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Rapid Automatic Exposure Determination Method for High-resolution Structured Light 3D Imaging

Automated 3D image capture technology uses a constant response algorithm coupled with High Dynamic Range to perform rapid, reliable, single-capture imaging without the need for specialized hardware or manual configuration.

Methods of 3D image capture for cameras require human intervention, which often leads to need for training. To obtain the best image, a user must conduct projector and camera aperture analysis, generate multiple random exposures, and calculate or estimate optimal sensor exposure time. The phenomenon leads to image disturbances including misinterpretation of ambient light, inability to distinguish surface reflectivity, and presence of noise from camera sensors.

Engineers at Purdue University have automated the process of profilometry by implementing an intrinsic constant response algorithm coupled with High Dynamic Range technology. This method calibrates a device one time to perform again and again at proper exposure times. Unparalleled to other camera-integrated components, this design allows an operator to capture an entire scene in one take. This process of 3D image capture eliminates any need for specialized hardware as well as need to obtain surface properties from objects before generating a visual. This enables cameras to produce images faster and more reliably, which is beneficial to geospatial intelligence, forensics, manufacturing, and prototyping.

Advantages:

-More accurate and rapid optimal exposure time selection for single capture

-Automation in camera configuration, making it hands-off

-Captures an entire contrast scene

Applications:

Technology ID

2019-ZHAN-68666

Category

Artificial Intelligence & Machine Learning/AI-Integrated Imaging Systems & Industrial Vision and Inspection

Artificial Intelligence & Machine Learning/3D Optical Imaging & Industrial Metrology

Robotics & Automation/3D Perception & Modeling for Automation

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View online

-Forensics/profilometry

-Manufacturing and rapid prototyping

-Geospatial topography

TRL: 7

Intellectual Property:

Provisional-Patent, 2019-05-28, United States

Utility-Gov. Funding, 2020-05-14, United States

CON-Patent, 2022-04-26, United States

Keywords: Automated 3D image capture, profilometry automation, intrinsic constant response algorithm, High Dynamic Range technology, rapid optimal exposure time, hands-off camera configuration, single capture contrast scene, geospatial intelligence, forensics profilometry, rapid prototyping 3D imaging, 3D Imaging, 3D Visual Exploration, Algorithm, Cameras, Data Visualization, Digital Modulation, Digital Storage, High Dynamic Range, High Resolution, Image Processing, Justice, Optic Design, Optical Elements, Portable, Public Safety, Reflection, Smart Cameras, Visual Analytics