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Fabrication of directional sound sensor by silicon micromachining[1] MICHAEL TOUSE, JEFFREY CATTERLIN, JOSE SINIBALDI, GAMANI KARUNASIRI, Naval Postgraduate School — A directional sound sensor based on the operational principle of the Ormia ochracea fly's hearing organism [1] was fabricated using micro-electromechanical system (MEMS) technology. The fly uses coupled bars hinged at the center to achieve directional sound sensing by monitoring the difference in their vibration amplitudes. The MEMS design employed in this work consisted of a 1x2 square millimeter polysilicon membrane hinged at the center and positioned about 1 micrometer above the substrate using a sacrificial silicon dioxide layer. Finite element analysis of the device shows two primary vibrational mode frequencies, one corresponding to a rocking mode which is highly dependent on angle of incidence, and the other to a bending motion which remains constant through all angles. Using a laser vibrometer to measure response, rocking and bending modes were observed at driving frequencies of 3.0 and 11.4 kHz, respectively, and angular dependence was in close agreement with modeling. [1] R.N. Miles, R. Robert, and R. R. Hoy, "Mechanically coupled ears for directional hearing in the parasitoid fly Ormia ochracea," J. Acoust. Soc. Am., **98** (6), Dec. 1995

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