A Concentric Circle Scanning Technique for Large Area Inspection
Technology #17259

Applications

Applications for this technology are found in sampling and super high resolution imaging, and more specifically in machine vision, medical imaging, surveillance, remote sensing, and scanning microscopy.

Problem Addressed

Large area scanning and super high resolution (SR) imaging of surfaces traditionally relies on the translation of results obtained by scanning and sampling in Cartesian coordinates. These techniques require complex hardware and/or software methods to ensure low vibration, fast scanning and high precision, and have issues such as registration errors induced by poor motion estimation, limited recovery of high frequencies in non-lateral dimensions, and vibration induced image degradation in some sensitive devices. Existing rotational sampling methods suffer from sparse data and variation in the outer radii as a result of uniform Polar sampling.

Technology

This technology is an optimized rotational sampling method that allows fast and uniform acquisition of image information on a circular surface. The technique has demonstrated the capability to increase sampling speed by 11.5% while reducing distortion error by 50%. Circular scanning method combined with SR techniques can increase the achievable resolution of existing scanners with large field of vision, without additional hardware.

Advantages

- Higher speed and attenuated transient behavior for large area inspections
- Minimized errors when using circular scanning trajectory to generate Cartesian composite image
- No tradeoff between resolution and field of vision
- Reduced vibration, higher speed, and easier control
- Compensates for hardware limitations such as motor speed and resonant frequency issues
- Increased resolution of existing scanners with large field of vision without additional hardware

Categories For This Invention:

Photonics
Sensors (Photonics)
Imagers
Life Sciences
**Imaging**
- MRI
- Ultrasound
- X-ray, CT, PET
- Instrumentation
- Microscopy

**Intellectual Property:**
Circular scanning technique for large area inspection
Issued US Patent
Circular scanning technique for large area inspection
Issued US Patent

**Inventors:**
Brian Anthony
Xian Du

**Publications:**
- Controlled Angular and Radial Scanning for Super Resolution Concentric Circular Imaging
  Optics Express
  2016
- Concentric Circular Trajectory Sampling for Super-resolution and Image Mosaicing
  Journal of the Optical Society of America
  2015
- Concentric Circle Scanning System for large area and High-precision Imaging
  Optics Express
  2015

**External Links:**
Device Realization, Computational Instrumentation @ MIT
https://devicerealization.mit.edu/people/brian-anthony

**Image Gallery:**

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255 Main Street, room NE 18-501
Cambridge, MA 02142-1601
Phone: 617-253-6966 Fax: 617-258-6790
http://tlo.mit.edu
Contact the Technology Manager: tlo-inquiries@mit.edu