Introduction

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Who

- Dr. Francesco Banterle
- Researcher at Visual Computing Laboratory (ISTI-CNR)
- Expertise: 2D/3D imaging, Computer Graphics
- E-mail: francesco.banterle@isti.cnr.it

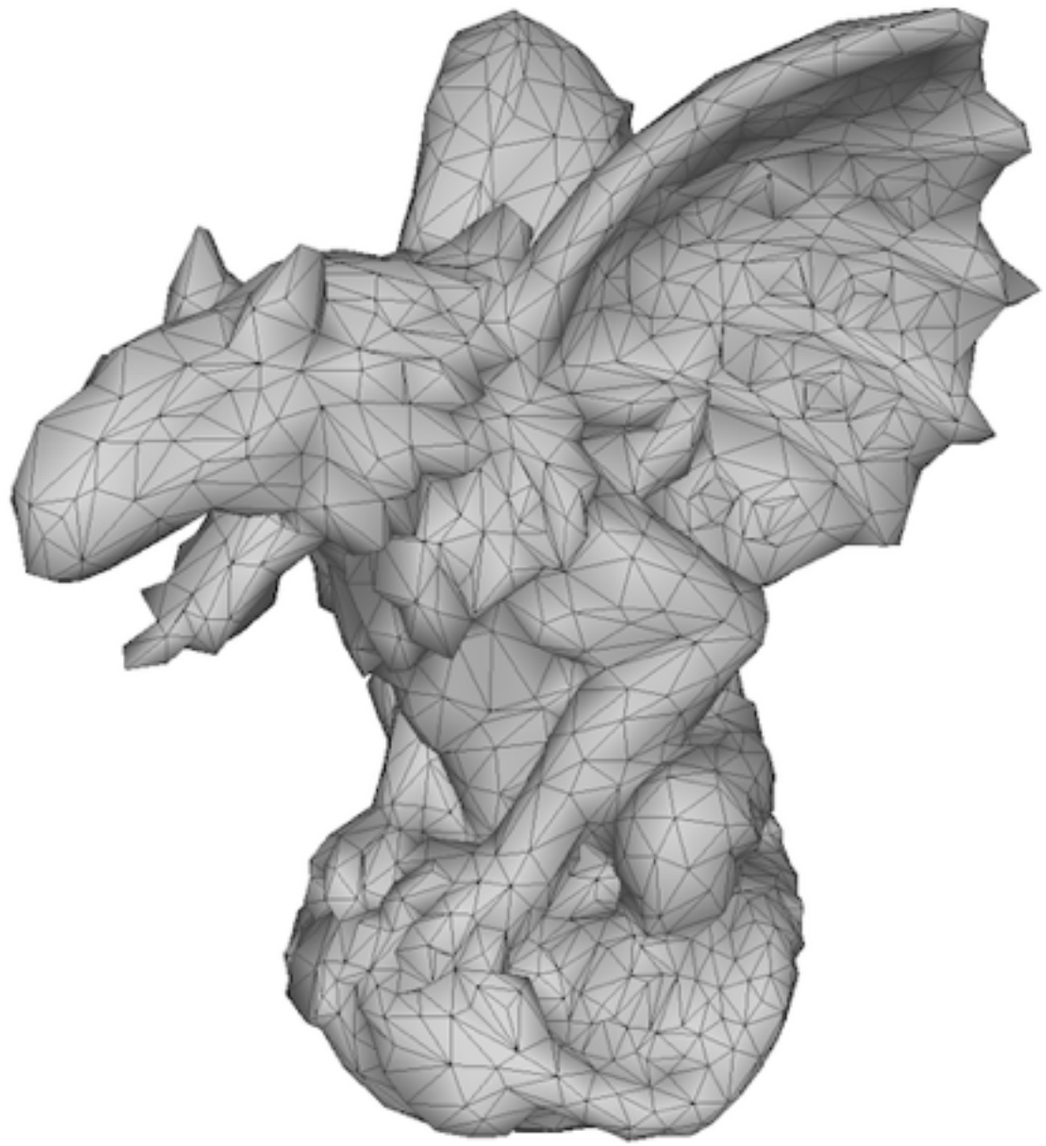
Who

- Dr. Gianpaolo Palma
  - Researcher at Visual Computing Laboratory (ISTI-CNR)
  - Expertise: 3D scanning, Mesh Processing, Computer Graphics
  - E-mail: gianpaolo.palma@isti.cnr.it

Appointment: Francesco Banterle

- Where:
  - Room C-19, Gate 7 or 8, ISTI-CNR, via G. Moruzzi n. 1
- When:
  - Tuesday from 15:00 to 17:00
  - ***please, send an e-mail to confirm an appointment***

The Goal



The Goal

- To know and to understand theory and practice for generating 3D models:
  - Techniques and algorithms
  - Existing open source software
  - Acquisition processes

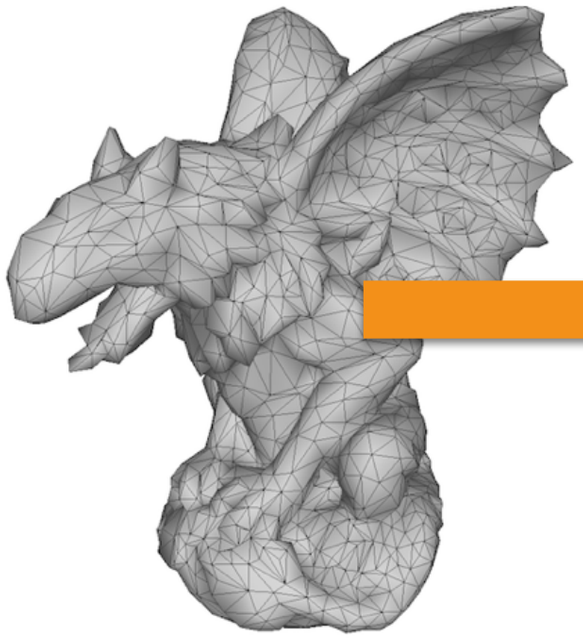
Why 3D Models?

Simulation for training (VR OR by 3D Systems)

Why 3D Models?

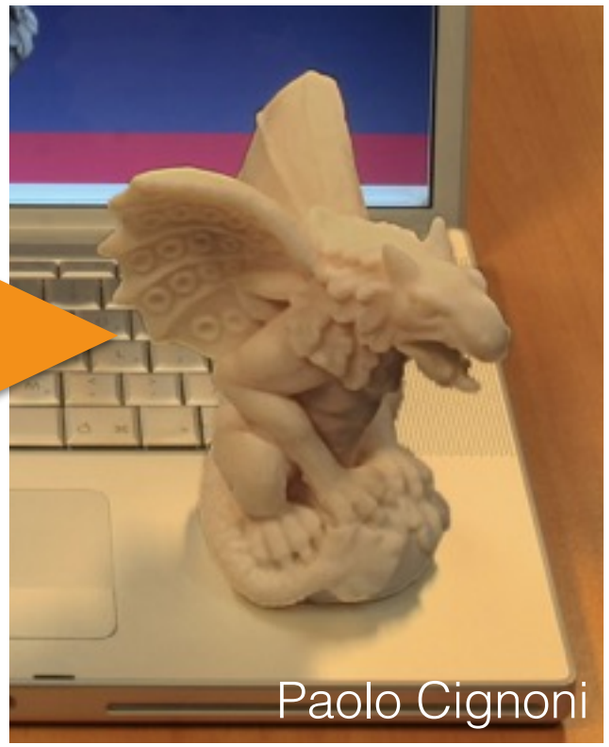
- As they are:
  - reference/teaching
  - simulations: VR, AR, and classic visualization
  - remote/accurate real-life surgeries

Why 3D Models?



3D Model

3D Printer
(UltiMaker)



