

## **Earl R. Geddes**

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### **1996 to Present - GedLee Associates, Novi, MI**

A consulting company that specializes in acoustics, audio, home theater and noise control.

#### **Principle Consultant**

- Ran all operations out of my home.
- Consulted in acoustics and noise control for a wide variety of clients including Motorola, Tellabs, Resound, Ford Motor, and Visteon.
- Wrote and personally prosecuted six Patent applications to issue.
- Served as an expert witness in three patent infringement suites.
- Licensed the Acoustic Lever to Visteon.
- Wrote and published Audio Transducers textbook and Home Theater.

### **1998 to 2001 - Visteon, Dearborn, MI**

A spin-off of Ford Motor Company, Visteon is the world's second largest automotive supplier. Sales exceed 20 Billion dollars per year.

#### **Senior Staff Specialist / Manager - Advanced Multimedia**

Report to the Director of Advanced Electronics and Telematics.

- Delivered the world's first MP3 player CD radio.
- Delivered Visteon's first DAB radio.
- Developed the Acoustic Lever into an Implementation Ready product

### **1994 to 1996 - Knowles Electronics, Itasca, IL**

A privately held company in the hearing aid components business, primarily sub-miniature microphones and loudspeakers.

#### **1995 to 1997 - Research Director**

Reported to the CEO and then the newly appointed General Manager. Responsible for development of new product concepts, proof of concepts and development tools.

- Managed the Transducer and Software Engineering Groups, up to 13 people and an annual budget of \$1,500,000.
- Re-engineered Research by recruiting seven (7) new hires. Repaired an inefficient low morale environment.

- Supervised and conceived the development of new transducer concepts. Project was on-time and budget through the prototype development stage.
- Released KEPAR - a state-of-the-art real time Digital Signal Processing (DSP) hearing aid design tool. Conceived the idea, sold the project, supervised product design and wrote code for this on time and under budget project.

### **1994 to 1995 - Technical Director**

Reported to Vice President of R&D

- Managed the Applied Research and Signal Processing Groups - six (6) to eight (8) people total.
- Developed new product development process to replace the inefficient “one man, one project” concept. Efficiency was increased by 25% due to a better process definition.
- Developed transducer models which reduced the time to analyze a design change from weeks (for hardware modifications) to hours with computer simulations. These models became major development and production tools for finding “hidden” design and process problems and are currently used in all phases of the design process at Knowles.
- Developed new “ultra-thin” microphone with only seven (7) months on the job. The design would have enabled a breakthrough in customer packaging flexibility. Was “bookshelved” because of competing demands on tool room

## **1978 to 1993 - Ford Motor Company, Dearborn, MI**

### **1990 to 1993 - Senior Staff Scientist**

Special Assignment - Active Noise Control Project. Reported to the Executive Engineer of Electronics Concepts and Systems in the Technology Development Office of the Electronics Division (ELD).

- Developed the vision, put together and sold the project proposal, helped to negotiate the five (5) year, \$10,000,000 contract for this high profile joint development project between Ford and Nelson Industries in Madison, Wisconsin.
- Sat on the six (6) member Joint Development Committee to oversee project direction and expenditures.
- Directed project as Ford’s technical representative. Supervised more than twenty (20) engineers and technicians, most of whom had advanced degrees, many with the Ph.D.
- Project team developed active exhaust systems, active engine mounts, active interior noise control and active induction systems for cars and light trucks.
- Personally made significant contributions to the algorithms and transducer designs which resulted in six (6).
- Project was an unqualified technical success with a proven performance and fuel economy advantage and a 100,000 mile durability.

## **1982 to 1990 - Acoustics and Vibration Specialist**

Reported to the Manager of the Electronics Technology Development Department.

