



**HAL**  
open science

## Smart camera design for realtime High Dynamic Range imaging

Pierre-Jean Lapray, Barthélémy Heyrman, Matthieu Rosse, Dominique Ginhac

► **To cite this version:**

Pierre-Jean Lapray, Barthélémy Heyrman, Matthieu Rosse, Dominique Ginhac. Smart camera design for realtime High Dynamic Range imaging. First Workshop on Architecture of Smart Camera (WASC), Apr 2012, Clermont ferrand, France. pp.1. hal-00785912

**HAL Id: hal-00785912**

**<https://u-bourgogne.hal.science/hal-00785912>**

Submitted on 7 Feb 2013

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

## **High dynamic range smart camera**

P.J. Lapray and D. Ginhac  
plapray@gmail.com, dginhac@u-bourgogne.fr

Aile de l'ingénieur  
Laboratoire Le2i  
21000 Dijon, France

Many camera sensors suffer from limited dynamic range. The result is that there is a lack of clear details in displayed images and videos.

This presentation describes our approach to generate high dynamic range (HDR) from an image sequence while modifying exposure times for each new frame. For this purpose, we propose an FPGA-based architecture that can produce a real-time high dynamic range video from successive image acquisition. Our hardware platform is built around a standard low dynamic range (LDR) CMOS sensor and a Virtex 5 FPGA board. The CMOS sensor is a EV76C560 provided by e2v. This 1.3 Megapixel device offers novel pixel integration/readout modes and embedded image pre-processing capabilities including multiframe acquisition with various exposure times.

Our approach consists of hardware architecture with different algorithms: double exposure control during image capture, building of an HDR image by combining the multiple frames, and final tone mapping for viewing on a LCD display.

Our stationary video camera system is able to achieve a real-time video rate of 30 frames per second for a full sensor resolution of 1280x1024 pixels.