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Biologically inspired MEMS based directional microphone<sup>1</sup> MICHAEL TOUSE, STEPHEN HARRISON, JEFFREY CATTERLIN, GAMANI KARUNASIRI, Naval Postgraduate School — A novel MEMS microphone is presented which mimics the aural system of the Ormia ochracea fly and its extraordinary directional sensitivity. To overcome the minimal separation between its ears, a flexible hinge mechanically couples the fly's two tympanic membranes. By comparing the frequency response of these two structures, the interaural differences are amplified and sound source information is processed with unparalleled speed and accuracy. The presented device is  $2\text{mm x } 1\text{mm x } 10\mu\text{m SOI}$ , hinged at the middle and attached to the substrate using two narrow legs, allowing both rocking and bending modes. Along the edges of the membrane, two sets of interdigitated comb fingers are connected to an Irvine Sensors capacitive readout chip to allow electronic measurement of the displacement. Also presented are results of extensive finite element modeling performed using COMSOL Multiphysics, which are in close agreement with experimental data.

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