Fiete Winter's Research

Release 1.0

Fiete Winter

Apr 20, 2020

Contents

This website contains information about my scientific work including additional material and figures of my publications.

Contents

1.1 List of Publications

1.1.1 Doctoral Thesis

1.1.2 Journal Articles

1.1.3 Peer-Reviewed Proceedings

1.1.4 Non-Peer-Reviewed Proceedings

1.1.5 Talks

1.2 Additional Material

The material for specific publications is stored in the `publications` directory of the github repository. The figures of each paper can be found in the respective sub-directory `figs`. For some publications, there is also a `slides` or a `poster_figs` directory containing the scripts for some figures on the presentations slides or the poster, respectively. The figures are enumerated either based on their numbering in the paper, on the slide they appear on, or in order of appearance for the poster. In order to reproduced a figure, execute the scripts in the following order (if existent):

1. MATLAB script: *.m

2. gnuplot script: *.gnu

3. include *.tex, *.png, *.pdf in your LaTeX document

For the third step, I recommend the `import` command from the LaTeX import package.

1.2.1 Requirements & Prerequities

Gnuplot

Special thanks go to Hagen Wierstorf for introducing me to Gnuplot. His Gnuplotting Blog contains a lot of examples and information about Gnuplot. You the following Gnuplot extensions

- ColorBrewer color schemes for gnuplot

In order to use the extensions their directories have to be included into Gnuplot's search path. This is done via the ``GNUPLOT_LIB``environment variable. Under Linux (and possibly Mac) execute

```
# gnuplot search path
export GNUPLOT_LIB=~/projects/gnuplot-colorbrewer:$GNUPLOT_LIB
```

in a shell of your choice. You may also add this to your `~/.bashrc` or something (depends on the shell your are using) to execute this automatically. For Windows, see here. You can check, if the path is correcty included via `show loadpath` in the Gnuplot command prompt. Among other lines, this should display something like

```
loadpath from GNUPLOT_LIB is "/home/bewater/projects/gnuplot-colorbrewer"
```

LaTeX

I am using pdfLaTeX, but it might be possible to get the scipts running with other LaTeX compilers (I don't know at all).

MATLAB

The code of this repository has been tested under MATLABR2015a. Please add the `./tools/matlab` directory to your MATLAB path. The software uses the following toolboxes, which you should download and add the their path to your MATLAB path. For specific installation instructions please take a look at the listed websites.

- Auditory Modelling Toolbox (AMT)
- The Large Time/Frequency Analysis Toolbox (LTFAT)
- Sound Field Analysis Toolbox (SOFiA)
- Sound Field Synthesis Toolbox (SFS)
- MATLAB2TikZ
- Two!Ears Auditory Front-End

1.2.2 Specific Dependencies

If you just want to get the material of one specific publication, you may not need all the requirements. The table shows, which publication needs which requirement. The shown versions or commits have to be interpreted as "successfully tested under".

Publication	MATLAB		Gnuplot
	SFS	Others	
[2019]	2.4.3		5.0.3
[2019c]	2.5.0		5.0.3
[2019b]	2.5.0		5.0.3
[2018]	2.4.2		5.0.3
[2018]	2.4.2		5.0.3
[2017a]	2.4.1		5.0.3
[2017b]	ef6c3a		5.0.3
[2017]	7db339	Two!Ears AFE 1.0	5.0.3
[2017d]	2.3.0		5.0.3
[2017b]	2.3.0		
[2016a]	2.2.1		
[2016b]	X		
[2016]	f14513		
[2015a]	X	MAT2TikZ 0.4.7	5.0.3
[2015b]	X	MAT2TikZ 0.4.7	
[2015b]	1.2.0		5.0.3
[2014]	1.1.0	AMT 0.9.7 LTFAT 2.4.0 SOFiA R13-0306 MAT2TikZ 0.4.7	5.0.3

1.3 License Information

The software is released under GNU General Public License, version 3, if not stated otherwise.

Any kind of artistic work (drawings, sketches, etc.) is released under Creative Commons Attribution 4.0 International (CC BY 4.0).

The templates of the presentation slides and the poster are part of the corporate design of the University of Rostock, Germany. Their usage is restricted to members of the university.

