

Georg Essl

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RESEARCH INTERESTS

Sound Synthesis. Mobile Interaction & Music Performance. Musical Cognition and Emotion Detection. Human-Computer interfaces. Tangible and Haptic Interface Technologies. Music Information Retrieval. Digital Fabrication. Computational and Musical Acoustics. Physical simulation. Digital Signal Processing. Computational psychoacoustics. Numerical methods. Computer Graphics. Applications of computers to the natural, social sciences and the arts.

EDUCATION

Ph.D. Computer Science. Princeton University, Princeton, NJ 1997 – Summer 2002
Research in computer-generated sound, by physical simulation. Advisor: Perry R. Cook

M.A. Computer Science. Princeton University, Princeton, NJ 1999

Diploma Engineer (M.Sc.) Computer Science & Electrical Engineering.
Graz University of Technology, Graz, Austria 1990 – 1996

Music Conservatory. Piano, Composition and Recorder.
Johann-Joseph Fux Conservatory, Graz, Austria 1979 – 1990

EMPLOYMENT & APPOINTMENTS

University of Wisconsin - Milwaukee, WI Spring 2019 – current
Research Professor, Mathematical Sciences

University of Wisconsin - Milwaukee, WI Summer 2016 – Spring 2019
Visiting Research Professor, College of Letters & Science, Grant Development, Center for 21st Century Studies

University of Michigan Ann Arbor, MI Summer 2009 – Summer 2016
Assistant Professor (tenure-track), Electrical Engineering & Computer Science and Music (by courtesy)

SonicMule Inc. (Smule) Palo Alto, CA Summer 2008 – Summer 2009
Advisor and Consultant, Mobile Sonic Apps for iPhones

Deutsche Telekom Labs, TU-Berlin, Berlin, Germany Summer 2005 – Summer 2009
Senior Research Scientist

MIT Media Lab Europe Dublin, Ireland Fall 2003 – Spring 2005

*Post-Doctoral Researcher, Partly funded by the European Union ENACTIVE
Network of Excellence*

University of Florida Gainesville, FL Fall 2002 – Summer 2003
*Assistant Professor (tenure-track), Computer & Information Science & Engineering.
Affiliated Assistant Professor, Electrical & Computer Engineering
Graduate Faculty.*

Princeton University Princeton, NJ 1997-2002
Assistant in Instruction and Assistant in Research

AT&T Research Labs Florham Park, NJ Summer 1999
*Summer Internship, Speech and Image Processing Services Group. Perceptual
sound-field reconstruction.*

Hyperwave R&D, Inc. Graz, Austria 1996-1997
Software Developer, Web server technology research and development.

Graz University of Technology, Graz, Austria 1995-1996
Research Assistant, Multimedia Information Systems.

Self-employed Graz, Austria 1991-1992
*Software Development. Gigamem software for Amiga computers.
Published/distributed by BSC Büroautomation, Munich, Germany, with T.Vollmer,
C.Schneider and F.Bürgel.*

Elin Weiz, Austria 1990
*Summer Internship. Software department, high-voltage transformer production and
development.*

PUBLICATIONS

BOOK CHAPTERS

1. Lee, S. W., Taylor, B., Essl G., “Interactive Music with Web Audio”, *Foundation in Sound Design for Interactive Media* (contracted, to appear).
2. Essl, G., Lee, S.W., “Mobile Devices as Musical Instruments - State of the Art and Future Prospects.”, In “*Music Technology with Swing*”, Aramaki, M., Davies, M., Kronland-Martinet, R., Ystad, S. Eds., Springer, 2018. (Expanded Version)
3. Wang, G., G. Essl, and H. Penttinen. “The Mobile Phone Orchestra”. In “*Oxford Handbook of Mobile Music Studies*” Vol 2. S. Gopinath and J. Stanyek Eds. Oxford University Press, 2014.
4. Essl, G. and O’Modhrain, S. “Perceptual integration of audio and touch: A case study of pebblebox,” in *Sonic Interaction Design — Case studies*, S. Serafin and K. Franinovic, Eds. MIT Press, 2013.
5. Essl, G. “Aspects of the Topology of Interactions on Loop Dynamics in One and Two Dimensions,” In the *Proceedings of the International Symposium on Computer Music Modeling and Retrieval 2004*, Esbjerg, Denmark, Lecture Notes in Computer Science 3310, Springer Verlag, 220-231, 2004.

JOURNAL PUBLICATIONS

1. Turchet, L. Fischione, C., Essl, G. Keller, D. and Barthelet, M. "Internet of Musical Things: State of the Art, Vision, Implications, and Current Challenges," IEEE Access, vol. 6, pp. 61995-62017, 2018.
2. Zhang, B., Mower Provost, E., and Essl, G. "Cross-corpus Acoustic Emotion Recognition with Multi-task Learning: Seeking Common Ground while Preserving Differences," IEEE Transactions on Affective Computing, 2017.
3. Essl, G., Lee, S. W. "The Design Of urMus as a Meta-Environment for Mobile Music," Journal of Creative Music Systems, 1:2, 2017.
4. Yang, Q. and Essl, G. "Evaluating Gesture-Augmented Keyboard Performance" Computer Music Journal Winter, 38:4. 68-79, 2014.
5. Rohs, M., Schleicher, S., Schöning, J., Essl, G., Naumann, A., Krüger, A. "Impact of Item Density on the Utility of Visual Context in Magic Lens Interactions" Springer Personal and Ubiquitous Computing 23:8, 633 - 646, 2009.
6. Essl, G., Rohs, M. "Interactivity for Mobile Music-Making" Organised Sound: 14:2, 2009.
7. Rohs, M., Essl, G. "Sensing-based Interaction for Information Navigation on Handheld Displays" Advances in Human-Computer Interaction, Volume 2008 (2008), Article ID 450385, 11 pages.
8. Essl, G., O'Modhrain, S. "An enactive approach to the design of new tangible musical instruments" Organised Sound: 11:3. 285-296, 2006.
9. Essl, G., "Computation of Wavefronts on a Disk I: Numerical Experiments," Post-conference publication, "Third Irish Conference on the Mathematical Foundations of Computer Science and Information Technology, Dublin, Ireland, July 22-23, 2004." Electronic Notes in Theoretical Computer Science 161, 25-41.
10. Essl, G., "'Whispering" waves and Bate's ridges in numerical experiments" Acoustics Research Letters Online 6:3, 227-231, 2005.
11. Essl, G., "Trapping and Steering on Lattice Strings: Virtual Slow Waves, Directional and Non-propagating Excitations," Physical Review E, 69, 066601-1-6, 2004.
12. Essl, G., Serafin, S., Cook, P. R., Smith, J. O., "Theory of Banded Waveguides," Computer Music Journal, 28:1, 37-50, 2004.
13. Essl, G., Serafin, S., Cook, P. R., Smith, J. O., "Musical Applications of Banded Waveguides," Computer Music Journal, 28:1, 51-63, 2004.
14. Kapur, A., Essl, G., Davidson, P., Cook, P. R., "The Electronic Tabla Controller," Journal of New Music Research 32:4, 351-360, 2003.
15. Essl, G. "On Gender in New Music Interface Technology," Organised Sound, 8:1, 19-30, 2003.
16. Essl, G., Cook, P.R., "Measurements and efficient simulations of bowed bars," Journal of the Acoustical Society of America, 108:1, 379-388, 2000.
17. Li, K., et al, "Early Experiences and Challenges in Building and Using A Scalable Display Wall System," IEEE Computer Graphics and Applications, 29-37, July/August, 2000.

