

*Abstract*

# Nonlinear-Based MEMS Sensors and Active Switches for Gas and Acceleration Applications <sup>†</sup>

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**Abstract:** In this talk, we demonstrate the realization of smart sensors and actuators through the exploitation of principles of nonlinear dynamics at the micro scale. Specifically, we demonstrate combining sensing and actuation into a single device through what is called smart switches triggered by the detection of a desirable physical quantity. The concept aims to reduce the complexity of systems that rely on controllers and complex algorithms to realize on-demand trigger actions. In the first part of the talk, we discuss the category of switches triggered by the detection of gas. Toward this, electrostatically microbeams resonators are fabricated, then coated with highly absorbent polymers (MOFs), and afterward are exposed to gases. Such devices can be useful for instant alarming of toxic gases. In the second part, we demonstrate switches triggered by shock and acceleration. The concept is demonstrated on a millimeter-scale capacitive sensor. The sensor is tested using acceleration generated from shakers. Such devices can be used for the deployment of airbags in automobiles.

**Keywords:** sensors; triggers; switches; resonators



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