

Active Piezo-Resistive MEMS in Flexible Substrates

Proposers

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Microelectromechanical systems have both electronic and mechanical functionalities. Therefore, MEMS can be used to detect physical motion. In this PhD proposal it is intended to study the use of piezoresistor arrays implemented in flexible polymeric substrates to detect breathing and determine its pace.

Breathing pace is a determinant screening input for the Manchester protocol followed in hospital urgencies. This indicator is often not fully exploited in urgencies since there is no automatic procedure to follow breathing activity and its changes while waiting for attendance. Therefore, breathing is sampled at the arrival and then sparsely observed

The Analog and Mixed-signal Group at INESC-ID has designed integrated circuits, in several different processes ranging from BiCMOS to pure CMOS circuits in technologies from 0.35 μm to SOI 28 nm. The circuits comprise RF, analog, interface circuits and digital.

The Thin-Film MEMS and BioMEMS group at INESC MN has developed a low-temperature, large-area process for the fabrication of MEMS piezoresistors that allows these resonators to be implemented on glass and flexible polymeric substrates using clean room micro and nanofabrication techniques.

This project intends to use the piezoresistive properties of appropriate MEMS structures (INESC-MN) to act as a sensor for breathing and integrate the electronics (INESC-ID) to bias, read, evaluate and communicate in a microelectronic ASIC (Application Specific Integrated Circuit) implemented in a CMOS backend process.

Profile sought: preference, but not limited, to students with a background in Physics with an interest in Electronics or Electrical Engineers with an interest in Physics, Devices, and Micro and Nanofabrication.