INVITED PUBLICATIONS

1. O'Modhrain, S. and Essl, G. "PebbleBox and CrumbleBag: 12 years later," In Alexander Jensenius and Michael Lyons eds. *The NIME Reader*, Springer Verlag, 2017.
2. Essl, G. "On-the-fly Programming: Using Code as an Expressive Musical Instrument and its Impact," In Alexander Jensenius and Michael Lyons eds. *The NIME Reader*, Springer Verlag, 2017.
3. Essl, G. and O'Modhrain, S. "Un Enfoque Enactivo al Diseño de Nuevos Instrumentos Musicales Tangibles," Mexican Journal Sonic Ideas 3:2, Special Issue Música en el Holodeck – 2a Parte / Music in the Holodeck – Part 2. 2011. Invited Spanish translation of Essl and O'Modhrain "An enactive approach to the design of new tangible musical instruments" Organised Sound: 11:3, 2006.

4. Essl, G. "Tinkering with Noise: Wie man neue Musikinstrumente technisch möglich macht" Invited Keynote presentation & paper (German). In Workshop-Proceedings of the 2008 Conference on Humans and Computers, Lübeck, Germany, September 2008.
5. Essl, G. "Mathematical Structure and Sound Synthesis", Proceedings of Sound and Music Computing 2005, Salerno, Italy, Nov. 24-26 2005.
6. Essl, G. "The Computational Structure of Waves on Drums for Sound Synthesis", Proceedings of Forum Acusticum, Budapest, Hungary, Aug. 29-Sept. 2, 2005.
7. Essl, G., "From Mathematical Concepts to Hands-on Interaction: Physical Modeling and Interaction Paradigms of Tablas and Singing Bowls" Invited paper, In the Proceedings of Frontiers of Research in Speech and Music, Annamalai, India, 6-8, January, 2004.

CONFERENCE PUBLICATIONS

1. Zhang, B., Kong, Y, Essl, G., Mower Provost, E. "f-Similarity Preservation Loss for Soft Labels: A Demonstration on Cross-Corpus Speech Emotion Recognition." In Proceedings of AAAI Conference on Artificial Intelligence (AAAI-19). Hawaii. January 2019.
2. Kalo, A., Essl, G. "Individual Fabrication of Cymbals using Incremental Robotic Sheet Forming" International Conference for New Interfaces for Musical Expression (NIME), Blacksburg VA, 2018.
3. Essl, G., Lee, S.W., "Mobile Devices as Musical Instruments - State of the Art and Future Prospects." In Proceedings of the International Symposium on Computer Music Multidisciplinary Research (CMMR), Matosinhos, Porto, Portugal, 2017.
4. Zhang, B., Essl, G., Mower Provost, E. "Predicting the Distribution of Emotion Perception: Capturing Inter-Rater Variability." *International Conference on Multimodal Interaction (ICMI)*. Glasgow, Scotland, November 2017.
5. Lee, S. W., Bang, J., Essl, G., "Live Coding YouTube Videos : Organizing Streaming Media for an Audiovisual Performance." In Proceedings of the International Conference on New interface for Musical Expression (NIME), Copenhagen, Denmark, 2017.
6. Zhang, B., Essl, G., Mower Provost, E. "Automatic Recognition of Self-Reported and Perceived Emotion: Does Joint Modeling Help?" International Conference on Multimodal Interaction (ICMI).Tokyo, Japan, November 2016. (full paper, oral presentation, best paper honorable mention).
7. Lee, S. W., Essl, G., "Live Coding the Audience Participation, " In Proceedings of the International Conference on Live Coding (*ICLC*) 2016, Hamilton, Canada, 2016.
8. Lee, S. W., Essl, G., Martinez, M. "Live Writing: Writing as a Real-time Audiovisual Performance," in Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), Brisbane, Australia, 2016.
9. de Carvalho Jr., A. D., Lee, S. W., Essl, G. "Understanding Cloud Service in the Audience Participation Music Performance of Crowd in C[loud]," in Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), Brisbane, Australia, 2016.
10. Zhang, B., Mower Provost, E., and Essl, G. "Cross-Corpus Acoustic Emotion Recognition From Singing And Speaking: A Multi-Task Learning Approach." International Conference on Acoustics, Speech and Signal Processing (ICASSP). Shanghai, China, March 2016.
11. Lee, S. W., de Carvalho Jr., A. D., Essl, G. "Crowd in C[loud] : Audience Participation Music with Online Dating Metaphor using Cloud Service" In Proceedings of the Web Audio Conference (WAC-16), Atlanta, Georgia, 2016.
12. Lee, S. W., Essl, G. "Hooking up Web Audio to WebGL Typography" In Proceedings of the Web Audio Conference (WAC-16), Atlanta, Georgia, 2016.

