POLITECNICO
MILANO 1863

DIPARTIMENTO DI MECCANICA

Reverse Engineering
Computer Vision and Reverse Engineering

Description:

The Computer Vision and Reverse Engineering laboratory is specialized in the Reverse Engineering pipeline for study, research and industrial applications: 3D devices calibration and characterization, 3D acquisition and processing, redrawing of CAD models based on 3D data. The 3D capturing equipment permits to acquire industrial components, structures, Cultural Heritage objects with a wide range of geometries, sizes and materials.

References:

The laboratory has contributed to the production of reality-based 3D models for the following patrons:
• Scuola Normale Superiore di Pisa
• Comune di Milano - Castello Sforzesco
• Comune di Milano - Civico Museo Archeologico
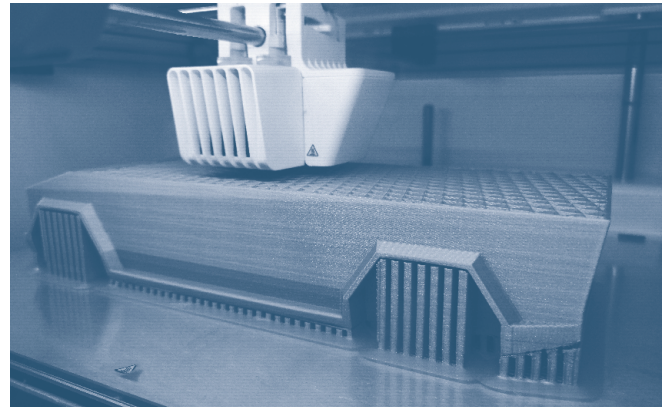
Instruments & Facilities:

3D Scanners:
• Konica Minolta Vivid 9i
• GOM Atos
• NextEngine Ultra HD
• Artec Leo
• EviXscan 3D Heavy Duty Quadro 3D
• Structure Sensor
Coordinate Measuring System:
• Microscribe MX digitizer system
Professional Cameras:
• Sony
• Canon

Activities:

Camera calibration for photogrammetry and 3D Vision

- Radial distortions assessment.
- Tangential distortion assessment.
- Affine distortion assessment.

Active 3D range sensors characterization (Triangulation and TOF/PS) according to Committee E57 draft ASTM

- Global uncertainty assessment.
- Precision assessment.
- Accuracy assessment.

3D acquisition and modelling based on:

- Traditional photogrammetry with sparse clouds.
- SFM/Image matching with dense clouds/meshes.
- Triangulation based laser scanning and dense mesh generation.
- TOF/PS laser scanning and dense mesh generation.
- CAD drawing on 3D data gathered manually or automatically.

3D models optimization for Virtual Navigation

- Mesh optimization.
- Texturing/Displacement mapping.
- 3D segmentation.