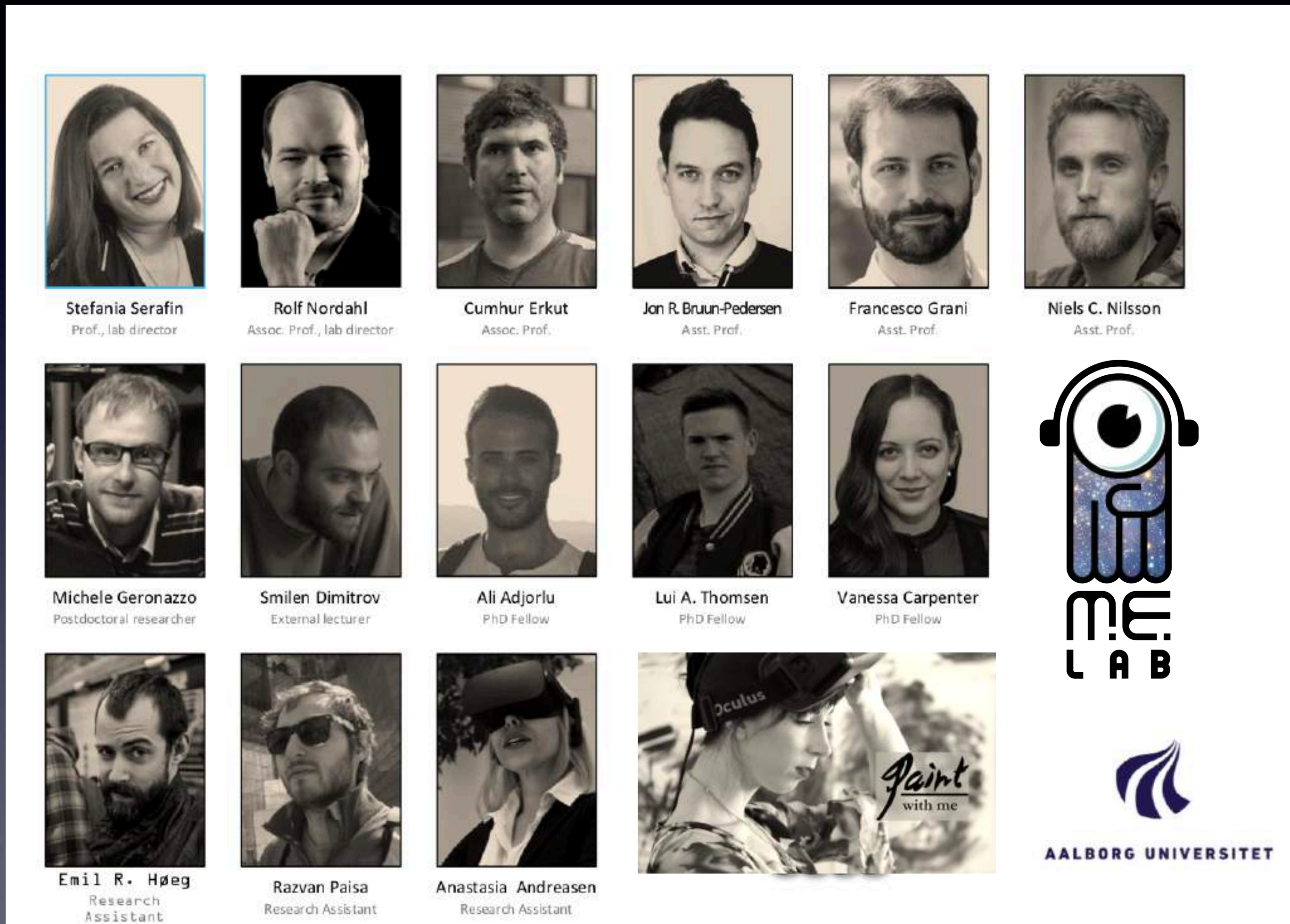
Ses Etkileşimleri?



Ses Etkileşimleri?



https://melcph.create.aau.dk

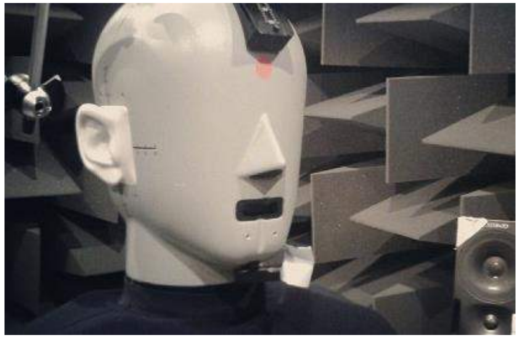


VR sistemleri, 64xWFS, Taban ve Topuk Haptik Araçlar



WIZDISH.com





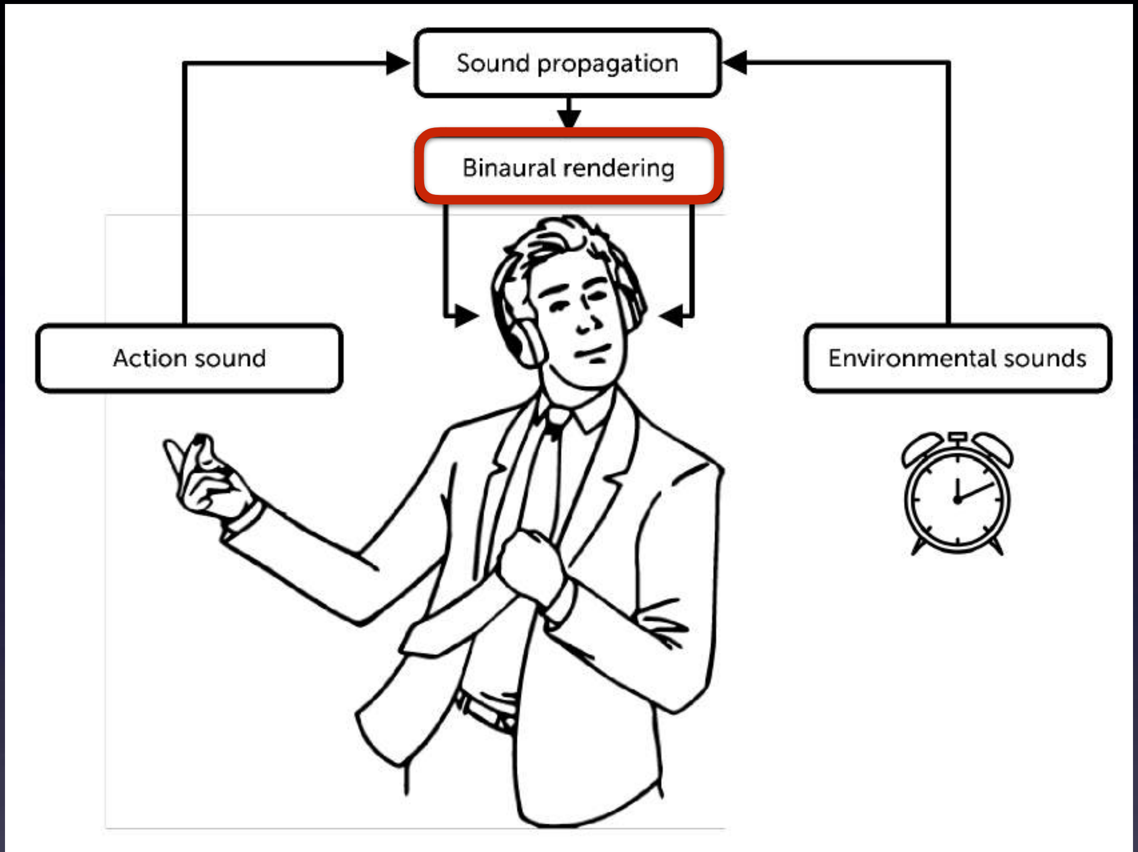

Ses Arabirimleri

Ses Arabirimleri

Alistirma / Problem

- Download the CIPIC HRTF database & the corresponding software.
- Using CIPIC database, produce at least 16 sounds with 4 **azimuth** and 4 **elevations**. Observe the quality of the result.
- (Record the same sounds using the **dummy head** in the lab & compare)
- Create a short soundscape where 3D sound plays a meaningful role.
  - **DUN**: Benzeşimler MATLAB uzerinde uygulanacak, Resonance Audio ve benzerlerine taşınmaları ozetlenecek.
  - **BUGUN: Amazon Sumerian @** https://aws.amazon.com/sumerian/ + UNITY NATIVE AUDIO Plugin SDK

Demo: https://tinyurl.com/ybv7mzjn



1) Giriş: kuram ve pratik

{Välimäki, 2012}

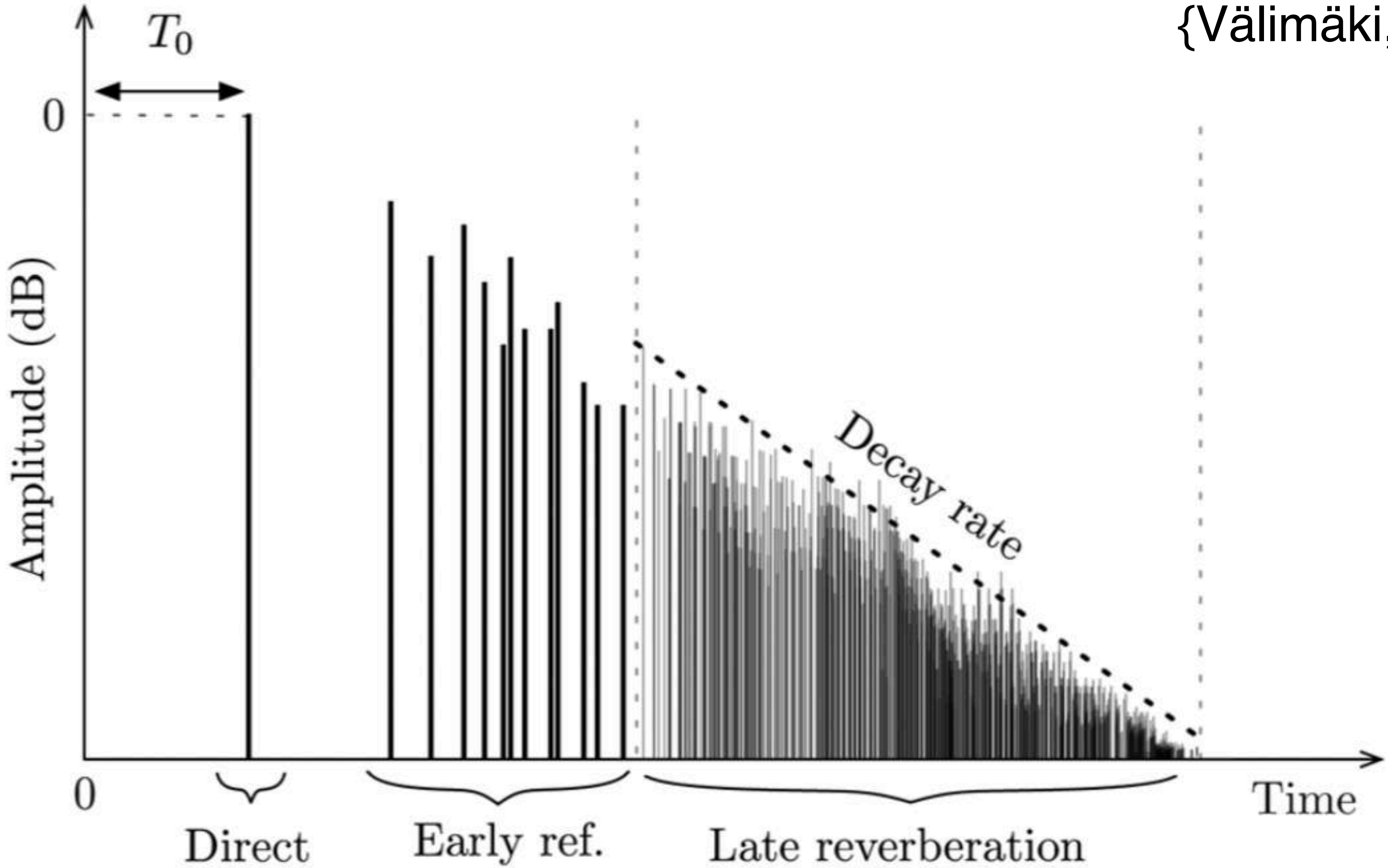


Fig. 1. Schematic example of a generic room impulse response.