- Instruct, oversee and coordinate, design and development of acoustic, vibration and noise control products, techniques and computer software - corporate wide.
- Participated in early investigations of “sound quality”. Wrote and sold the proposal for a new NVH (noise, vibration and harshness) development process which became the standard for all car lines by 1992. As a result, Ford currently leads the US car industry in this technology. Received the Henry Ford Award for this contribution.
- Headed the DSP Evaluation Team for ELD’s Triumph Project which used specialty teams to evaluate Japanese companies suitable for participating in an Asian design and manufacturing Joint Venture (JV). The team’s results were used to establish the FMS (Ford-Mazda-Sanyo) JV in Malaysia which supplies the radio needs for Ford and Mazda in Asia and Australia.
- Developed a test bench method for simulating the acoustic effects of air induction systems. Virtually all current Ford induction systems utilize this technique.
- Developed the prototype designs for the JBL audiophile sound system (widely acclaimed as the premier OEM sound system). Annual sales went on to exceed \$100,000,000 per year. By 1996 this system design became the standard for all Ford OEM systems.
- Developed a multiple microphone vehicle interior sound testing technique which eliminated the measurement variability inherent in classic techniques. This technique is now standard practice for automotive interior sound measurements worldwide.

## **1980 to 1982 Student**

Educational Leave to continue education at The Pennsylvania State University.

## **1978 to 1980 - Design Engineer, Electronics Division**

Reported to Supervisor of the Audio Components Group.

- Revised loudspeaker specifications to update them to present industry technology.
- Wrote equipment specifications, interface software and test specifications for the new In-car sound lab, a fully computerized audio testing facility still in use today.
- Performed advanced development work on loudspeakers using computer modeling techniques.

## **1987 to 1990 - Eastern Michigan University, Ypsilanti, MI**

### **Adjunct Professor:**

- Developed a graduate level program in acoustics.
- Developed and taught courses in Advanced Theoretical Acoustics and Signal Processing.

## Education

Ph.D. - Acoustics, GPA 4.0/4.0, 1980 - 1982 The Pennsylvania State University, University Park, PA

M.S. - Physics, GPA 4.0/4.0, 1975 - 1977 Eastern Michigan University, Ypsilanti, MI

B.S. - Physics, GPA 3.7/4.0, 1969 - 1973 Eastern Michigan University, Ypsilanti, MI

## Honors and Affiliations

- Awarded the Henry Ford Technological Achievement Award in 1991 for work in “Sound Quality”. The single highest award given by the Ford Motor Company. From over 300,000 employees, less than ten are given per year and only a few hundred have ever been given.
- Nominated for two other Henry Ford awards.
- Honored for contributions to the Ford-Nelson JV by the naming of the Erickson-Geddes building in Madison, Wisconsin.

### Audio Engineering Society - Member since 1978

- Fellow - 1988
- Central Region Vice President - 1986-87
- Governor - 1990-91
- 91st Convention Papers Chairman, October 1991
- Presidential Candidate 1992 & 1993
- Chairman - Transducer Technical Committee - 1994-1998

### Acoustical Society of America - Member since 1981

- Member Noise Technical Committee 1991-1995

### Society of Automotive Engineers - Member since 1983

- Member of the NVH (noise) Conference planning committee for three conferences, 1989, 1991, 1993

## Patents

- #6,269,318 "*Method for Determining Transducer Linear Operational Parameters*"
- #5,469,510 "*Arbitration Scheme for Sound Reproduction System and Active Noise Control*"
- #5,455,396 "*Temperature Resistant Transducer Suspension*"
- #5,432,857 "*Dual Bandpass Secondary Source*"
- #5,420,929 "*Signal Processor for Sound Imaging*"
- #5,343,533 "*Transducer Flux Optimization*"
- #5,319,165 "*Dual Bandpass Secondary Source*"
- #5,313,407 "*Integrated Active Vibration Cancellation and Diagnostics*"
- #5,323,466 "*Tandem Transducer Magnet Structure*"
- #5,233,137 "*Protective ANC Loudspeaker Membrane*"

- #5,229,556 “Internal Ported Band Pass Enclosure for Sound Cancellation”
- #5,210,805 “Transducer Flux Optimization”
- #5,119,902 “Active Muffler Transducer Arrangement”
- #5,063,598 “Active Noise Control System With Two Stage Conditioning”
- #5,060,271 “Active Muffler with Dynamic Tuning”
- #5,048,470 “Electronically Tuned Intake Manifold”