13. Fernandes, E., Chen, Q. A., Essl, G., Halderman, J. A., Mao, Z. M. and Prakash, A. "Android UI Deception Revisited: Attacks and Defenses" In Proceedings of Financial Cryptography and Data Security (FC 2016), Barbados, 2016.
14. Zhang, B., Essl, G., and Mower Provost, E. "Recognizing Emotion from Singing and Speaking Using Shared Models," In Proceedings of the International Conference on Affective Computing and Intelligent Interaction (ACII2015), Xi'an, China, 2015.
15. de Carvalho Jr., A. D., Essl, G., de Queiroz, M. G., "Computer Music through the Cloud: Evaluating a cloud service for collaborative computer music applications," In Proceedings of the International Computer Music Conference (ICMC-15), Denton, Texas, 2015.
16. Lee, S. W., Essl, G. "Live Writing: Web Based Text Editor for Asynchronous Playback of Live Coding and Writing," In Proceedings of the International Conference on Live Coding (ICLC-15), Leeds, UK, 2015.
17. de Carvalho Jr., A. D., Lee, S. W., Essl, G. "SuperCopair: Collaborative Live Coding on Supercollider through the cloud," In Proceedings of the International Conference on Live Coding (ICLC-15), Leeds, UK, 2015.
18. Lee, S. W., Essl, G. "Web-Based Temporal Typography for Musical Expression and Performance," In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME-15), Baton Rouge, Louisiana, 2015.
19. Yang, Q., Essl, G. "Representation-Plurality in Multi-Touch Mobile Visual Programming for Music," In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME-15), Baton Rouge, Louisiana, 2015.
20. Zhang, B. Mower Provost, E., Swedberg, R. and Essl, G. "Predicting Emotion Perception Across Domains: A Study of Singing and Speaking," In Proceedings of AAAI Conference on Artificial Intelligence (AAAI-15), Austin, Texas, January 2015.
21. Lee, S. W., Essl, G. "Models and Opportunities for Networked Live Coding" In Proceedings of Live Coding and Collaboration Symposium, Birmingham, UK, 2014.
22. Lee, S. W., Essl, G. "Communication, Control, and State Sharing in Collaborative Live Coding" In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), London, UK, 2014.
23. Lee, S. W., Essl, G., Mao, Z. M. "Distributing Mobile Music Applications for Audience Participation Using Mobile Ad-hoc Network (MANET)" In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), London, UK, 2014.
24. Lee, S. W., Essl, G. "Live Coding The Mobile Music Instrument" In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), Daejeon + Seoul, South Korea, p.28-34, 2013.
25. Yang, Q., Essl, G. "Visual Associations in Augmented Keyboard Performance" In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), Daejeon + Seoul, South Korea, p.79-83, 2013.
26. Fan, X., Essl, G. "Air Violin: A Body-centric Style Musical Instrument" In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), Daejeon + Seoul, South Korea, p.65-67, 2013.
27. Kratz, S., Rohs, M., Essl, G. "Combining Acceleration and Gyroscope Data for Motion Gesture Recognition using Classifiers with Dimensionality Constraints" In Proceedings of Intelligent User Interfaces (IUI '13), Santa Monica, CA, USA, 2013.
28. Juett, J. and Essl, G. "Real-time Computer Vision for Heading Correction in Mobile Augmented Reality Registration on Wind Farms" MobileHCI Workshop on Mobile Vision (MobiVis), San Francisco, 2012.

29. Essl, G. "Playing with Time - Manipulation of Time and Rate in a Multi-Rate Signal Processing Pipeline," In Proceedings of the International Computer Music Conference (ICMC), Ljubljana, 2012.
30. Yang, Q. and Essl, G. "Augmented Piano Performance through a Depth Camera" In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), Ann Arbor, 2012.
31. Derbinsky, N. and Essl, G. "Exploring Reinforcement Learning for Mobile Percussive Collaboration," In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), Ann Arbor, 2012.
32. Essl, G. "Automated Ad Hoc Networking for Mobile and Hybrid Music Performance," In Proceedings of the International Computer Music Conference (ICMC), Huddersfield, 2011.
33. Kim, J. W. and Essl, G. "Concepts and Practical considerations of Platform-Independent Design of Mobile Music Environments," In Proceedings of the International Computer Music Conference (ICMC), Huddersfield, 2011.
34. O'Keefe, P. and Essl, G. "The Visual in Mobile Music Performance," In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), Oslo, 2011.
35. Kratz, S., Westermann, T., Rohs, M. and Essl, G. "CapWidgets: tangible widgets versus multi-touch controls on mobile devices" In CHI '11 Extended Abstracts on Human Factors in Computing Systems (CHI EA '11). ACM, New York, NY, USA, 2011.
36. Derbinsky, N. and Essl, G. "Cognitive Architecture in Mobile Music Interactions," In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), Oslo, 2011. Essl, G., Rohs, M. and Kratz, S. "Use the Force (or something) - Pressure and Pressure-Like Input for Mobile Music Performance," In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), Sydney, Australia, June 15-18 2010.
37. Essl, G. and Müller, A. "Designing Mobile Musical Instruments and Environments with urMus," In Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), Sydney, Australia, June 15-18 2010.
38. Essl, G. "UrMus – An Environment for Mobile Instrument Design and Performance," In Proceedings of the International Computer Music Conference (ICMC), Stony Brooks/New York, June 1-5 2010.
39. Essl, G. "The Mobile Phone Ensemble as Classroom," in Proceedings of the International Computer Music, Stony Brooks/New York, June 1-5 2010.
40. Essl, G. "Mobile phones as programming platforms". In Proceedings of the Pervasive Workshop on Programming Methods for Mobile and Pervasive Systems, Helsinki, Finland, May 17, 2010.
41. Stewart, C., Rohs, M., Essl, G. and Kratz, S. "Characteristics of Pressure-Based Input for Mobile Devices," in Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI 2010), Atlanta, Georgia, USA, April 10-15, 2010.
42. Essl, G., Rohs, M., Kratz, S. "Squeezing the Sandwich: A Mobile Pressure-Sensitive Two-Sided Multi-Touch Prototype" In Proceedings of UIST'09, Victoria, Canada, October 4-7, 2009.
43. Rohs, M., Schöning, J., Schleicher, R., Essl, G., Naumann, A. and Krüger, A. "Impact of Item Density on Magic Lens Interactions" In Proceedings of the 10th International Conference on Human Computer Interaction with Mobile Devices and Services (MobileHCI), Bonn, Germany, September 15-18, 2009.
44. Wang, G. et al "Smule = Sonic Media: An Intersection of the Mobile, Musical, and Social" In Proceedings of the International Computer Music Conference, Montreal, 2009.
45. Essl, G. "SpeedDial: Rapid and On-The-Fly Mapping of Mobile Phone Instruments" In Proceedings of the International Conference on New Interfaces for Musical Expression, Pittsburgh, 2009.
46. Müller, A. and Essl, G. "Utilizing Tactile Feedback to Guide Movements Between Sounds" In Proceedings of the International Conference on New Interfaces for Musical Expression, Pittsburgh, 2009.