{Välimäki, 2012}

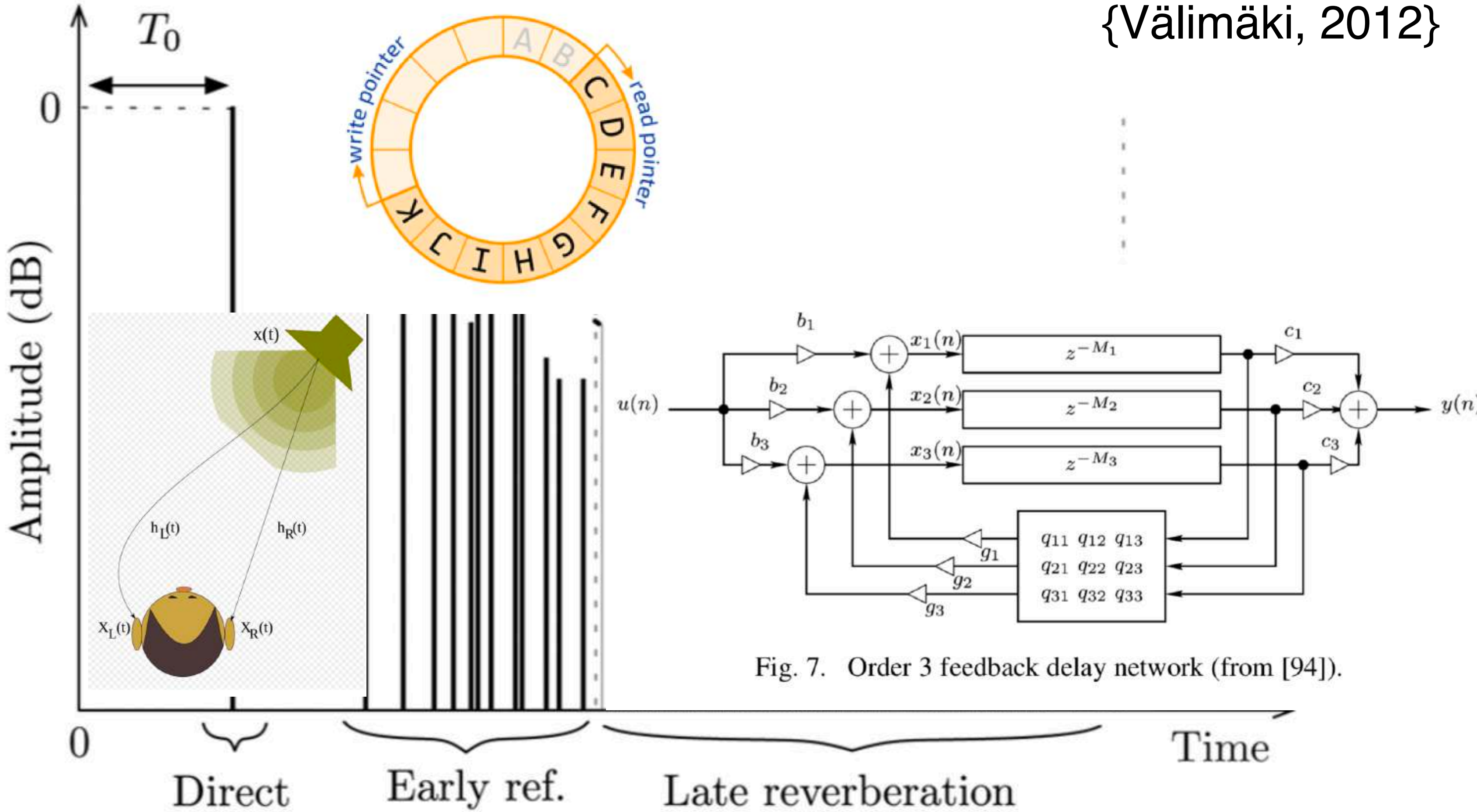
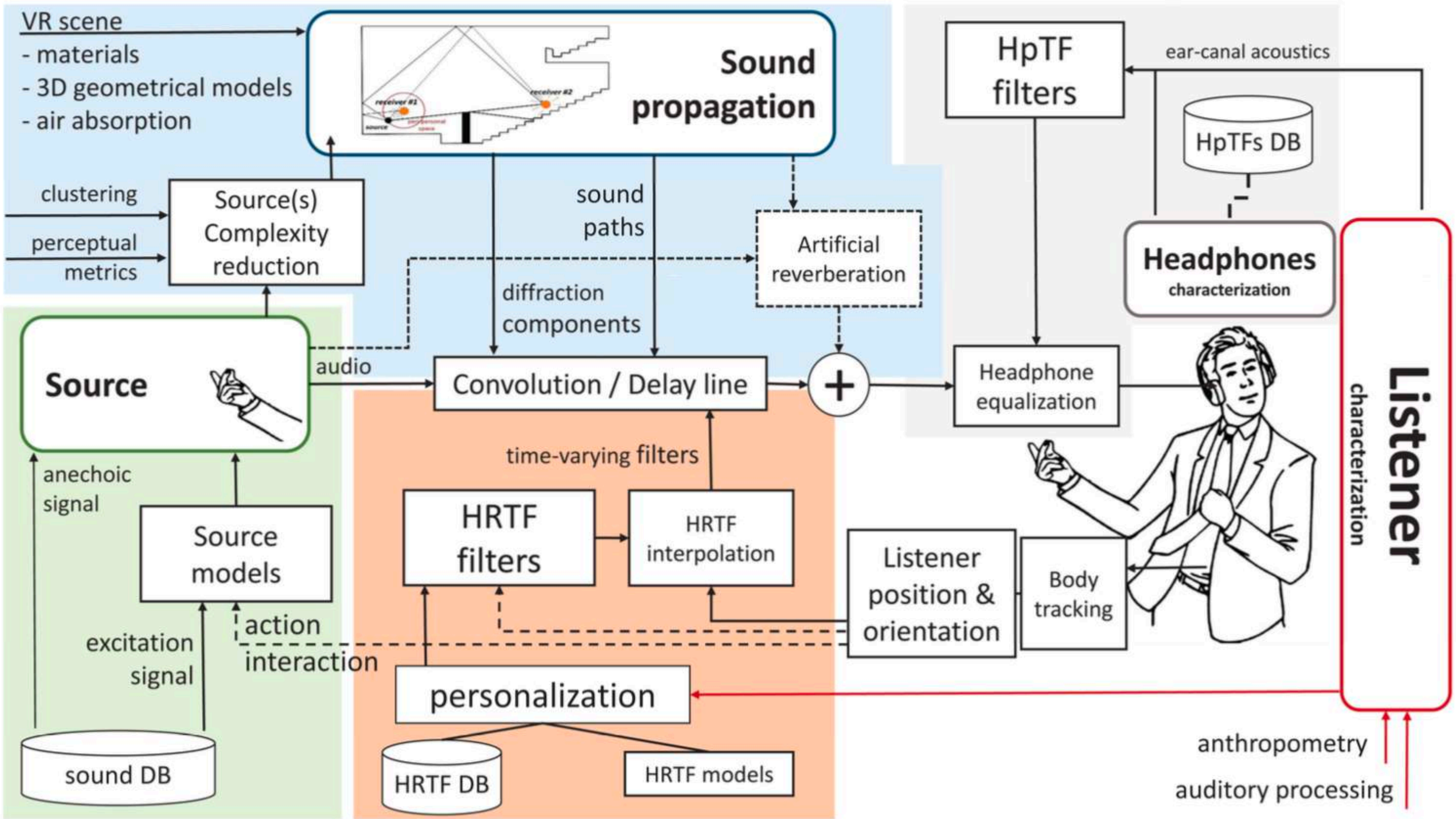


Fig. 7. Order 3 feedback delay network (from [94]).

