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Title:

Development of a multispectral short wave infrared demonstrator using pixel level filtering

Abstract:

SILIOS Technologies, THALES LAS, and LYNRED have co-developed a snapshot multispectral shortwave infrared (SWIR) prototype using pixel level filtering. Spectral imaging in the SWIR spectral band is emerging thanks to its large potential. Indeed, close to VIS/NIR wavelengths, SWIR images interpretation is made easier for the users compared to IR band, atmospheric transmission and contrast could be better compared to VIS/NIR band. Furthermore, thanks to the presence of the filters, new opportunities can be found in several fields of applications such as defense and security (laser detection and observation, detection under camouflage,…), transport (automotive safety), industry (nondestructive process control, food and plastic sorting) or new space. In the frame of this work, a new dimension is added: the spectral resolution.

The SILIOS Technologies' filters are positioned in the optical path on top of the focal plane array (FPA) and aligned on its imaging pixels. The pixelated filters are made of a 3x3 (or 2x2) array transmitting 9 (or 4) different wavelengths from 1.1µm up to 1.7µm. These 3x3 (or 2x2) pixel arrays are repeated in both directions over the whole FPA.

One of the main technology in SWIR is based on InGaAs material. This material insures performance, stability and reliability. Furthermore it is compatible with a high production capacity. The prototype discussed in this paper is based on the SNAKE product from LYNRED. SNAKE is a 640x512 15µm pitch FPA. On the incoming light side of the FPA, a specific thinning process is used in order to improve the spectral performances of the prototype by a reduction of the optical cross-talk between filtered pixels.

A full set of characterization has been performed. The spectral performances of the prototype are described in this paper. The prototype is now integrated in a camera core and is ready for an evaluation in applicative conditions.