Third-party material, e.g. university logos, are not covered by any licensing.

1.4 Funding

From Dec. 2013 to Dec. 2016, my research was part of the Two!Ears project. This project has received funding by the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 618075.

Bibliography

[2019] **Fiete Winter**. *Local Sound Field Synthesis*. PhD thesis, Universität Rostock, Germany, November 2019. [PAPER], [BibTeX].

[2019] **Fiete Winter**, Gergely Firtha, Frank Schultz, and Sascha Spors. A Geometric Model for Prediction of Spatial Aliasing in 2.5D Sound Field Synthesis. *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, 27(6):1031–1046, June 2019. [PAPER], [REPO], [BibTeX].

[2018] **Fiete Winter**, Hagen Wierstorf, Christoph Hold, Frank Krüger, Alexander Raake, and Sascha Spors. Colouration in Local Wave Field Synthesis. *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, 26(10):1913–1924, October 2018. [PAPER], [DATA], [REPO], [BibTeX].

[2016] **Fiete Winter**, Jens Ahrens, and Sascha Spors. On Analytic Methods for 2.5D Local Sound Field Synthesis Using Circular Distributions of Secondary Sources. *IEEE/ACM Transactions on Audio, Speech, and Language Processing*, 24(5):914–926, February 2016. [PAPER], [REPO], [BibTeX].

[2017a] **Fiete Winter**, Christoph Hold, Hagen Wierstorf, Alexander Raake, and Sascha Spors. Colouration in 2.5D local wave field synthesis using spatial bandwidth-limitation. In *Proc. of IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*, 160–164. New Paltz, NY, USA, October 2017. [PAPER], [DATA], [REPO], [BibTeX].

[2017b] **Fiete Winter**, Nara Hahn, and Sascha Spors. Time-Domain Realisation of Model-Based Rendering for 2.5D Local Wave Field Synthesis Using Spatial Bandwidth-Limitation. In *Proc. of 25th European Signal Processing Conference (EUSIPCO)*, 688–692. Kos Island, Greece, August 2017. [PAPER], [REPO], [BibTeX].

[2017c] Nara Hahn, **Fiete Winter**, and Sascha Spors. Synthesis of a spatially band-limited plane wave in the time-domain using wave field synthesis. In *Proc. of 25th European Signal Processing Conference (EUSIPCO)*, 673–677. Kos Island, Greece, August 2017. [PAPER], [BibTeX].

[2017d] **Fiete Winter**, Hagen Wierstorf, and Sascha Spors. Improvement of the reporting method for closed-loop human localization experiments. In *Proc. of 142nd Aud. Eng. Soc. Conv.* Berlin, Germany, May 2017. [PAPER], [DATA], [REPO], [BibTeX].

[2016a] **Fiete Winter** and Sascha Spors. On Fractional Delay Interpolation for Local Wave Field Synthesis. In *Proc. of 24th European Signal Processing Conference (EUSIPCO)*, 2415–2419. Budapest, Hungary, August 2016. [PAPER], [REPO], [BibTeX].

[2016b] Nara Hahn, **Fiete Winter**, and Sascha Spors. Local Wave Field Synthesis by Spatial Band-Limitation in the Circular/Spherical Harmonics Domain. In *Proc. of 140th Aud. Eng. Soc. Conv.* Paris, France, June 2016. [PAPER], [BibTeX].

[2015a] Christopher Schymura, **Fiete Winter**, Dorothea Kolossa, and Sascha Spors. Binaural Sound Source Localisation and Tracking using a dynamic Spherical Head Model. In *Proc. of Interspeech*, 165–169. September 2015. [PAPER], [BibTeX].

[2015b] **Fiete Winter** and Sascha Spors. Physical Properties of Local Wave Field Synthesis Using Linear Loudspeaker Arrays. In *Proc. of 138th Aud. Eng. Soc. Conv.* Warsaw, Poland, May 2015. [PAPER], [REPO], [BibTeX].