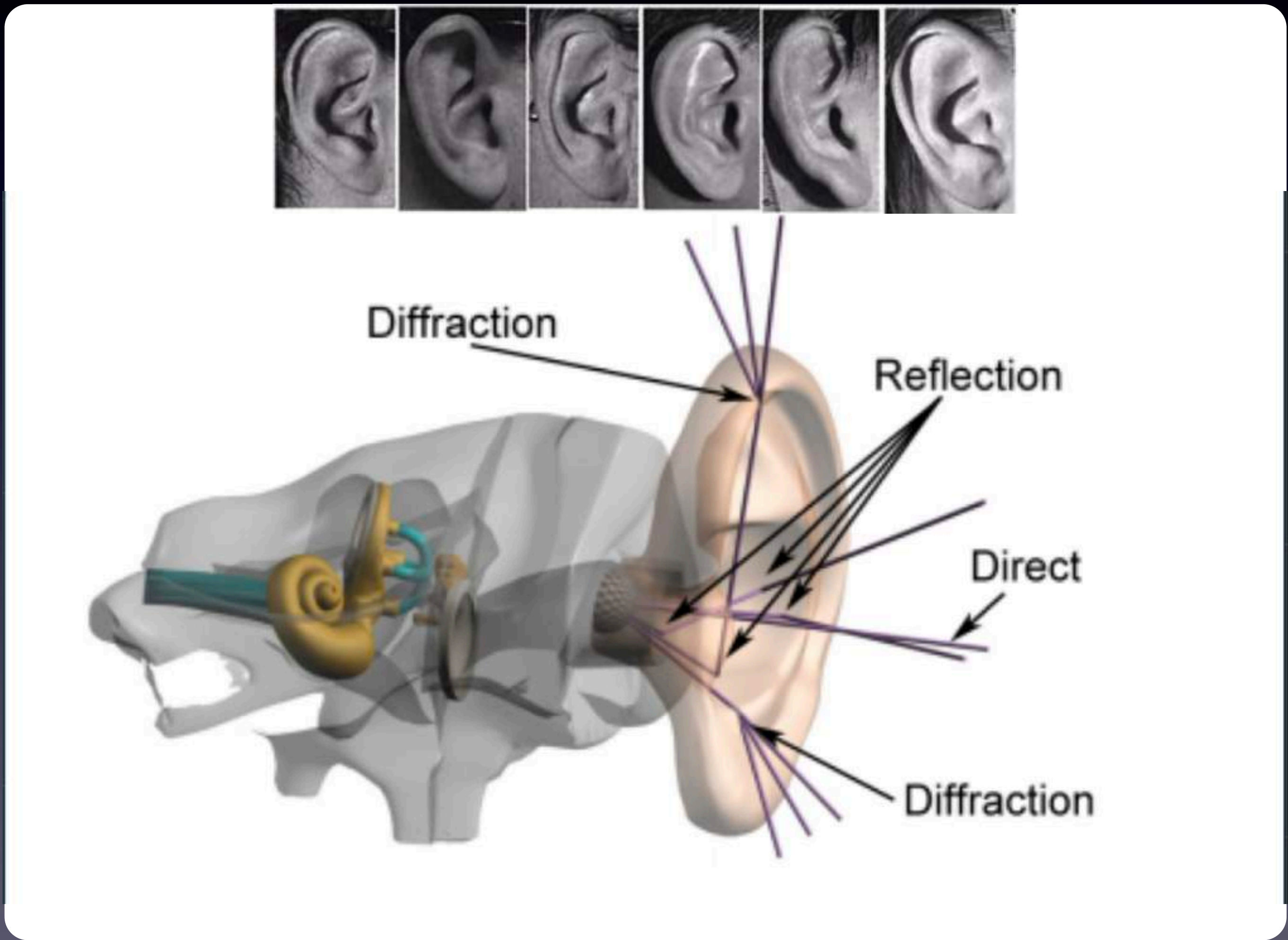
Fig. 1. Schematic example of a generic room impulse response.

Kulaklık için uzamsal ses isleme: Ayrıntılar



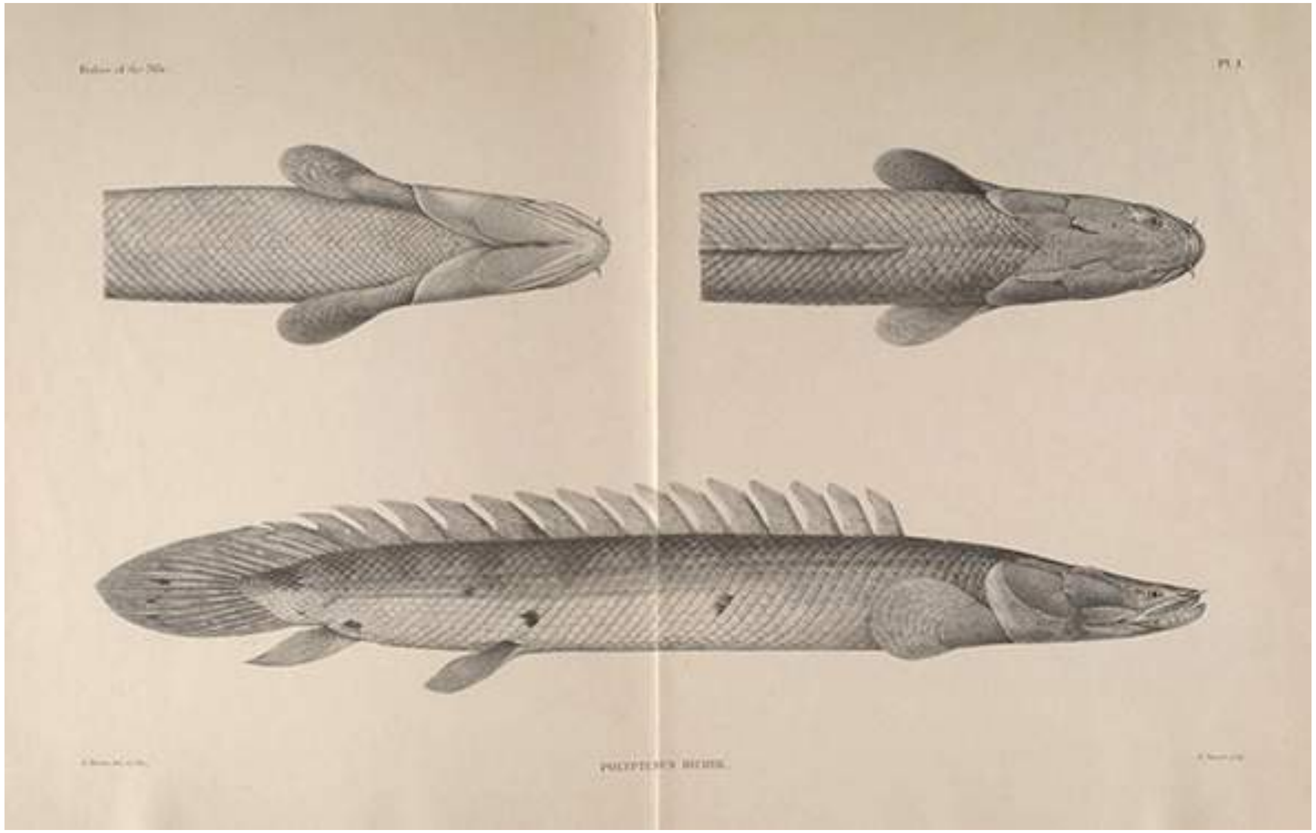
Seslerin konumlarını nasıl kestiriyoruz?

Head-related transfer functions (HRTF) / impulse responses (HRIR)



Polypterus

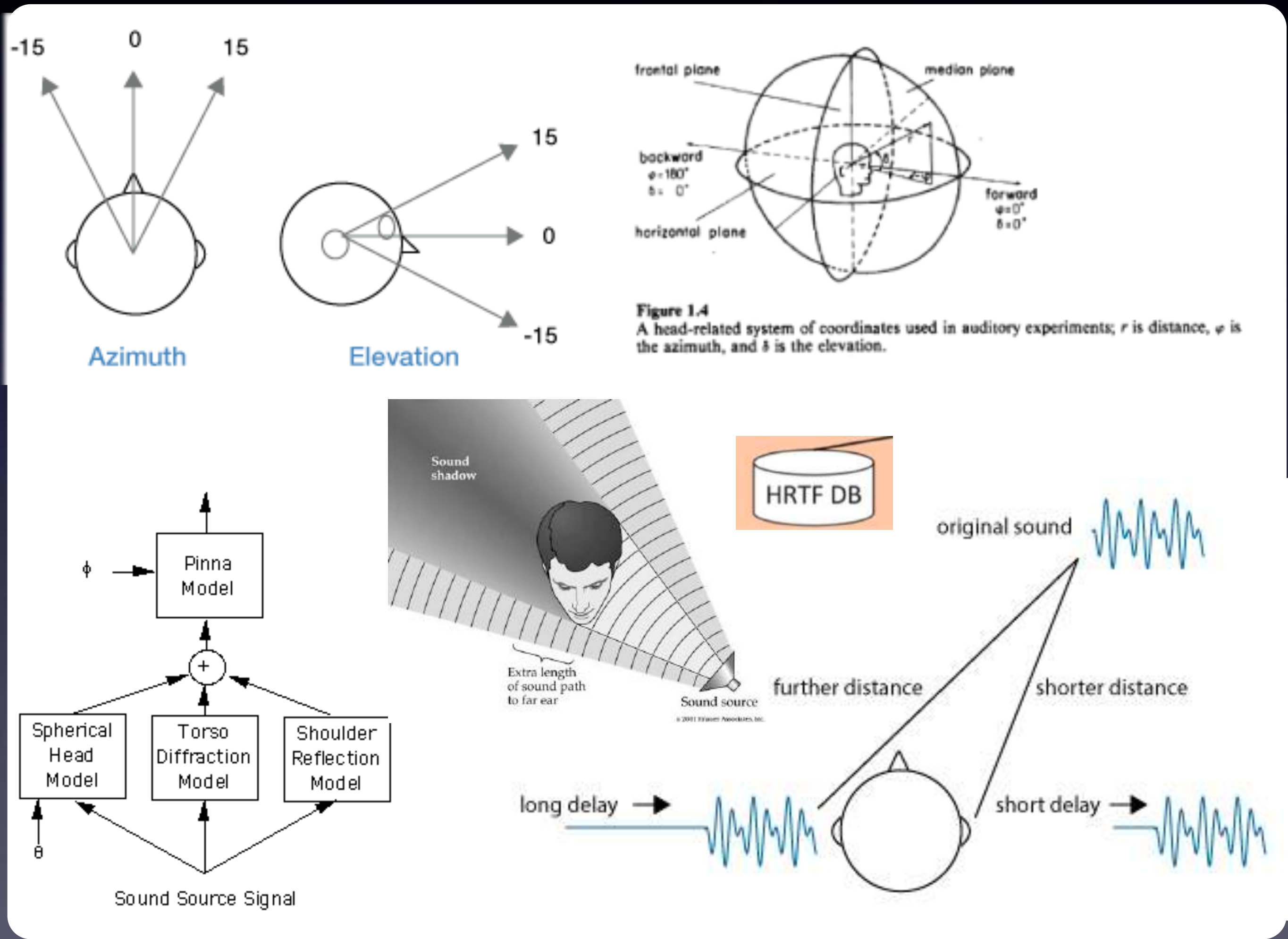
Bu baliğin isitme duyumuzun temellerini oluşturduğu düşünülüyor.



