

3D Reconstruction of Intricate Objects using Planar Cast Shadows

Tzung-Han Lin, Hao-Teng Chang, Shang-Jen Hu
National Taiwan University of Science and Technology

[Supplementary materials]



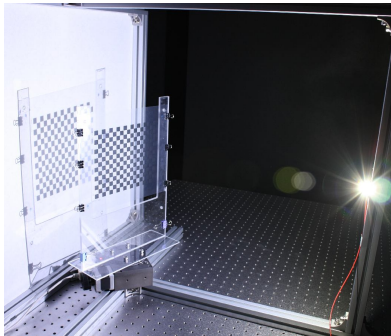
(a) the real objects



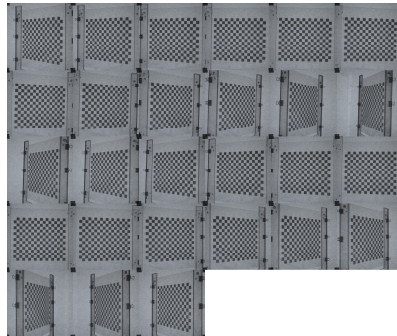
(b) reconstruction result shown by high quality render

Figure 1. Reconstructed 3D models.

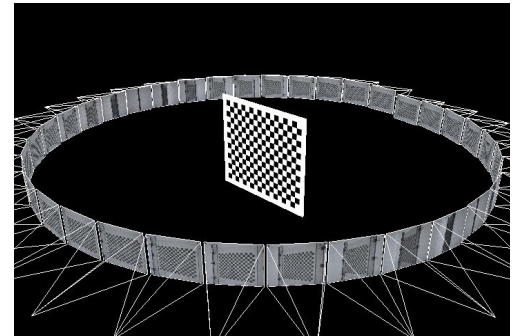
(Note: their shapes are intentionally mirrored since our method takes pictures from the rear side.)



(a) the setup of the translucent checkerboard



(b) the selected homography images

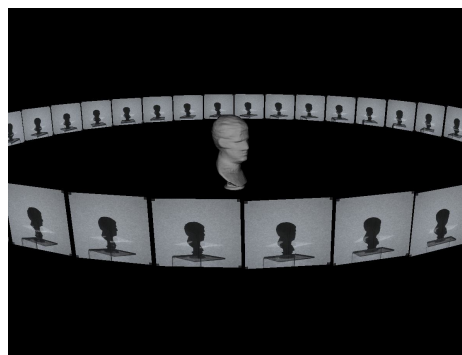


(c) calibration result

Figure 2. An example for calibrating 36 views.



