Exponent®
Engineering & Scientific Consulting

Daniel Mennitt, Ph.D., P.E., INCE Bd. Cert.

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Professional Profile

Dr. Mennitt is a board-certified acoustical consultant. He applies his expertise to solve challenges in noise control and electroacoustics across applications ranging from infrastructure and construction to consumer products, medical devices, and vehicles. Dr. Mennitt's work integrates empirical testing, modeling methods, and audio signal processing to diagnose noise issues and develop solutions that support product development, ensure regulatory compliance, and improve safety.

Dr. Mennitt has extensive experience in the characterization, design, and modeling of acoustical environments and devices. He has applied his expertise to noise control of machines, consumer products, infrastructure, power generation facilities, healthcare facilities, medical devices, and vehicles. He has developed and implemented solutions to effectively reduce noise transmission to sensitive areas, isolate vibration, and support the development of quieter products. Dr. Mennitt conducts testing to measure acoustical quantities such as sound power, directivity, transmissibility, and frequency response; he also draws on analytical methods, numerical models and expertise in sound and vibration signal processing to evaluate mechanisms of sound generation and noise transmission paths.

Dr. Mennitt's work is rooted in the human response to sound and vibration. As a certified Occupational Hearing Conservationist, he has evaluated occupational noise exposure, hearing conservation programs, hearing protection devices, and the efficacy of mitigative measures to protect hearing. His consulting experience related to human perception has included the audibility of alarms, annoyance of noise, speech intelligibility, vibration exposure, and evaluations of product sound quality. Dr. Mennitt has conducted forensic investigations, provided litigation support, and served as an expert witness.

Dr. Mennitt has worked extensively with federal agencies and other organizations to assess environmental noise and the effects of noise exposure on humans and ecological systems. Prior to joining Exponent, he worked at Colorado State University in partnership with the National Park Service's Natural Sounds and Night Skies Division to manage acoustical environments. His research involved the spatiotemporal patterns of environmental sound on landscape scales, acoustical transducers, bioacoustics, flow noise, and predictive modeling. Dr. Mennitt has designed acoustic devices and methods for data acquisition, calibration, and monitoring sound in extremely quiet environments. While at Colorado State University, Dr. Mennitt also taught a course on acoustics, noise, and signal processing.

Dr. Mennitt's experience in computational acoustics includes deterministic time and frequency domain simulations of acoustic propagation (FEA, BEM, FDTD) as well as models that exploit machine learning. He led a multidisciplinary team to pioneer technology that uses geospatial data to generate comprehensive maps of environmental sound levels and noise exposure on continental scales. He has worked with academia, government, and industry to translate these estimates to implications for land management, ecological, epidemiological, military, and commercial applications.

Dr. Mennitt's background is in mechanical engineering. He performed his doctoral work at Virginia Tech's Vibration and Acoustics Laboratory, developing terrestrial sonar systems for localization and tracking of acoustic sources in free-field and cluttered environments. During this research, he developed robust statistical methods for classification of acoustical signals and fusion of information from distributed sensor networks. Dr. Mennitt's signal processing experience extends to signal detection, beamforming, adaptive filtering, speech processing, hearing, and array signal processing. While at the Vibration and Acoustics Laboratory, he conducted testing with anechoic and reverberation rooms, intensity probes, impedance tubes, modal impact hammers, accelerometers, and shakers. Other graduate work included applications in spatial audio, active noise control for signal enhancement, architectural acoustics, music production, and audio engineering. His training and expertise in audio engineering helps Dr. Mennitt conduct educated and critical observations to address acoustical issues.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Virginia Polytechnic Institute and State Univ, 2008

B.S., Mechanical Engineering, Virginia Polytechnic Institute and State Univ, 2004

The Robert Bradford Newman Medal for Merit in Architectural Acoustics, 2005

Best Paper By A Young Presenter, 153rd Meeting of the Acoustical Society of America, 2007.

Licenses and Certifications

Professional Engineer, Arizona, #85612

Professional Engineer, Colorado, #PE.0058367

Professional Engineer, Wisconsin, #48642-6

Board Certified

Academic Appointments

Research Scientist I-III, Department of Electrical and Computer Engineering, Colorado State University, 2010-2019

Graduate Research Assistant, Department of Mechanical Engineering, Virginia Polytechnic Institute and State University, 2004-2008

Professional Affiliations

Acoustical Society of America (ASA)

Institute of Noise Control Engineering (INCE)

American Society for Testing and Materials (ASTM): Committee E33 on Building and Environmental Acoustics

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

Patents

US Patent No. 12,001,765 B2: Textile-material model for vibroacoustic structural simulation, issued June 4, 2024 (with L. Shumaker et. al.).

US Patent No. 10,966,011. Adaptive coupler for calibration of arbitrarily shaped microphones, issued March 30, 2021.

Publications

Selected Publications

D. J. Mennitt, K. Spak, D. Datta, and B. Cotts, “Wind induced tonal noise from electrical power transmission infrastructure,” Proceedings of Noise-Con, INCE-USA (2025): 1-12.

L. A. Ferguson, B. D. Taff, J. I. Blanford, D. J. Mennitt, A. J. Mowen, M. Levenhagen, C. White, C. A. Monz, C. D. Francis, J. R. Barber, P. Newman, “Understanding park visitors’ soundscape perception using subjective and objective measurement,” PeerJ 12 (2024):e16592.

K. Spak and D. J. Mennitt, “Vibration specifications and standards as part of EPC contracts,” VIATC 45th Vibration Institute Annual Training Conference (2023): 267-279.

M. Senzaki, J. R. Barber, J. N. Phillips, N. H. Carter, C. B. Cooper, M. A. Ditmer, K. M. Fristrup, C. McClure, D. J. Mennitt, L. P. Tyrrell, J. Vukomanovic, A. A. Wilson and C. D. Francis, “Sensory pollutants alter bird phenology and fitness across a continent,” Nature 587 (2020):605-609.

D. J. Mennitt, “An adaptive coupler for the calibration of the arbitrarily shaped microphones,” Applied Acoustics 154 (2019):114-120.

K.E. Rudolph, A. Shev, D. Paksarian, K.R. Merikangas, D.J. Mennitt, P. James, and J. A. Casey, “Environmental noise and sleep and mental health outcomes in a nationally representative sample of urban US adolescents,” Environmental Epidemiology, 3 (2019): e056.

D. J. Mennitt, K. Fristrup, and B. Notaros, “Characterization of gain and directivity of exponential horn receivers,” The Journal of the Acoustical Society of America, 142 (2017):3257-3266.

R. T. Buxton, M. F. McKenna, D. J. Mennitt, K. M. Fristrup, K. Crooks, L. Angeloni, and G. Wittemyer, “Noise pollution is pervasive in US protected areas.” Science 356, no. 6337 (2017):531-533.

D. J. Mennitt, M. F. McKenna, and K. M. Fristrup, “Continental perspectives of noise exposure and its effects,” INTER-NOISE and NOISE-CON Congress and Conference Proceedings, 255 (2017):1168-1172.

D. J. Mennitt and K. Fristrup, “Influential factors and spatiotemporal patterns of environmental sound levels in the contiguous United States,” Noise Control Engineering Journal, 64 (2016):342-353.

D. J. Mennitt, K. Fristrup, and K. Sherrill, “A geospatial model of ambient sound pressure levels in the contiguous United States,” The Journal of the Acoustical Society of America 135 (2014):2746-2764.

D. J. Mennitt, K.M. Fristrup, “Obtaining calibrated sound pressure levels from consumer digital audio recorders,” Applied Acoustics 73 (2012):1138-1145.

K. M. Fristrup, and D. J. Mennitt. “Bioacoustical monitoring in terrestrial environments.” Acoustics Today 8(2012):16-24.

D. J. Mennitt, and M. Johnson, “Multiple-array passive acoustic source localization in urban environments,” The Journal of the Acoustical Society of America, 127.5 (2010): 2932-2942.

D. J. Mennitt, P. Gillett, J. Carneal and M. Johnson, “Tracking Noise Sources Using Multiple Mobile Microphone Arrays,” Thirteenth International Congress on Sound and Vibration, Vienna, Austria (2006):1-8.

M. Ermann, M. R. F. Kidner, and D. J. Mennitt, “Mapping the sound field of a 400 seat theater,” Building Acoustics 13.3 (2006):199-210.

Selected presentations, proceedings, and seminars

J. A. Casey, A. Shev, D. Paksarian, K. R. Merikangas, D. J. Mennitt, and K. E. Rudolph, “Association between exposure to noise and sleep and mental health outcomes in a nationally-representative sample of U.S. adolescents,” 2018 Annual Conference of the International Society for Environmental Epidemiology (2018).

M. F. McKenna, D. J. Mennitt, M. Thompson, J. Stanley, S. Van Parijs, K. M. Fristrup, and L. Hatch, “Including acoustical features in marine ecological prediction,” NOAA-Navy Workshop: Soundscape Metrics to Support Marine Protected Area Management, Woods Hole Oceanographic Institution, MA (2018).

D.J. Mennitt, D. Joyce, and K. Fristrup, “Benefits and challenges of using consumer audio equipment for unattended acoustical monitoring,” The Journal of the Acoustical Society of America, 144, 1828 (2018).

D. J. Mennitt, “Classification of wind induced pseudo noise using low resolution features,” National Park Service, Natural Resource Stewardship and Science, Fort Collins, CO (2017).

D. J. Mennitt and K. Fristrup, “Gain and directivity of exponential horn receivers,” The Journal of the Acoustical Society of America 140, 3140 (2016).

D.J. Mennitt and K. Fristrup, “Anomaly detection and other practical considerations for estimating acoustical metrics from time series data,” The Journal of the Acoustical Society of America, 140, 3424 (2016).

D. J. Mennitt and K. M. Fristrup, “A geospatial approach to mapping environmental sound levels across the United States,” American Society for Photogrammetry and Remote Sensing, Geobytes (2016).

P. James, R. Banay, D. J. Mennitt, K. Fristrup, J. Africa, J. Hart, F. Laden, "Noise and Cardiovascular Disease in a Nationwide Cohort Study," 28th Annual Conference of the International Society of Environmental Epidemiology, Rome, Italy (2016).

D. J. Mennitt, L. Hatch, K. M. Fristrup, M. Thompson, D. Cholewiak, M. F. McKenna, P. Auster and S. Van Parijs, “A geospatial approach to exploring the soundscape of Stellwagen Bank National Marine Sanctuary,” Oceanoise 2015, Vilanova i la Geltrú, Spain (2015).

D. J. Mennitt, E. Brown, and K.M. Fristrup, “Assessing the condition of acoustical resources across the National Park Service Units,” 2015 George Wright Society Conference on Parks, Protected Areas, and Cultural Sites, Oakland, CA (2015).

M. F. McKenna, K. M. Fristrup, and D. J. Mennitt, “Predicting historic and current sound levels from point measurements: a geospatial model,” Science for Parks, Parks for Science: The Next Century, Berkeley, CA (2015).

D. Risch, P. Auster, D. Cholewiak, K. Fristrup, L. Hatch, M. McKenna, D. Mennitt, M. Thompson, and S. Van Parijs, “Monitoring bio-acoustic activity & geospatial models of ambient sound: Applications in a marine sanctuary,” Ecology and acoustics: emergent properties from community to landscape, Paris, France (2014).

D. J. Mennitt, "Spatial variation of natural ambient sound pressure levels in Rocky Mountain National Park." The Journal of the Acoustical Society of America 129, 2617 (2011).

M. Ermann, J. Carneal, D. Mennitt, C. Jackson, B. Karmarkar, M. Helveston, and P. Clay, “Sound transmission loss of nontraditional building materials and redundancies,” The Journal of the Acoustical Society of America 122(5) (2007).

D. J. Mennitt, M. Johnson, and J. Carneal, “Coarse classification of acoustic signals using temporal and spectral characteristics,” Journal of the Acoustical Society of America 121(5):3046 (2007).

J. Carneal, M. Johnson, D. J. Mennitt, and P. Gillett, “Localization and tracking noise sources with autonomous vehicles: from node processing to central command fusion and tracking,” Acoustical Society of America's North Carolina Chapter, Raleigh, NC (2006).

D. J. Mennitt, “Numerical accuracy of virtual acoustic prototyping: determination of the minimum size of the evaluation sphere to achieve accurate local simulation,” Acoustical Society of America's North Carolina Chapter, Raleigh, NC (2006).

Project Experience

Noise Control Engineering

- Characterized the sound emission of noise sources associated with machines, electronics, consumer products, medical devices, motors, and other equipment; analytical or finite element models are often used in conjunction with sound and vibration measurements to identify dominant noise sources, mechanisms of sound radiation, transmission paths, and effective noise control strategies.
- Evaluated noise sources for adverse impacts and compliance with regulations; experience with standards and guidance from organizations such as ISO, ANSI, ASTM, AHRI, IEC, ITU, FHWA, FRA, FTA, and others.
- Prescribed and optimized noise controls such as acoustical enclosures, damping treatments, and vibration isolation to provide sufficient noise reduction within design constraints.
- Evaluated occupational noise exposure, hearing conservation programs, OSHA compliance, and the efficacy of mitigative measures (for example, hearing protection devices) to protect employee hearing; applications have included transportation facilities and industrial facilities such as a data center.
- Applied models of sound radiation to develop test methods for ultrasonic acoustic sources and evaluated the risk of human exposure to ultrasound.
- Characterized processes to estimate peak sound levels associated with impulsive noise from impacts and the potential for adverse health effects including hearing loss.

Environmental Noise and Vibration

- Conducted environmental noise studies of industrial facilities, construction activities, utilities, electrical power infrastructure, and transportation projects to assess the potential for community noise complaints or other environmental impacts; served as a noise consultant and provided assistance through all aspects of project development including planning, mitigation, construction, and post-construction compliance testing; experienced in applying codes, standards, and guidance from ISO, ANSI, ASA, FHWA, FRA, FTA.

- Designed, executed, and analyzed acoustic field surveys of ambient conditions outdoors in urban communities and remote areas; typical applications have included noise source characterization, assessment of existing conditions, insertion loss of controls, audibility, and post-construction noise emissions for regulatory compliance.
- Modeled acoustic propagation from noise sources to conduct noise impact assessments, estimate the potential impacts to local communities, determine compliance with local noise ordinances, and assess noise mitigation strategies.
- Prepared noise control plans for construction activities such as the installation of underground power transmission lines and drilling operations.

Building Vibration and Architectural Acoustics

- Evaluated sound and vibration transmission in buildings including measurement of architectural acoustics parameters such as sound transmission class, impact insulation class, outdoor-indoor transmission loss, absorption, and reverberation time.
- Designed experiments and conducted path analyses to determine the root cause of noise and vibration transmission in residential and commercial buildings; implemented mitigation to effectively isolate vibration, reduce noise transmission to sensitive areas, and reduce noise complaints.
- Conducted field measurements of airborne and ground-borne noise and vibration arising from roadways and rail systems to evaluate human exposure and response in residential and other buildings.
- Developed numerical models and conducted field measurements to assess the sound transmission of building facades and highway noise abatement strategies.
- Evaluated the potential effects of floor transmitted vibration from transportation and machinery sources on sensitive equipment in offshore platforms, laboratories, and other sensitive facilities.
- Analyzed noise and vibration from heating, ventilation and air conditioning (HVAC) systems and components (fans, ducts, pumps, actuators) to assess design and construction issues, resolve deficiencies, and mitigate annoyance; experience with ASHRAE and other relevant standards.
- Evaluated floor-ceiling assemblies to assess impact noise in buildings and prescribed renovation options to mitigate construction deficiencies related to noise problems.

Auditory Perception

- Evaluated the audibility of alarms and other warning signals such as sirens, horns, travel alarms, and backup beepers; conducted acoustic analyses including laboratory and field testing and evaluating compliance.
- Conducted laboratory testing to determine the effect of noise cancelling headphones and other hearing protection devices (HPDs) on recognition of warning signals.
- Evaluated the audibility of sound sources such as aircraft and resource extraction under various environmental conditions.
- Conducted measurements of acoustic events to evaluate their subjective perception using psychoacoustic metrics such as tonality, sharpness, and time-varying loudness.
- Devised screening criteria for acceptable sound quality of a quieter product based on acoustical metrics and spectral data.