## Language/Program

<u>Program</u>	<u>Experience</u>
FORTRAN	Extensive
Visual Basic, .Net	Extensive
C/C++, Visual C++	Familiarity
DSP	
Theory	Extensive
Coding	Familiarity
Math Cad	Extensive
Office Automation	Extensive
Finite Element	
Theory	Extensive
Programs (Various)	Familiarity
Numerical Methods	Extensive

Summary - Extremely capable at all aspects of computers

## Publications and Presentations:

### Books

Audio Transducers, 2002, GedLee Publishing

Premium Home Theater, 2004, GedLee Publishing

### Refereed

- *Acoustic Waveguides In Practice*, Earl R. Geddes, Paul D. Bauman, A.B. Adamson, J. Audio Eng. Soc., Vol. 41, No. 6, June 1993.
- *Acoustic Waveguide Theory Revisited*, Journal Audio Eng. Soc., Vol. 41, No. 6, June 1993. Reprinted in the Loudspeakers - An Anthology series.
- *Sound Radiation from Acoustic Apertures*, Journal Audio Eng. Soc., Vol. 41, No. 4, April 1993.
- *Acoustic Waveguide Theory*, Journal Audio Eng. Soc., Vol. 37, No. 7, August 1989. Reprinted in the Loudspeakers - An Anthology series.
- *An Introduction to Bandpass Loudspeaker Enclosures*, Journal Audio Eng. Soc., Vol. 37, No. 5, May 1989.

- Reprinted in the Loudspeakers - An Anthology series.
- *Computer Simulation of Horn Loaded Compression Drivers*, Earl R. Geddes, D Clark, J. Audio Eng. Soc., Vol. 35, No. 7, August 1987.
- *A Boundary Element Approach to Finite Element Radiation Problems* Earl R. Geddes, J. Porter, Journal Audio Eng. Soc., Vol. 35, No. 4, April 1987.
- Reprinted in the Loudspeakers - An Anthology series.
- *Finite Element Approximation for Low Frequency Sound in a Room with Absorption* Earl R. Geddes, J. Porter, J. Acou. Soc. Am., Vol. 33, No. 3, May 1987.
- *The Localized Sound Power Method* Earl R. Geddes, H. Blind, Transactions of the Soc. Auto. Eng., September 1986.
- *Source Radiation Characteristics*, Journal Audio Eng. Soc., Vol. 34, No. 6, June 1986
- *The Localized Sound Power Method* Earl R. Geddes, H. Blind, Journal Audio Eng. Soc., Vol. 34, No. 3, March 1986.

## OTHER

- “Noise Perception in the Hearing Impaired”, with Lidia Lee, presented to the 167th convention of the ASA, Dec. 1996, Honolulu Hawaii.
- Published in Journal of Speech and Hearing Research.
- "On the Use of the Hankel Transform for Source Directivity Calculations", presented at the 93rd AES Convention, October 1992, New York NY.
- “Efficient Loudspeaker Linear and Nonlinear Parameter Estimation: An Extension”, with Henry Blind and Alan Phillips,
- presented at the 93rd AES Convention, October 1992, New York NY.
- “Efficient Loudspeaker Linear and Nonlinear Parameter Estimation”, with Alan Phillips,
- presented at the 91st AES Convention, October 1991, New York NY.
- “Statistical Stability of Automotive Sound Systems”, with Robert Benedict, James Porter and Gregory Weyneth,
- presented at the 110th SAE Convention, February 1990. Detroit MI.
- “Two Microphone Technique for Measuring Acoustic Waveguide Impedance”, with Steven Riggs,
- presented at the 87th AES Convention, October 1989, New York NY.
- “Modern Spectral Estimation and Its Uses in Audio”, presented at the 87th AES Convention, October 1989, New York NY.
- “Cabinet Diffraction Effects”, with James Porter, presented at the 85th AES Convention, November 1988, Los Angeles CA.
- “Sound Radiation From Acoustic Apertures”, presented at the 85th AES Convention, November 1988, Los Angeles CA.
- "Acoustic Waveguide Theory”, presented at the 83rd AES Convention, October 1987, New York NY.
- “Compensation For Road Noise In Automotive Entertainment Systems”, with David Clark, Henry Blind and Walter Dorfstatter,
- presented at the 107th SAE Convention, February 1987, Detroit MI.
- "Bandpass Loudspeaker Enclosures”, with David Fawcett, presented at the 80th AES Convention, November 1986, Los Angeles CA.