47. Gillian, N., O'Modhrain, S. and Essl, G. "Scratch-Off: A gesture based mobile music game with tactile feedback" In Proceedings of the International Conference on New Interfaces for Musical Expression, Pittsburgh, 2009.
48. Wang, G., Essl, G., Penttinen, H., "Do Mobile Phones Dream of Electric Orchestras?," In Proceedings of the International Computer Music Conference (ICMC), Belfast, 2008.
49. Misra, A., Essl, G., Rohs, M. "Microphone as Sensor in Mobile Phone Performance," In Proceedings of the International Conference on New Instruments for Musical Expression (NIME), Genova, 2008.
50. Essl, G., Wang, G., Rohs, M. "Developments and Challenges turning Mobile Phones into Generic Music Performance Platforms," in Proceedings of the Mobile Music Workshop, Vienna, 2008.
51. Rohs, M., Schöning, J, Raubal, M., Essl, G., Krüger, A. "Map Navigation with Mobile Devices: Virtual versus Physical Movement with and without Visual Context," In Proceedings of the International Conference on Multimodal Interactions (ICMI), Nagoya, 2007.
52. Essl, G. "Iterated Fundamental Solution Simulations of Sections of Circular Membranes," In Proceedings of the International Symposium for Musical Acoustics (ISMA), Barcelona, 2007.
53. Rohs, M., Essl, G. "Sensing-based Interaction for Information Navigation on Handheld Displays" in Proceedings of the 9th International Conference on Human Computer Interaction with Mobile Devices and Services (MobileHCI), Singapore, September 9-12, 2007.
54. Essl, G., Rohs, M. "ShaMus - A Sensor-Based Integrated Mobile Phone Instrument" In Proceedings of the International Computer Music Conference (ICMC), Copenhagen, 2007.
55. Rohs, M., Essl, G. "CaMus2 - Collaborative Music Performance with Mobile Camera Phones" Pro-ceedings of the International Conference on Advances in Computer Entertainment Technology (ACE), Salzburg, Austria, June 13-15, 2007.
56. Rohs, M., Essl, G. "CaMus2 - Optical Flow and Collaboration in Camera Phone Music Performance" In Proceedings of the Seventh International Conference on New Interfaces for Musical Expression (NIME), New York, USA, June 6-10, 2007.
57. Essl, G. Rohs, M. "The Design Space of Sensing-Based Interaction for Mobile Music Performance" Proceedings of the 3rd International Workshop on Pervasive Mobile Interaction Devices (PERMID), Toronto, Ontario, Canada, May 13, 2007.
58. Rohs, M., Essl, G. "Which One is Better? – Information Navigation Techniques for Spatially Aware Handheld Displays" in Proceedings of the International Conference on Multimodal Interfaces (ICMI), , Banff, Nov. 2-4, 100-107, 2006.
59. Essl, G., Rohs, M. "Mobile STK for Symbian OS" in Proceedings of the International Computer Music Conference (ICMC-06), New Orleans, 2006.
60. Essl, G. "Circle Maps as a Simple Oscillators for Complex Behavior: I. Basics" in Proceed-ings of the International Computer Music Conference (ICMC-06), New Orleans, 2006.
61. Essl, G. "Circle Maps as a Simple Oscillators for Complex Behavior: II. Experiments" in Proceedings of the International Conference on Digital Audio Effects (DaFX), Montreal, Canada, 2006.
62. Rohs, M., Essl, G., Roth, M., "CaMus: Live Music Performance using Camera Phones and Visual Grid Tracking" in Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), Paris, France, 2006.
63. Essl, G. Magnusson, C., Eriksson, J., O'Modhrain, S. "Towards evaluation of performance, control and preference in physical and virtual sensorimotor integration ", Proceedings of Enactive 2005, Genova, Italy, November 17-18, 2005.
64. Essl, G. "Towards the Synthesis of Wavefront Evolution in 2-D", Proceedings of the International Computer Music Conference, Barcelona, Spain, September 5-9, 2005.