(a) the setup

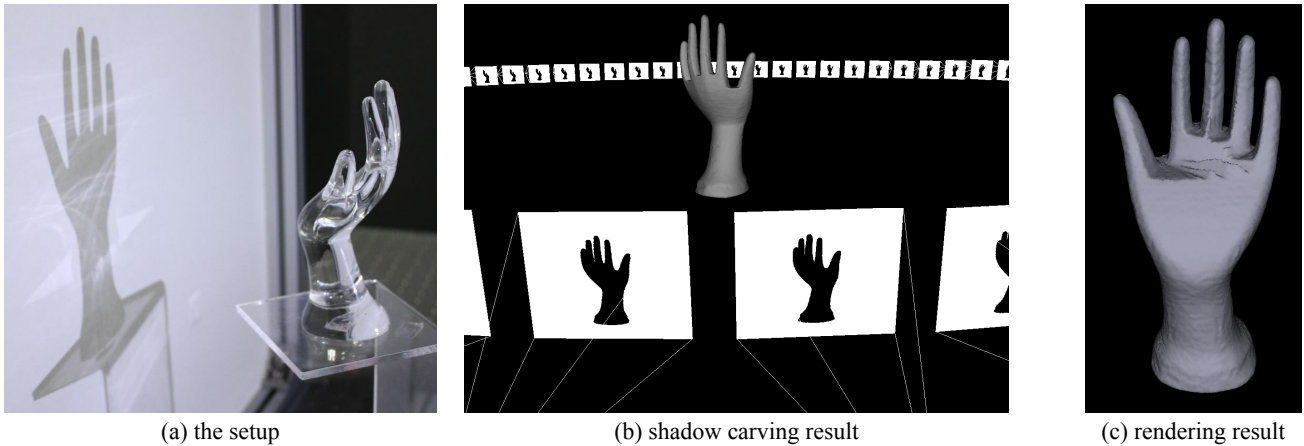


(b) shadow carving result

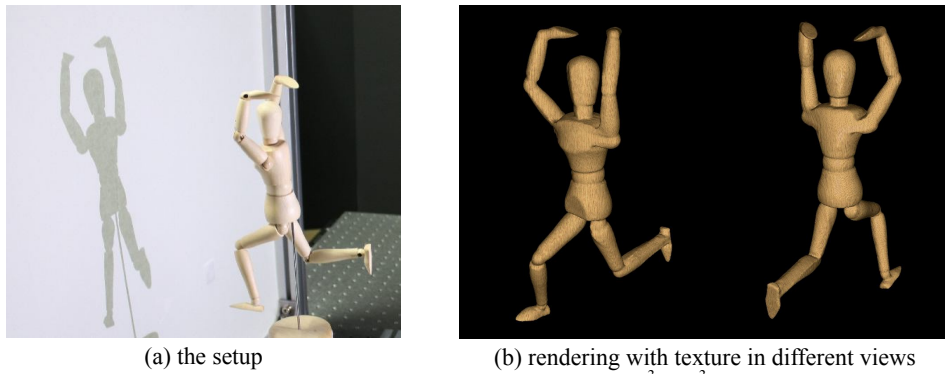


(c) overview

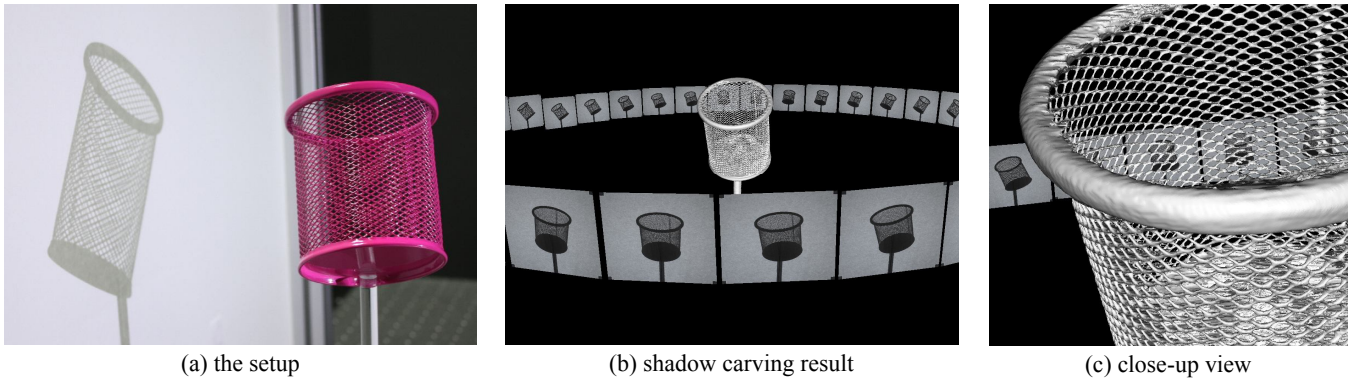
Figure 3. 36 images are used for reconstruction of this small sculpture. The voxel size is 0.5^3 mm^3 , and 0.22M polygons are generated.



(a) the setup (b) shadow carving result (c) rendering result
 Figure 4. 72 images are used for reconstruction of a translucent acrylic model. In this case, all silhouettes in the shadow images are manually assigned by using the “scissor” function of GIMP image manipulation software. (voxel size: 0.5^3 mm^3)



(a) the setup (b) rendering with texture in different views
 Figure 5. Reconstruction of a wood puppet (72 images, voxel size: 0.5^3 mm^3 , 0.25M polygons generated).

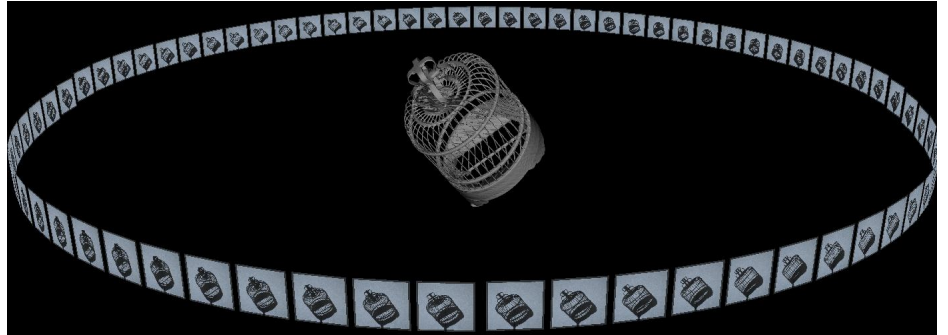


(a) the setup (b) shadow carving result (c) close-up view
 (This figure shows 36 images only)

Figure 6. 72 images are used for reconstruction of this pen holder. The boundaries of all silhouettes are determined by the value of 128 in 8-bit grey images. The voxel size is 0.25^3 mm^3 , and 5.4M polygons are generated.



(a) the setup



(b) shadow carving from 72 images



(c) reconstructed voxel shape



(d) all erased isolated voxels shown in red color.

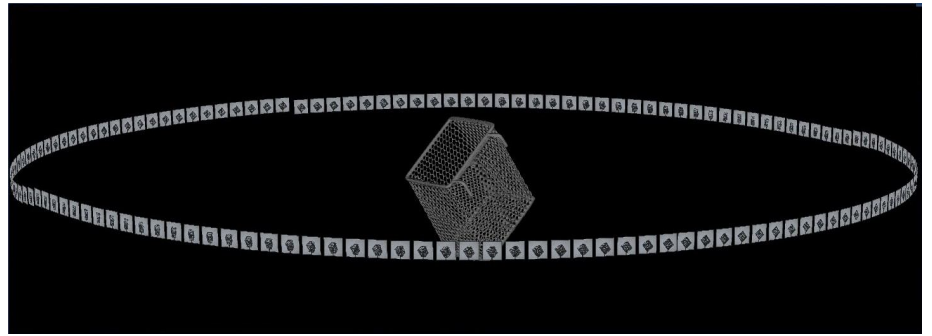


(e) after Gaussian filter

Figure 7. Cage model (voxel size: 0.25^3 mm^3 , and 4.1M polygons)



(a) the setup



(b) 144 shadow images



(c) reconstructed voxel shape



(d) all erased isolated voxels shown in red color.



(e) after Gaussian filter

Figure 8. Another pen holder (voxel size: 0.25^3 mm^3 , 3.2M polygons)