

# Jonathan Lay

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## Engineering, Innovation, Solution Development

*Software and electronics engineer with BS degree and extensive experience in instrument automation, science, and business.*

### Areas of Expertise

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| • Software development                     | • Mathematical analysis                    |
| • Electronic system design                 | • Audio production & engineering           |
| • Process & equipment automation           | • Acoustics                                |
| • Calibration system development           | • Medical device design & manufacturing    |
| • Sensor characterization & implementation | • Graphic User Interface (GUI) development |
| • Experimental research                    | • Device drivers                           |
| • Manufacturing                            | • Innovative solutions                     |
| • Business concepts & analysis             | • Technical writing & verbal communication |
| • Project management                       | • Leadership & teamwork                    |

### Tools

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| • Software development: Microsoft Visual Basic (VB6 & VB.NET), UltraEdit, UltraCompare, MySQL, SQL | • Graphic design: Adobe PageMaker  |
| • General software tools: MS Excel, MS Word, MS Project, MS Visio, MS Access                       | • Specialized acoustic tools: realtime FFT analyzer, sound level meter, accelerometer, sound isolation chamber, artificial mastoid                                     |
| • Web design: FrontPage, HTML  | • Specialized air quality tools: nephelometer, gas chromatograph, barometer, gas sensors (CO, CO <sub>2</sub> , VOC), chilled mirror hygrometer, environmental chamber |
| • Audio recording & production: Digidesign Pro Tools, Syntrillium Cool Edit Pro, Adobe Audition    |  |

### Professional Experience

**AirAdvice Inc., Portland, OR. (Indoor air quality equipment manufacturing & advice.)** **2001 to 2007**  
**Titles: Manager of Calibration & Test Systems; Lead Hardware Engineer**

- Principal designer for all sensor calibration procedures.
- Principal engineer for all test and calibration equipment and systems.
- Developed calibration equations for temperature, humidity, pressure, carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), and volatile organic compound (VOC) sensors.
- Designed, conducted, and analyzed results of experiments to characterize or evaluate sensor performance. This has led to extremely high performance from inexpensive sensors.
- Developed all software for automated testing and calibration of AirAdvice products. This software allows the operator to select procedures, click "Start," and walk away. Software components developed include instrument drivers, graphic user interface, test protocols, and database interface.
- Scaled manufacturing test and calibration systems in response to an approximately 300-fold increase in product revenues over four years. In the same time period, the product's sensor-set and accuracy were increased, and a service load for periodic recalibration emerged.
- Recruited and managed the engineering and production team that made the company's breakthrough product manufacturable. This team then performed the actual production test and calibration to meet extremely aggressive production demands with minimal resources. The team consisted of a chemist, an electronic test technician, and myself.
- Worked integrally with the AirAdvice technical team in all major technical projects involving hardware and firmware, including product and feature development, manufacturing, industrial design, and problem solving.

**Epicor Software Corp., Tualatin, OR. (Customer relationship management (CRM) software) 1999-2001**

**Software Engineer:** Worked in a team of 4 to 6 software engineers to add features and release a new revisions of the company's flagship customer relationship management (CRM) software product, and two related software products. In each of 3 revision cycles, the team completed assignments on schedule, with the planned feature set, and with high quality.

**Self-employed engineer & consultant**

**1998-1999**

Work for clients included software development, electronic & audio engineering, and interim management.

**Client: Oregon Health Sciences University, Portland, OR**

- Tinnitus Evaluation System: Maintained and updated software application which allows sound stimuli to be presented to patients in order to characterize their tinnitus (ringing in the ears). Calibrated clinical system. Trained audiologist on system use & calibration. (This was a system I previously developed while an employee of OHSU).
- Hearing Research: Installed, calibrated, and maintained equipment, customized instrumentation and software, and provided technical advice for medical study.

