



TECHNOLOGY

True High-Dynamic Range Single Lens Video Camera

OVERVIEW

Background

Current digital imaging arrays (sensors), whether CCD or CMOS, have a fundamentally limited dynamic range. For imaging in daytime conditions, direct sunlight coupled with reflections from the water surface and other bright objects causes saturation that could hide important details in parts of the image. Conversely, in dawn, twilight, or nighttime conditions details can be hidden in the faintly lit areas. Low dynamic range imagery can be problematic at best but could easily be life endangering in military situations. In many circumstances being able to quickly gather as much visual information as possible in the minimum amount of time is critical.

Innovative Technology

Researchers at the University of Maryland have developed a high dynamic range video camera that from a single lens provides multiple image streams that are successively attenuated by precise factors. These images are then instantly interleaved via hardware-based image processing to provide composite frames that have sufficient dynamic range to show very dim and very bright features and avoid the saturation effects that would result if a standard single sensor video camera were used to view a scene. High dynamic range video obtained in this way does not require the development of new high dynamic range imaging arrays. This approach allows image capture of very dim regions of an image in the presence of very bright illumination from other regions, and facilitates new technology insertion because the imaging sensor is easily upgraded as sensor device technology improves. Compared to existing DSLRs that produce HDR images by taking a series of images in quick succession at different exposures, this design is a true video camera which composites each frame from the three sensors and displays the output without distortion caused by motion in the scene. The camera also automatically adjusts its overall dynamic range based on the scene's lighting conditions, ensuring that the splitting ratios between sub-imagers are optimized.

Advantages

- High dynamic range
- No motion blur
- Ease of upgrading sensors to larger resolutions, higher frame rates, or different wavelengths.
- Imager sub-assembly is path matched for a single standard camera lens, so any lens from the same mount type may be used.

Applications

- High dynamic range motion-blur free video imaging
- Laser beam turbulence measurements
- Medical imaging

APPLICATIONS

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Additional Information

INSTITUTION

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PATENT STATUS

Pending

CATEGORIES

- Imaging devices
- Sensors/Monitors
- Microelectronics

EXTERNAL RESOURCES

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