Hybrid Model for 3D Shape Measurement

APPLICATION AREAS
3D scanning for Industrial, Medical, Security, Manufacturing and Other Applications

ABSTRACT
Three dimensional (3D) shape measurement is becoming increasingly important for a variety of industrial and research applications, such as non-contact inspection or industrial automation. However, current methods for real-time 3D shape measurement, such as time of flight, stereo vision, or spacetime stereo, suffer from limitations including difficulty in measuring smooth surfaces or step-height, difficulty in reconstructing images in real-time, or difficulty in achieving pixel-level resolution. In addition, current approaches are also limited in their ability to measure multiple objects simultaneously. To overcome these drawbacks, ISU researchers have developed a hybrid model for 3D shape measurement that enables high-resolution, rapid 3D shape measurement. This method is based on a structured light technique whereby a novel hybrid phase-shifting algorithm is used for 3D reconstruction, which enables absolute position measurement at very high resolution. High speed is achieved by using a modified DLP (digital light processing) projector that allows for sequential bit-by-bit binary image projection. Because this technology has the potential to increase measurement speed, expand the measurement range, and increase measurement capabilities, it has utility for a wide variety of applications, including manufacturing, medical sciences, entertainment, and homeland security.

BENEFITS
- Increases measurement speed by 11-fold compared to existing approaches
- Enables measurement of step-height objects
- Allows simultaneous measurement of multiple objects

REFERENCES:


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