

Face Capturing

High-Quality Single-Shot Capture
of Facial Geometry

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Motivation

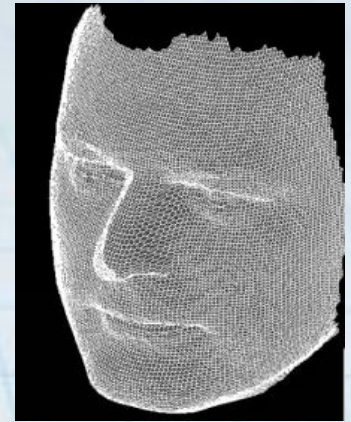
Why 3D faces?

- reproducing realistic human faces
- of interest in multiple domains (movies, games, medicine, etc)
- application: combination of speech and facial expression



<http://www.heise.de/newsticker/meldung/3D-Gesichtserkennung-von-NEC-95901.html>

Motivation



current methods

active systems

- + robust
- + high quality
- special hardware
- time-multiplexing

passive systems

- + one shot
- + different arrangements
- + various # of cameras
- + multiple distances and scenes
- + common hardware
- no high quality

idea

combine advantages of passive stereo system with high quality of active systems

Method

Overview

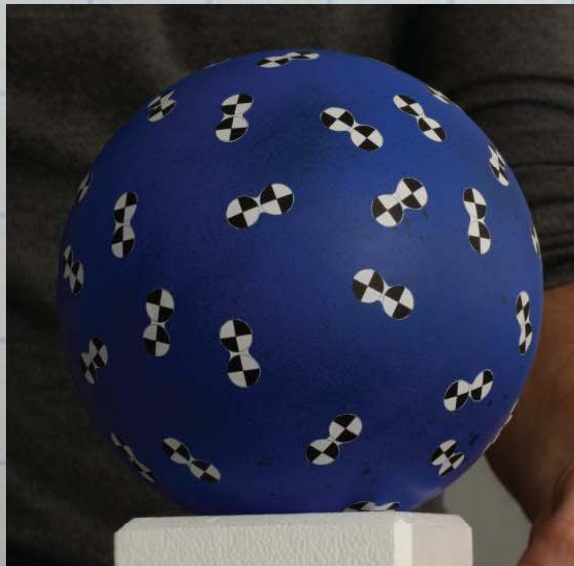


Overview

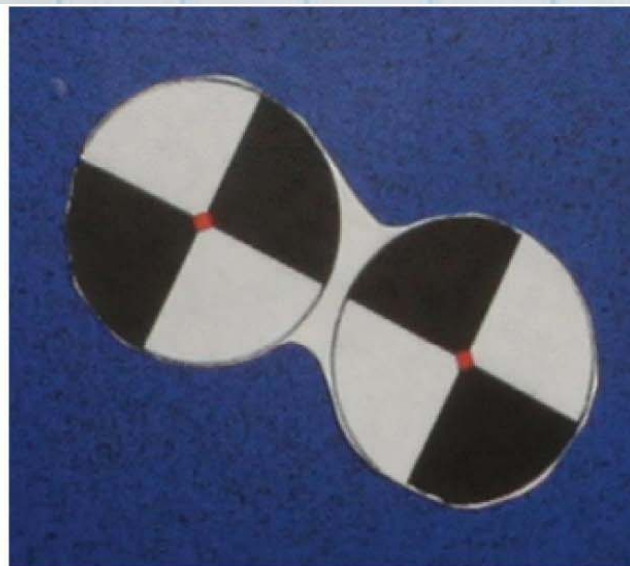


Calibration

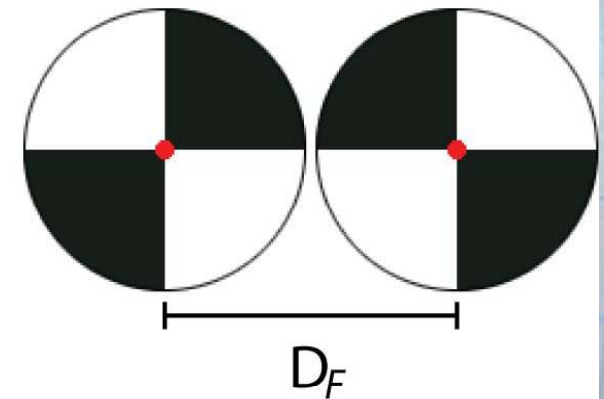
- pre-processing for face scanning
- aim: orientation of the cameras
- sphere: nearly head sized
- fiducials help setting up a 3D capture zone



