EXHIBIT 7

2023-05-03 PLAINTIFF'S REPLY CLAIM CONSTRUCTION BRIEF

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

EIGHT KHZ, LLC, Plaintiff, v. **META PLATFORMS, INC.; META PLATFORMS TECHNOLOGIES, LLC; TWISTED PIXEL GAMES, LLC,** Defendants.	Civil Action No. 6:22-cv-575-ADA-DTG JURY TRIAL DEMANDED

DECLARATION OF DURAND R. BEGAULT, PH.D
IN SUPPORT OF PLAINTIFF'S REPLY CLAIM CONSTRUCTION BRIEF

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I, Durand R. Begault, declare as follows:

I. INTRODUCTION

1. I am currently employed as Director, Audio Forensic Center, a wholly-owned subsidiary of Charles M. Salter Associates, an acoustical consulting firm located in San Francisco, California. I am also currently employed as a research scientist in the Human Systems Integration Division of NASA Ames Research Center, Moffett Field, California.
2. I have been retained as an independent expert consultant in the proceeding by the plaintiff Eight kHz LLC ("8kHz").
3. I understand that this proceeding involves U.S. Patent Nos. 9,226,090, 9,282,196, 9,674,628, 10,368,179, 10,448,184, 10,798,509, 10,917,737, 11,172,316, and 11,290,836, referred to by 8kHz as the "Asserted Patents." I will refer to these patents individually using common shorthand. I have been asked to consider the proposed claim constructions of the parties in this proceeding.

II. QUALIFICATIONS

4. I am the director for Audio Forensic Center, where I perform investigations with regards to acoustics; video and audio evidence recordings; audio patent infringement analysis; acoustic measurement; speech intelligibility and warning signal audibility; human factors and psychoacoustics; musicology and copyright infringement; voice comparison; and recorded gunshot analysis. I also serve as a research scientist for NASA Ames Research Center specializing in psychoacoustics, human factors, multimodal systems, and communications engineering research, applied to aerospace safety, virtual reality, and speech communications. I obtained my Ph.D. in 1987 from the University of California, San Diego with a focus in Computer Audio, and was made

a fellow of the Audio Engineering Society in 2002 "for contributions to understanding of spatial hearing".

5. For over 30 years I have conducted analyses and testified in cases for attorneys, law enforcement agencies, and corporate internal investigations. I have qualified as an expert in numerous State and U.S. Federal Courts; the United States International Trade Commission (USITC); and courts in Canada and international arbitration panels. I have over 100 publications in the area of acoustics, psychoacoustics and forensic audio, and have testified over 85 times in court or deposition, including in the area of digital audio recording authentication and metadata (e.g., the International Centre for Settlement of Investment Disputes, The World Bank, Washington, D.C.; California Superior Courts; United States District Court). I have served as an adjunct faculty member of the Sound Recording Department at McGill University in Montreal, Canada, and have received a Fellowship Award from the Audio Engineering Society. I have also served on numerous journal review boards, technical committees and Ph.D. dissertation committees in the area of acoustics and audio engineering. Attached hereto and incorporated by reference as Exhibit "A" is a true and correct copy of my CV.

III. SUMMARY OF OPINIONS

6. My opinions in this Declaration are based on my review of the Asserted Patents, and their prosecution history before the U.S. Patent and Trademark Office. In addition, I draw upon my experience and knowledge of acoustical engineering, psychoacoustics, signal processing, human-machine interaction, and virtual reality systems.

IV. RELEVANT LEVEL OF ORDINARY SKILL IN THE ART

7. In my opinion, as relates to U.S. Patent Nos. 9,226,090, 9,282,196, 9,674,628, 10,368,179, 10,448,184, 10,798,509, 10,917,737, 11,172,316, and 11,290,836 (the "Patents-in-Suit"), a person of ordinary skill in the relevant art (a PHOSITA) would have several years of academic and/or professional experience in a technical field relevant to digital audio signal processing, such as electrical engineering, computer engineering, or computer science; and a familiarity with relevant literature and concepts concerning virtual "3D" audio processing, which were widely available at the time of disclosure (2014).

V. ANALYSIS OF CHALLENGED CLAIM TERMS

A. The "Call" Terms

8. In my opinion, a PHOSITA, in analyzing the patents' specifications and claims, would reasonably conclude that the three phrases "electronic call," "electronic phone call," and "telephone call" are equivalent and that Plaintiff's proposed construction "voice communication over an electronic network between at least two parties" is correct. These three terms are used interchangeably in the specifications to describe the use of any type of medium to enable communication between two or more locations. Likewise, the specifications demonstrate that these calls involve voice communications between two or more people. Finally, the calls always take place over some type of electronic network, for example the internet.

B. The "Away From and Proximate To" Term

9. In my opinion, a PHOSITA, analyzing the patents' specifications and claims, would reasonably conclude that the Plaintiff's proposed construction for "a distance from" is correct. In the context of spatial audio, it is well understood by a PHOSITA that the

phrase "away from" describes a sound that is "externalized," that is, localized at a distance "outside-the-head," as distinct from a sound that is located "inside of" the head of a listener. The distinction is important because the technique for creating externalized, outside-the-head localized sounds is enabled by using 3D audio (binaural) processing, whereas non-binaurally processed headphone sound appears inside of a listener's head. The problem of inside-the-head localization is well known in the psychoacoustic literature.

10. The phrase "proximate to" clearly modifies the extent of the distance at which an externalized (outside-the-head) sound is intended to appear. Two persons having a conversation at a normal sound level within the same room are *proximate* to one another, as opposed to communication between two persons over a long distance, say 20 or more feet, which might require a raised voice or shouting. There are a plethora of examples in the specifications where "proximate to" indicates two people having a conversation in the same room.

11. In other words, a PHOSITA would recognize that the term "*away from and proximate to*" describes a spatial acoustic image for a listener of communicating with an externalized ("*away from*") talker at a normal ("*proximate to*") conversational distance.

C. The "Binaural Voice" Term

12. In my opinion, the meanings of "binaural" and "voice" have well-understood meanings to a PHOSITA. The word "binaural" simply means "heard with two ears." The word "voice" is commonly understood to indicate a multitude of different sound types, on a spectrum ranging from *actual speech* to *synthetic speech* to *speech-like sounds*, or combinations of speech and non-speech sounds, and therefore includes a representation of vocal sound waves. Further, Defendants' proposed construction is too limiting

because it restricts "voice" to "vocal sound waves" which plainly conflicts with the specification. Additionally, a PHOSITA, in analyzing the patents' specifications and claims, would reasonably understand that a "binaural voice" would not be limited to spoken words. There are also vocal sounds that are not in fact speech, such as a whistling sound or a "shhh" sound for "quiet" that are used in communication. A PHOSITA would recognize the wide range of possibilities for the meaning of a "voice" from fields such as music sound synthesis, where a voice refers to the timbre or continuous stream of an auditory element, such as the tones produced by one of multiple sound oscillators. Non-speech voices can come from animals, including birds that can mimic human speech. The increasing prevalence of speech synthesis and recognition systems where persons can have a two-way communication with a computer further illuminates the non-vocal aspects of "voice." All of these types of sounds can be processed binaurally.

D. The "Head Related Transfer Functions" / "HRTFs" Term

13. In my opinion, a PHOSITA, in analyzing the patents' specifications and claims, would understand the term "head related transfer functions" / "HRTFs" recited in claims of the '628, '737, '179, '184, and '836 Patents, to mean *the transformations responsible for modifying the spectrum and time of arrival of sound at each of a listener's ears*, for a given sound source at a position relative to the listener. The defendant's understanding of the construction is incorrect because:

(1) Many factors other than the HRTF are responsible for "how sound reaches the ears of a listener", such as room acoustics, head movement, intensity of the sound source, etc.

(2) HRTFs are measured in terms of azimuth and elevation orientation relative to a listener (two variables). The measured HRTF does not change as a function of distance beyond an acoustic wavelength. In practice, the variable of distance is usually implemented in terms of gain adjustment to the measured (two variable) HRTF, in order to mimic the attenuation of sound with distance.

(3) An HRTF is *not* a specification by a user of a location (a SLP), it is the means by which a location is rendered by signal processing. When a new SLP requires a change in location, the specification can change in terms of one or more of the spatial variables (azimuth, elevation, or distance). In such a case, a new HRTF pair would be required to render a change in azimuth and/or elevation. A single spatial variable can be changed in an SLP specification. To effect that specification, a change in the measured HRTFs may be required. See Table I for exemplary differences between SLP specifications and rendering methods.

TABLE I.

SLP SPECIFCATION	RENDERING METHOD
Change in distance only	Same HRTFs, gain adjustment (distance)
Change in Azimuth only	Different HRTFs, no change in gain (distance)
Change in Elevation only	Different HRTFs, no change in gain (distance)

E. The "Digital Signal Processor" Term

14. In my opinion, a PHOSITA, in analyzing the patents' specifications and claims, would reasonably conclude that the Plaintiff's proposed construction "specialized processor or software optimized for transforming an input signal at its output" is correct. In my

experience, a DSP is typically an integrated circuit that has been optimized to transform an input signal at its output. In view of the patents in this case, the DSP's transformation involves "HRTF filtering" (convolution) of an acoustic input, and rendering at its output a binaural signal having the spectral and time modifications caused by a binaural HRTF, so that a listener with headphones can localize sound to a virtual direction. Although specialized DSP chip processors are primarily used, a DSP can also be implemented in software within the native CPU. For a PHOSITA, the primary purpose of using a DSP is for specialized processing that it is capable of. Further, a PHOSITA would find the stated advantages of "power performance" and "efficiency" (as suggested by the Defendant) to be unnecessary conditions.

F. The "Processor" Terms

15. In my opinion, reading the processor claims of the '090, '196, '628, '328, '767, '836, '179, and '184 Patents in light of the specifications that provide exemplars such as a CPU, or an application-specific integrated circuit (ASIC), to provide a PHOSITA with sufficiently definite structure well beyond a generic black box (an unspecified, undefined processor). See '090 at 41:20-22; '196 at 41:20-22; '628 at 42:6-8; '737 at 58:9-40; '836 at 28:33-64; '179 at 45:1-28; '184 at 45:1-4. Furthermore, the recited functions help to further define the structure. For example, all of these claims recite audio processing functions that are not foreign to a PHOSITA. See '090 at cl. 15 ("adjust the binaural voice"); '196 at cl. 15 ("provide binaural sound"); '196 at cl. 19 ("change attenuation and reverberation of the binaural sound"); '628 at cl. 9 ("processing . . . a voice . . . with head related transfer functions"); '328 at cl. 16 ("processing . . . a voice . . . with head related transfer functions"); '767 at cls. 1, 14, 15, 16 ("processing . . . with head related transfer function to generate the binaural

sound"); '836 at cls. 8, 10 ("process sound . . . to generate binaural sound"); '836 at cls. 8, 10 ("[a DSP] that processes the sound . . . with head-related transfer functions"); '179 at cl. 14, '184 at cl. 14 ("processing, by a [DSP], sound with HRTFs to generate binaural sound"). All of these functional recitations point a PHOSITA to known audio DSP structures within the art, including ASICs for audio processing, systems on a chip that have DSP elements or other audio processing, and common industry programming techniques or software libraries for audio processing, which are all capable of performing the recited functions.

16. Convolution is the main algorithm required to perform the claimed processes of applying an HRTF, which is a well-known mathematical operation to a PHOSITA. The application of a transfer function to a sound, e.g., using a convolution operation, instructs a PHOSITA on how to process sound as claimed. These processes are described in literature commonly available at the disclosure date (2014).

VI. CONCLUSION

17. I declare that all statements made herein of my knowledge are true, that all statements made on information and belief are believed to be true, and that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code. I reserve the right to modify my opinions as additional information becomes available to me.

Dated: May 3, 2023

By: _____
Durand R. Begault, Ph.D.

EXHIBIT A

Durand R. Begault, Ph.D.
Curriculum Vitae

AUDIO FORENSIC CENTER
AUDIO • VIDEO • DIGITAL MEDIA

EXPERT TESTIMONY 1995 – 2023

2023 **Pacheco v. City of Stockton et al.** (US DC, Eastern District of California) (deposition) 20-cv-01404-TLN-KJN

2022 **Ethiopian Airlines Flight ET 302 Crash** (US DC, Northern District of Illinois, Eastern Division) (deposition) 1:19-cv-02170
Torres v. Los Angeles Unified School District, et al. (Los Angeles County, Superior Court of California) (deposition) BC701873
McGauh et al. v. Naudet et al. (Circuit Court, Jackson County, Missouri) (deposition) 2016-CV14902
Clark v. City of Sacramento et al. (US DC, Central District of California) (deposition) 2:19-cv-00171-JAM-EFB

2021 **Novak v. City of Madera et al.** (US DC, Eastern District of California) (deposition) 1:20-CV00301-DAD-SKO
Clear One Inc. v. Shure Acquisition Holdings (US Patent Trial & Appeal Board) (third deposition) IPR 2020-00079
Korzekwa v. Encore (San Francisco County, Superior Court of California) (deposition) CGC-18-570071

2020 **QC Manufacturing v. Solatube International (**JAMS Arbitration, Los Angeles, California) 1210037272
Gross v. Towfiq (Orange County, Superior Court of California) 30-2020-01165114-CU-NP-CJC
Caldwell v. City and County of San Francisco (US DC, Northern District of California) (deposition) 12-cv-1892-DMR
Lefiti v. Allied Universal Security Services (San Francisco County, Superior Court of California) (deposition) CGC-17-561236
Cascade investments NV v. Republic of Turkey (ICSID, The World Bank, Washington, D.C.) 19-20107 (ES) (SCM)
Clear One Inc. v. Shure Acquisition Holdings (US Patent Trial & Appeal Board) (second deposition) IPR 2019-00683
Moro v. Lezama (Santa Barbara County, Superior Court of California)
Doe, Borrayo v. Napa Valley Unified School District (Napa County, Superior Court of California) (deposition) 16CV000234

2019 **Watson v. BNSF Railway** (Pawnee County, District Court, State of Oklahoma) CJ-2015-00028
Clear One Inc. v. Shure Acquisition Holdings (US Patent Trial & Appeal Board) (deposition) IPR 2019-00683
Economus v. City & County of San Francisco (US DC, Northern District of California) (deposition) ND 4:18-CV-01071

2018 **Irwin v. County of Sacramento** (Sacramento County, Superior Court of California) (deposition) 34-2017-00210093
Ernesto Flores v. County of San Bernardino (US DC, Central District of California) (deposition) 5:2015-cv-0220
Sahar v. Shefayee (Contra Costa County, Superior Court of California) MSC20-00706
People v. J. Grant and C. Warren (Santa Clara County, Superior Court of California) C1759030
Maharrey v. County of Kern (US DC, Eastern District of California) (deposition) BCV-15-101291

2017 **Alvarez, et al. v. Fresno Community Regional Medical Center** (deposition) 13-CEC-G03906
McGowan; Blanco v. County of Kern et al. (US DC, Eastern District of California) (deposition) ED 1:15-cv-01365-KJM-SKO
People v. Jereh Lubrin et al. (Santa Clara County, Superior Court of California) C1519377
Taheri v. Four Seasons Hotels Ltd. et al. (Second Circuit Court, Maui, Hawaii) HI 1:15-cv-00024

2016 **People v. Joseph Nunn** (Placer County, Superior Court of California) 62-125182
Krapivkin v. L. B. Property Management (Los Angeles County, Superior Court of California) LC096466
ABS Entertainment v. CBS Corporation (deposition) CD 2:15-CV-06257-PA-AGR
Dolan v. Troy (deposition) (Marin County, Superior Court of California) CIV 1205771
Marriage Preston v. Preston (Weld County, District Court, Colorado)

2015 **Olivero v. Yellow Cab** (San Francisco County, Superior Court of California) CGC 14 537850
People v. Foreman (Marin County, Superior Court of California) SC188751A
Capitol Oil v. Tanin, et al. (Sacramento County, Superior Court of California) (deposition)

2014 **Frary v. County of Marin** (US DC, Northern District of California) (deposition) C12 3928 MEJ
Sterling v. City of Antioch (US DC, Northern District of California) (deposition) 13-cv-00812-NC
Johnson v. Bay Area Rapid Transit (US DC, Northern District of California) ND C09-00901 EMC
Hale v. Atlantic Recording Corporation (deposition)
People v. Bernstine (Kelly-Frye Hearing re "Shot Spotter") Contra Costa County, Superior Court of California) CIVMSN13-0781
Burkinshaw v. Box Elder County (US DC, D. Utah) (deposition) 1:13CV00079-CW

2013 **Rosenblatt v. Town of Hillsborough** (deposition) ND C12-5210 LB
McConville v. Aspen Transportation et al. (deposition) RIC1101758
Duenez v. City of Manteca (deposition) 2:11-cv-01820-LKK-KJN
Connor v. City of Porterville (Tulare County, Superior Court of California) 10-239413

2012 **Crown v. Levin** (Court of Queen's Bench, Superior Trial Court, Province of Alberta)
Hayley v. C. W. Brower, Inc. (Stanislaus County, Superior Court of California)
Faidi v. Faidi (Marin County, Superior Court of California) FL1100264
Hernandez v. City of Napa et al. (US DC, Northern District of California) C–09–02782 EDL

EXPERT TESTIMONY 1995 – 2022 (CONT.)

2011 **State of New Mexico v. Shirley** (Fifth Judicial Court, County of Lea, New Mexico) 142 N.M. 765
Enriquez v. City of Fresno (US DC, Eastern District of California) 1:10-CV-00581-AWI-DLB
Singh v. City of Gilroy (deposition) 5:09-cv-00740-EJD
Mehdavi v. City of Fremont (deposition)
People v. Kopack (San Luis Obispo County, Superior Court of California)

2010 **Nokia v. Apple Computer, Inc.** (US International Trade Commission, Washington, DC) 1:09-cv-00791
Richardson v. City of Antioch, et al. (US DC, Northern District of California) (deposition) 3:08-cv-03470
Jones v. County of Del Norte et al. (US DC, Northern District of California) (deposition) 08-cv-03222 CW
Walston v. Davis (Los Angeles County, Superior Court of California) (deposition)

2009 **State of Texas v. Lewis** (Brazoria County DC, Texas) 01-10-00762-CR
Libananco Holdings Co. Ltd. v. The Republic of Turkey (ICSID, The World Bank, Washington, D.C.)
Rago et al. v. Federal Signal Corporation (deposition)
People v. Mark Corella (Alameda County, Superior Court of California)

2008 **Green v. Fire Insurance Exchange** Alameda County, Superior Court of California) (deposition) HG04151663
Taylor v. Medimpact (deposition)
Bose Corporation v. Phitek, et al. (deposition) (International Trade Commission, Washington, D.C.)
Euparadorn v. Dunning (deposition)
Johnson v. Lumenis Corporation (deposition)
Del Barba v. AMR (deposition)

2007 **People v. McClish** (Santa Cruz County, Superior Court of California)
Schnapf v. Shaugnessy (Marin County, Superior Court of California)

2006 **Williams v. Patton** (deposition)
People v. Hessabi (Solano County, Superior Court of California)
Screen Actors Guild v. NBC Studios, Inc. (arbitration)
Bay Ship and Yacht vs. McKinley, et al. (deposition)
Bowoto v. Chevron (deposition) (US DC, Northern District of California)

2005 **State of Nevada v. Harkins** (Judicial Court, Washoe County, State of Nevada-)

2004 **People v. Davis** (Marin County, Superior Court of California)
Zarzuela v. Zarzuela (Orange County, Superior Court of California)
Cavette v. Johnson (Los Angeles County, Superior Court of California)

2003 **Pacific American Securities v. McGee** (arbitration)
People v. Gantz (San Francisco County, Superior Court of California)

2002 **Clanton v. Carr** (Humboldt County, Superior Court of California) (deposition)

1998 **Skallerud v. City of Pinole** (US DC, Northern District of California)
Aureal Corporation v. Creative Technology Ltd. (deposition)

1997 **Willis v. County of El Dorado** (deposition)

1995 **Focal Point v. Advanced Gravis** (arbitration)

* * *

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DEGREES

University of California, San Diego, Ph.D. 1987 Computer Audio (Music -Theoretical Studies). Emphases in psychoacoustics, digital signal processing, computer audio, acoustic engineering, speech sciences, music theory. Dissertation: *Control of Auditory Distance.* Research and post-doc work conducted at the Computer Audio Research Laboratory, U. C. San Diego.

Mills College, Oakland, California, M.F.A. 1981 Electronic Music & Recording Media

University of California, Santa Cruz, B.A. ***cum laude*** 1979 Music & Heuristic Models

Continuing education in audio forensics with Fausto Poza (Poza Consulting Services); video forensic training at Ocean Systems.

CONSULTING POSITIONS

1996-current Director, **Audio Forensic Center**, **Charles M. Salter Associates**, San Francisco, CA

Expert consultant in the areas of acoustics; video and audio evidence recordings; audio patent infringement analysis; acoustic measurement; speech intelligibility and warning signal audibility; human factors and psychoacoustics; musicology and copyright infringement; voice comparison; and recorded gunshot analysis. Authentication, speech enhancement, signal identification and analysis of audio-video recordings in legal cases. Consultation in over 800 audio-video and acoustic forensic cases since 1987. Expert testimony over eighty times in court or depositions, in U.S. Federal and State courts including the United States International Trade Commission (USITC), and courts in Canada and International arbitration panels (World Bank-ICSID).

