UNIVERSITÉ DE SHERBROOKE

# (Chaire NSERC- TDSI) Hyperspectral infrared imaging

Record number : OPR-507

## Overview


**RESEARCH DIRECTOR**

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**Information**
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**ADMINISTRATIVE UNIT(S)**

Faculty of Engineering
Department of Electrical and Computer Engineering

**LEVEL(S)**

Master's degree
Ph.D.

**LOCATION(S)**

Campus principal
Bromont

## Project Description

Research topics background : In infrared spectroscopy, particularly for gas analysis, the medium and far infrared spectrum is divided into two regions: the one from ~2.5 µm to ~6 µm corresponding to vibrations from the stretching of molecules and the one from ~6 µm to ~20 µm corresponding to vibrations from their bending. Molecular groups have a specific absorption in this second region allowing them to be identified. Infrared imagers based on microbolometers, manufactured by our industrial partner, are particularly sensitive in the 8 µm to 14 µm range. Thus, the objective of this research topic is to develop an integrated solution based on microbolometers to perform hyperspectral imaging without external spectral discrimination components such as a spectrometer or an interferometer. The work will consist in designing, simulating and characterizing pixel-level spectral filters that sample infrared spectra in a sufficiently dense manner on the microbolometer matrix to allow the use of image reconstruction algorithms. Very regular interactions with our industrial partner will allow us to integrate filtering solutions into the imagers manufacturing process in order to characterize and select the most efficient candidates.

Research environment: As part of a research project with industrial partners, several PhD thesis topics are available in the areas of manufacturing processes development, encapsulation and characterization of new materials for the micro-electromechanical systems (MEMS) next generation. For this, an outstanding research environment is available. First, the Interdisciplinary Institute for Technological Innovation (3IT), located on Université de Sherbrooke’s campus (Quebec), houses 1600 m2 of space laboratories and 430 m2 of class 100 clean rooms. Second the MiQro Innovation Collaborative Center (C2MI) located in Bromont, whose founding members are the Université de Sherbrooke, IBM Canada and Teledyne DALSA and which is the biggest microelectronics research center in Canada. Finally, Teledyne DALSA, a semiconductor foundry specialized in MEMS, CMOS and CCD technologies. In this context, the activities of the industrial research program provide a unique training environment, given the C2MI industrial micro/nano facilities, its collaborative context, and 3IT topics and multidisciplinary environment.

Candidate profil : Candidates must have a Master's degree in Physics of Materials and Nanotechnologies (nano-optics, nano-manufacturing, nano-materials ...) or a recognized engineering degree, ideally in Nanotechnologies. Candidates should be autonomous, flexible, proactive and able to work in team within industrial research environment.

## Discipline(s) by sector

### Natural Sciences and Engineering

Electrical Engineering and Electronic Engineering

## Funding offered

Yes

## Partner(s)

Teledyne DALSA

The last update was on 24 November 2020. The University reserves the right to modify its projects without notice.