Calibration Sphere



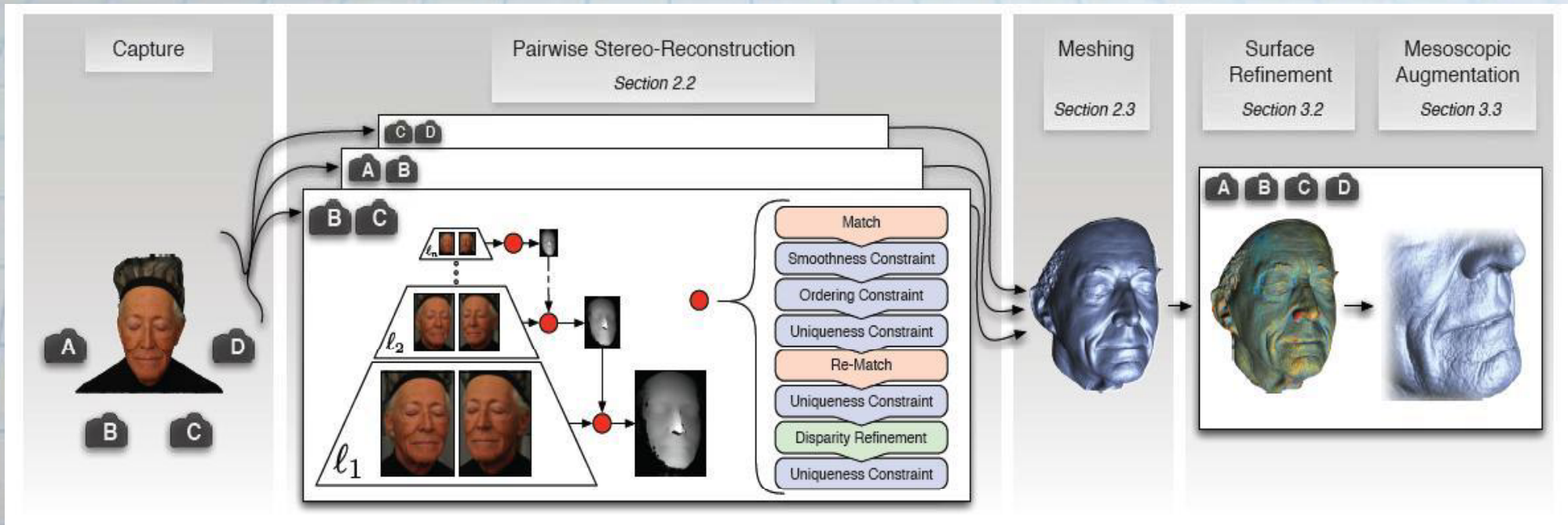
Fiducial



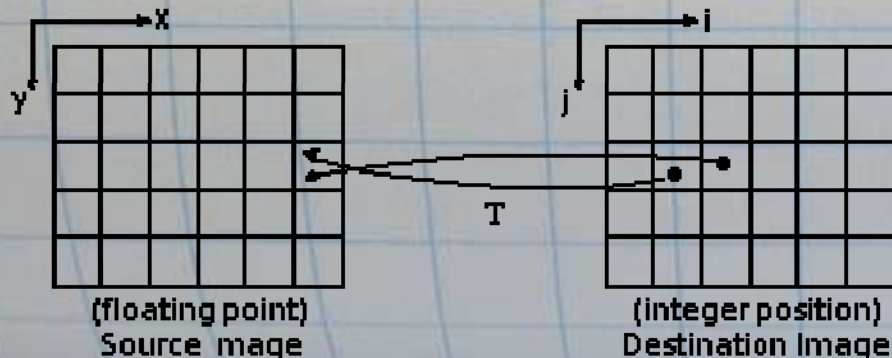
Overview



Pairwise Stereo-Reconstruction



- Pixel Matching



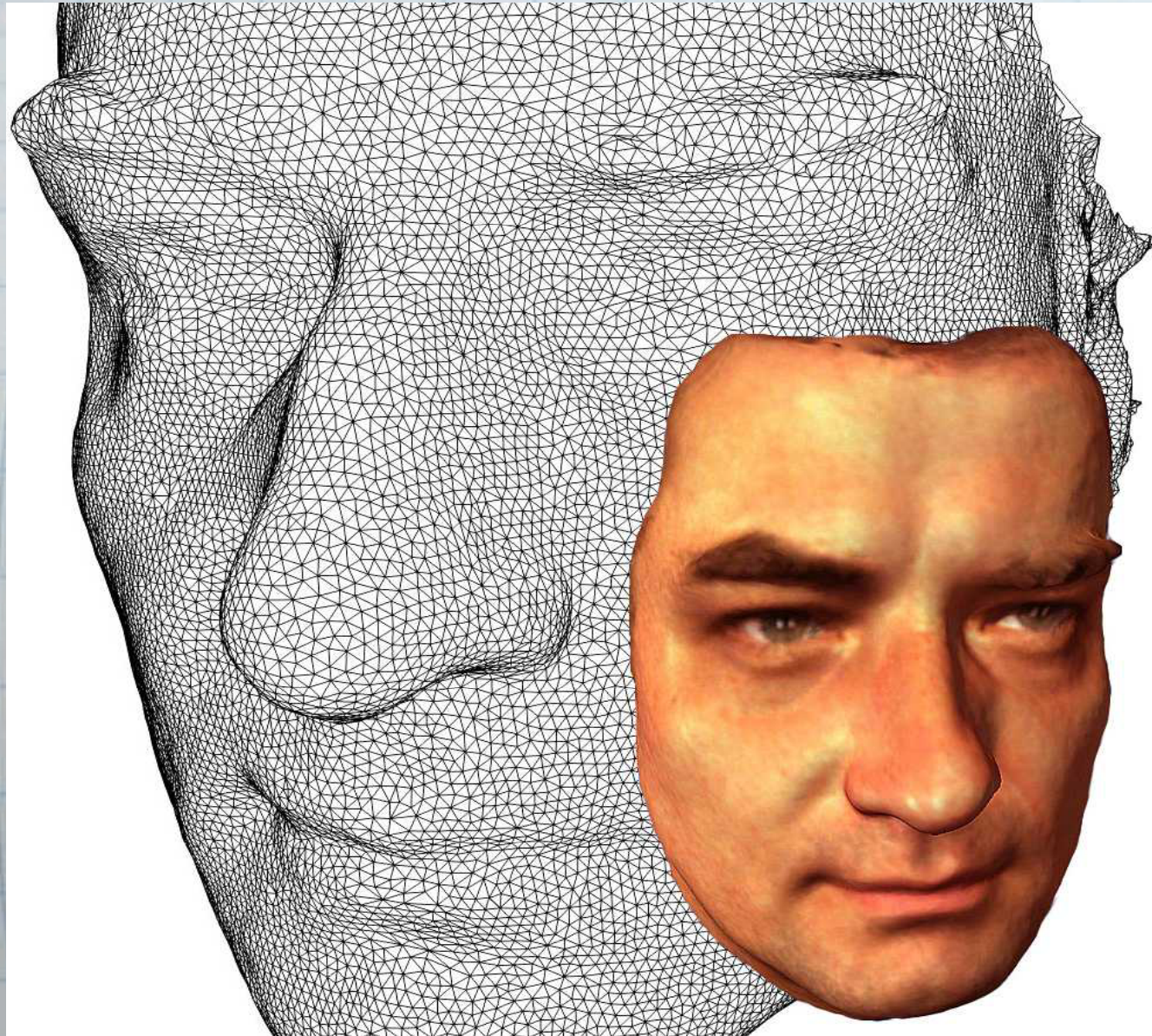
- Constraints

- Smoothness Constraint
- Uniqueness Constraint
- Ordering Constraint

Overview



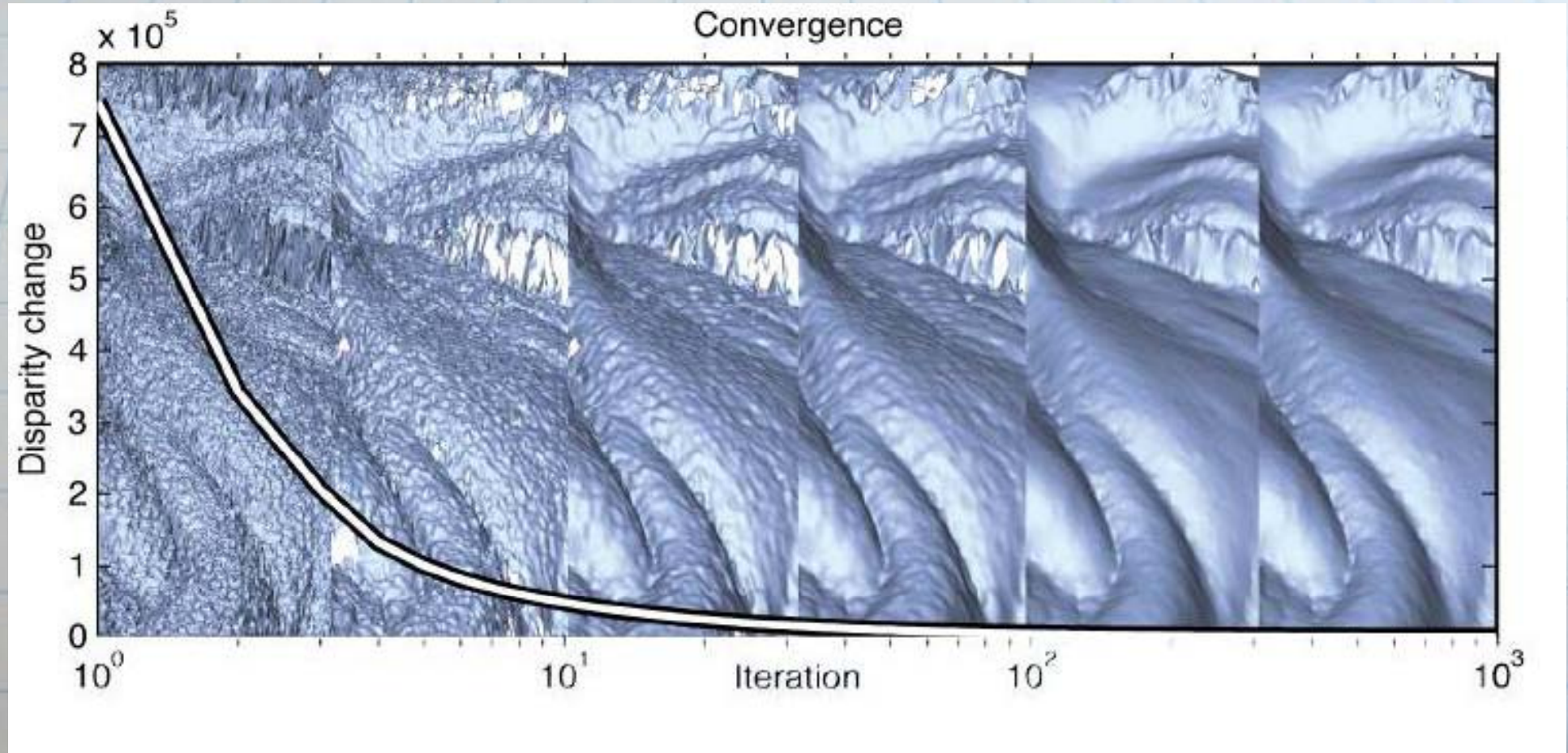