RESEARCH POSITIONS

1988-current **NASA Ames Research Center** Research Scientist, Human Systems Integration Division

Research scientist specializing in psychoacoustics, human factors, multimodal systems, and communications engineering research, applied to aerospace safety, virtual reality, and speech communications. Activities have included: Design of experiments concerned with spatial hearing, speech intelligibility, human performance, acoustic analysis and simulation, cognitive load, and multimodal interaction. Development and patenting of advanced technologies for communications and warning systems, virtual acoustic technologies. Participant in writing NASA standards (NASA-STD-3001), recommendations and publications. Cross-laboratory team organization and cooperative agreements with industry and academia (Bang & Olufsen, McGill University, Alegent Health, U.C. San Diego). Collaboration and support for NASA programs include the Human Research Program for human factors of space habitats; the Airspace Operations and Safety Program (aeronautics directorate); JSC's Crew and Thermal Systems Division (EVA communications); Dept. of Homeland Security DNDO (Domestic Nuclear Detection Office); and aviation noise response for the RVLT program (Revolutionary Vertical Lift Technology). Member, Auditory Health and Performance Focus Group, Multilateral Medical Operations Panel (ISS). Expertise in acoustical engineering, acoustic measurement and instrumentation, simulation, human factors and subjective evaluation. Four US patents for audio technologies; over one hundred publications (conference papers, journal papers, book chapters, and books); >4500 citations per Google Scholar.

ACADEMIC POSITIONS

2004-current	**McGill University**, Adjunct Professor, Sound Recording program, Schulich School of Music (lecturer in room acoustics; audio-haptic interaction).
1997-2016	**Ph.D. committee member**, Helsinki University of Technology; U.S. Naval Postgraduate School, Monterey; University of Paris VI; McGill University; University of Melbourne; Northwestern University; Chalmers University of Technology, Goteburg, Sweden; University of Nice.
1996	**San Francisco State University**, Conceptual Design Program: Lecturer, Multimedia Technology.
1995-7	**University of California Santa Cruz Extension**, Department of Science and Technology. Visiting Lecturer, Audio Technology.
1987-8	**San Diego State University,** Lecturer, Computer Music.

HONORS AND AWARDS

Audio Engineering Society **Fellowship Award** for contributions to spatial hearing, 2002
NASA **Ames Honor Award**, contractor category, 1999
Ten NASA **Certificates of Recognition** for Inventive Contributions, 1992-2005
Three NASA **Garner Space Act Awards** for US patents, 1994, 2002
Three NASA **Director's Discretionary Funding** awards 1992, 1997, 2001
NASA Ames Research Center **Nielsen Award** for best basic research proposal, 1992
National Research Council **Post-Doctoral Fellowship**, Ames Research Center, 1988-90
Post-Doctoral Fellowship, U.C.S.D. Computer Audio Research Laboratory, 1987
University of California **Regent's Fellowship**, U.C.S.D., 1981-2

REVIEW BOARDS AND STANDARDS COMMITTEES

Member, Human Subjects Institutional Review Board, NASA Ames Research Center (2012-2014).
Member, Acoustical Society of America Subcommittee on Forensic Acoustics (2011-2014).
Chair, Technical Committee on Audio Forensics, Audio Eng. Soc. (2006-2010).
Associate Technical Editor and Vice-Chair, Publications Committee, Journal of the Audio Engineering Society (2009-2012).
Co-papers chair, semi-annual International Conference on Audio Forensics, sponsored by the Audio Engineering Society (2008-2017).
Chair, Technical Committee on Perception and Subjective Evaluation of Audio Signals (1999-2006), Audio Eng. Soc.; member, Standards Committee, Forensic Audio.
Vice-Chairman (2006, 2010-2015), Technical Committee on Human Factors, Audio Eng. Soc..
Reviewer (guest), Journal of the Human Factors Society, Journal of the Acoustical Society of America, Journal of Experimental Psychology, Int. Journal of Audiology.

PROFESSIONAL SOCIETIES

Acoustical Society of America; Audio Engineering Society; Human Factors and Ergonomics Society; Institute of Noise Control Engineering; International Association for Identification; Society of Forensic Engineers and Scientists; American Musicological Society.

PATENTS

Begault, D. R. (1992). "Head related transfer function pseudo-stereophony". U.S. patent 5,173,944.
Begault, D. R. (1995) "Multi-channel spatialization system for audio signals". U.S. patent 5,438,623.
Begault, D. R. (2008) "Auditory alert systems with enhanced detectability", U.S. Patent 7,346,172.
Begault, D. R., Anderson, M. R., McClain, B. M. and Miller, J. D. "Reconfigurable Auditory-visual Display (2008) U.S. Patent 7,378,963.

BOOK PUBLICATIONS, CHAPTERS IN EDITED BOOKS

Begault, D. R. (1994). *3-D Sound for Virtual Reality and Multimedia.* Cambridge, MA: Academic Press Professional.

Begault, D. R. (1996). *The Sonic CD-ROM for Desktop Audio Production. An Electronic Guide to Producing Computer Audio for Multimedia*. [CD-ROM]. Chestnut Hill, MA: Academic Press Professional.

Ellis, S. R., Begault, D. R., & Wenzel, E. M. (1997). Virtual Environments as Human-Computer Interfaces. In M. Helander (Ed.), Handbook of Human-Computer Interaction. Amsterdam: Elsiver Science Publishers B.V.

Begault, D. R. (1998). Fundamentals of Acoustics. Psychoacoustics and Hearing. Acoustical Measurements. In C. M. Salter (Ed.), *Acoustics. Architecture, Engineering, The Environment.* New York: McGraw-Hill.

Begault, D. R. (1999). 3-D Sound and Auralization. In J. Sendra (Ed.) *Computational* Architectural Acoustics. Southampton, UK: Computational Mechanics Publications.

Begault, D. R. (Ed.). (2004). *Spatial Sound Techniques*. *Part I: Virtual and Binaural Audio Technologies.* New York: Audio Engineering Society.

Begault, D. R., Godfroy, M., and Wenzel, E. M. (2017). Perception of spatial sound. In Roginska, A. and Geluso, P. (ed.s), *Immersive Sound: The Art And Science of Binaural and Multi-Channel Audio*. Burlington, MA: Taylor and Francis.

Begault, D. R. and Sandor, A. (2017). Visual-Aural Alert Design. in Sgobba, T., Kanki, B. G., Clervoy, J. and Sandal, G. (ed.s), *Space Safety and Human Performance.* Amsterdam, NL: Elsevier.

JOURNAL AND CONFERENCE PUBLICATIONS, WORKSHOPS

Begault, D. R. (1986). Spatial Manipulation and Computers. *Ex Tempore 4*(1), 56-88.

Begault, D. R. (1987). *Control of Auditory Distance*. Unpublished Ph.D. dissertation, Music Department, U. C. San Diego. Available via University Microfilms International, Ann Arbor, MI.

Begault, D. R. (1990). The Composition of Auditory Space: Recent Developments. *Leonardo 23* (1), pp. 45-52.

