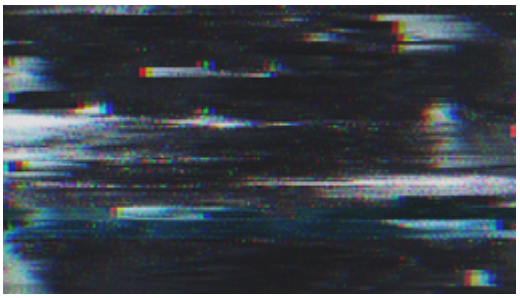
INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Phase Correction for Single Pixel Camera in a Lissajous Pattern

TECHNOLOGY NUMBER: 2018-422



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Category
Therapeutics and Vaccines
Life Sciences

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OVERVIEW

An improved method for image processing in Lissajous scanning

- Corrects for drift in phase delay and produces clearer images
- Better image reconstruction in medical and non-medical applications

BACKGROUND

Advancements in single pixel imaging have led to medical innovations in many areas including endomicroscopy, which can perform an "optical biopsy" using properties of light to make instant diagnoses with an endoscope. Images are acquired with microelectromechanical systems (MEMS) scanners which scan an object in a spiral pattern and collect the sequence of reflected light. The evaluation of raw data measuring the intensity of light from different points on the object plane may deviate as it is recorded by the MEMS scanner, leading to poor quality images. To date, attempts to counteract this solution have included temperature-based calibration an on-chip capacitive sensing, but these methods are not reproducible and present major limitations in space constrained applications such as endomicroscopy.

INNOVATION

Researchers have created a method for image processing which predicts the phase and corrects for phase errors to provide improved image quality for Lissajous scanning, which has many optical applications including biomedical imaging, scanning probe microscopes, and single pixel cameras. This invention uses image processing techniques that can accurately predict the phases along different axes to produce more accurate images. The phase can be predicted based on the degree of sharpness or blurriness of the image, with the resulting image sharpest

when reconstructed with an accurate phase. The image is reconstructed multiple times by sweeping through different phases in the x and y directions to find the sharpest image. The process also corrects for drift in phase delay. This approach is the first use of such a method to correct for drift in phase delay arising from dynamics of MEMS scanning mirrors, or other compact scanners that might be used to produce a Lissajous pattern. The invention can provide improved image reconstruction for a variety of medical and non-medical applications.