J S Anderson, J D Pardo, H C Maddin, M Szostakiwskyj, and A Tinius. 2016. Is there an exemplar taxon for modelling the evolution of early tetrapod hearing? Proc. R. Soc. B 283, 1832: 20160027–4. http://doi.org/10.1098/rspb.2016.0027

Kavramlar

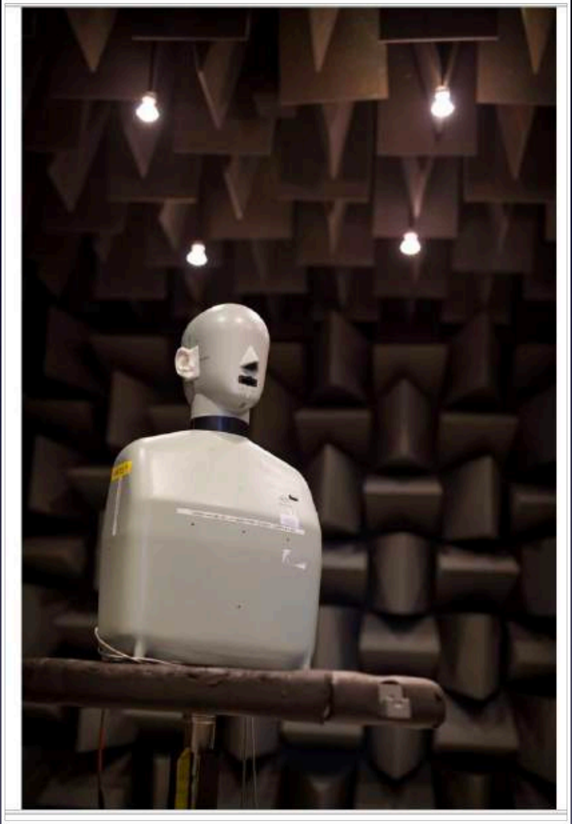
Azimuth, Elevation, IR, TF, Inter-aural Level/Time Differences

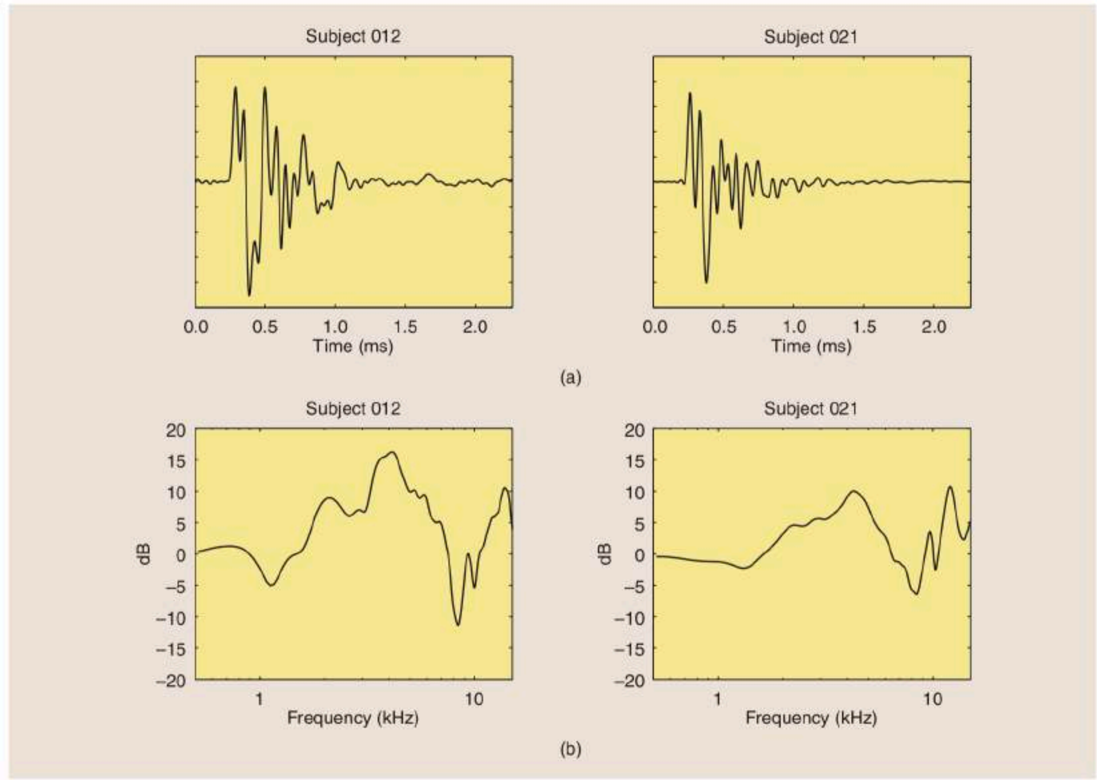


http://gureckislab.org/courses/spring13/robots/SoundLocalization-2.html

HRTF/HRIR nasıl ölçülüyor?

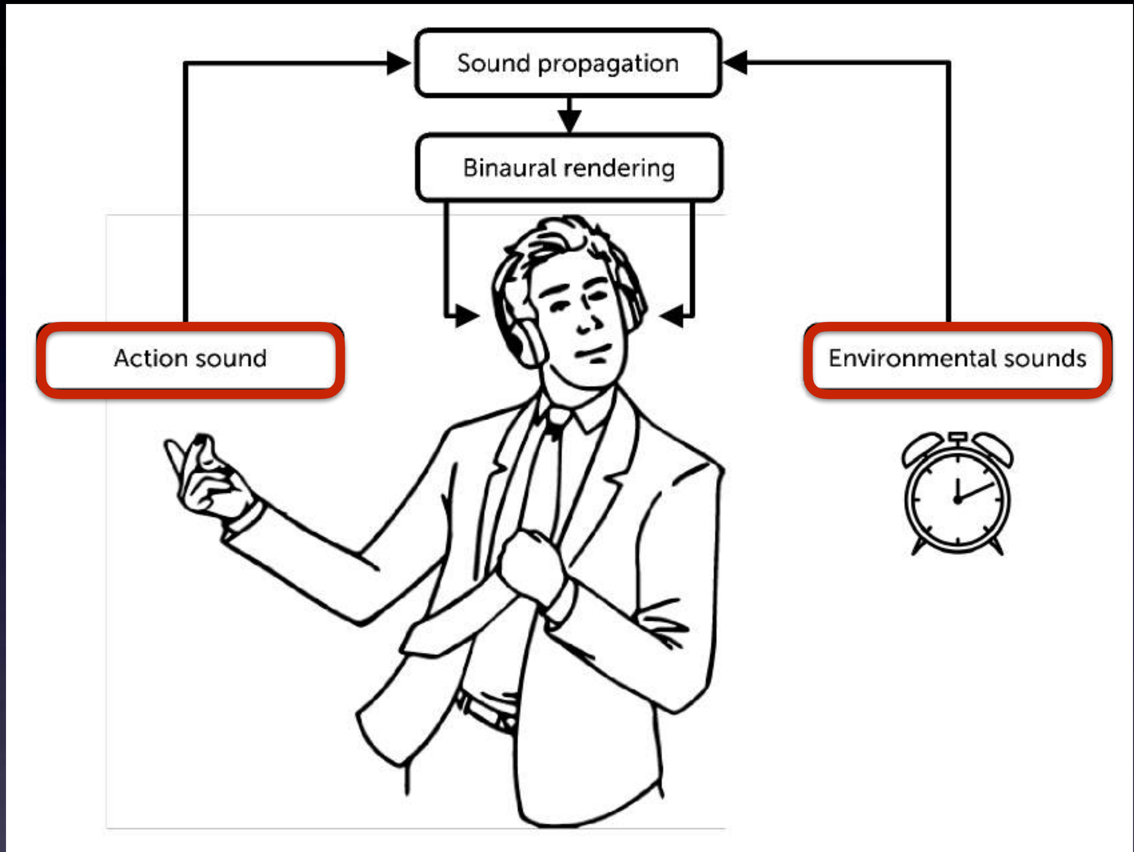
Yapay kafa (solda), bireysel HRIR/HRTF ölçümleri (sagda)





[FIG1] Part (a) shows the HRIRs for Subject 012 and Subject 021 in the CIPIC HRTF database. Part (b) shows the magnitudes of the HRTFs.

Ralph Algazi and R O Duda. 2011. Headphone-Based Spatial Sound. Signal Processing Magazine, IEEE 28, 1: 33–42. http://doi.org/10.1109/MSP.2010.938756



II) Ses kaynaklarının sınıflandırılması ve modellenmesi (hareket ve çevresel etkileşimler)

VR audio

Virtual reality musical instruments

Guidelines for multisensory interaction design

AALBORG UNIVERSITY
DENMARK

Stefania Serafin, Cumhur Erkut, Juraj Kojs, Niels C. Nilsson, and Rolf Nordahl
{sts,cer}@create.aau.dk, j.kojs@miami.edu, {ncn,rn}@create.aau.dk

FROST SCHOOL OF MUSIC
UNIVERSITY OF MIAMI

Introduction

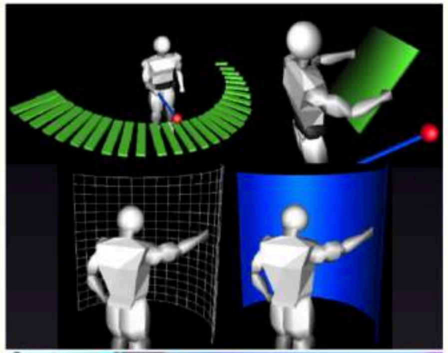
- Rapid development of low cost virtual reality displays such as the Oculus Rift HTC Vive, OSVR and Samsung Gear VR has boosted the interest in immersive virtual reality music applications.
- We have recently suggested nine principles for design and evaluation of VR musical instruments (VRMIs) [5].
- How does these design and evaluation guidelines apply to historical VRMIs?

Guidelines

1. Design sound, visual, touch and proprioception in tandem, and consider the mappings between these modalities
2. Reduce latency
3. Prevent or limit cybersickness
4. Do not copy but leverage expert techniques
5. Consider both natural and magical interactions
6. Consider the ergonomics of the display
7. Create a sense of presence
8. Consider the representation of player's body
9. Make the experience social

ALMA VRMIs

Mäki-Patola and his colleagues presented a software system designed to create virtual reality musical instruments within the ALMA Project [2, 4], and provide case studies on a virtual xylophone, a virtual membrane, a virtual air guitar, and a gestural FM synthesizer



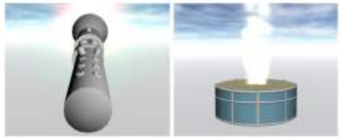
Latency and learnability evaluated.

Lanier's VRMIs

VRMIs to be played in consort in a complete virtual world [3]: the Rhythm Gimbal, the CyberXylo, and the CyberSax.

AAU VRMIs

Gelineck and his colleagues proposed physics-based VRMIs: a flute and a drum [1]. The size of the VRMIs can be changed while playing.



They focus on learnability and visualization within pedagogical settings.