Begault, D. R. & Wenzel, E. M. (1990). Technical Aspects of a Demonstration Tape for Three-Dimensional Auditory Displays. (Technical Memorandum 102286). NASA Ames Research Center.

Begault, D. R. (1991). Preferred sound intensity increase for sensation of half distance. *Perceptual and Motor Skills*, *72*, 1019-1029.

Begault, D. R. (1991). Challenges to the successful implementation of 3-D sound. *Journal of the Audio Engineering Society*, *39* (11), 864-870.

Begault, D. R. (1992). Perceptual effects of synthetic reverberation on three-dimensional audio systems. *Audio Engineering Society 91st Convention* (paper 3212).

Begault, D. R. & Wenzel, E. M. (1991). Headphone Localization of Speech Stimuli. In *Proceedings of the Human Factors Society 35th Convention*, pp. 82-86.

Begault, D. R. (1992). Perceptual effects of synthetic reverberation on three-dimensional audio systems. *Journal of the Audio Engineering Society*, *40*(11), 895-904.

Begault, D. R. & Wenzel, E. M. (1992). Techniques and applications for binaural sound manipulation in human-machine interfaces. *International Journal of Aviation Psychology* *2*(1), 1-22.

Begault, D. R. (1992). The Virtual Reality of 3-D Sound. In L. Jacobson (Eds.), *Cyberarts: Exploring Art and Technology* (pp. 79-87). San Francisco: Miller-Freeman Publications.

Begault, D. R. (1992). Binaural Auralization and Perceptual Veridicality. *Audio Engineering Society 93rd Convention*, *San Francisco, CA* (paper 3421).

Begault, D. R. (1992). Perceptual similarity of measured and synthetic HRTF filtered speech stimuli. *Journal of the Acoustical Society of America*, *92*, 2334.

Begault, D. R. & Wenzel, E. M. (1993). Headphone Localization of Speech. *Human Factors*, *35*, 361-376.

Begault, D. R. (1993). An introduction to 3-D sound for virtual reality. In S. K. Helsel (Ed.), *VR Becomes A Business: Virtual Reality '92 Proceedings.* (pp. 4-15). Westport, CT: Meckler.

Begault, D. R. (1993). Call sign intelligibility improvement using a spatial auditory display: applications to KSC speech communications. *Proceedings of the Space Operations, Applications and Research (SOAR) Conference*, 363-70. NASA Johnson Space Center.

Begault, D. R. (1993). Call sign intelligibility improvement using a spatial auditory display (Technical Memorandum No. 104014). NASA Ames Research Center.

Begault, D. R., & Erbe, T. R. (1993). Multi-channel spatial auditory display for speech communications. *Audio Engineering Society 95th Convention*, Preprint No. 3707 .

Begault, D. R. (1993, October). The Evolution of 3-D Sound. *Mix, 17*, 42-46.

Begault, D. R. (1993). A head-up auditory display for TCAS advisories. *Human Factors*, *35*, 707-717.

Begault, D. R., & Pittman, M. T. (1994). 3-D Audio Versus Head Down TCAS Displays. (Contractor Report No. 177636). Moffett Field, CA: NASA Ames Research Center.

Begault, D. R., & Erbe, T. (1994). Multichannel spatial auditory display for speech communications. *Journal of the Audio Engineering Society*, *42*, 819-826.

Begault, D. R. (1995). Virtual acoustic displays for teleconferencing: Intelligibility advantage for "telephone grade" audio. *Audio Engineering Society 98th Convention, San Francisco* (paper 4008).

Begault, D. R. (1995). Head-up auditory display research at NASA Ames Research Center. *Proceedings of the 39th Annual Human Factors and Ergonomics Society Meeting, San Diego, CA.*

Begault, D. R. (1996). Audible and inaudible early reflections: thresholds for auralization system design. *Audio Engineering Society 100th Convention, Copenhagen, DK* (paper 4244).

Begault, D. R., & Pittman, M. T. (1996). Three-Dimensional Audio Versus Head-Down Traffic Alert and Collision Avoidance System Displays. *International Journal of Aviation Psychology*, *6*(1), 79-93.

Begault, D. R. (1996). Virtual acoustics, aeronautics and communications. Audio *Engineering Society 101st Convention, Los Angeles* (paper 4352).

Begault, D. R., Wenzel, E. M., Shrum, R., & Miller, J. (1996). A virtual audio guidance and alert system for commercial aircraft operations. *Proceedings of the International Community on Auditory Display (ICAD 1996), Palo Alto, CA.*

Foyle, D. C., Andre, A. D., McCann, R. S., Wenzel, E. M., Begault, D. R., & Battiste, V. (1996). Taxiway Navigation and Situation Awareness (T-NASA) system: Problem, design philosophy, and description of an integrated display suite for low-visibility airport surface operations. *Proceedings of the SAE/AIAA World Aviation Congress*, paper 965551.

McCann, R. S., Andre, A. D., Begault, D. R., Foyle, D. C., & Wenzel, E. M. (1997). Enhancing ground taxi performance under low visibility: are electronic moving maps enough? *Proceedings of the Human Factors Society 41st Annual Meeting, Albuquerque, NM*, pp. 37-41.

Begault, D. R. (1997). Evaluation of psychoacoustical parameters of 3-D sound. *Workshop on three-dimensional sound spatialization and its applications* [Invited presentation]*, Institut de Recherche et Coordination Acoustique/Musique (IRCAM), Paris, FR.*

Begault, D. R. (1997). Virtual acoustics: evaluation of psychoacoustic parameters of early reflection synthesis for improved rendering and data reduction. [Invited paper] *Proceedings of IWHIT'97, Third International Workshop on Human Interface Technology, University of Aizu, Aizu-Wakamatsu, Japan, March 12-14, 1997.*

Begault, D. R., Wenzel, E. M., & Lathrop, W. B. (1997). Augmented TCAS advisories using a 3-D audio guidance system. *Proceedings of the Ninth International Symposium on Aviation Psychology.*

Begault, D. R., Wenzel, E. M., Tran, L. L., & Anderson, M. R. (1998). Survey of Commercial Airline Pilot's Hearing Loss. *Perceptual and Motor Skills*, v. 86, p. 258.

Begault, D. R., & Abel, J. S. (1998). Studying room acoustics using a monopole-dipole microphone array. *Proceedings of the 16th International Congress on Acoustics and 135th Meeting of the Acoustical Society of America, Seattle, 369-370*.

Begault, D. R., Wenzel, E. M., Tran, L. L., & Anderson, M. R. (1998). Octave-band thresholds for Modeled Reverberant Fields. *Audio Engineering Society 104th Convention, Amsterdam, NL* (paper 4662).

Begault, D. R. (1998). Virtual acoustics, aeronautics and communications. *Journal of the Audio Engineering Society*, *46*, 520-530.

Begault, D. R. (1998). An introduction to Auralization and Psychoacoustics. *Conference Acoustique Virtuelle '98 - le son 3d et ses applications, Pôle Universitaire Leonard de Vinci, Paris.*

Begault, D. R., Ellis, S. R., & Wenzel, E. M. (1998). Headphone and head-mounted visual displays for virtual environments. *Proceedings of the Audio Engineering Society 15th International Conference (Audio, Acoustics, and Small Spaces), Snekkersten, DK*, pp. 213-217.