65. Essl, G., O'Modhrain, S., "Scrubber: An Interface for Friction-induced Sounds," in Proceedings of the International Conference on New Interfaces for Musical Expression, Vancouver, Canada, May 26-28, 70-75, 2005.
66. O'Modhrain, S. and Essl, G., "PebbleBox and CrumbleBag: Tactile Interfaces for Granular Synthesis," in the Proceedings of the Conference for New Interfaces for Musical Expression, Hamamatsu, Japan, 74-79, 2004.
67. Essl, G., Cook, P. R., "The principle of closed wavetrains, resonance and efficiency: past, present and future," In the Proceedings of the Stockholm Music Acoustics Conference (SMAC-03), Stockholm, Sweden, 6-10 September, 385-388, 2003.
68. Young, D., Essl, G., "HyperPuja: A Tibetan Singing Bowl Controller," In the Proceedings of the International Conference on New Interfaces for Musical Expression (NIME-03), Montreal, Canada, 22-24 May, 9-14, 2003.
69. Essl, G., "The Displaced Bow and APhISMs: Abstract Physically Informed Synthesis Methods for Composition and Interactive Performance," in Florida Electroacoustic Music Studio Library (Proceedings of the Twelfth Annual Florida Electroacoustic Music Festival 2003), Gainesville, Florida, 3-5 April, 2003.
70. Tzanetakis, G., Essl, G., Cook, P. R., "Human Perception and Computer Extraction of Musical Beat Strength," in Proc. of the 5th Int. Conference on Digital Audio Effects (DAFx-02), Hamburg, Germany, 26-28 September, 257-261, 2002.
71. Essl, G., Cook, P. R., "Banded Waveguides on Circular Topologies and of Beating Modes: Tibetan Singing Bowls and Glass Harmonicas," in Proc. of the International Computer Music Conference (ICMC-02), Göteborg, Sweden, 16-21 September, 49-52, 2002.
72. Kapur, A., Essl, G., Davidson, P., Cook, P.R., "The Electronic Tabla Controller," in Proc. 2002 Conference on New Instruments for Musical Expression (NIME-2002), Dublin, Ireland, 24-26 May, 2002. Tzanetakis, G., Essl, G., Cook, P.R., "Audio Analysis using the Discrete Wavelet Transform," In Proc. WSES Int. Conf. Acoustics and Music: Theory and Applications (AMTA 2001) Skiathos, Greece, 2001. Reprinted in "Mathematics and Simulation with Biological, Economical and Musicoacoustical Applications", WSES Press, 318-323, 2001.
73. Tzanetakis, G., Essl, G., Cook, P.R., "Automatic Musical Genre Classification of Audio Signals," In Proc. Int. Symposium on Music Information Retrieval (ISMIR), Bloomington, Indiana, 2001.
74. O'Brien, J.F., Cook, P.R., Essl, G., "Synthesizing Sound from Physically Based Motion," In Proc. SIGGRAPH 2001, Los Angeles, CA, August, 529-536, 2001.
75. Essl, G., Cook, P.R., "Banded Waveguides: Towards Physical Modeling of Bar Percussion Instruments," In Proc. Int. Computer Music Conf. (ICMC), Beijing, 22-28 October, 321-324, 1999.
76. Cook, P.R., Essl, G., Tzanetakis, G., Trueman D., "N >> 2: Multi-Speaker Display Systems for Virtual Reality and Spatial Audio Projection," In Proc. Int. Conf. Auditory Display (ICAD), Glasgow, 1-4 November, 1998.

OTHER PUBLICATIONS

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1. Fernandes, E., Chen, Q. A., Essl, G., Halderman, J. A., Mao, Z. M. and Prakash, A. "TIVOS: Trusted Visual I/O Paths for Android" University of Michigan CSE Technical Report CSE-TR-586-14, May 2014.
 2. Essl, G., "Book Review of 'Computational Line Geometry' by H. Pottmann, J. Wallner" SIGACT News 36:3, 13-17, 2005.
 3. Essl, G. "Strange Excitations" Workshop on Sound in Interactive Media, Copenhagen, May 12-13 2005 (abstract only).
 4. Essl, G., Serafin, S., Cook, P. R., Smith, J. O., "2. Sound Examples to Accompany the Article, 'Musical Applications of Banded Waveguides' by Georg Essl, Stefania Serafin, Perry R. Cook, and Julius O. Smith (Volume 28, Number 1)," Computer Music Journal, Sound and Video Anthology DVD, Volume 28, 2004.

5. O'Modhrain, S., Essl, G., "Enaction in the Context of Musical Performance," paper, Enactive Virtual Workshop, November 11, 2004.
6. Essl, G., "Newton's use of the word "action" and the "principle of stationary action"," Enactive Virtual Workshop, July 16, 2004.
7. Essl, G., "The "quality" of enactive interfaces and their social implications," Enactive Virtual Workshop, June 25, 2004.
8. Essl, G., "Enaction, passitivity and the complexity of modes of sensation ," Enactive Virtual Workshop, June 13, 2004.
9. Essl, G., "Enaction and Automaticity," Enactive Virtual Workshop, May 10, 2004.
10. Essl, G., "Who "sees"? The individual's choice to perceptive categories", Enactive Virtual Workshop,, May 10, 2004.
11. Essl, G., "Physical Wave Propagation Modeling for Real-Time Synthesis of Natural Sounds," Ph.D. thesis, Computer Science Department, Princeton University, 2002.
12. O'Brien, J. F., Cook, P. R., Essl G., "Synthesizing Sounds from Physically Based Motion." (computer generated animation), The visual proceedings of ACM SIGGRAPH 2001, Los Angeles, CA, August 11-17. In the ACM SIGGRAPH 2001 Animation Theater.
13. Essl, G., "Possibilities for a Hyper-G-WWW-gateway," Master's thesis, Graz University of Technology, 1996.

UNPUBLISHED MANUSCRIPTS, SUBMITTED OR IN PREPARATION FOR PUBLICATION

1. Essl, G. "Wave Fronts and Caustics of Points Sources Inside a Sphere for the 3-D Wave Equation" in preparation.
2. Essl, G., "Topological Description of Repetitive Structures" In "Mathematical and Computational Musicology", T. Klouche, ed. , SIM Berlin, invited chapter, submitted.
3. Essl, G., "Velocity excitations and impulse responses of strings – Aspects of continuous and discrete models," in preparation.
4. Essl, G., "Elementary Integration Methods for Velocity Excitations in Displacement Digital Waveguides," in preparation.
5. Essl, G., "Verona Lectures on the Geometry of Waves" in preparation.

PATENTS, PATENTS PENDING, PATENTS SUBMITTED

1. Kratz, S., Rohs, M., Essl, G. "Sandwich: Pressure-Sensitive Two-Sided Touch Interaction for Mobile Devices" German patent, issued February 9, 2011.
2. O'Modhrain, S., Essl, G. "Particle Based Touch Interaction for Creation of Media Streams" US patent US 7,427,711 B2. Filed August 19, 2004 (provisional)/Nov. 17, 2005, final application. Granted September 23, 2008.

DVD PRODUCTIONS

1. Simoni, M., Dowd, S., "The questions that tempt the sleeper," DVD. 2011. Creative credit for additional writing, dramaturgy, mobile instrument design and directing the Michigan Mobile Phone Ensemble.