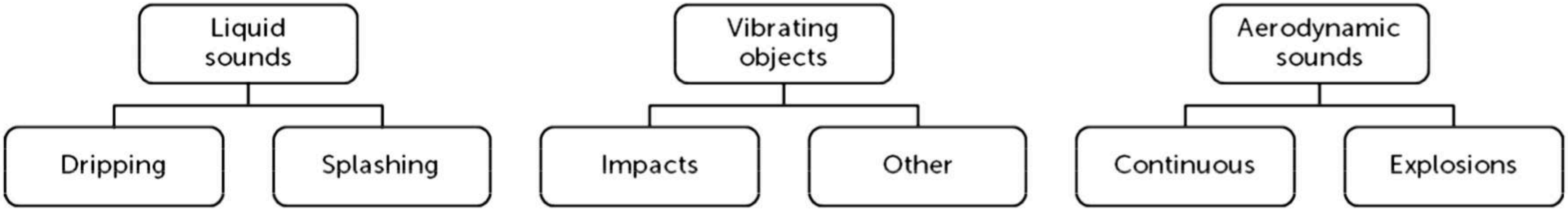
Intonarumori

http://playmux.com


FOLK MUSIC OF C


Dawn of the New Everything
Encounters with Reality and Virtual Reality
Jaron Lanier
Author of You Are Not a Gadget

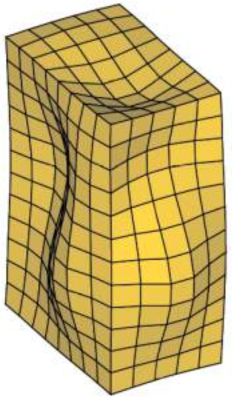
Sınıflama (Gaver'93)

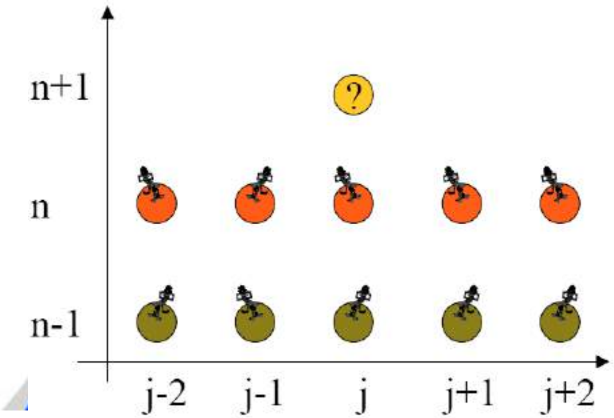


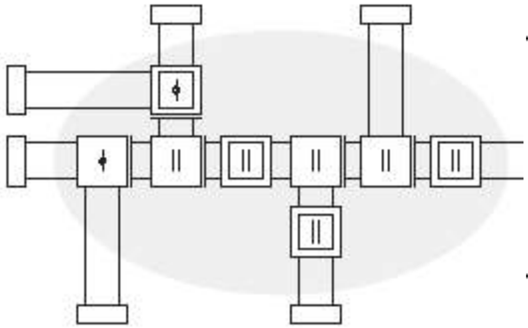
Modelleme (Erkut'05, Välimäki'06)

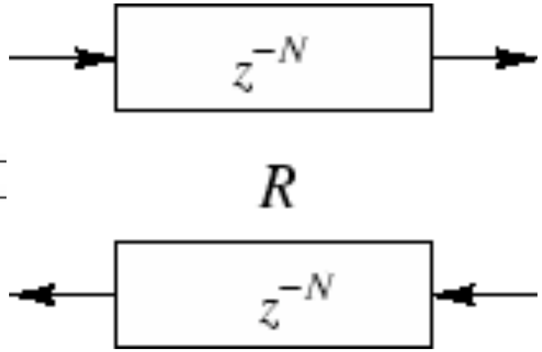
$KP + i\omega CP - \omega^2 MP = i\rho\omega F$

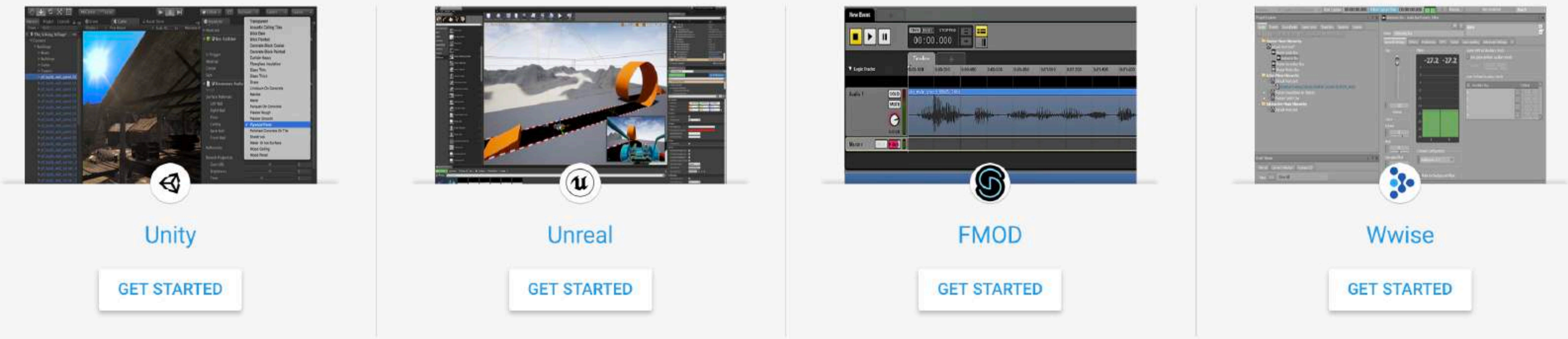
M, C, and K are mass, damping, and stiffness matrices



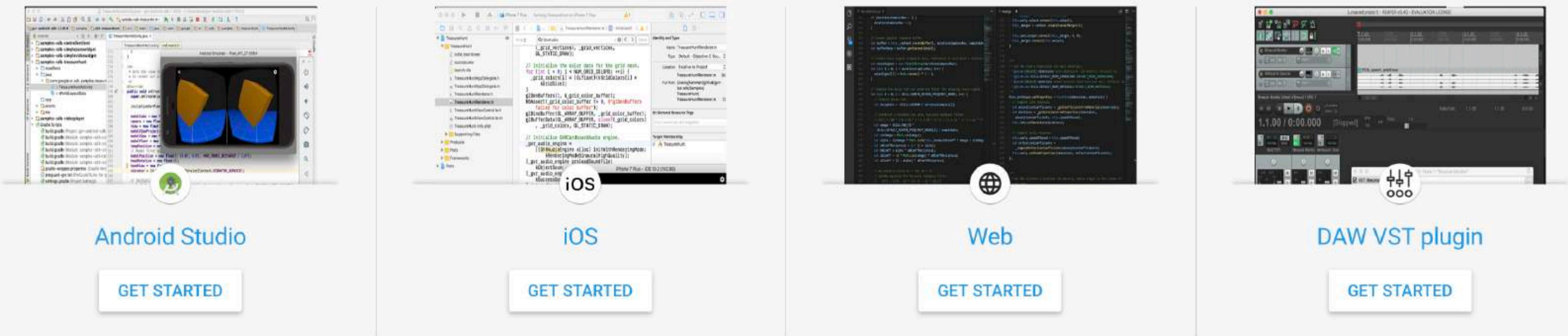


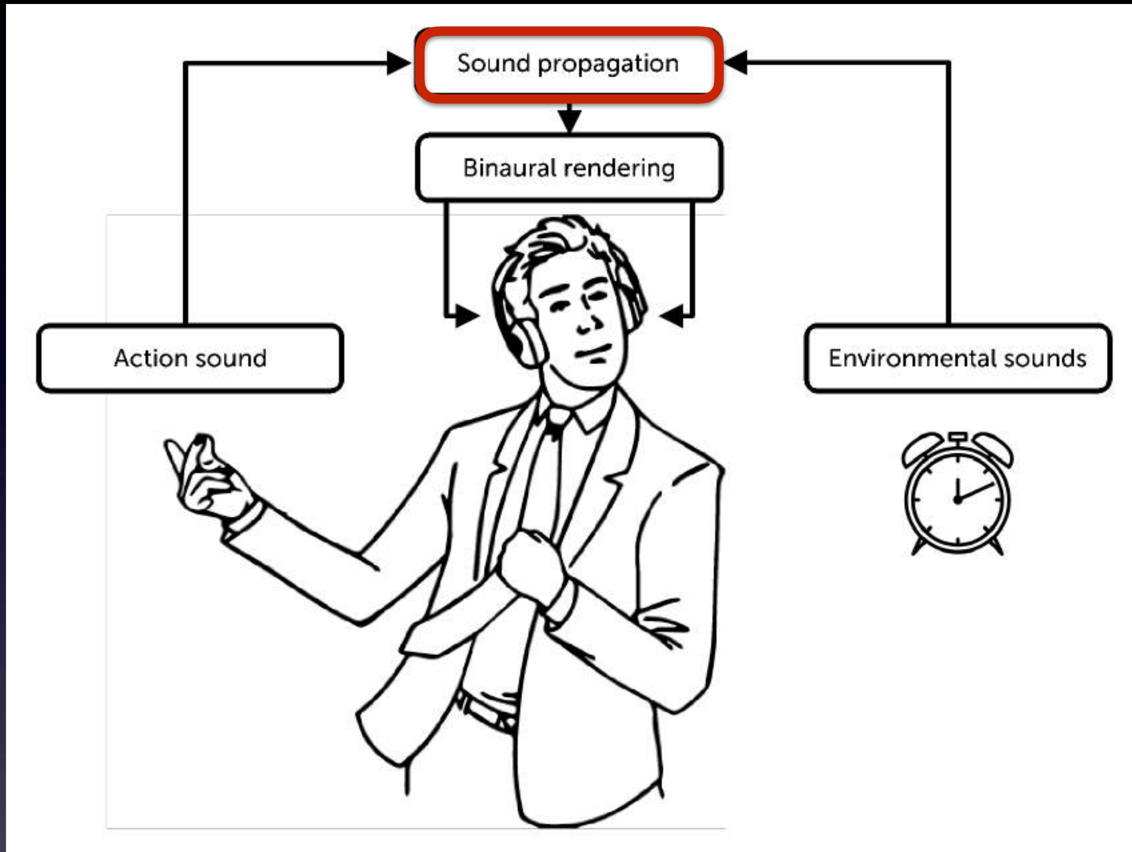






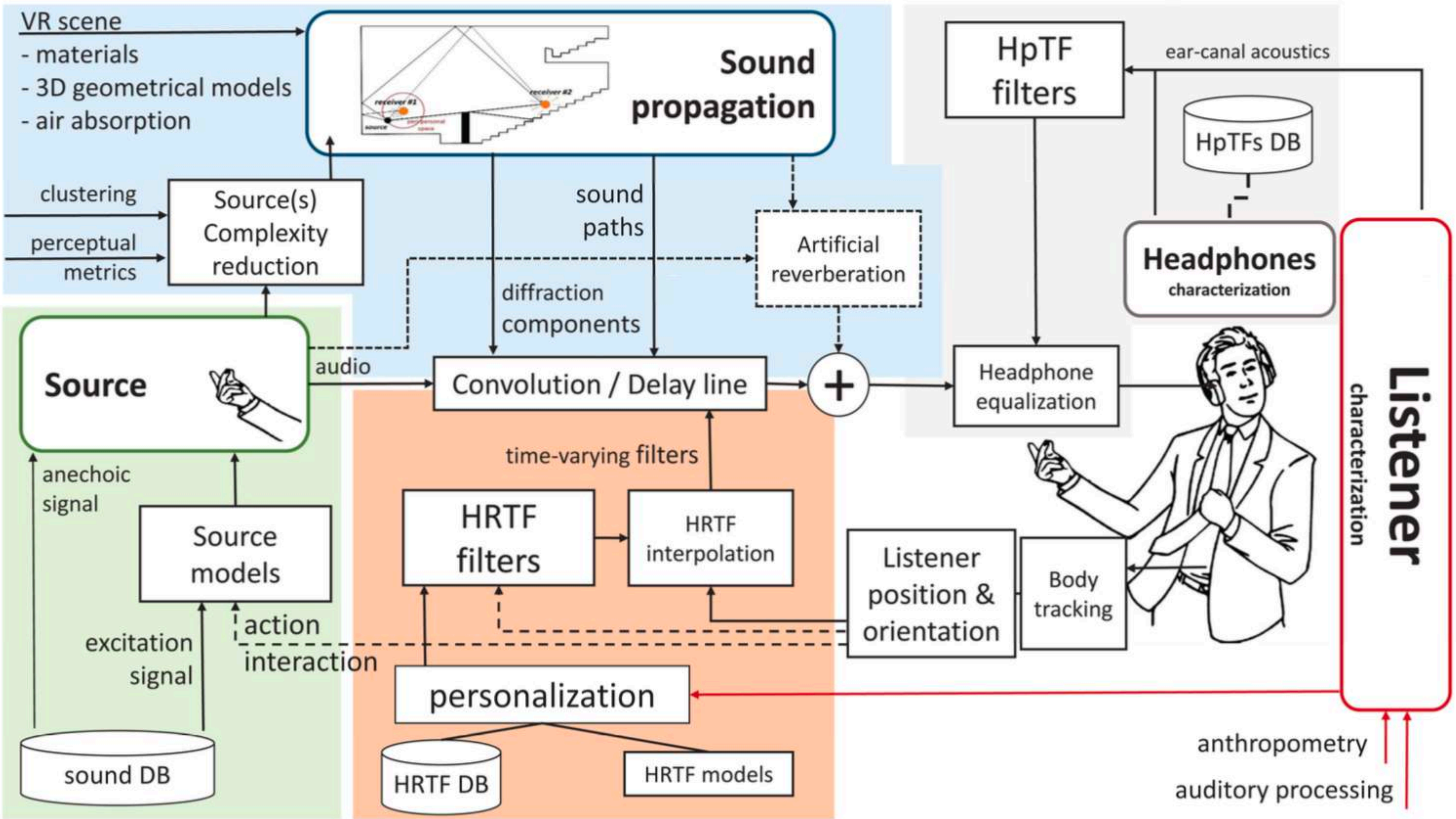
Trend: Sondan sona yapay öğrenme (Gabrielli 2018)





III) Sanal ortamda ses yayılımı (dalga, geometrik ve karma modeller)

A VR system for binaural rendering




MIXED REALITY
AR
MR
Augmented Reality
The Virtuality Continuum

AR/MR audio

ScattAR

A Mobile Augmented Reality Application that uses Scattering Delay Networks for Room Acoustic Synthesis

Alex Baldwin, Stefania Serafin, and Cumhur Erkut
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AALBORG UNIVERSITY
DENMARK

ME LAB

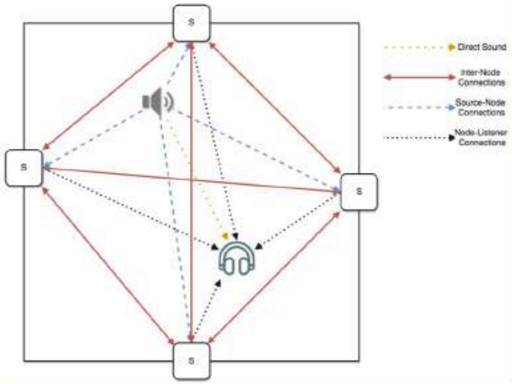
Introduction

We present a mobile Augmented Reality (AR) application, where a sound source is placed on a drone that floats in a real room. We read the audio contentfrom a file as samples.

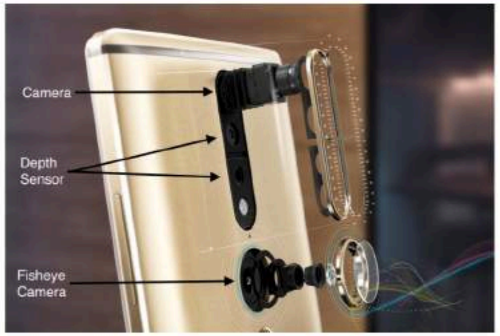
Our application renders the direct path (green rays in the figure) from the source to the listener, together with six first-order reflections (red rays) from nearby walls, floor, and ceiling, plus an efficient reverberation.

Scattering Delay Networks

Formulation after [1].



Hardware, Operation, and UI



Operation:

1. Scan room (via Tango API)
2. Load mesh (via OrbCreation [2])
3. Motion Tracking (via Tango API)
4. Auditory Rendering
   - Direct sound (Unity Ray Tracing)
   - Paths (via the spherical Fibonacci point set algorithm [3])

Conclusions

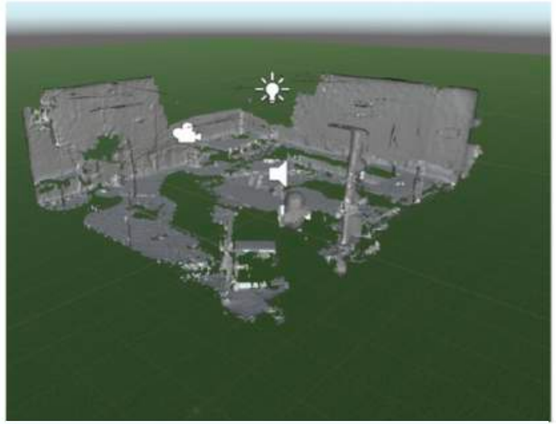
- Our AR audio application efficiently renders a moving sound source in a given room.
- First AR application of SDNs [1]? Currently, With positive-real scattering parameters.
- Future: computational benchmarking, frequency-dependent scattering filters.
- Perceptual properties of the implementation remain to be evaluated.

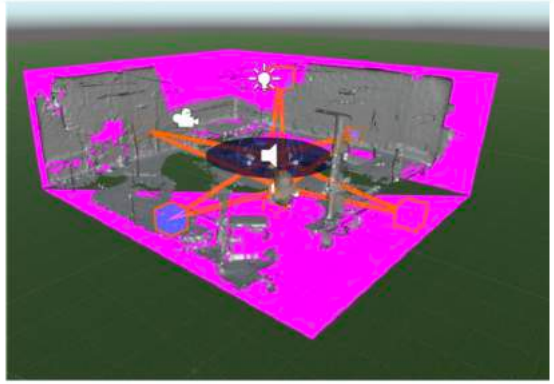
References

[1] E. De Sena, H. Hacıhabiboğlu, Z. Cvetkovic, and J. O. Smith, "Efficient synthesis of room acoustics via scattering delay networks," *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, vol. 23, pp. 1478–1492, Sept. 2015.

[2] Orbcreation, "Simple .obj." Unity Asset Store, October 2014. Version 1.4 for Unity 4.5.0.

[3] R. Marques, C. Bouville, M. Ribardière, L. P. Santos, and K. Bouatouch, "Spherical fibonacci point sets for illumination integrals," in *Computer Graphics Forum*, vol. 32, pp. 134–143, Wiley Online Library, 2013.

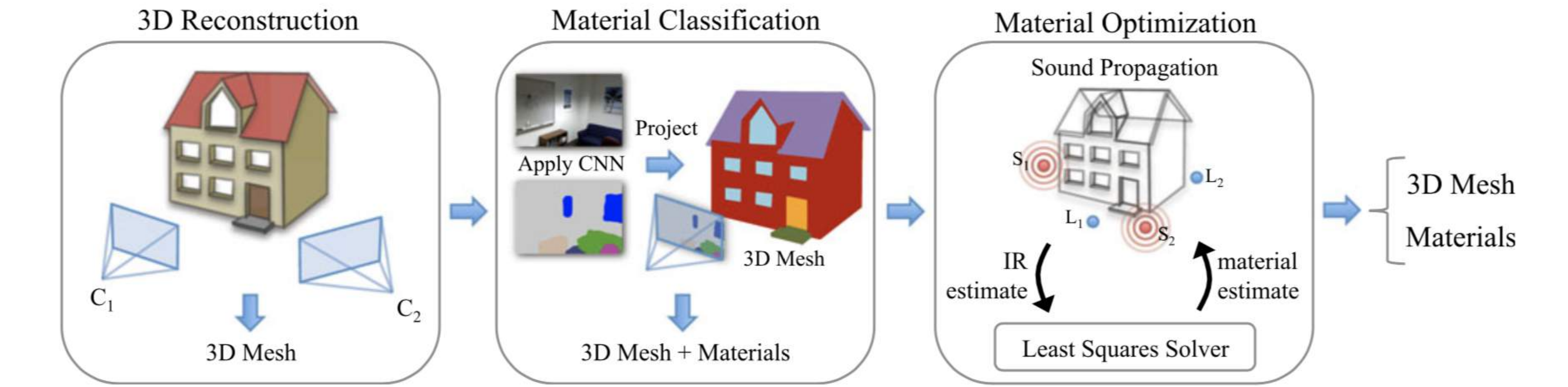


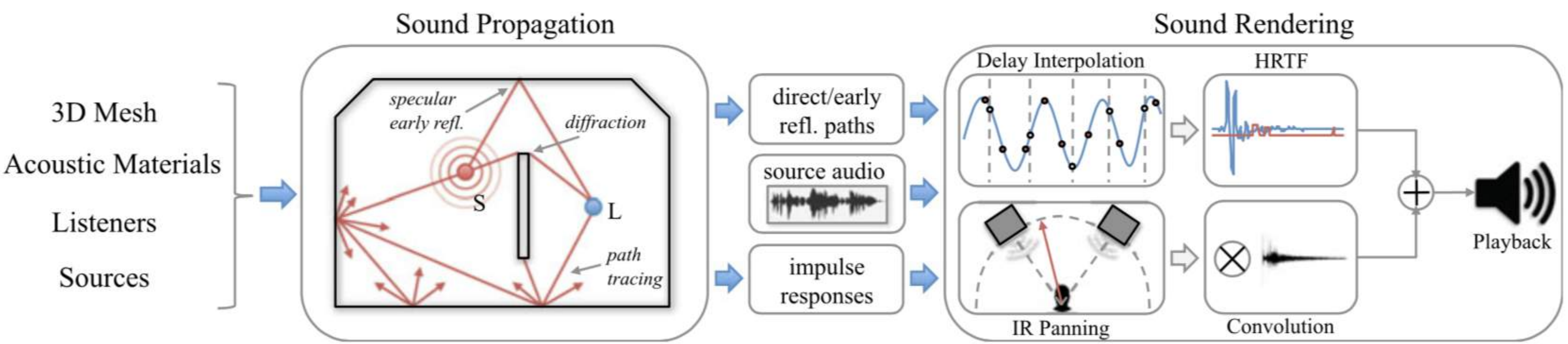


Demo ScattAR

Mobile AR In and Out: Towards Delay-based Modeling of Acoustic Scenes

Cumhur Erkut, Alex Baldwin, Jonas Holfelt & Stefania Serafin





Schissler, Loftin & Manocha, "Acoustic Classification and Optimization for Multi-Modal Rendering of Real-World Scenes"