Abel, J. S., & Begault, D. R. (1998). Methods for room acoustic analysis and synthesis using a monopole-dipole microphone array. *Proceedings of the 1998 International Congress on Noise Control Engineering (InterNoise 98), Christchurch, NZ* (paper 123).

Begault, D. R. (1999). Auditory and non-auditory factors that potentially influence virtual acoustic imagery. *Proceedings of the Audio Engineering Society 16th International Conference on Spatial Sound Reproduction, Rovaniemi, FIN.* [invited paper]

Begault, D. R. (1999). Challenges facing 3-D audio display design for multimedia*. Proceedings of the 137th meeting of the Acoustical Society of America, 2nd Convention of the European Acoustics Association (Forum Accusticum 99) and the 25th German DAGA Conference, Berlin.*

Begault, D. R. (1999). Virtual acoustic displays for teleconferencing: intelligibility advantage for "telephone-grade" audio. *Journal of the Audio Engineering Society*, *47,* 824-828.

Begault, D. R. (2000). Direct comparison of the impact of head tracking, reverberation, and individualized head-related transfer functions on the spatial perception of a virtual speech source. *Audio Engineering Society 108th convention, Paris* (paper 5134).

Begault, D. R. (2000). Improved HRTF-Based Pseudo-stereophony. *NASA Tech Briefs*. pp. 40-43.

Begault, D. R. (2001). Compositional spatial sound manipulation: historical overview and analyses. *Journal of the Acoustical Society of America (abstracts)*, *109,* 2460. [invited paper]

Begault, D. R. and McClain, B. U. (2001). Early reflection thresholds for virtual acoustic sound field simulation. *Proceedings of the 17th International Congress on Acoustics, Rome, 2-7 September* [invited paper].

Begault, D. R., McClain, B. U., and Anderson, M.R. (2001). Early reflection thresholds for virtual sound sources. *Proceedings of the 2001 International Workshop on Spatial Media (IWSM '01), Aizu-Wakamatsu, Japan. October 25-26, 2001* [invited paper]

Begault, D. R., Wenzel, E.M. and Anderson, M. R. (2001). Direct comparison of the impact of head tracking, reverberation and individualized head-related transfer functions on the spatial perception of a virtual speech source. *Journal of the Audio Engineering Society*, *49,* 904-916.

Krukowski, A. E., Begault, D. R., Wenzel, E. M., and Stone, L. S. (2001). Human oculomotor responses to virtual auditory motion. *Society for Neuroscience 31st Annual Meeting*, *San Diego, CA* (poster).

Krukowski, A. E., Begault, D. R., Wenzel, E. M., and Stone, L. S. (2002). Human smooth pursuit eye movement responses to visual, auditory, and imagined target motion. *The Society for the Neural Control of Movement Twelfth Annual Meeting, Naples, Florida,* poster 404.15.

Jost, A. and Begault, D. R. (2002). Observed effects of HRTF measurement signal level. *Proceedings of the Audio Engineering Society 21st International Conference. Architectural acoustics and sound reinforcement, St. Petersburg, RU.*

Begault, D. R. (2002). Challenges and solutions for realistic room simulation. *Journal of the Acoustical Society of America (abstracts)*, *111,* 2440. [invited paper]

Begault, D. R. (2002, October). Binaural Effects and Spatial Hearing. In A. Kohlrausch & D. Begault (Co-chairs.), *What Audio Engineers Should Know About Human Sound Perception. Workshop, Audio Engineering Society 113th Convention, Los Angeles, CA*

Begault, D. R. (2002). Making audible alarms more noticeable in noisy environments. *NASA Tech Briefs* **26**(9).

Begault, D. R., Anderson, M. R., & McClain, B. U. (2003). Spatially-modulated auditory alerts. *Proceedings of the 2003 International Conference on Auditory Display, Boston, MA. July 6-9 2003.*

Adelstein, B. D., Begault, D. R., Anderson, M. R., & Wenzel, E. M. (2003). Sensitivity to Haptic-Audio Asynchrony. *Fifth International Conference on Multimodal Interfaces November 5-7, Vancouver, B.C.*

Krukowski, A. E., Begault, D. R., et al. (2003 submitted). Pursuing the invisible: Human oculomotor response to auditory motion. *Nature*.

Begault, D. R. (2003). Intelligibility in auditory displays. *Proceedings of Reproduced sound 19, Institute of Acoustics, Oxford, UK*.

Begault, D. R. (2003). Overview of electronic reverberation systems. In D. R. Begault (Chair), *Electronic reverberation systems*. *Workshop, Audio Engineering Society 114th Convention, Amsterdam, NL.*

Begault, D. R. (2003). Measurement and auralization of 'moving' late reverberation. *Proceedings of the Third International Workshop on Spatial Media (IWSM 2003), Aizu, Japan.*

Begault, D. R. (2003). Measurement and perception of 'moving' late reverberant fields. In J. Voetman (Chair), *Large room acoustics*. *Workshop, Audio Engineering Society 114th Convention, Amsterdam, NL.*

Begault, D. R. (2003). Tutorial on listening tests. *Workshop, Audio Engineering Society 115th Convention, New York, N.Y. and 116th Convention (Berlin, DE).*

Begault, D. R., McClain, B. M., and Anderson, M. R. (2004). Early Reflection Thresholds for Anechoic and Reverberant Stimuli within a 3-D Sound Display. *Proceedings of the 18th International Congress on Acoustics, Kyoto, JP.*

Begault, D. R. (2004). Application-driven design of auralization systems. *Paper presentation, Special session on "Acoustics of Virtual Environments", 147th Acoustical Society of America meeting, New York, NY 24-28 May 2004.*

Begault, D. R. (2004). Binaural Hearing and Intelligibility in Auditory Displays. In Ellis, S. R. (Chair), *Virtual Environments for Training and Interfaces to Spatial Instruments.* Invited panel presentation, *75th Scientific Meeting of the Aerospace Medical Association (AsMA), May 3-6, Anchorage, AK*; and *NASA Aeronautics Research Mission Directorate Human Factors Symposium, October 18-21, Moffett Field, CA*

Begault, D. R. (2004). Measurement and subjective evaluation of the spatial modulation of late reverberation. *Journal of the Acoustical Society of America* v. 116, p. 2553.

Begault, D. R., and Wenzel, E. M. (2004). Perception of multimodal time differences in virtual environments. *Journal of the Acoustical Society of America* v. 116, p. 2606.

Begault, D. R., Anderson, M. R., Miller, J. D. and McClain, B. M. (2005). Audio-Visual Communication Monitoring System for Enhanced Situational Awareness. Poster, *Working Together: R&D Partnerships in Homeland Security Conference, Boston, MA, 27-28 April*.

Begault, D. R., Adelstein, B. D., McClain, B. M., and Anderson, M. R. (2005). Thresholds for auditory-tactile asynchrony. *Audio Engineering Society 118th Convention, Barcelona* (paper 6511).

Begault, D. R. (2005). Tutorial on distance perception. *Audio Engineering Society 118th Convention, Barcelona*, *Audio Engineering Society 119th Convention, New York, NY.*

Begault, D. R. (2005). Workshop on auditory-haptic interaction. *Audio Engineering Society 118th Convention, Barcelona*, and *Audio Engineering Society 119th Convention, New York, NY*.

