Technology Offer   CSIC/JA/001

Method and hardware for single-shot simultaneous AE and HDR imaging

Novel sensor technology that concurrently merges AE and HDR during image capture. Suitable for application scenarios demanding prompt decisión making: navigation of robots and drones, security, surveillance ...

Intellectual Property

Priority patent application filed

Stage of development

Experimental proof of concept

Intended Collaboration

Licensing and/or co-development

Contact

José Andrés Espino Román

Vice-presidency for Innovation and Transfer

innovacion@imse-cnm.csic.es
comercializacion@csic.es

Market need

Image sensors are expected to adapt to the ambient illumination and properly encode the wide dynamic range of real-world scenes, both of which are unknown in advance.

The standard adaptation approach in commercial image sensors implies: iteratively searching for a suitable exposure setting according to prescribed aspects of the scene using AE techniques, which may cause flickering in scenes undergoing abrupt lighting changes; and capturing several images with different exposure times to compose an HDR image using exposure bracketing, which may generate motion artefacts. The complete process prolongs the image formation.

CSIC solution

A Hardware implementation based on pixel array circuitry that automatically adjusts its response to the ambient illumination and fits the radiance map os the scene into the available signal range. Linear sensor response for low levels of light intensity and non-linear sensing response for high levels of light intensity – "low" and "high" relative to the ambient illumination. No additional time apart from the photo-integration interval required to generate an HDR image. Arbitrary radiance maps can be accommodated within the available signal range. Asynchronous operation of the proposed circuitry once the pixels are reset, requiring no external control.

Competitive advantages

- First imaging technique that integrates AE and HDR asynchronously in a single shot keeping a linear pixel response.
- Simple and rapid image formation process, requiring neither external control nor assumptions about the illumination conditions of the scene.
- Saving of memory and computational system resources: no composition of multiple images required.