CURATED EXHIBITS

1. O'Modhrain, S., Essl, G., Brady, A. "PebbleBox" Victoria and Albert Museum, London, Touch Me Exhibition, June 16-August 29, 2005. Curators: Hugh Aldersey-Williams and Lauren Parker.

CONCERTS, PUBLIC PERFORMANCES

1. "The Final Class Concert", Stamps Auditorium, University of Michigan, April 18, 2015 8pm, 12 new pieces, written and performed by students of the course "Mobile Phones as Musical Instruments".
2. "Arme Arirang" by Mary Simoni, NIME Concert, Seoul, South Korea, May 30, 2013. Performed laptop on original piece written by Mary Simoni for Carinet and Laptop.
3. "The Final Class Concert", Stamps Auditorium, University of Michigan, April 19, 2013 8pm, 8 new pieces, written and performed by students of the course "Mobile Phones as Musical Instruments".
4. "The Final Class Concert", Stamps Auditorium, University of Michigan, April 21, 2011 8pm. New 6 pieces, written and performed by students of the course "Mobile Phones as Musical Instruments".
5. "The Final Class Concert", McIntosh Theater, University of Michigan, December 10, 2010. New 6 pieces, written and performed by students of the course "Mobile Phones as Musical Instruments".
6. "The Final Class Concert", McIntosh Theater, University of Michigan, April 21, 2010. New 6 pieces, written and performed by students of the course "Mobile Phones as Musical Instruments".
7. "The Questions that Tempt the Sleeper", Video Studio, Duderstadt, November 5, 2010, 1 piece, performed by actors and members of the Michigan Mobile Phone Ensemble, PAT-25 Anniversary ONCE/More.
8. "MoPho @ The PAT Showcase", Britton Recital Hall, University of Michigan, March 26, 2010. 1 piece, performed by members of the Michigan Mobile Phone Ensemble.
9. "MoPho @ The Groove", Michigan Theater, Ann Arbor, December 11, 2009. 1 piece, performed by members of The Groove. Guest performance as part of the annual concert of the percussion ensemble The Groove.
10. "The Premiere Final Projects Concert", Britton Recital Hall, University of Michigan, December 9, 2009. 6 pieces, written and performed by students of the course "Building a Mobile Phone Orchestra".
11. "MoPho @ Seamus Regional Concert", McIntosh Theatre, University of Michigan, November 14, 2009. 1 piece written for and performed by commodity mobile devices. Orchestra members are faculty and students of the Performing Arts Technology program at the University of Michigan.
12. "Goodbye MoPho", T-Labs, Auditorium 3, June 31, 2009. 4 pieces. Performance for T-Labs members and invited guests only.
13. "MoPhO - A Suite for Mobile Phone Orchestra" @ ICMC'08, Belfast, UK, August 27, 2008. 4 pieces written for and performed by commodity mobile phones. Orchestra members are faculty and students of CCRMA, HUT and TU-Berlin, as well as select invited colleagues from the scientific community.

14. “MoPho”, @ Lange Nacht der Wissenschaften, Wissenschaftsforum, AudiMax, TU-Berlin, June 13, 2009. 4 pieces written for and performed by commodity mobile phones. Orchestra members are research scientists and students of T-Labs, TU-Berlin, FH-Potsdam.
15. “MoPho on Top” @ Lange Nacht der Wissenschaften, SkyBar, T-Labs, June 13, 2009. 4 pieces. Closing events for T-Labs.
16. “MoPho & SLOrK” @ MacWorld, San Francisco, USA, January 9, 2009. 1 piece. Orchestra members are faculty and students of CCRMA and TU-Berlin.
17. “MoPhO - A Suite for Mobile Phone Orchestra” @ NIME’08, Genova, Italy, June 7, 2008. 4 pieces written for and performed by commodity mobile phones. Orchestra members are invited member of the NIME community.
18. “Mobile Phone Orchestra of CCRMA”, CCRMA stage, Stanford University, Jan. 13, 2008. First public concert. Featured 8 original pieces written for and performed by commodity mobile phones. Orchestra members are faculty and students of CCRMA.

NEWS COVERAGE

BBC, CBS News, ABC News, Wired, NPR, Detroit Free Press, Radio Berlin-Brandenburg (RBB), West-Deutscher Rundfunk (WDR), Globo TV Brazil

INVITED PRESENTATIONS, TALKS, GUEST LECTURES, PANELS

- University of Wisconsin-Milwaukee**, Colloquium, “Mathematics of Musical Sound Synthesis”
February 1, 2019
- University of Wisconsin-Milwaukee**, Invited Colloquium, “Physical Modeling of Sound – From Structure-Preservation to Inaudible Sources”
March 23, 2015
- University of Michigan**, Art Enterprise Winter Lecture Series, “The Digital Landscape: Music Meets the 21st Century”
February 11, 2015
- University of Wisconsin, Milwaukee**, Talk, “Mobile Live Art and Music Performance”
October 17, 2013
- LAC@IEM, TU-Graz**, Workshop, Mobile Music Instrument Design using urMus May 8, 2013
- SLEO, Louisiana State University**, Workshop, Mobile Music Instrument Design using urMus
April 15, 2012
- NIME, Oslo, Norway**, Workshop, Designing Mobile Instruments and Performances in urMus
May 28, 2011
- Northwestern**, Midwest Music Information Retrieval Gathering, Talk
June 24, 2011
- School of the Art Institute Chicago**, Arist-In-Residence, Guest Lecture and Seminar Talk
March 2-4, 2011
- University of Wollongong**, Workshop "Programming the Mobile Phone for Music" June 20, 2010
- HarvestWorks, NYC**, Workshop "Programming the Mobile Phone for Music" June 8, 2010
- Helsinki University of Technology**, Seminar Talk "Mobile Phones as Musical Instruments"

May 18, 2010

GeorgiaTech, Invited Talk "Designing an environment to create mobile music instrument"

April 14, 2010

CHI 2010, Panel Moderator, C. Burns, R. Dannenberg, S. Jorda, C. Latulipe "Performance Panel I"

April 13, 2010

TEDxUofM, Invited Live Demonstration, "Mobile Phones as Musical Instruments" April 10, 2010

Oberlin College, Two Invited Seminar Talks on Mobile Music Performance February 22, 2010

University of Victoria, Seminar Talk "Mobile Phones as Musical Instruments"

October , 2009

Siggraph 2009, Organiser and Moderator, Panel Discussion, Paradiso, J., Jorda, S., Essl, G. "The Visual in New Musical Instruments"

August, 2009

Stanford University, Invited Workshop, "Mobile Music Making" /w J. Seppänen (Nokia) 3 days

November 2007

Stanford University, Invited Guest Lectures, "Mobile Music Making – History and Prospects" 1 hour and "Why are 2-D waves more tricky than 1-D?" 1 hour

November 2007

FH Potsdam, Invited Guest Lecture, "Designing Interfaces for Musical Expression" 3 hours

November 2006

Re/Act 2005, Heidelberg, Invited Plenary Talk, "Interactions with a Touch of Sound" 1 hours.