Poza, F., and Begault, D. R. (2005). Voice Identification and Elimination using Aural-Spectrographic Protocols. *Proceedings of the Audio Engineering Society 26th International Conference, "Audio Forensics in the Digital Age", July 2005,* pp. 21-28.

Brixen, E. B., and Begault, D. R. (2005). Validity of Bit-Compressed Digital Voice Recordings for Spectrographic Analyses: Input for a Database, a preliminary test. *Proceedings of the Audio Engineering Society 26th International Conference, "Audio Forensics in the Digital Age", July 2005,* pp. 53-64.

Begault, D. R., Brustad, B. M., and Stanley, A. M. (2005). Tape Analysis and Authentication using Multitrack Recorders. *Proceedings of the Audio Engineering Society 26th International Conference, "Audio Forensics in the Digital Age", July 2005*, pp. 115-121

Begault, D. R., Anderson, M. R., and McClain, B. M. (2006). Spatially-modulated auditory alerts for aviation. *Journal of the Audio Engineering Society* 55:4, pp. 276-282

Begault, D. R. (2006). Preference versus Reference: Listeners as participants in sound reproduction. *Proceedings of the First International Conference on Audio and Sensory Evaluation Techniques, Institute for Advanced Studies, University of Surrey, Guildford, U.K. 6-7 April 2006.*

Begault, D. R., Godfroy, M., Miller, J., Roginska, A., Anderson, M., and Wenzel, E. M. (2006). Design and verification of HEADZAP, a semi-automated HRIR measurement system. Audio Engineering Society 120th Convention, Paris (paper 6655).

Begault, D. R. and Godfroy, M. (2006). Best practices for auditory alarm design in space applications. *Journal of the Acoustical Society of America* v. 120, pp. 3274.

Begault, D. R. and Peltier, C. A. (2006). Acoustic signal analysis for forensic applications. *Journal of the Acoustical Society of America* 120:3275.

Freytag, J. C., Begault, D. R., and Peltier, C. A. (2006). The acoustics of gunfire. *Proceedings of Inter-Noise 2006, Honolulu, Hawaii, 3-6 December.*

Katz, B. and Begault, D. R. (2007). Round Robin Comparison of HRTF Measurement Systems: Preliminary Results. *Proceedings of the 19th International Congress on Acoustics, Madrid, 2-7 September*.

Begault, D. R., Godfroy, M., Sandor, A. and Holden, K. (2007). Auditory alarm design for NASA CEV applications. *Proceedings of the 13th International Conference on Auditory Display, Montreal, CA, 26-29 June 2007.*

Begault, D. R., and Hieronymus, J., (2007). Acoustical issues and proposed improvements for NASA Spacesuits. *Audio Engineering Society 122nd Convention, Vienna, 5-8 May 2007* (paper 7152).

Begault, D. R., and Peltier, C. A. (2007). The Practice of Audio Forensics. *Workshop presentation, Audio Engineering Society 122nd Convention, Vienna, 5-8 May 2007*.

Begault, D. R. (2007). Experiment in Computational Voice Elimination Using Formant Analysis. *Audio Engineering Society 123rd Conference, New York, NY 5-8 October 2007* (Paper 7272).

Begault, D. R. (2008). Forensic analysis of the audibility of female screams. *Proceedings of the Audio Engineering Society 33rd International Conference "Audio Forensics-Theory and Practice" Denver, CO 5-7 June 2008*.

Poza, F., and Begault, D. R. (2008). The role of transcriptions in the courtroom: a scientific evaluation. *Proceedings of the Audio Engineering Society 33rd International Conference "Audio Forensics-Theory and Practice", Denver, CO 5-7 June 2008.*

Begault, D. R., Godfroy, M., Holden, K., and Sandor, A. (2008). Caution and Warning Alarm Design and Evaluation for NASA CEV Auditory Displays. *Audio Engineering Society 124th Convention, Amsterdam, 7-10 May 2008* (Paper 7493).

Begault, D. R., Hieronymus, J., and Adelstein, B. D. (2008). Acoustic and vibration measurements of NASA spacesuits. *Journal of the Acoustical Society of America* v. 123, p. 3173.

Godfroy, M., Begault, D. R., and Wenzel, E. M. (2009). Speech synthesis for data link: a study of overall quality and comprehension effort. *Proceedings of the 15th International Symposium on Aviation Psychology, Wright State University, Dayton, Ohio, April 27-39, 2009.*

Begault, D. R. (2009). Effect of Whole-Body Vibration on Speech. Part I: Stimuli Recording and Speech Analysis. *Audio Engineering Society 127th Convention, New York, NY 9-12 October 2009* (Paper 7820).

Begault, D. R. (2009). Multi-modal human interfaces. A review of NASA research activities. *Keynote presentation, Haptic-Audio Interface Design 4th International Workshop (HAID '09), Technische Univerität Dresden, Dresden, Germany, September 10-11 2009.*

Mortensen, D. H., Bech, S., Begault, D. R. and Adelstein, B. D. (2009). The relative importance of visual, auditory and haptic information for the user's experience of mechanical switches. *Perception* v. 38, pp. 1560-1571.

Begault, D. R., Wenzel, E. M., Godfroy, M., Anderson, M. R., and Miller, J. D. (2010). Applying spatial audio to human interfaces: 25 years of NASA experience. *Proceedings of the Audio Engineering Society 40th International Conference on Spatial Audio, Tokyo, Oct. 8-10 2010.*

Begault, D. R., Wenzel, E. M., and Godfroy, M. (2010). Guidelines for NextGen Auditory Displays and Alerts. NASA Technical Paper NASA/TP-2010-216416.

Holden, K. L., McCann, R. S., Thompson, S. G., Kaiser, M. K., Sándor, A., Begault, D. R., Wenzel, E. M., Adelstein, B. D., Beutter, B. R., Stone, L. S. and Godfroy, M. (2010). Space Human Factors and Habitability: Information Presentation. *2010 NASA Human Research Program Investigators' Workshop, February 3-5, 2010, Houston, TX* (poster SHFH-7, abstract 1063).

Begault, D. R. (2011). Overview of Auditory Displays for Human-Machine Interfaces. Workshop on Space Communications: Challenges for Auditory Displays & Interactive Spoken Dialogue Systems. *Fourth IEEE International Conference on Space Mission Challenges for Information Technology (SMC-IT 2011), August 2-4, Palo Alto, CA.*

Begault, D. R. (2011). Effect of whole-body vibration on speech. Part II: Effect on Intelligibility. *Audio Engineering Society 131st Convention, New York, NY* (paper 8582).

