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Biologically Inspired Acoustic Sensors

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The development of novel, biologically-inspired silicon microphones will be presented. The primary goal of this effort is to enable the fabrication of very small directional microphones. The design approach follows from our investigation of the mechanics of directional hearing in insects. Many small animals rely on the localization of sound sources both for mate selection and for predator avoidance. In small animals such as insects, the small separation distance of the ears causes the interaural differences in time of arrival or amplitude of the sound to be insufficient to permit sound source localization based on signal processing in the central nervous system. In some insect species, the auditory system has evolved clever mechanical devices to accomplish a mechanical pre-processing of the signals prior to input into the central nervous system. In this talk, an analysis will be presented of the highly directional ears of the parasitoid fly, *Ormia ochracea* which has a remarkable ability to use auditory clues to locate its host, a singing male cricket. The tympanal structures of these ears suggest a novel approach to designing very small directionally sensitive microphones. Microphone diaphragm designs are presented that have been fabricated using silicon microfabrication technology. Development efforts will be described for directional microphones for hearing aids and for smart acoustic microsensors for military applications.

Ron Miles received a BSEE from UC Berkeley in 1976, a MSE in 1985, and a Ph.D. in 1987, both from the University of Washington. Beginning in 1977 he worked in the acoustics staff at Boeing for eight years. He was an assistant research engineer and lecturer in the Department of Mechanical Engineering at UC Berkeley from 1/87 through 12/88. He has been with the Department of Mechanical Engineering at the State University of New York at Binghamton since 1989 where he is now Professor.



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