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 $\rightarrow$ long exposure)
- Move around the object at constant height and distance in $\sim10^\circ$-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=D7Torjkc4
Example
The Object

- Choose an object which you can access throughout the whole term
- Size: apple - pineapple
- Ideally a waterproof object (for 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 9\(^{th}\) – April 27\(^{th}\)  
  At the institute (HA 0420, Favoritenstraße 9)

- **Tutorium**  
  May 2\(^{nd}\) – June 6\(^{th}\)  
  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