Begault, D. R. (2012). Guidelines for NextGen Auditory Displays. Special issue on auditory displays, *Journal of the Audio Engineering Society* v. 60: pp. 519-530

Koteskey, R. W., Wu, S., Begault, D. R., Wenzel, E. M., Lachter, J. B., Battiste, V., and Walter W. Johnson, W. J. (2012). Audio Twitter for NextGen: The Impact of Selectively Enhancing Audio Channel Information During Simulated Free Flight Operations. *Fourth Int. Conference on Applied Human Factors and Ergonomics, July 21-25, 2012, San Francisco*

Nash, A., Begault, D. R., and Peltier, C. (2012). Uncertainty in the Measurement of the Electrical Network Frequency. *Audio Engineering Society 46th International Conference. Audio Forensics: Recording, Recovery, Analysis and Interpretation.*

Begault, D. R., Bittner, R., and Anderson, M. R. (2012). Multimodal information management: Effect of Auditory and Haptic Cues on Communication Display Performance and Preference. *Audio Engineering Society 133rd Convention, San Francisco, CA.*

Begault, D. R., Anderson, M. R., and Bittner, R., (2012). Simulation of Auditory-Haptic Cues for NextGen Communication Displays. *Audio Engineering Society 133rd Convention, San Francisco, CA.*

2017 Audio Engineering Society International Conference on Audio Forensics, Arlington, VA
Begault, D. R., Heise, H. D., and Peltier, C. A. (2013). Analysis Criteria for Forensic Musicology. *ICA 2013 21st International Congress on Acoustics-165th Meeting of the Acoustical Society of America-52nd Meeting of the Canadian Acoustical Association, Montréal, Québec, Canada, 2 – 7 June 2013*.

Bittner, R. M. Begault, D. R., and Christopher, B. R. (2013). Pilot Workload and Speech Analysis: A Preliminary Investigation. *Audio Engineering Society 135th Convention, New York, NY* paper 8985.

Bittner, Rachel M., and Begault, D. R. (2014). Signal Processing Methods for Removing the Effects of Whole-Body Vibration upon Speech. *IEEE International Conference on Acoustics, Speech and Signal Processing ICASSP 2014*, *Florence, IT.*

Begault, D. R., Bittner, R. M., and Anderson, M. R. (2014). Multimodal Information Management. Evaluation of Auditory and Haptic Cues for NextGen Communication Displays. *Journal of the Audio Engineering Society* 62:6, pp. 375-385.

Begault, D. R., Heise, H.D., and Peltier, C. A. (2014). Forensic Musicology. An Overview. *Audio Engineering Society 54th International Conference, Audio Forensics: Techniques, Technologies and Practice, London, UK.*

Woszczyk, W., Begault, D. R., and Higbie, A. G. (2014). Comparison and contrast of reverberation measurements in Grace Cathedral, San Francisco. *Audio Engineering Society 137th Convention, Los Angeles, CA* Engineering Brief 1787.

Begault, D. R., Christopher, B. R., Zeamer, C., Anderson, M. R., and Burns, K. (2014). A touchpad-based method for inducing attentional tunneling. *Audio Engineering Society 137th Convention, Los Angeles, CA* Engineering Brief 164.

Andreopoulou, A., Begault, D. R., and Katz, B. G. (2015). "Inter-Laboratory Round Robin HRTF Measurement Comparison," *IEEE Journal of Selected Topics in Signal Processing* Vol. 9, pp. 895-906.

Begault, D. R., Sunder, K., Godfroy, M., and Otto, P. (2015). Speech Intelligibility Advantage using an Acoustic Beamformer Display. *Audio Engineering Society 139th Convention, New York, NY*. Engineering Report 211.

Begault, D. R., Lu, A. L. and Perry, P. J. (2015). Forensic Sound Analyses of Cellular Telephone Recordings". *Audio Engineering Society 139th Convention, New York, NY* Paper 9472.

Sándor, A., Moses, H., Sprufera, J., and Begault, D. R. (2016). Memo on Speech Alarms: Replication and Validation of Results. NASA Technical Memorandum 219107.

Begault, D. R., Christopher, B. R., Zeamer, C., Anderson, M. R., and Guevara, G. (2016). A Touchpad-Based Method for Inducing Attentional Tunneling. NASA Technical Memorandum 219208.

Begault, D. R. (2016). Spatial Auditory Feedback in Response to Tracked Eye Position. *2016 Audio Engineering Society International Conference on Audio for Virtual and Augmented Reality, Los Angeles, CA.* Paper 6-1.

Mehra, R., Nicholls, A., Begault, D. and Zannoli, M. (2016). Comparison of localization performance with individualized and non-individualized head-related transfer functions for dynamic listeners. *Journal of the Acoustical Society of America* 140, 2956.

Begault, D. R. (2017). Gunshot Analysis workshop. *2017 Audio Engineering Society International Conference on Audio Forensics, Arlington, VA.*

Begault, D. R. (2018). Assessment and mitigation of the effects of noise on habitability in deep space environments: report on non-auditory effects of noise. NASA Technical Memorandum 2018-219748.

Guevara, G., Begault, D. R., Sunder, K. and Anderson, M. (2018). Mitigation of attentional tunneling in the flight deck using a spatial auditory display. NASA Technical Memorandum 2018-219932.

Begault, D. R. (2018). Overview of Metrics Pertinent to Human Response to UAM Noise. *Presentation, NASA Acoustics Technical Working Group Meeting, Glenn Research Center, Cleveland, Ohio, October 16, 2018*. NASA Technical Reports Server, document 20180007464.

Begault, D. R. (2019). Audibility, threshold metrics and background noise (with respect to Urban Air Mobility). *Presentation, NASA Acoustics Technical Working Group Meeting, Langley Research Center, Virginia, April 11, 2019.*

Begault, D. R., Beck, S. D., Maher, R. C. (2019). Overview of Forensic Audio Gunshot Analysis Techniques. *2019 Audio Engineering Society International Conference on Audio Forensics, Porto, Portugal*.

Begault, D. R. (2019). Ambient Noise Measurement for UAM Metric Analysis & Research *Presentation, NASA Acoustics Technical Working Group Meeting, Glenn Research Center, Cleveland, Ohio, October 23, 2019*. NASA Technical Reports Server.

Begault, D. R. (2020). Psychoacoustic Measures for UAM Noise in the Context of Ambient Sound. *Presentation, Vertical Flight Society San Francisco Bay Area Chapter, June 11, 2020*.

Begault, D. R. (2021). Perceptual attributes of eVTOL noise, noticeability and blend with reference to the ambient. *Presentation, NASA Acoustics Technical Working Group Meeting, Langley Research Center, Hampton, VA, April 14, 2021*. NASA Technical Reports Server

Begault, D. R. (2021). Methods for Recording and Documenting Ambient Environmental Sound for use in Listening Tests. NASA Technical Memorandum 2021-0017504.

Begault, D. R. (2021). Perceptual attributes of eVTOL noise, noticeability and blend with reference to the ambient. *Presentation, NASA Acoustics Technical Working Group Meeting, Langley Research Center, Hampton, VA, April 14, 2021*. NASA Technical Reports Server

Christian, A., Boucher, M., Begault, D. R. , and Rafaelof, M. (2022). Initial Results from a Psychoacoustic Test for UAM Sound Quality. *Presentation, NASA Acoustics Technical Working Group Meeting, Glenn Research Center, Cleveland, OH, October 19, 2022*. NASA Technical Reports Server.

Begault, D. R. (2022). PVT+AUDIO. Online psychoacoustic testing iOS app for evaluating AAM/UAM noise response. *Presentation, NASA Acoustics Technical Working Group Meeting, Glenn Research Center, Cleveland, OH, October 19, 2022*. NASA Technical Reports Server