Meshing



Overview



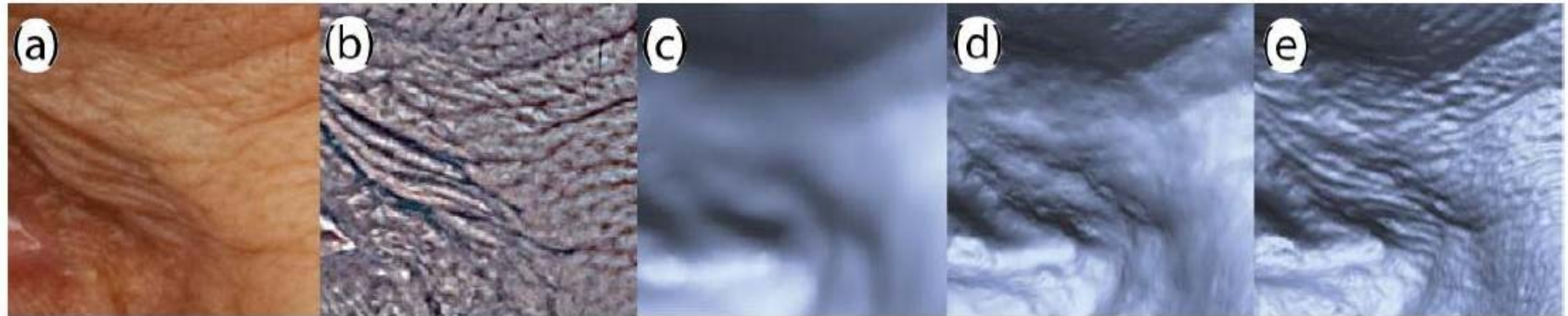
Refinement



Overview



Mesososcopic Consistency



a) photo

b) filter

c) mesh

d) refinement e) mesoscopic

Mesososcopic Augmentation

Results

- Capture Process
- Quantitative Evaluation
- Qualitative Evaluation

Capture Process

flexibility

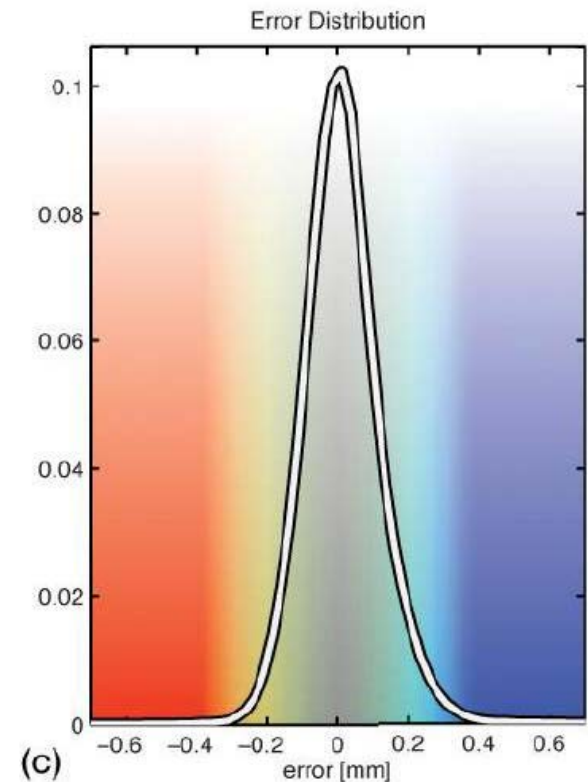
Studio-Setup

