Method and Apparatus for Compressive Acquisition of Depth Range
Technology #15495

Applications

This technology is useful for 3D sensing and imaging applications.

Problem Addressed

Traditional methods of sensing three-dimensional (3D) scenes suffer from poor spatial resolution, low range accuracy, and the high cost of its implementation. Therefore, it is desirable to develop a depth acquisition system that possesses high spatial resolution without increasing the device cost and complexity.

Technology

The invention captures depth information for a three-dimensional scene in an efficient and cost-effective manner using only a single time-resolved detector and a pulsed laser diode as the illumination unit. The system achieves spatial resolution through patterned sensing of the scene using a digital micro-mirror device (DMD) array. The depth map reconstruction uses parametric signal modeling to recover the set of distinct depth ranges present in the scene. Then, using a convex program that exploits the sparsity of the Laplacian of the depth map, the spatial content at the estimated depth ranges is recovered.

Advantages

- Higher spatial resolution, lower device cost and complexity than conventional 3D acquisition techniques
- Well suited for limited energy availability application such as battery powered applications and applications with smaller form factor e.g. laptops, digital cameras, etc.
- Capable of minimizing the negative effects of ambient light when capturing 3D scenes

Categories For This Invention:

- Photonics
- Sensors (Photonics)
- Cameras
- Imagers

Intellectual Property:

Method and Apparatus to Determine Depth Information for a Scene of Interest
Issued US Patent
8,982,363
Method and Apparatus to Determine Depth Information for a Scene of Interest
US Patent Pending
2013-0088726

Inventors:
Ahmed Kirmani
Vivek Goyal

Publications:
CoDAC: A Compressive Depth Acquisition Camera Framework
March 2012, pp. 3809-3812.

External Links:
Research Laboratory of Electronics
http://www.rle.mit.edu/

Image Gallery: