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3D Vision

Robert Sablatnig

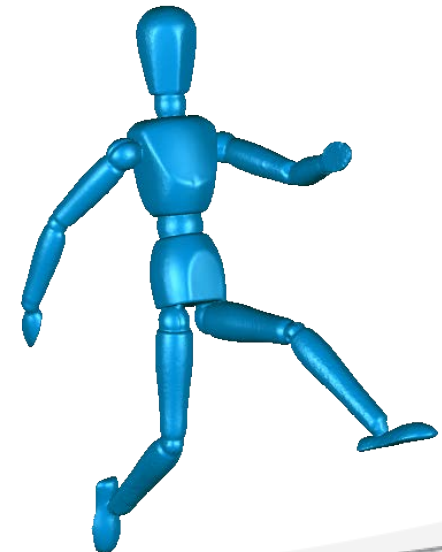
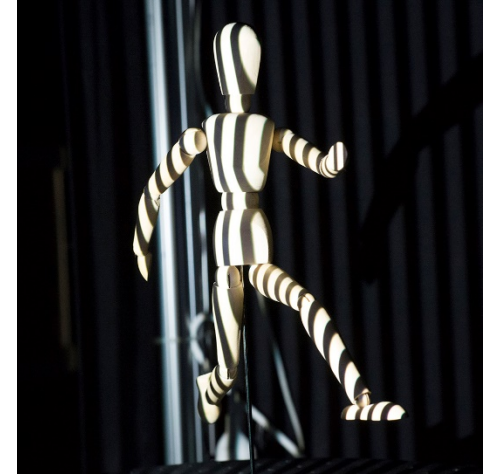
Tutoren: Fabian Hollaus, Simon Brenner

Course overview

- Tasks:
 - Scan an object (of your choice) with our Structured Light Scanner (Aicon Primescan)
 - Create a Structure from Motion model of the **same** object by taking photos and processing them with a suitable software
 - Compare the results
- Team size:
 - 2-3 students
 - **1 Object per student**

3D Scanning

- Structured Light scanner
 - In our lab
- 1 object per student
 - Bring your own object
- Tasks
 - Noise removal, registration and merging
 - Waterproof 3D Model
 - Evaluation



Structure from Motion

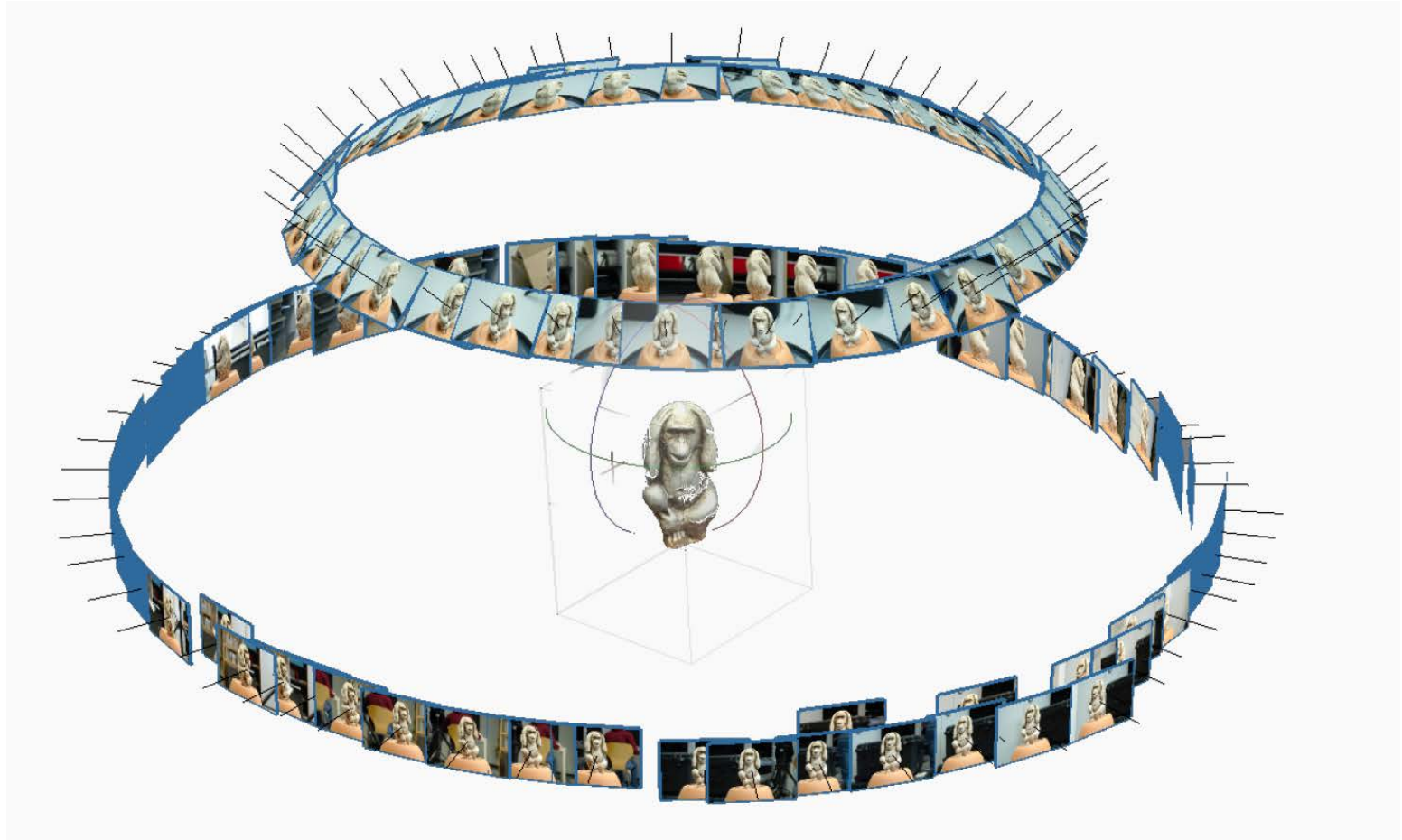
- Take **good** pictures
- Create 3D model with SfM software, e.g:
 - VisualSFM: open source, very basic
 - Agisoft Photoscan: commercial, lots of handy features, 30 days full trial available
- Export model and refine it in Geomagic (noise removal etc)
- Waterproof 3D model not necessary, but nice-to-have
- Compare output to scanned object

