基於光場成像原理的物體偵測及距離測量傳感器

Object Detection and Distance Measurement Sensor based on Light Field Imaging

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通過深度學習技術從2D圖像實時獲取物體的4D光場信息的傳感器

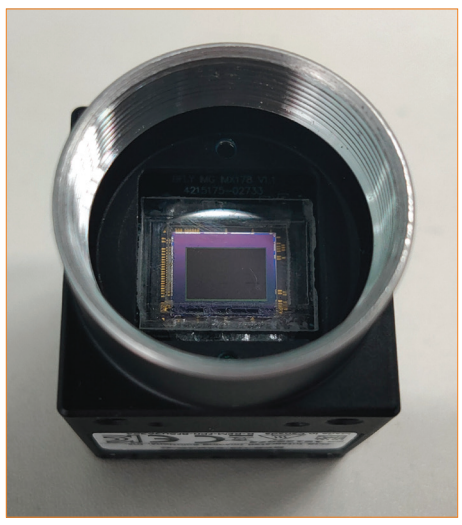
A sensor that can acquire real-time 4D information of objects from 2D images using deep learning technology

專利號碼: ZL201410357264.2(中國)
專利申請編號: 201510028430.9 (中國), 201810691605.8 (中國), 201810213125.0(中國)

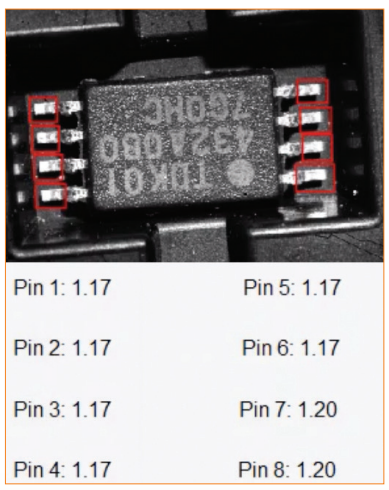
該傳感器由CCD/CMOS模塊及以超精密加工技術製造的微透鏡陣列組成。傳感器通過以深度學習建立的算法，可從2D圖像中辨認物體，並實時獲取其4D光場信息，以進行測量。該傳感器輕巧便攜，可安裝在不同類型的相機鏡頭上，適用於不同範圍的精密距離測量，包括微觀及宏觀攝影。

傳感器適用於生產線上，能通過精密距離測量為產品（例如半導體）進行全面的自動品質檢查。

配有理大光場傳感器的成像系統
An imaging system with our light field sensor



光場傳感器
Our light field sensor



產品檢測：測量晶片的引腳高度
Product Inspection: measuring the height of chip pins

The sensor includes a CCD/CMOS module and a micro-lens array, which was fabricated with our own ultra-precision machining techniques. Using the algorithm created by deep learning, it can identify an object from a 2D image and acquire its 4D light field information in real time for measurement. The sensor is compact, portable and attachable on different types of camera lens for precise distance measurement in various ranges, including micro and macro photography.

The sensors can be used in production lines to perform comprehensive automated quality inspections by examining the accurate measurements of products, such as semiconductor measurements.

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Access More info via mobile
Note: Subject to data charges by mobile operators

特色與優點

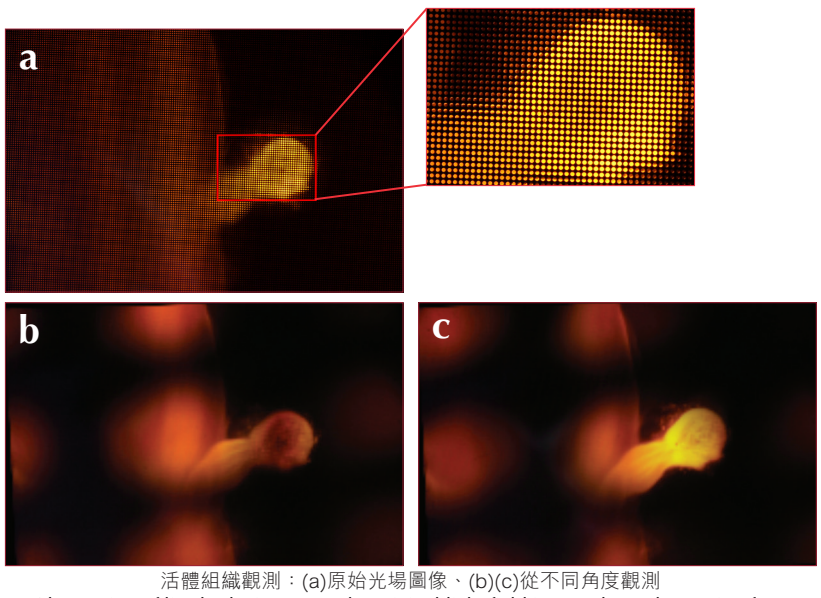
- 只需拍攝一些2D圖像即可獲取4D光場信息
- 能夠辨認目標物體，並測量物體與鏡頭之間的距離
- 能與任何相機鏡頭或顯微鏡的4倍或10倍物鏡相容
- 生產成本低
- 精確度極高，距離測量誤差率只有3%，進行產品檢測時高度值測量誤差率低至0.5%

應　用

- 測量10厘米至50米範圍內的物體
- 透過測量物件的高度值進行產品檢測，例如檢測半導體和寶石鑲爪等
- 用於醫學診斷的活體組織立體結構觀測

獎　項

第71屆德國紐倫堡國際發明展 - 金獎 (2019年11月)



活體組織觀測：(a)原始光場圖像、(b)(c)從不同角度觀測
Observation of live body tissues: (a) the original light field image, (b)(c) observation from different angles

Patent No.: ZL201410357264.2(China)
Patent Application No.: 201510028430.9 (China). 201810691605.8 (China), 201810213125.0 (China)

Special Features and Advantages

- Capable of capturing 4D light field information by taking 2D images
- Capable of detecting the target object and measuring the distances between the lens and it
- Compatible with any camera lens or microscopic objective lens with 4x or 10x magnification
- Low in production cost
- Highly accurate with 3% error rate in distance measurement and 0.5% error rate in height value measurement during product inspection

Applications

- Measuring objects in the range of 10 cm to 50 m
- Measuring height values of objects for real-time inspection of products, e.g. semiconductors and claw settings of jewellery
- Observing the 3D structure information of live body tissues for medical diagnosis

Award

Gold Medal – The 71st International Trade Fair "Ideas – Inventions – Novelties", Nuremberg, Germany (Nov 2019)

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