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Soft-Matter Resistive Sensor for Measuring Shear and Pressure Stresses DANIEL TEPAYOTL-RAMIREZ, PETER ROBERTS, CARMEL MAJIDI, Carnegie Mellon University — Building on emerging paradigms in soft-matter electronics, we introduce liquid-phase electronic sensors that simultaneously measures elastic pressure and shear deformation. The sensors are com- posed of a sheet of elastomer that is embedded with fluidic channels containing eutectic Gallium- Indium (EGaIn), a metal alloy that is liquid at room temperature. Applying pressure or shear traction to the surface of the surrounding elastomer causes the elastomer to elastically deform and changes the geometry and electrical properties of the embedded liquid-phase circuit elements. We introduce analytic models that predict the electrical response of the sensor to prescribed surface tractions. These models are validated with both Finite Element Analysis (FEA) and experimental measurements.

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