Tips for taking pictures

- Use proper camera! If you don't have access to one, we have two Nikons + tripods at the lab.
- Use a **small aperture** (e.g. f20) for high Depth of Field
- Use a **tripod** when indoors (small aperture → long exposure)
- Move around the object at constant height and distance in $\sim 10^\circ$ -steps; do several rounds from different heights.
- Make raw images and convert them to **lossless format** (TIFF/PNG) (Unfortunately VisualSfM only supports jpg+ppm..)
- If your object has little texture, put it onto something textured (e.g. newspaper)
- **Put a ruler/grid in the scene!** So you can correctly scale your object afterwards.

<https://www.youtube.com/watch?v=D7Torjkefc4>

Example



The Object

- Choose an object which you can access throughout the whole term
- Size: apple - pineapple
- Ideally a waterproof object (vor volume measurement!)
- Matte surface, moderately textured
 - Lots of texture → hard for scanner
 - Little texture → hard for SfM
 - Specular surfaces → don't even try..



Don'ts



shiny



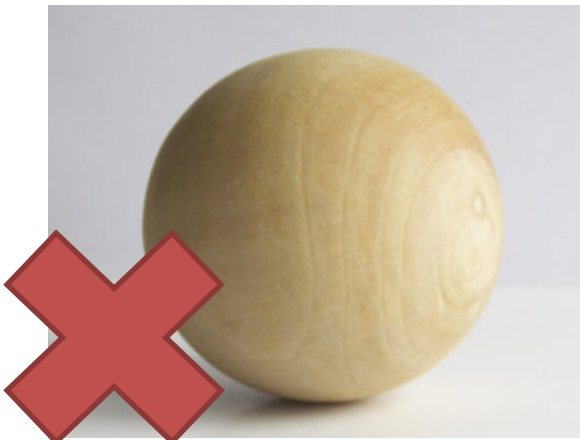
Transparent /translucent



High contrast texture



Too complex



Too simple / symmetric

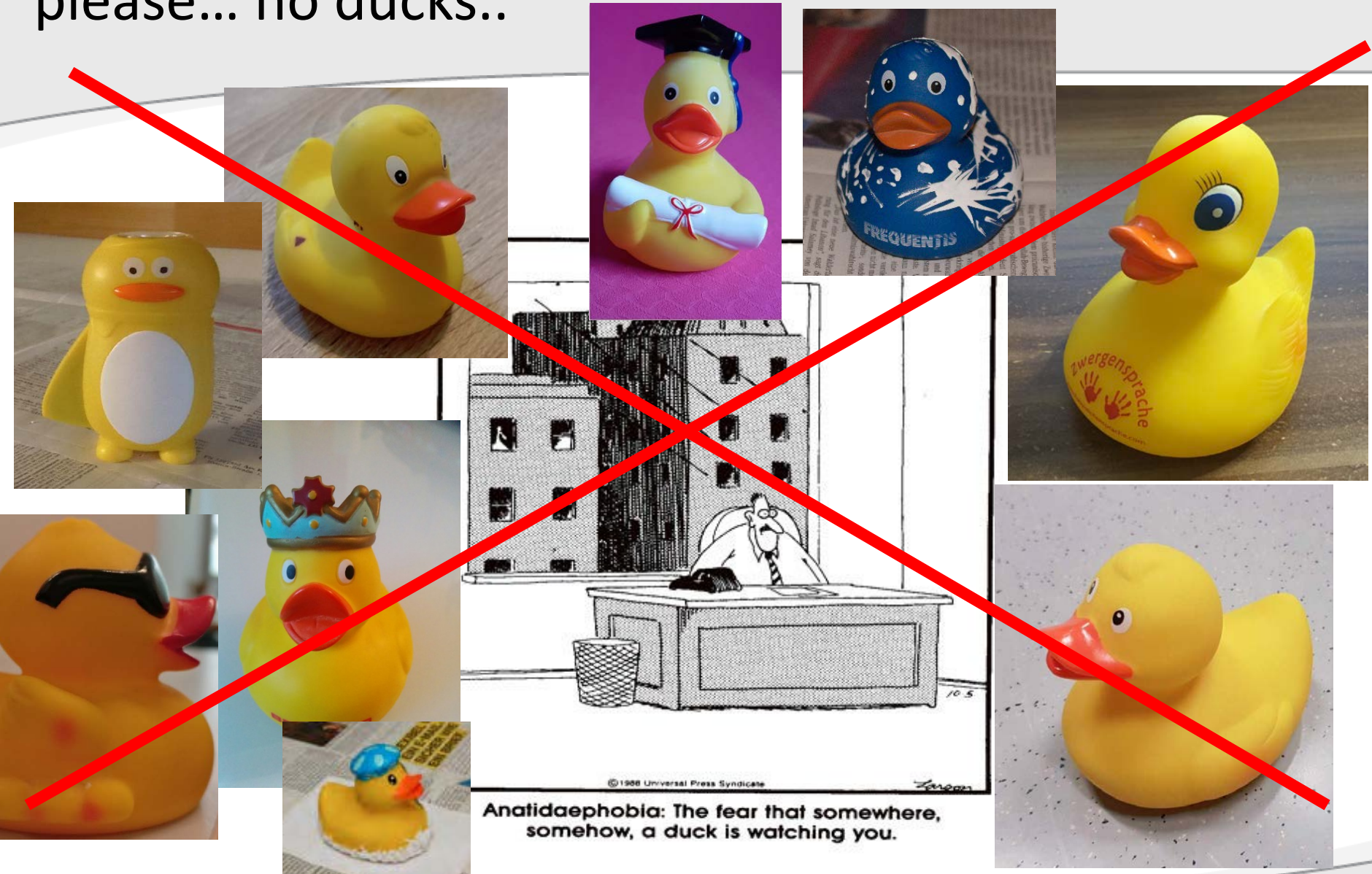


deformable

Dos

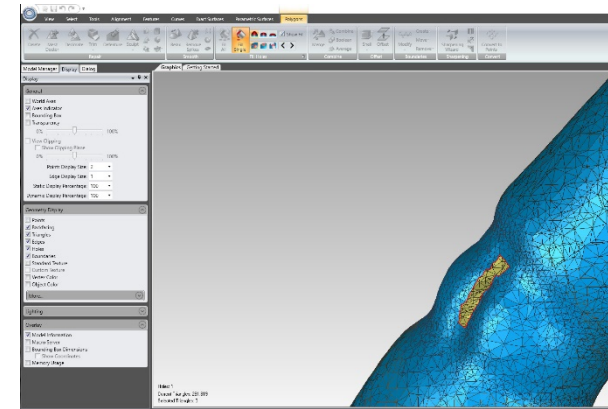


please... no ducks..



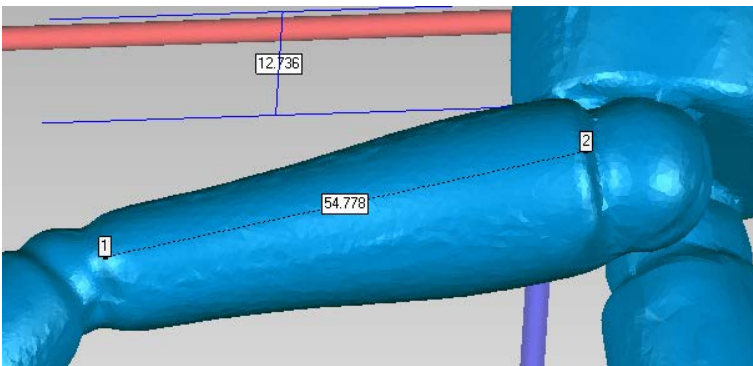
Geomagic Wrap

- Professional 3D editing software
 - Registration, noise removal, hole filling etc.
 - Validation
- Installed on Pong Lab PCs
- @Home: 15 Days fully functional trial available (should be enough time..)



Documentation

- 2-4 pages per student
 - Show your results
 - Give a short evaluation (measure accuracy)
 - Compare the results from scanner & SfM
 - Write about the lessons learned when modelling your object
 - (Do not explain how the scanner works)



Presentation

- Length
 - 5-7 minutes per group
 - Maximally 12 slides (including title page)
- Content
 - Intermediate results
 - Point out troubles when modelling your object
 - Give a short evaluation (compare model & physical object)
 - Measure lengths
 - Measure volume

Schedule

- 3D scanning April 9th – April 27th
 - At the institute (HA 0420, Favoritenstraße 9)
- Tutorium May 2nd – June 6th
 - Pong Room (HG EG15, Favoritenstraße 9)
 - Monday 12:00 – 14:00
 - Thursday 10:00 – 12:00
- Deadlines
 - Presentation End of June (TBA)
 - Final Model & Documentation after presentation

Registration is now open. Please register for the course via TISS.

thank you