**Client: Hearing Innovations Inc., Tucson, AZ (now Misonix)**

Worked as a consultant engineer on the development and product release of the first (and only) ultrasonic hearing aid. This device, called the HiSonic, is an alternative to cochlear-implant hearing aids. It has since evolved into the HiSonic-TRD (Tinnitus Relief Device).

- Managed the engineering and manufacturing team on an interim basis (3 months)
- Designed and executed tests of the initial prototype sensors and devices using acoustic laboratory equipment
- Developed prescription fitting software ("Hearing Assistant") for tailoring the performance of the device to the needs of individual patients. The software included a GUI, data storage & retrieval, and a hardware driver.
- Worked with directly with everyone in the company, including the CEO, audiologists, engineers, technicians and assemblers.
- Developed the software portion of an "Osseometer" instrument used to determine a patient's threshold of hearing for bone-conducted sound at various frequencies. The software included a GUI and hardware driver.

**Oregon Health Sciences University, Portland, OR / Oregon Hearing Research Center  
Research Associate (Electronics/Software/Acoustics Engineer):**

**1993-1998**

- Provided engineering support to research scientists and clinical staff.
- Participated in a broad range of projects involving electronics, acoustics, software engineering, and digital signal processing.
- Developed (with a co-engineer) a PC-based system for diagnosing tinnitus. The system included a PC with sound card and application software, and an external hardware device for precise control and presentation of audio stimuli. Personal contributions included project concept and launch, determination of performance requirements, architecture co-development, and development of application software for clinical testing and calibration. Application software included graphic user interface, device driver, test protocol, calibration procedure, and test data storage. This system is still in daily clinical use in year 2007.

**Virtual Corporation, Portland, OR (Hearing diagnosis products.)****1986-1992**

- **Manufacturing Manager:** Responsible for production and service of audiometric instruments.
  - Managed all manufacturing and repair functions.
  - Procured all raw materials and contract manufacturing service.
  - Provided technical support and training to the production team.
  - Participated in technical aspects of design changes.
  - Directly performed technical work including audiometer calibration, machining and adapting high-frequency audiometer earphones, configuring and repairing computers.
- **Product Development Team Leader:** Project was to develop a computer-controlled audiometer with extended high-frequency capability (the Model 320). Responsible for entire project except the software and user's manual.
  - Researched audiometer performance requirements.
  - Developed hardware architecture and performance specifications.
  - Coordinated activities of 3 engineers, 1 technician, and 1 assembler.
  - Directly performed many portions of electronic & mechanical design.
  - Researched requirements and specified production tests for audiometer, sound field speakers, microphones, bone vibrator, high frequency (20 kHz) earphones, and insert earphones.

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**Education**

- BS Industrial Management, Oregon Institute of Technology, 1992. Graduated with honors.
- AS Electronic Engineering Technology, Chemeketa Community College, Salem, OR 1981

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**Publications and Presentations**

- Lay, Jonathan & Nunley, James, "Tinnitus Evaluation System Based on Computerized Auditory Research Laboratory (CARL)," poster presented at the Fifth International Tinnitus Seminar, July 12-15, 1995.
- Lay, Jonathan & Nunley, James "Tinnitus Evaluation System Based on Computerized Auditory Research Laboratory," *Proceedings of the Fifth International Tinnitus Seminar*, Published 1996 by American Tinnitus Association, Portland, Oregon
- Lay, Jonathan & Nunley, James, "Computer-Based Tinnitus Evaluation System," *Hearing Instruments*, March 1996.
- Golding, Maryanne, David Lilly, Jonathan Lay, "A Staggered Spondaic Word (SSW) Test for Australian Use," *The Australian Journal of Audiology*, Vol. 18, Number 2, Nov. 1996 pp81-87.
- Meikle, Mary, Jonathan Lay, "Clinical Techniques for Evaluation and Treatment of Tinnitus," lecture presented to American Academy of Audiologists, Oregon Chapter, Salem, Oregon, June 7, 1997.