



HEI MAKERS

# WORKSHOP

## #2

3D models from 3D scanning



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# 3D MODELS FROM 3D SCANNING

- Aim of the workshop is to introduce students with the 3D scanning technologies and process and to teach them to prepare a scanned 3D model for 3D printing.
- Resources / Tools needed: 3D scanner, camera, *Blender*, *Netfabb*, *ContextCapture* software.
- Safety first: observe all the safety rules applicable in the workshop; follow the 3D scanner safety instructions; avoid looking into the direction of the laser; avoid direct eye exposure, do not stare into the laser beam and do not direct it to other people.

Duration	2 academic hrs
Author / Lecturer	Leonardas Žilinskas, VGTU
Delivery methods	Teamwork
Evaluation methods	Feedback

# INTRODUCTION TO 3D SCANNING

- 3D scanning is a technique used to capture the shape of an object using a 3D scanner.
- The result is a 3D file of the object which can be saved, edited, and 3D printed.
- The basic principle is to use a 3D scanner to collect data about a subject. The subject can be:
  - an object
  - an environment (such as a room)
  - a person (3D body scanning)

# OVERVIEW OF THE 3D SCANNING TECHNOLOGIES

3D scanning technologies rely on different physical principles and can be classified in categories:

- Laser triangulation 3D scanning technology
- Structured light 3D scanning technology
- Photogrammetry
- Contact-based 3D scanning technology
- Laser pulse

# #NANOJESUS EXAMPLE

- “Sense” V2 3D scanner was used in the process. Each model consisted of around 200000 dots. After the scanning all the figures were specified and corrected using *Blender* and *Netfabb* software.
- After the scanning was finalized, the modeling of all the figures had to be done precisely.

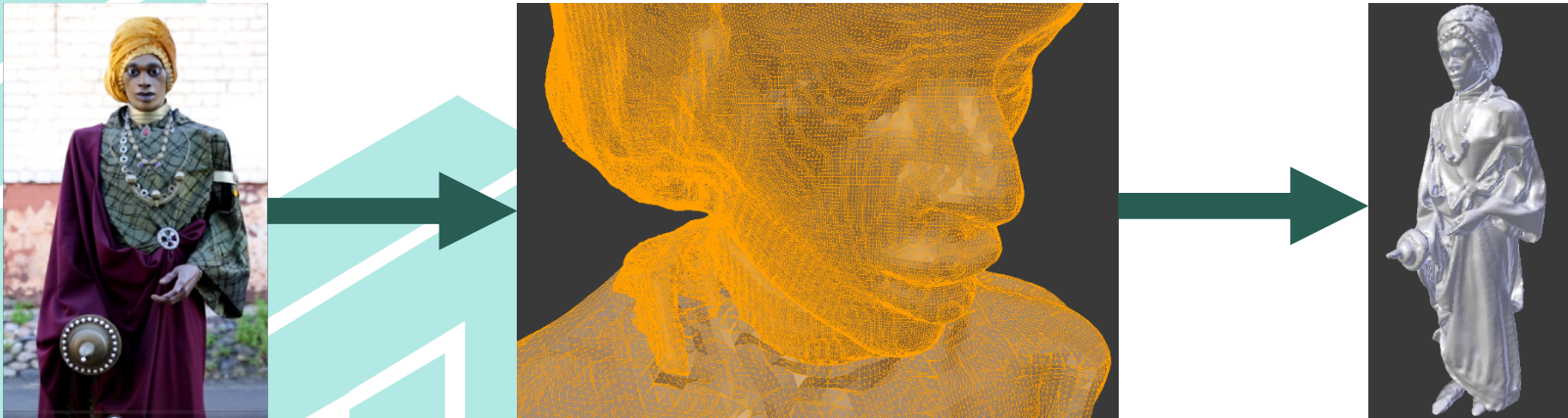


Figure 1. The King Balthazar: sculpture, different resolution of the head and body, whole model of the sculpture.

# #NANOJESUS EXAMPLE



Figure 2. The final scene of 3D modeling.

<https://www.nanojesus.com>

# #DIVINEMERCY EXAMPLE

- The church was scanned using photogrammetry. 3D model was designed using *Context Capture* software.