December 2005

Re/Act 2005, Heidelberg, Panel Discussion, Angeseleva, J., Debatty, R., Essl, G., //Fur//, Nehls, H. "Panel Discussion – Tangible Interactions"

November, 2005

UdK Berlin, Invited Guest Lecture, "Scientific Writing"

November, 2005

McGill University, Invited Guest Lecture, "Introduction to Physical Modeling of Musical Instruments", 1 hour.

McGill, Invited Colloquium, "Interacting with Physical Models and New Musical Instruments"

March 2005

TU Munich, Invited Presentation, „Struktur und numerische Effizienz der Wellengleichung“

February 2005

University of Verona, Invited Lecture Series,

September 2004

"Geometry and Topology of Wave Phenomena", 6 hours.

University of Verona, Invited Talk, "Topological Ideas in Sound Synthesis" September 2004

Uppsala University, Invited Lecture, "Visualising Time-Varying Data", 30 minutes. June 2004

Inria, Sophia-Antipolis, Invited Talk, "Musical Instruments are Nice Rooms in Flatland"

March 2004

University of Performing Arts Graz, Invited Talk, "Echtzeitsynthese durch Physical Modelling"

June 2003

Simon Fraser University, Invited Colloquium, "Real Time Synthesis using Propagation Modeling"

May 2003

McGill University, Invited Guest Lecture, “Introduction to Design & Performance of Computer-based Musical Instruments”, 1 hour.

McGill University, Invited Colloquium, “The Sound of Banded Waveguides” April 2003

University of Virginia, Invited Guest Lecture, “Sound in the Making”, 1 hour. November 2002

Ohio State University, Invited Colloquium, “Real Time Synthesis using Propagation Modeling”
March 2002

University of Chicago, Invited Colloquium, “Real Time Synthesis using Propagation Modeling”
January 2002

ADVISING EXPERIENCE

COMPLETED GRADUATE STUDENTS

Sang Won Lee (Ph.D., University of Michigan, advisor)	2018
Biqiao Zhang (Ph.D., University of Michigan, co-Advisor)	2018
James Juett (Ph.D., University of Michigan, advisor)	2016
Qi Yang (Ph.D., University of Michigan, advisor)	2015
Thor Kell (M.A., McGill University, external reader)	2014
Xin Fan (M.A., University of Michigan, advisor)	2013
Alexander Opperman (Diploma Engineer, TU-Berlin, co-advisor)	2012
Alexander Kuhn (Ph.D. University of Michigan, committee member)	2012
Patrick O’Keefe (M.A., University of Michigan, advisor)	2012
François Germain (M.A., McGill University, external reader)	2011
Devin Kerr (M.A., University of Michigan, thesis advisor)	2011
Colin Zyskowski (M.A., University of Michigan, committee member)	2010
Rishi Daftuar (M.A. University of Michigan, committee member)	2010
Ananya Misra, (Ph.D., Princeton University, external reader)	2009
Fabian Hemmert (MFA, FH Potsdam, external reader)	2007
Hyunju Shim (M.Sc., University of Florida)	2003

PH.D. STUDENTS ADVISED

Alexander Müller-Rakow (co-Advisor, TU-Berlin)	2009-
Eric Keylor (co-Advisor, Arizona State University)	2007-2008
Ananya Misra (summer internship, Princeton University)	Summer 2007
Jeff Magnusson, first year. (University of Florida)	2002-2003
Liam Mayron, first year.	
Arturo Camacho, second year.	

TEACHING EXPERIENCE

Assistant Professor at University of Michigan

Introduction to Human-Computer Interaction Research Spring 14, Fall 15

Graduate course in HCI research methodology and literature. Includes a research project requiring the design of a user study and appropriate analysis. Weekly reading of at least 4 seminal papers in the field with focus on recent advances. (EECS598-003)

Building a Mobile Phone Orchestra/Mobile Phones as Musical Instruments Fall 2009/10, Spring 2011/13

Advanced undergraduates and graduates learning how to build up a mobile phone ensemble from scratch. (EECS 598-001, EECS 498-007, PAT 461-001, PAT 561-001, PAT 511-001)

Digital Sound Synthesis Spring 2012

Undergraduate course on the foundations of digital sound synthesis for students in performing arts technology.

Acoustics and Psychoacoustics Spring 2010

Undergraduate course on introductory acoustics and psychoacoustics for students in performing arts technology.

Programming and Introductory Data Structures Fall 2011/12

Undergraduate course on programming (C++) and introductory data structures, 150 students in section, 450 total.

Lecturer at Technical University of Berlin

Advanced Topics in Human Computer Interaction, co-taught with Rohs, M. Spring 2008, 2009

Seminar for advanced undergraduates and graduates reading current topical research articles in Human-Computer Interactions.

Mobile HCI, co-taught with Rohs, M. Fall 2007, 2009

Undergraduate course and lab discussion all aspects of mobile device interaction and design, combined with hands on development and programming in J2ME and Symbian.

Human Computer Interactions, co-taught with Rohs, M., Raake, A. and Spors, S. Spring 2007

Introduces advanced undergraduate and beginning graduate students to current trends in human computer interaction research.

Virtual and Augmented Reality, co-taught with Rohs, M., Raake, A. and Spors, S. Spring 2006

Introduces advanced undergraduate and beginning graduate students to current trends in virtual and augmented reality research.