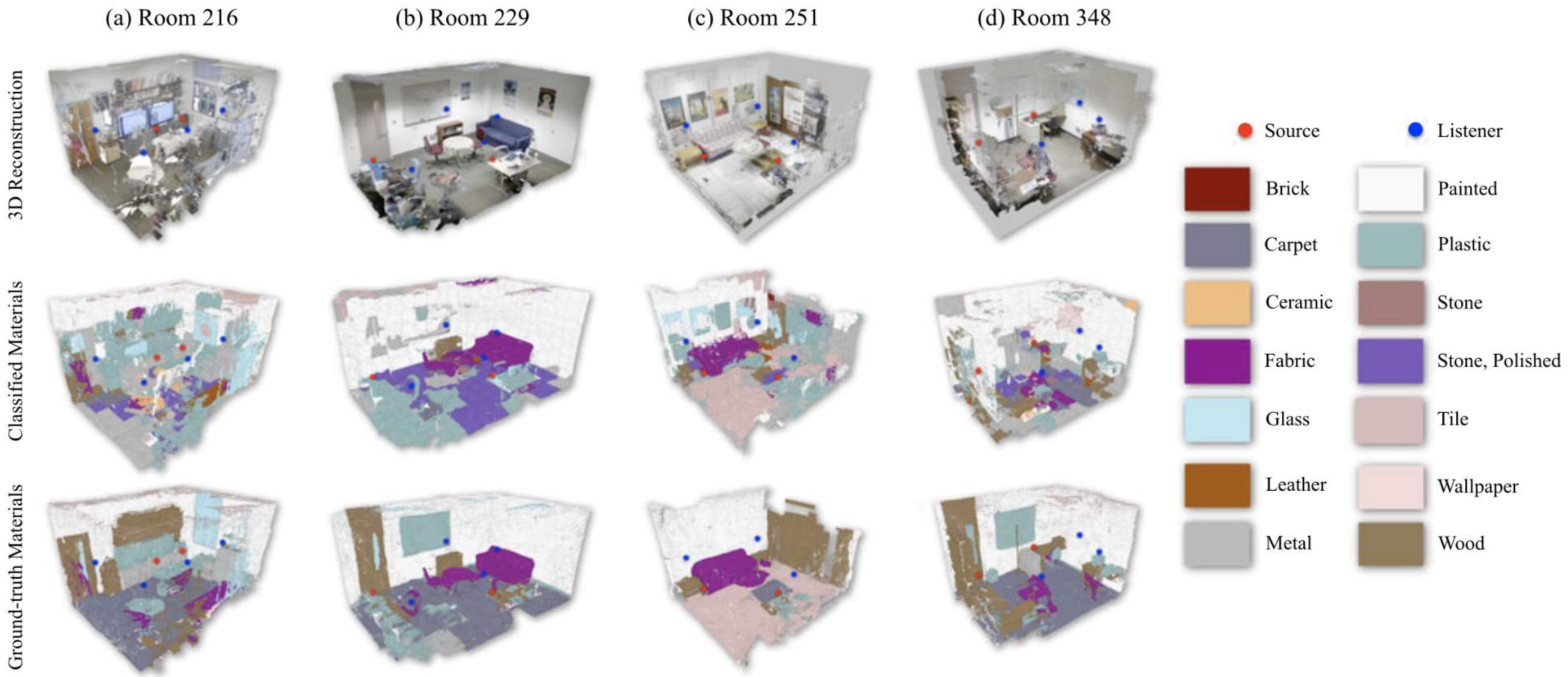
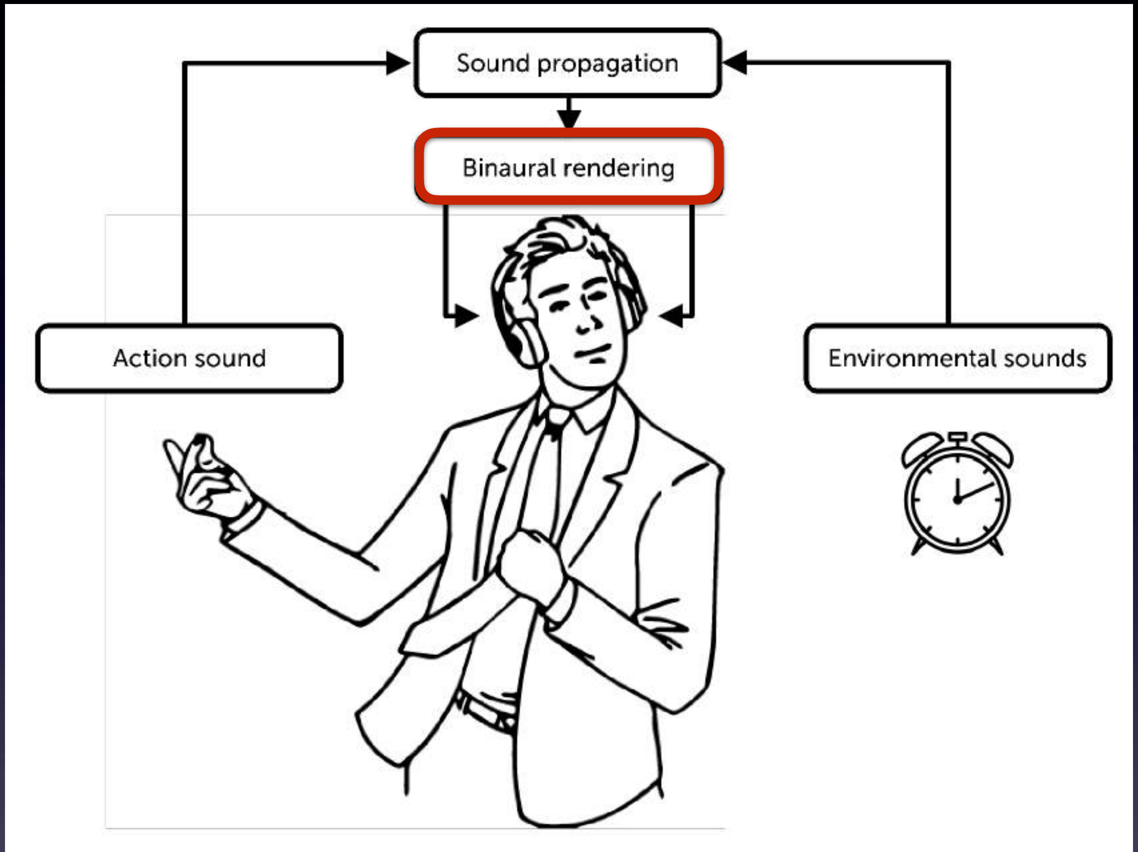


Fig. 4. The results of our visual material classification algorithm for the four benchmark scenes. Colors indicate the material category that has been assigned to each triangle of the reconstructed model. The middle row shows the results of our material classification, and the bottom row shows the manually-generated ground-truth classification that are used for validation. The source and listener positions for the acoustic measurements within the real room are shown as red and blue circles, respectively. These are used to optimize the acoustic materials present in the scenes.



IV) Kullanıcıya sunum ve etkileşim (kulaklık/hoparlör bazlı teknikler)

AMBEO

3D AUDIO TECHNOLOGY BY SENNHEISER

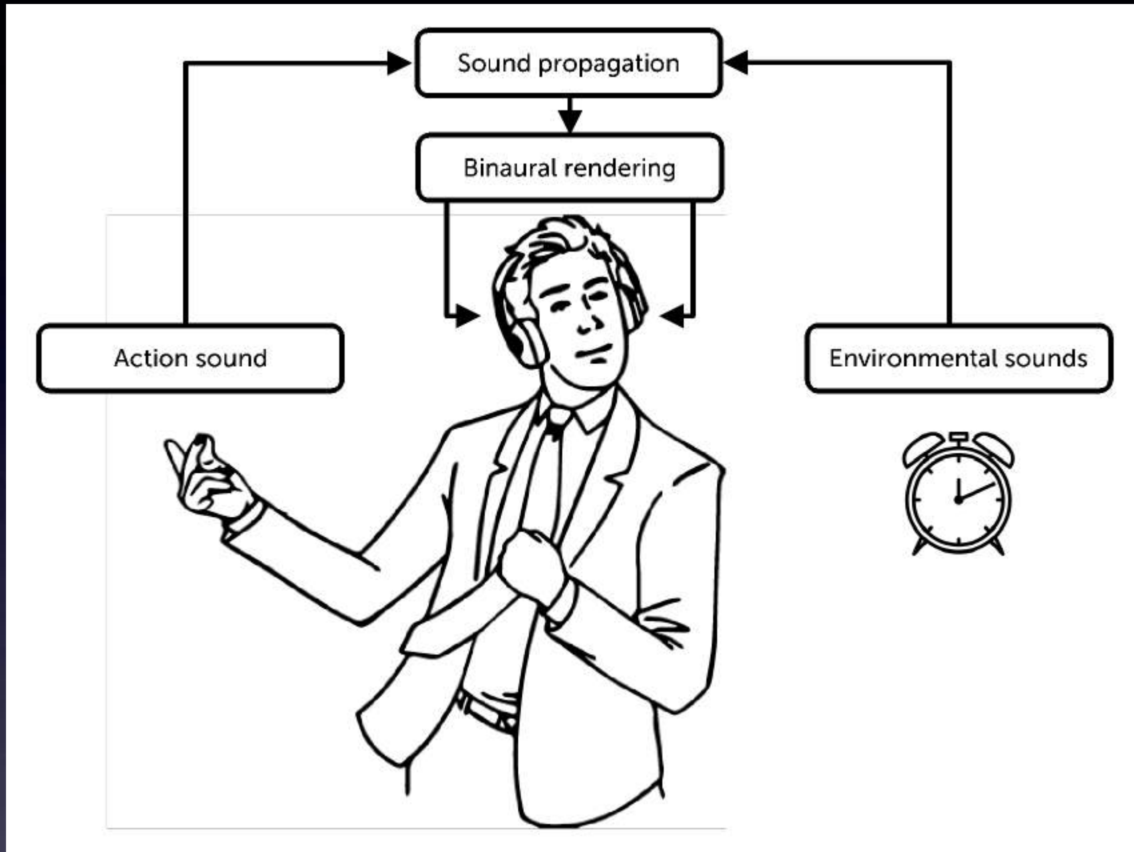
CAPTURING

MIXING

PROCESSING

LISTENING


MAJORHiFi
OSSIC
DESIGN FEATURES
OUTPUT / PLAYBACK
POSITION IN SPACE
SIZE OF OUR HEAD
SHAPE OF OUR EARS



V) Yeni uygulamalar ve çözüm bekleyen sorunlar

Zorluklar

- Ön/arka ayrımı
- Yükseklik hataları
- Seslerin kafa içine yerleşmesi
- Renklenme