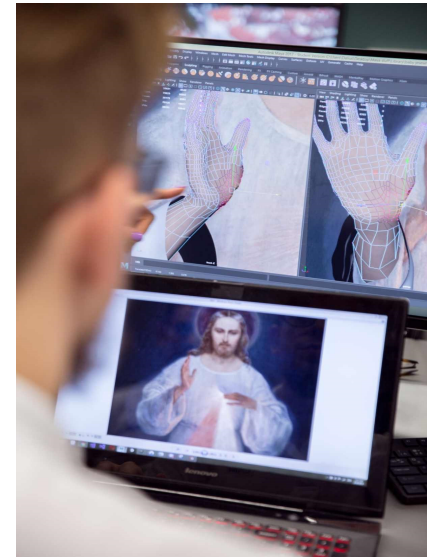
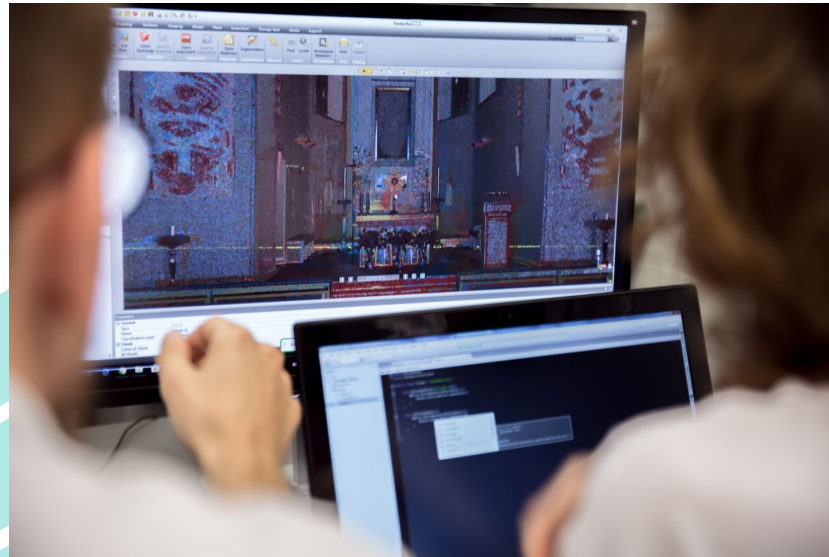


Figure 3. 3D scanning and model preparation.

<https://divinemercury3d.com>

# LASER PULSE TECHNOLOGY

- Scan the objects using 3D scanner: hold a scanner in a hand and move it around the objects to make sure the cameras of the scanner have picked up all the information they need to form a full model of the object. Ensure good lighting.
- After the scanning use *Sense* software to remove the excess details and fix up the biggest holes in the model.
- As scanned 3D models tend to have rough surfaces and must be smoothed using “Blender” 3D modeling software.



# PHOTOGRAMMETRY

- Take multiple overlapping photographs and derive measurements from them to create 3D models of objects or scenes.
- Use *ContextCapture* software to create scans from images and create 3D model.

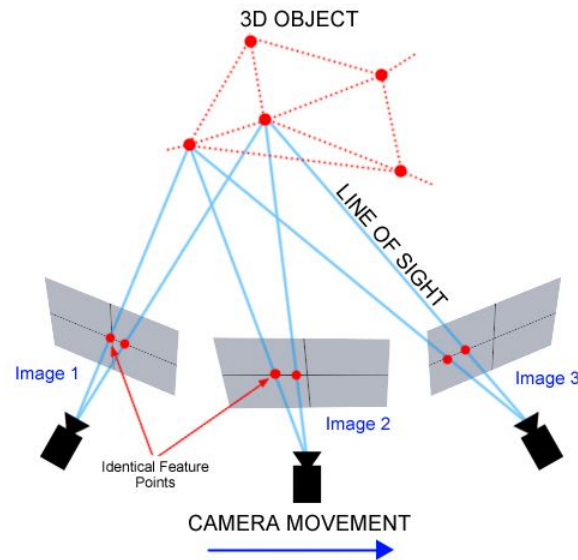


Figure 4. Photogrammetry (source: <https://thehaskinssociety.wildapricot.org/resources/Documents/Tutorials/PhotogrammetrywithPhotoScanTutorial.pdf>)

# 3D SCANNING WITH A MOBILE DEVICE

- When scanning with a mobile device photogrammetry method is applied:
  - Choose a 3D scanning application
  - Place the object to stand somewhere where you can walk around it
  - Be sure to ensure good lighting and follow the basic rules for 3D scanning
  - Follow the scanning procedure as indicated in the app
  - Save the result



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