Assistant Professor at University of Florida

CIS 4930/6930: *Computing for Sound Processing*. Spring 2003

Teaches undergraduate seniors and graduate students the current state of sound synthesis methods from an integrated computer science and art perspective.

CIS 4930/6930: *Digital Production Studio III*. Fall 2002

Undergraduate seniors and graduate students learn digital arts & sciences in a collaborative and studio-based learning environment. Co-taught with a Fine Arts faculty.

Assistant in Instruction for undergraduate computer science courses at Princeton University:

COS323: *Computing for Physical and Social Sciences*. Prof. Kenneth Steiglitz. Fall 1999

Teaching two 1-hour classes per week, grading of lab exercises and student interaction for projects.

COS126 *General Computer Science*. Prof. Adam Finkelstein Spring 1998

Teaching one 1-hour class per week, grading of programming exercises and exams.

COS436 *Human Computer Interface Technology*. Prof. Perry Cook. Fall 1997

Lab supervision, grading of lab assignments, student interaction for projects.

Lab Instructor for undergraduate computer science course at Graz University of Technology:

Programming exercises in Computer Graphics. Institute for Computer Graphics. 1993

Lab supervision, teaching 1-hour seminars for 4 programming projects.

PROFESSIONAL ACTIVITIES AND SERVICE

BOARD MEMBERSHIPS, SOCIETY OFFICERSHIPS

Research Coordinator, Board of the International Computer Music Association (ICMA) 2007-2013

New Interfaces for Musical Expression (NIME) steering committee member 2012-2014

New Interfaces for Musical Expression (NIME) advisory board member 2014-present

CONFERENCE ORGANIZATION

Conference Chair, New Interfaces for Musical Expression (NIME'12), Ann Arbor, Michigan 2012

Paper Chair, Organizing Committee, International Computer Music Conference, 2006

New Orleans, Louisiana. Joint with Ichiro Fujinaga. General Chair: Tae Hong Park, Tulane University.

Paper Chair, Organizing Committee, International Computer Music Conference, 2004

Miami, Florida. Joint with George Tzanetakis. General Chair: Colby Leider, University of Miami.

CONFERENCE PAPER COMMITTEES

NIME, ICMC, DaFX, ISMIR, MovableVis, MobileHCI, IWS, HAID, PQS, IEEE-GIE, CMMR, SMC

ADDITIONAL CONFERENCE REVIEWS

SMC, TEI, CHI, Siggraph, Siggraph Asia, Waspaa, ICAD

BOOK PROPOSAL REVIEWS

Springer Verlag, Wiley

REVIEWER FOR JOURNAL SUBMISSIONS

Computer Music Journal, Journal of New Music Research, IEEE Transactions in Audio and Speech Signal Processing, Virtual Reality Journal, Springer, IEEE Multimedia, Communications of the ACM, Presence, IEEE Computer Graphics and Applications

ART, SCIENCE & ENGINEERING INTEGRATION ADVOCACY

NSF/NEA SEAD Initiative contributor 2012-present
Organizing committee, “The Role of Art-Making and the Arts in the Research University” (Michigan Meeting) 2011
Faculty advisory committee, Art and Engineering Integration, University of Michigan 2009-2013

GRANT REVIEWS

National Science Foundation Review Panelist (twice)
Canadian Innovation Fund
Hongkong Research Grants Council External Reviewer
Deutsche Forschungsgesellschaft (German Federal Funding Agency)
Swiss National Science Foundation Reviewer (twice)
External reviews for University internal grants in the US and Canada.

UNIVERSITY AND DEPARTMENTAL SERVICE

University of Michigan 2009
Faculty search, Undergraduate education, undergraduate advising, Mobile Technology committee, Student Mobile Programming Club advising
Deutsche Telekom Labs, TU-Berlin
Co-Organiser, Usability Colloquium, weekly invited speaker series. 2005-2009
University of Florida: Computer & Information Science & Engineering
CISE Digital Arts & Science Program Development Committee Member 2002-2003
Degree program and curriculum development of interdisciplinary degree in Computer & Information Science & Engineering and Fine Arts.
Faculty Search & Screening Committee for Digital Arts & Science 2002-2003
Hiring for faculty in the field of Digital Arts & Science.

GRANT ACTIVITIES

University of Michigan, M-Cubed Initiative	2015
Support for cross-disciplinary research into intelligent collaborative programming	\$20,000
Gilbert Whitaker Fund for the Improvement of Teaching	2013
Support of development of web-based quiz taking and grading web-site	\$10,000
University of Michigan, M-Cubed Initiative	2012
Support for cross-disciplinary research into fabric dynamic and acoustic	\$20,000
General Electric	Spring 2011
Sponsored research collaboration	\$105,322
Google	Spring 2011
Hardware gift of GoogleTV units	\$600
University of Michigan, College of Engineering, Curriculum Innovation	Fall 2010
Support for Course Mobile Phones as Musical Instruments	\$3,330
Apple	Fall 2009
Support for Mobile Phone Orchestra Course	\$2,827
Enactive Network of Excellence, FP6-IST-1-002114, European Union	
Enactive Days, Bilbao, Spain	November 23-26, 2004
WP4a Enactive Meeting, Lund, Sweden	June 22, 2004
First Enactive Days, Villard de Lans, France	March 2-5, 2004

AWARDS AND HONORS

Guggenheim Fellowship	2019
ICMI 2016 Honorable Mention Award winner	2016
University of Michigan Provost Teaching Innovation Prize Finalist	2015
MobileHCI 2007 Best Paper Award Silver Medal winner	2007
Postgraduate Fellowship, Austrian Federal Ministry for Education, Science and Culture	1997-1999
European IT Grand Prize Winner for HyperWave web-server technology	1997
BYTE's Best of CeBit'97 "Best of Show"-Award for HyperWave web-server technology	1997
BYTE's Best of Cebit'97 "Best Internet Product"-Award for HyperWave server technology	1997

SOCIETY MEMBERSHIPS

Member of IEEE	1993-present
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Member of the Acoustical Society of American (ASA)	1998-present
Member of the International Computer Music Association (ICMA)	1998-present
Member of the American Mathematical Society (AMS)	2005-present
Member of the Association for Computing Machinery (ACM)	2009-present