相位偏折术在高反射面及透明表面三维测量及缺陷检测的应用
Phase Measuring Deflectometry (PMD) for 3D Measurement & Defect Inspection

ASTRI 香港应用科技研究院

相位偏折术是基于光的反射原理，结合了多目视觉和相位偏移技术。它具有精度高，动态范围广，非接触式全场测量的技术特点,特别适用于高反射高透明物体的在线缺陷检测及三维测量。

PMD is based on the principle of light reflection, combining multi-vision and phase shift technology. It has the technical characteristics of high precision, wide dynamic range, and non-contact full-field measurement. It is especially suitable for online defect detection and three-dimensional measurement of highly reflective and transparent objects.

应用实例 Application example

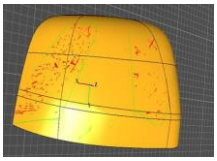
手机盖板玻璃质量管控
Cover glass quality control

人工关节检测
Detection of Artificial Joints

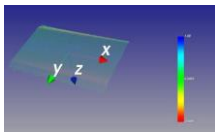
汽车零件缺陷检测
Automobile parts defect detection

技术优势 Technical Advantages

- **基于相位偏折术的光学系统** Based on PMD Optical System
  - 结构光双目视觉系统 Structured Light Binocular Vision System
  - 相位测量偏折技术 Phase Measuring Deflectometry Technology
- **半自适应参数与路径规划算法** Semi-adaptive Parameter and Path Planning Algorithm
  - 灵活性高，检测精度高 High flexibility and high detection accuracy
  - 覆盖零件所有面的检测 Detection covering all surfaces of the parts
- **嵌入式系统与GPU加速** Embedded System and GPU Acceleration
  - 结构体积小，易于生产线应用 Small structural volume, easy to be applied in production lines
  - 检测速度快 Fast detection speed

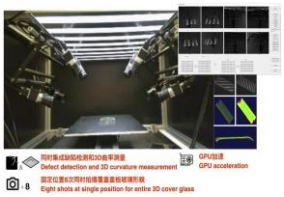


缺陷映射至3D模型
Defects are mapped to 3D models



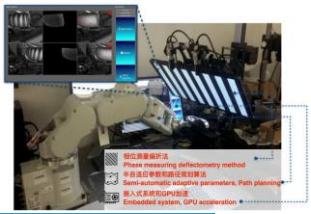
查看与标准模型的差异
Direct compare with standard point cloud (CAD Model)

系统规格 System Specifications



三维测量规格 3D measurement

3D重建时间 3D reconstruction	≈5s
表面高度精度 Surface height accuracy	±0.025mm
图像采集时间 Image acquisition	≈5s



缺陷检测规格 Defect inspection

缺陷检查尺寸 Defect inspection size	≥ 0.2mm
图像采集时间 Image acquisition	≤ 2s/position
缺陷检查时间 Dfect inspection time	<2s

蒋金波博士 Dr. JIANG Jinbo
jinbojiang@astri.org
852-3406-2802