- "High Accuracy Interior Noise Measurements", presented at Noise-Con 86, July 1986, Boston MA.
- "Passively Assisted Loudspeakers", with David Clark,
- presented at the 79th AES Convention, October 1985, New York NY, and the 106th SAE Convention, February 1986, Detroit MI.
- "Computer Simulation of Horn Loaded Compression Drivers", with David Clark, presented at the 79th AES Convention, October 1985, New York NY.
- "Source Radiation Characteristics", presented at the 78th AES Convention, May 1985, Anaheim CA.
- "In Pursuit of Elusive Loudspeaker Parameters", with Henry Blind and Walter Dorfstatter,
- presented at the 78th AES Convention, May 1985, Anaheim CA.
- "The Equalized Sound Power (ESP) Automotive Sound System" with Henry Blind,
- presented at the 76th AES Convention, October 1984, New York NY, and the 105th SAE Convention, February 1985, Detroit MI.
- "The Localized Sound Power Measurement Technique", with Henry Blind,
- presented at the 76th AES Convention, October 1984, New York NY, and the 105th SAE Convention, February 1985, Detroit MI.
- "The Breakdown of the Green's Function Near a Source in Finite Element Analysis", with James C. Porter,
- presented at the 108th ASA Convention, October 1984, Minneapolis MN.
- "The Finite Element Method in Acoustics", presented at the 106th ASA Convention, November 1983, San Diego CA.
- "Low Frequency Sound Field Statistics in Non-rectangular Reverberation Chambers", presented at the 105th ASA Convention, May 1983, Cincinnati OH.
- "Acoustic Lenses: Their Design and Application", presented at the 61st AES Convention, November 1978, New York NY.

## INVITED

- Invited speaker at the Annual Starkey Hearing Aid Conference held in Martinique in February 1996. Topic: "Noise Issues for the Hearing Impaired".
- Invited speaker Illinois Academy of Audiology in Chicago, Illinois, February 1996. Topic: "Back to Basics: Hearing Aid Transducers".
- Invited Speaker at the *Recent Advances in Hearing Aid Technology* session of the 130th ASA Convention, November 1995, St. Louis, Missouri.
- Topic: "Recent Advances in Microphones for Hearing Aids".
- Invited speaker at the *Sound Quality* session of the 104th ASA Convention, May 1990, State College PA.
- Topic: "The History of Sound Quality in the Automotive Industry"
- Invited speaker at the Toronto Chapter AES, June 1988. Topic: "Acoustic Waveguides"
- Invited speaker at the special session on Transducer Modeling, 82nd AES Convention, October 1987, New York NY.
- Topic: "Transducer Modeling"

- Invited speaker at The Pennsylvania State University, May 1986 and the University of Waterloo, Waterloo Ontario, July 1987.
- Topic: “The Use of Finite Element Method In Acoustics”
- Invited speaker at the Austin Texas Chapter of AES, May 1987.  
Topic: “Automotive Sound System Design”
- Keynote speaker at The Midwest Acoustics Conference held at Northwestern University, Chicago IL, April 1987.
- Topic: "Computer Modeling of Audio Transducers”

## **EVENTS**

- Organizer and Co-Chairman, *Sound Quality* papers session, SAE Noise and Vibration Conference, May 1993, Traverse City MI
- Papers Chairman, The 91st AES Convention, October 1991, New York , NY.
- Organizer and Chairman, *Subjective Aspects of Noise Control* papers session, SAE Noise and Vibration Conference, May 1991, Traverse City MI
- Co-Organizer (with Dave Lubman) of the *Sound Quality* session of the 104th ASA Convention, May 1990, State College PA.
- Organizer and Chairman, *Sound Quality* session and workshop, SAE Noise and Vibration Conference, May 1989, Traverse City MI.
- Session Chairman, *Acoustics*, 79th AES Convention. October 1985, New York, NY.