3D Print

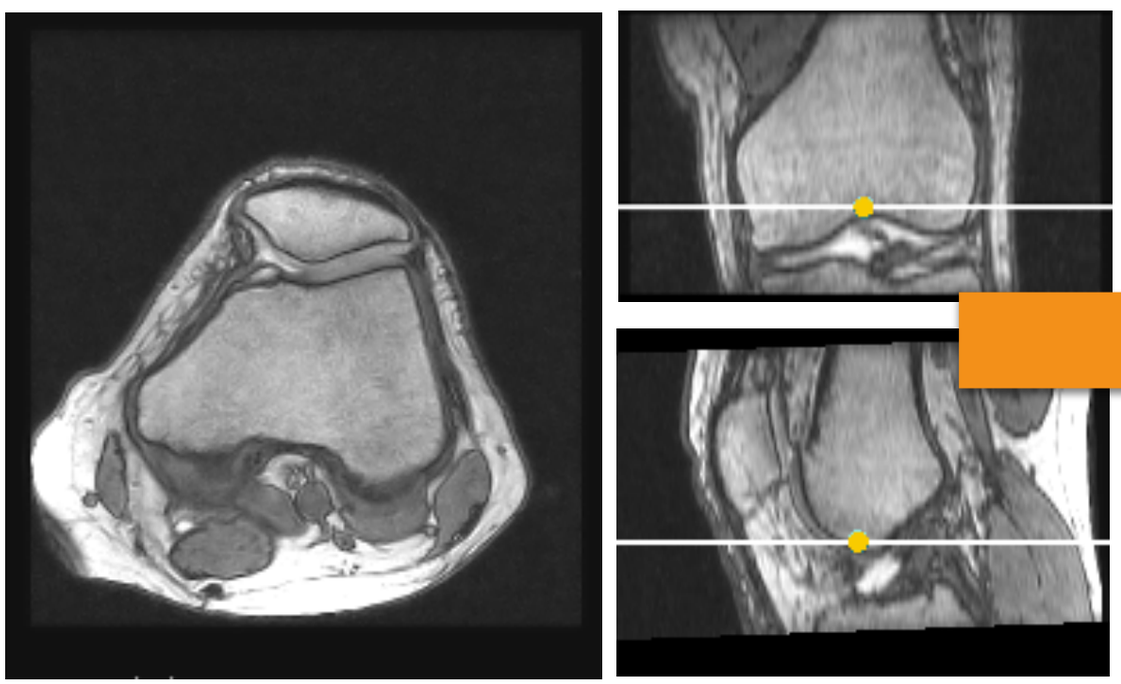
Why 3D Models?

- 3D printing uses:
    - reference
    - prototyping
    - orthopedic cast custom designed
    - prosthetics custom designed

