Field Programmable Magnetic Surface Acoustic Wave (SAW) Devices for Hybrid Sensor Networks

We are developing novel magnetic sensors amenable to wireless interrogation in complex sensor networks. These sensors are based on an acousto-electric effect where the propagation velocity of surface acoustic waves (SAW) in a piezoelectric substrate changes in response to the conductivity of an overlying magnetic film. Key benefits realizable from the successful development of these devices include:

- Passive (no battery) operation
- Remote radio frequency (RF) interrogation
- Field programmable ID for sensor networks
- Rugged and inexpensive

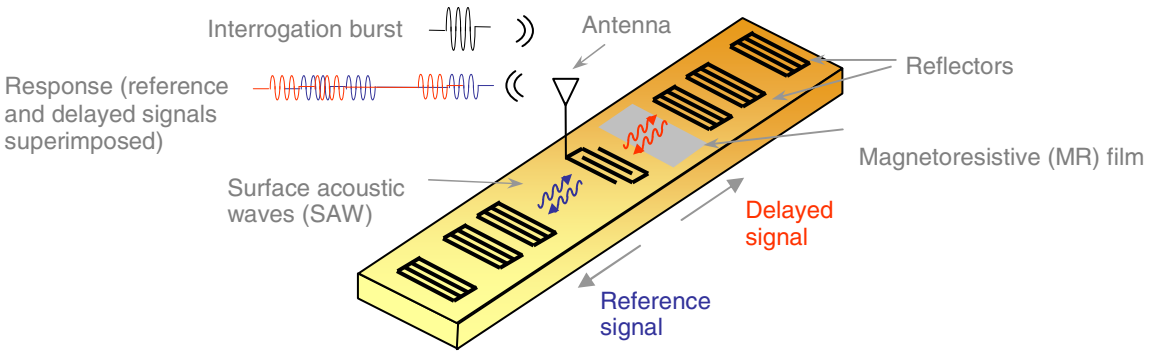

Figure 1. In the presence of a magnetic field the resistance of the magnetoresistive film changes. Consequently, the propagating SAW is delayed relative to a reference. By measuring this delay the strength of the magnetic field can be determined, thereby allowing the use of the device in magnetic field sensing applications. The reflectors and antenna enable wireless measurements and device identification. The reflectors may be selectively programmed to be "short" or "open". The device is thus endowed with a unique identification (ID) so that when queried with a short burst of radio frequency (RF) waves it returns a "signature" response, determined uniquely by the position and programming of the reflectors.

Supported by: NSF
Investigator: Dr. Dhagat, OSU