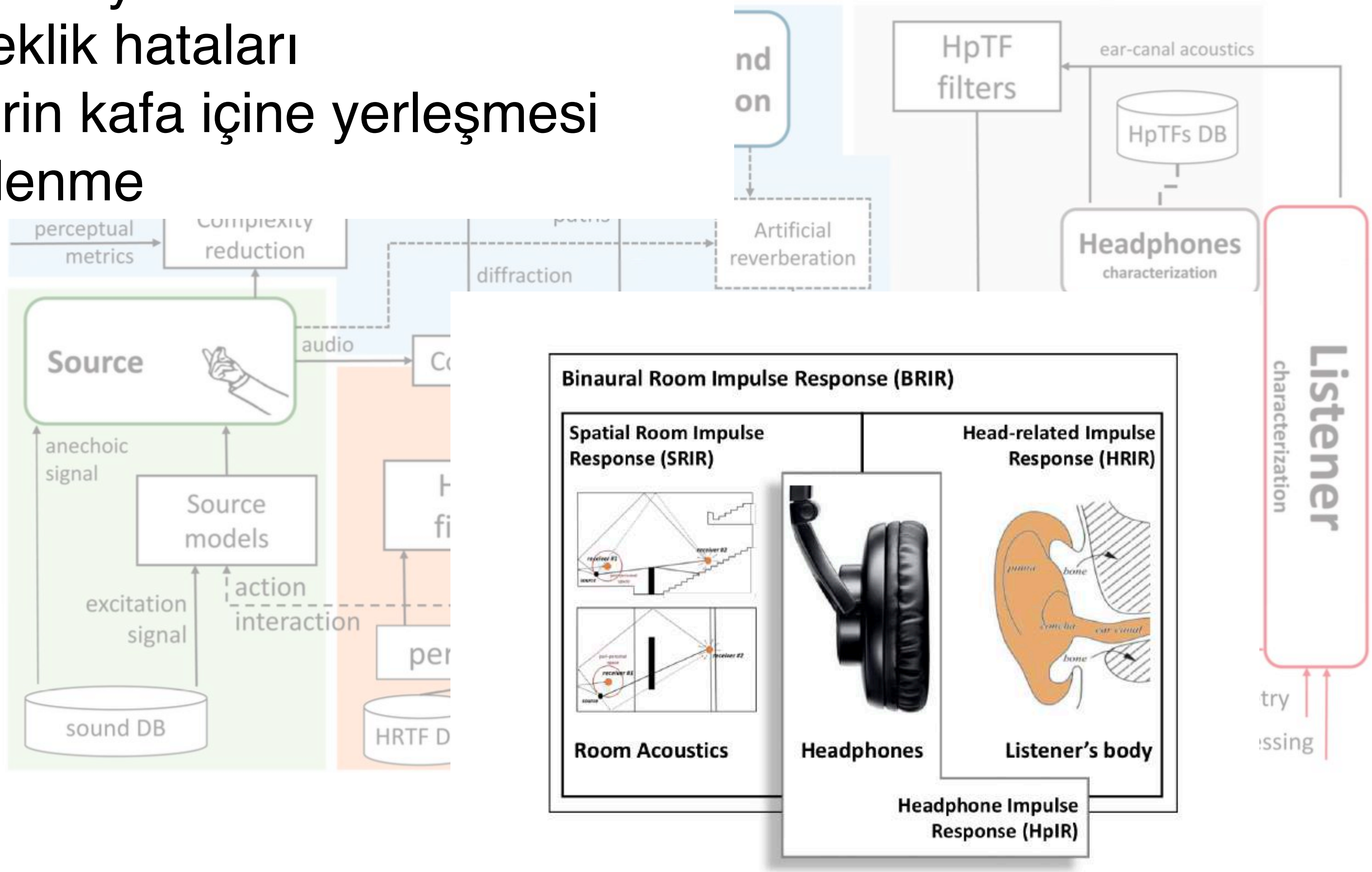
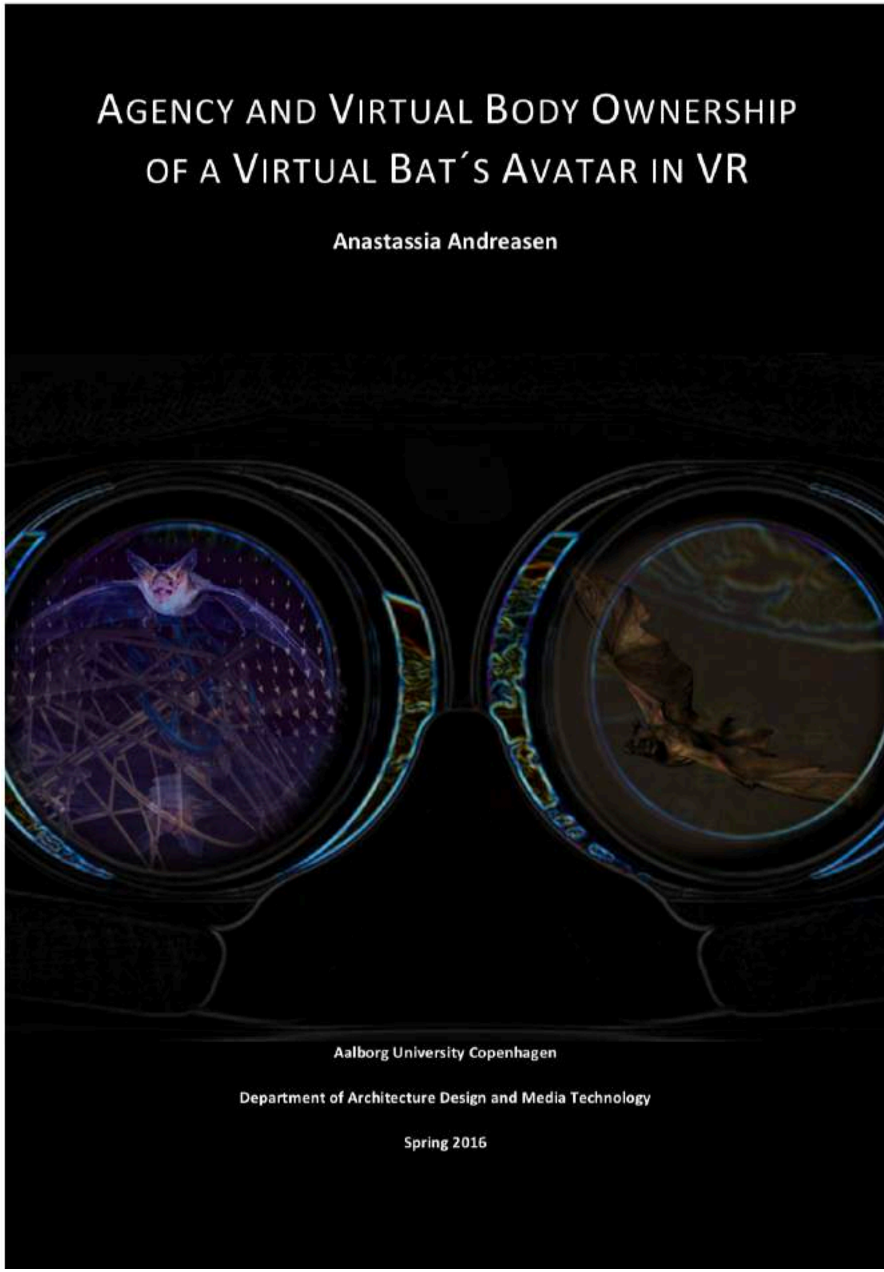
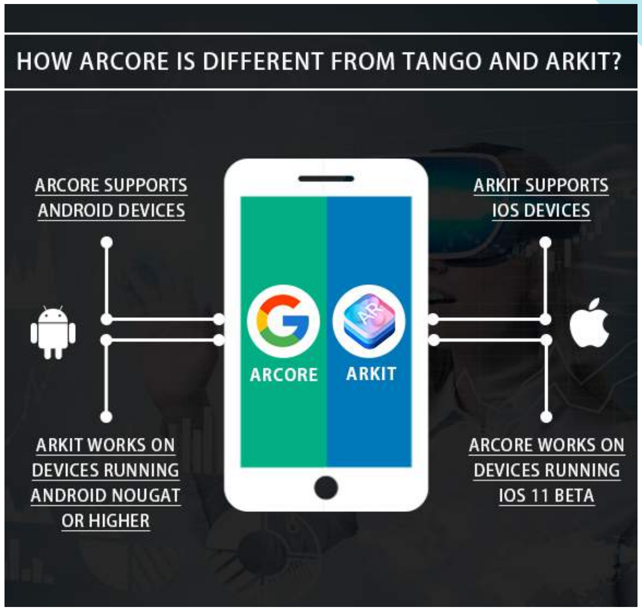


Figure 4.5: A small environment was created, to simulate relative size as well as possible. The room is supposed to represent a large room of 9x7x4 meters

Figure 4.7: The scale used to evaluate the subjective perceptual quality of synthesized effects [42]. Here the participant can play a sound by clicking on of the green bars, and then drag them to place them on the scale.



Özet ve Gelecekteki Calışmalar

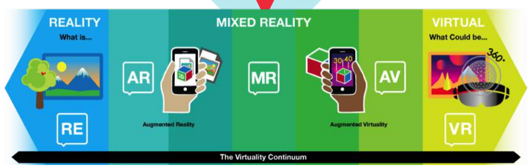


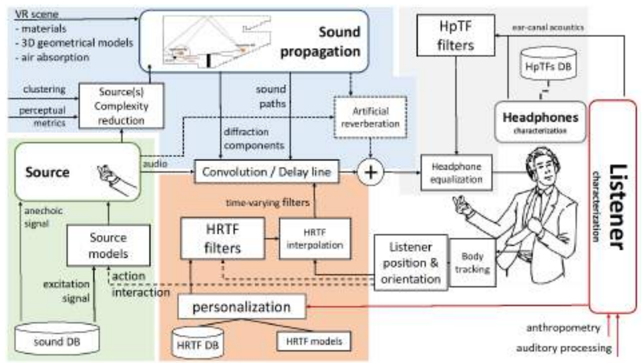
Yeni Donanım

Yeni Yazılım

Artirilmis Gerceklik

Sanal Gerceklik





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