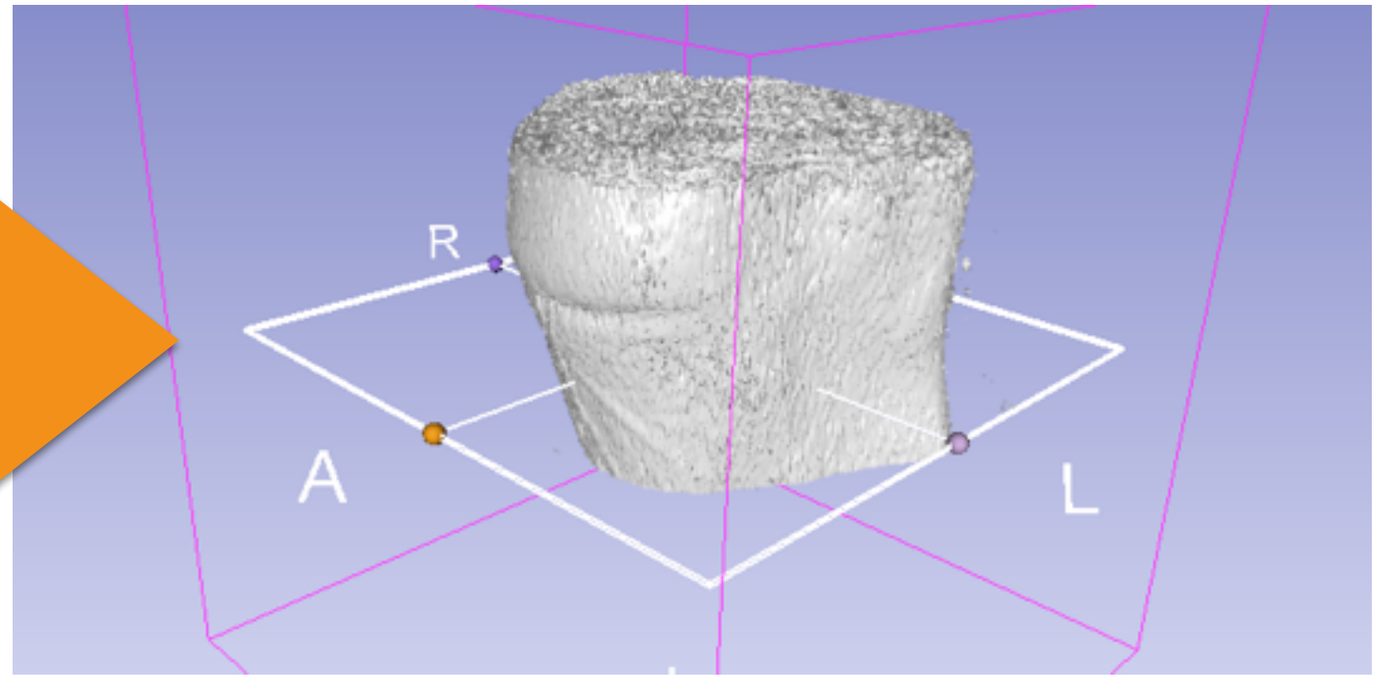
Course Overview

- Part I: 3D models from medical images
- Part II: 3D models from photographs
- Part III: 3D models from range sensors