[2019a] Nara Hahn, **Fiete Winter**, and Sascha Spors. 2.5D Local wave field synthesis of a virtual plane wave using a time domain representation of spherical harmonics expansion. In *Proc. of 23rd International Congress on Acoustics (ICA)*, 1132–1139. Aachen, Germany, September 2019. [BibTeX].

[2019b] Frank Schultz, Gergely Firtha, **Fiete Winter**, and Sascha Spors. On the Connections of High-Frequency Approximated Ambisonics and Wave Field Synthesis. In *Proc. of German Annual Conference on Acoustics (DAGA)*, 1446–1449. Rostock, Germany, March 2019. [BibTeX].

[2019c] **Fiete Winter**, Frank Schultz, and Sascha Spors. Array Design for Increased Spatial Aliasing Frequency in Wave Field Synthesis Based on a Geometric Model. In *Proc. of German Annual Conference on Acoustics (DAGA)*, 463–466. Rostock, Germany, March 2019. [REPO], [BibTeX].

[2018] **Fiete Winter**, Jens Ahrens, and Sascha Spors. A Geometric Model for Spatial Aliasing in Wave Field Synthesis. In *Proc. of German Annual Conference on Acoustics (DAGA)*, 1310–1313. Munich, Germany, March 2018. [REPO], [BibTeX].

[2017a] **Fiete Winter**, Hagen Wierstorf, Alexander Raake, and Sascha Spors. The Two!Ears Database. In *Proc. of 142nd Aud. Eng. Soc. Conv.* Berlin, Germany, May 2017. [PAPER], [REPO], [BibTeX].

[2017b] **Fiete Winter** and Sascha Spors. Time-Domain Realisations of 2.5-Dimensional Local Sound Field Synthesis. In *Proc. of German Annual Conference on Acoustics (DAGA)*, 1134–1137. Kiel, Germany, March 2017. [REPO], [BibTeX].

[2016a] **Fiete Winter**, Hagen Wierstorf, Ariel Podlubne, Thomas Forgue, Jérome Manhès, Matthieu Herrb, Sascha Spors, Alexander Raake, and Patrick Danès. Database of binaural room impulse responses of an apartment-like environment. In *Proc. of 140th Aud. Eng. Soc. Conv.* Paris, France, May 2016. [PAPER], [DATA], [BibTeX].

[2016b] **Fiete Winter** and Sascha Spors. A Comparison of Sound Field Synthesis Techniques for Non-Smooth Secondary Source Distributions. In *Proc. of German Annual Conference on Acoustics (DAGA)*, 1463–1466. Aachen, Germany, March 2016. [PAPER], [REPO], [BibTeX].

[2015a] **Fiete Winter** and Sascha Spors. Physical Properties of Local Wave Field Synthesis Using Circular Loudspeaker Arrays. In *Proc. of 10th European Congress and Exposition on Noise Control Engineering (EuroNoise)*, 263–268. Maastricht, The Netherlands, May 2015. [PAPER], [REPO], [BibTeX].

[2015b] **Fiete Winter** and Sascha Spors. Parameter Analysis for Range Extrapolation of Head-Related Transfer Functions using Virtual Local Wave Field Synthesis. In *Proc. of German Annual Conference on Acoustics (DAGA)*, 1131–1134. Nuremberg, Germany, March 2015. [PAPER], [REPO], [BibTeX].

[2014] **Fiete Winter**, Frank Schultz, and Sascha Spors. Localization Properties of Data-based Binaural Synthesis including Translatory Head-Movements. In *Proc. of Forum Acusticum*. Krakow, Poland, September 2014. [PAPER], [REPO], [BibTeX].

[2019a] **Fiete Winter**. Local Sound Field Synthesis. *PhD Defense*. Rostock, Germany, October 2019. [REPO], [BibTeX].

[2019b] **Fiete Winter**. Local Sound Field Synthesis - Physics and Perception. *German Annual Conference on Acoustics (DAGA)*. Rostock, Germany, March 2019. [REPO], [BibTeX].

[2017] **Fiete Winter**, Nara Hahn, Hagen Wierstorf, and Sascha Spors. Azimuthal Localisation in 2.5D Near-Field-Compensated Higher Order Ambisonics. *Acoustics '17*. Boston, MA, USA, June 2017. [REPO], [BibTeX].