- Instrumented and analyzed the interior sound field of vehicles to evaluate the driver's auditory experience and related NVH (noise, vibration and harshness) metrics.
- Designed and conducted experiments to assess acoustical aspects of earbuds and other telecommunications equipment such as speech intelligibility and sound immission; experience with ISO and ITU standards.
- Conducted measurements and analyzed the characteristics of sources to assess human response to whole body vibration in vehicles and buildings and hand-transmitted vibration from machines.
- Developed acoustic simulations for virtual acoustic prototyping with head related transfer functions.

Signal Processing

- Engineered sonar systems for military, industrial, and consumer applications; systems include sonic and ultrasonic transducers in air and underwater for detection, localization, classification, and imaging.
- Formulated signal processing algorithms and designed filters for detection, classification, and enhancement of audio signals such as speech; designed and implemented array processing algorithms such as adaptive beamforming and generalized sidelobe cancellers; experience with phased arrays and blazed arrays for acoustic localization and imaging.
- Instrumentation and testing of vehicles to evaluate component function and acoustic transmission; conducted vibroacoustic analyses of drivetrain components and identified the mechanism of noise generation in a vehicle using coherent output power techniques.
- Designed octave band and fractional-octave-band digital filter banks to efficiently calculate sound pressure levels from audio data; demonstrated performance in accordance with standards.
- Developed voice activity detectors and metrics to investigate the efficacy of active noise control for acoustic echo cancellation in a telecommunications system.
- Forensic audio analyses using deep learning (AI) for blind voice separation, speech enhancement, and automatic speech recognition.
- Feature engineering for machine learning; applications have included sound detection, level prediction, and diagnoses of rotating machinery such as motors and gear trains.
- Conducted forensic audio analyses and prepared demonstrative courtroom exhibits.

Flow Induced Noise and Vibration

- Measured meteorological, sound, and vibration data to determine the root cause of wind-induced flow noise and vibration affecting outdoor infrastructure; implemented mitigation to control noise emissions.
- Conducted and evaluated acoustical measurements to characterize noise sources in HVAC equipment; identified feasible strategies to reduce the A-weighted noise level and increase speech intelligibility in classrooms.
- Determined the dominant noise transmission paths in a fan enclosure using analytical calculations and experimental sound and vibration data.
- Investigated a flow induced resonance in a steam pipeline and designed noise controls to reduce structural vibration.

- Designed acoustic absorbers to control flow noise in a medical device which could not use typical porous materials.
- Formulated lumped parameter models to estimate the resonant characteristics of systems excited by flow.

Nondestructive Testing and Failure Analysis

- Evaluated medical ultrasound devices requiring hydrophone measurement of high intensity therapeutic shock waves to demonstrate compliance with regulatory guidance.
- Conducted failure analyses of components and structures such as acoustic transducers.
- Performed reliability analyses and developed test protocols for components subject to shock and vibration.
- Engineered instrumentation and protocols to assess the effect of vibration on nondestructive evaluation of gas pipelines that account for vibroacoustic interaction of pipe shell and fluid dynamics; analyzed measurement data to assess piping vibration sources and the risk of vibration induced fatigue failure in natural gas and water pipelines.
- Characterized the performance of piezoelectric transducers, including phased arrays for ultrasound imaging and acoustic source localization, using empirical data, analytical methods, and finite element models.
- Instrumented turbomachinery and analyzed condition monitoring data to identify component failure and determine maintenance requirements.
- Conducted experimental modal analysis of vibrating structures to determine root cause of failure in conjunction with finite element analyses.
- Performed design review and provided support for the development of a vibroacoustic sonar system operating underground.
- Conducted laser doppler vibrometer measurements to determine the effects of vibration on thermal performance of a consumer electronic device.
- Measured the dynamics of lightweight membrane structures using laser doppler vibrometry for applications including earbuds and loudspeaker rub and buzz in consumer products.

Additional Education & Training

Certified Occupational Hearing Conservationist (COHC), Council for Accreditation in Occupational Hearing Conservation, 503540

Peer Reviews

Noise Control Engineering Journal

Journal of the Acoustical Society of America

Environment International Journal

IEEE Sensors Journal