Course Overview:
3D from Volumes

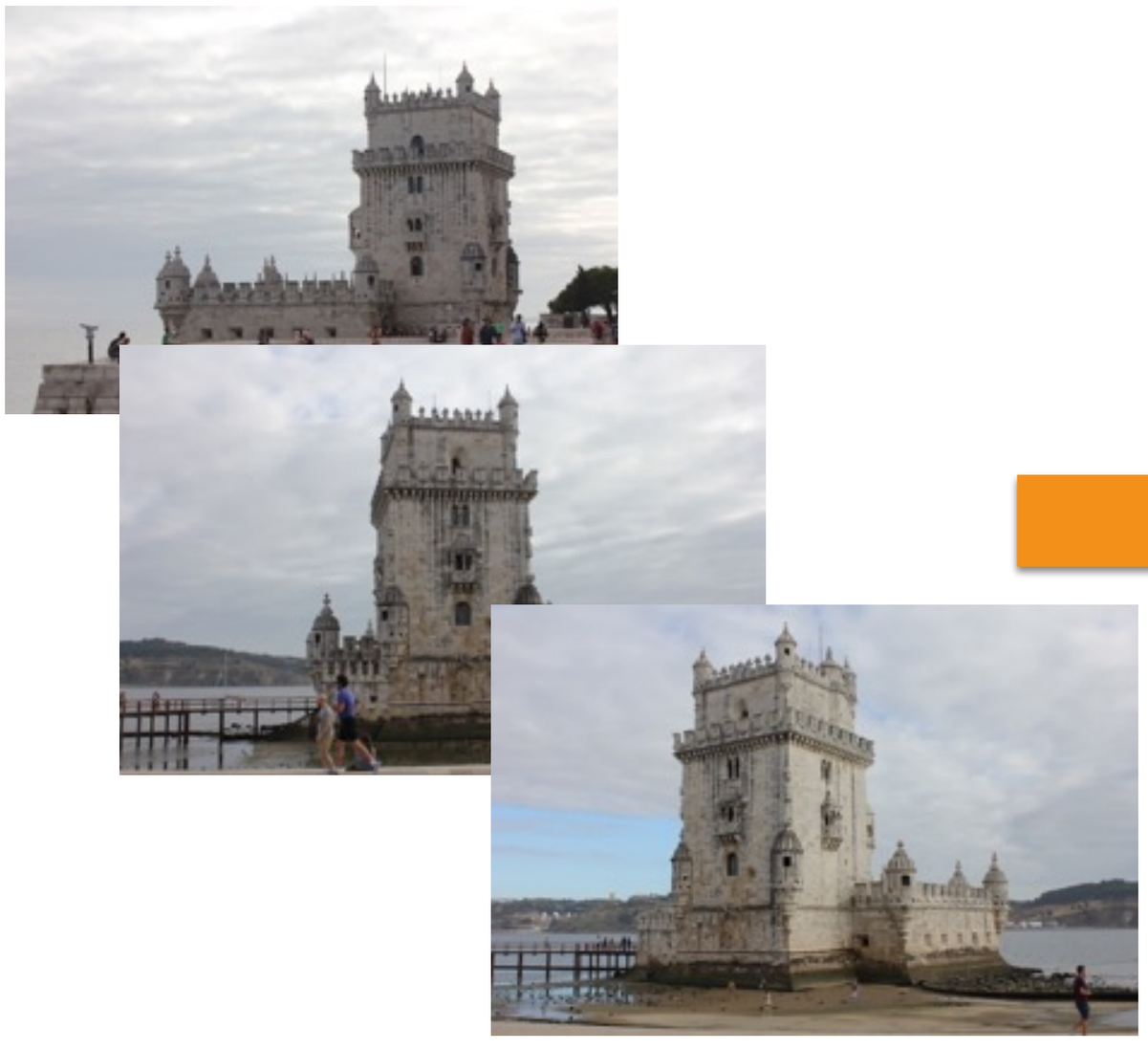


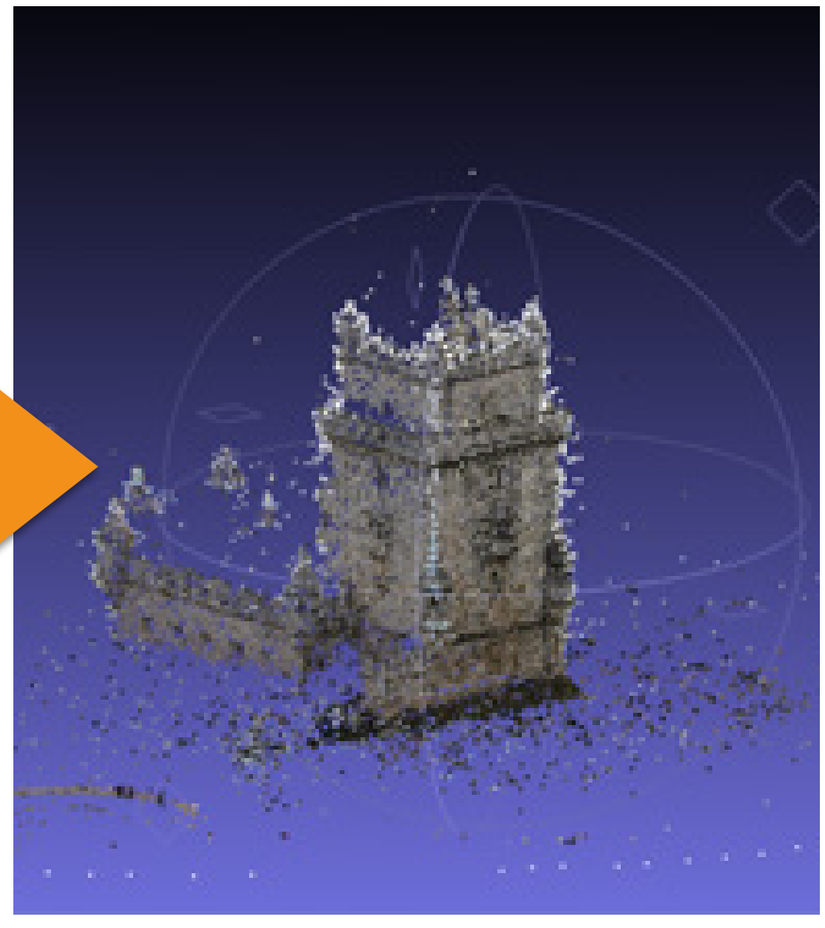
MRI stacks



3D Model

Course Overview:
3D from Photographs





Course Overview:
3D from Range

Range scans

3D Model

The Exam

- A written exam; an open question for each block:
  - 3D from Volumes
  - 3D from Photographs
  - 3D from Range

The Exam

- Implementation project:
  - MATLAB/C++ code
  - Writing a report
  - Presentation

The Exam

- A 3D scanning campaign:
  - Creating a 3D model from volume/photographs/ range maps
  - Writing a report
  - Presentation

Tools

- MATLAB/Octave: please read “MATLAB Primer” (just google it) or :
  - www.math.toronto.edu/mpugh/primer.pdf
- MeshLab:
  - http://www.meshlab.net/
- 3D Slicer:
  - https://www.slicer.org/

Tools

- VisualSFM:
  - http://ccwu.me/vsfm/
- ImageJ:
  - https://imagej.net/ImageJ2
- Fiji + trackEM2:
  - https://fiji.sc/
- CloudCompare:
  - http://www.danielgm.net/cc/

Course Material

- Slides will be uploaded at:
  - http://www.banterle.com/francesco/courses/2017/be_3drec/