MEMS Optical Cavities for Low Power Distributed Sensing

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Abstract

In order to enable greater density and number of distributed sensors it is necessary to vastly reduce the power consumption and interconnection complexity for each individual sensor. Traditional sensor interconnection methods use wired electrical connections or antennas for wireless connections. We propose a new method of sensor interconnection which uses a MEMS optical cavity and optical fiber in order to communicate with vastly reduced power consumption using a novel method of communication.

We have demonstrated a new method of communication where light is sent down an optical fiber to a MEMS optical cavity. The optical cavity consists of a MEMS mirror and glass encapsulation with a small air gap in between. The MEMS mirror's position can be changed using electrostatics which requires very little power. The movement results in a change in reflectivity seen by the light sent down the optical fiber. This reflected light can be used for communication, where the position of the MEMS mirror and the reflected light intensity are related. Only reflected light is modulated, no new light or signals need to be created. In the future these MEMS optical cavities can be connected to sensors or 'Smart' CMOS electronics, and they could be arrayed in series along a single optical fiber.

Biography of Presenter

Jacob Schopp is a graduate research assistant working on MEMS optical devices at the University of Louisville. At the University of Louisville, Jacob has received his bachelor's degree and is working on his master's degree in Electrical Engineering.