Stereo-Camera



Quantitative Evaluation

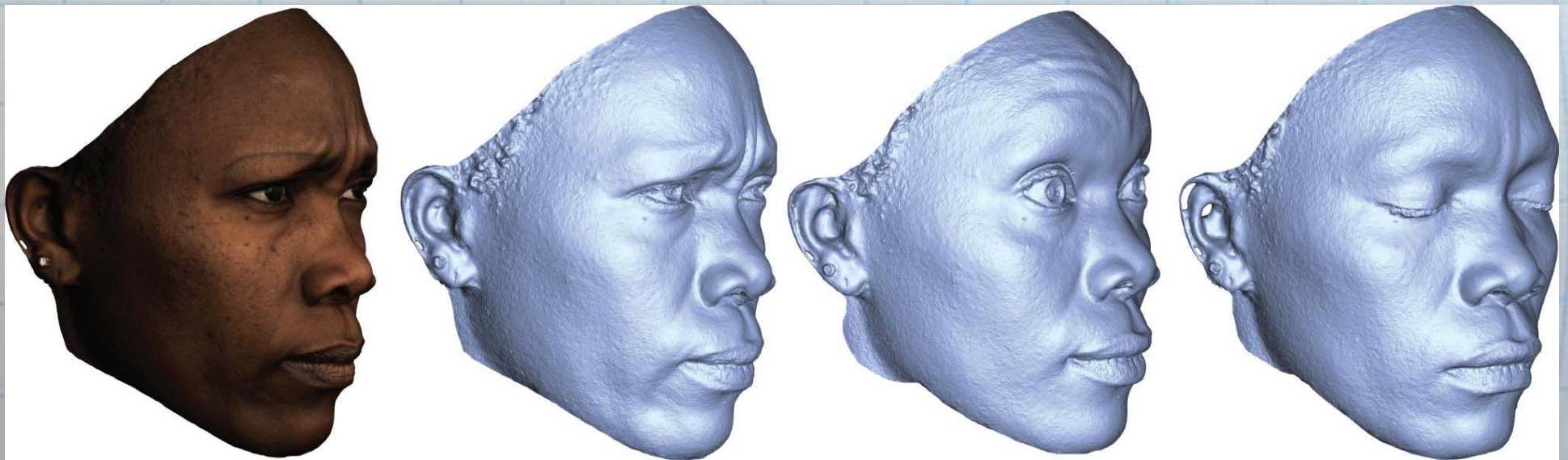
physical mask



Qualitative Evaluation

robustness

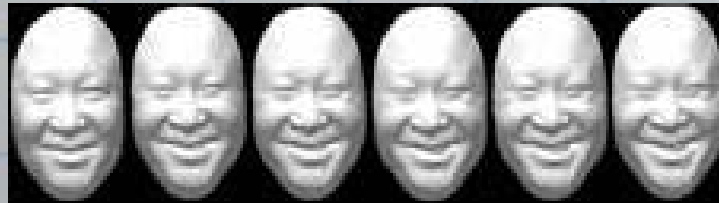
- faces of varying gender, ethnicity, age and facial expression



Results

Conclusion

- good results for both capture methods
- problem with direct lighting
- passive system can compete with active systems in reliability and quality
- future work: image sequences



Quellen

- Thabo Beeler; Bernd Bickel; Paul Beardsley; Bob Sumner; Markus Gross: "**High-Quality Single-Shot Capture of Facial Geometry**" in Proceedings of ACM SIGGRAPH (Los Angeles, USA, July 25-29, 2010), ACM Transactions on Graphics, vol. 29, no. 3
- **Webseite** des Projekts CGL@ ETHZ (Computer Graphics Laboratory ETH Zürich) <http://graphics.ethz.ch/publications/papers/paperBee10.php>
- **Video** 1 zum Projekt: <http://www.youtube.com/watch?v=JX5stsU6xfE>
- **Video** 2 (untersch. Gesichtsausdrücke und ethnische Zugehörigkeit) <http://www.youtube.com/watch?v=svTiVW3xogA&feature=related>
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