Ultrasensitive wireless strain sensor for structural health monitoring

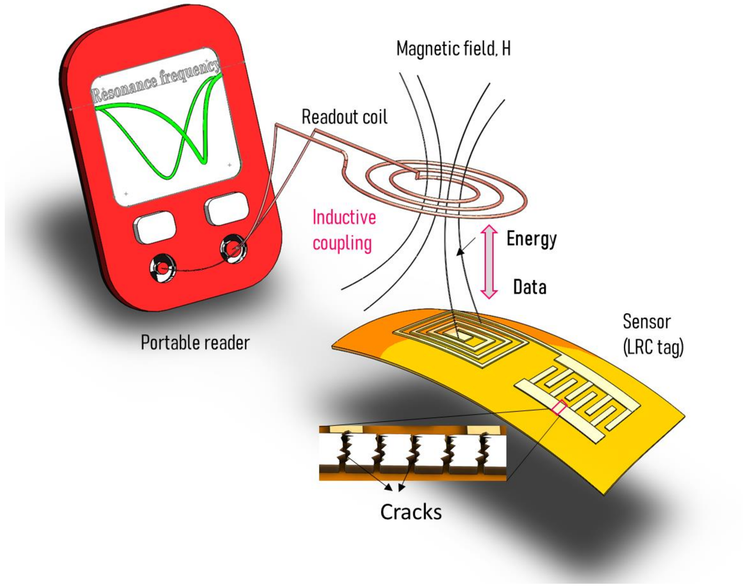
Hussein Nesser and Gilles Lubineau

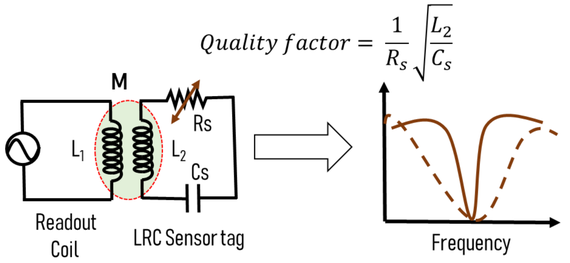
Objective:
Embedding a monitoring system including :sensor, cable, and interface circuit is a hindrance for some structures. Our project aims to develop new generations of strain sensors that are ultra-sensitive, have wireless communication of data and energy, low consumption of power, easy installation *in-situ* structures.

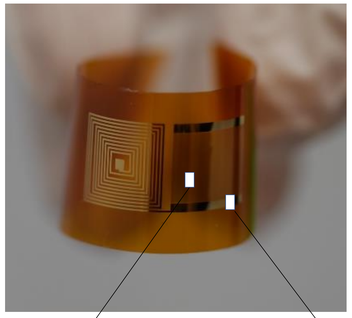
Methods:
The data and energy, from and to LRC tag, will be transmitted remotely by an inductive coupling between the internal inductance of the sensor and an external readout coil. The external strain is detected by following the variation on the quality factor of the resonance frequency of the LRC circuit resulting from the variation of resistance of cracked electrodes.

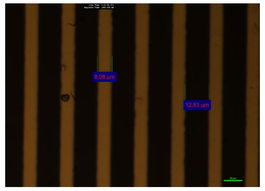
Results:
- Microfabrication method, alternative to silicon technology, is used in the fabrication of our sensor.
- Durable, flexible and thin materials like polyimide or PET, are used in the fabrication of our sensor which facilitates the process of integrating the sensor.
- High crack density is created in a nonmetric metal electrodes (Cr/Au).
- High-sensitivity (GF= 6657) and low strain detection (<0.1% strain).

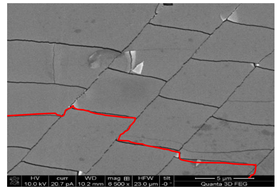
➢ *Working towards following the resonance frequency by an external readout coil.*

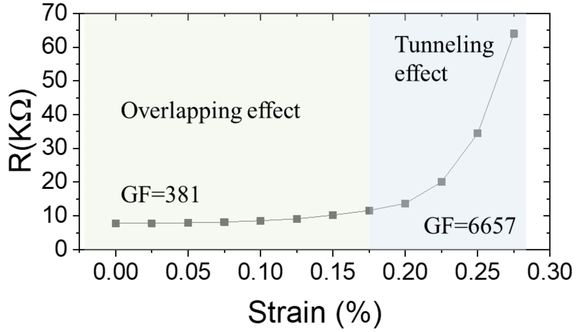












King Abdullah University of Science and Technology (KAUST), Physical Sciences and Engineering Division (PSE), COHMAS Laboratory, Thuwal 23955-6900, Saudi Arabia.

COHMAS