3D World, Augmented Reality, and Cultural Heritage

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Video by Fletcher Coleman

The Silk Road
Dunhuang
Datong
Tianshui
Luoyang
India
By the end of the Eastern Han dynasty in the 3rd century CE

moved the imperial capital from Pingcheng to Luoyang

Northern Wei

Yungang Grottoes, ~453

Indian style

Longmen Grottoes, ~494

Sinicization

Tang Dynasty

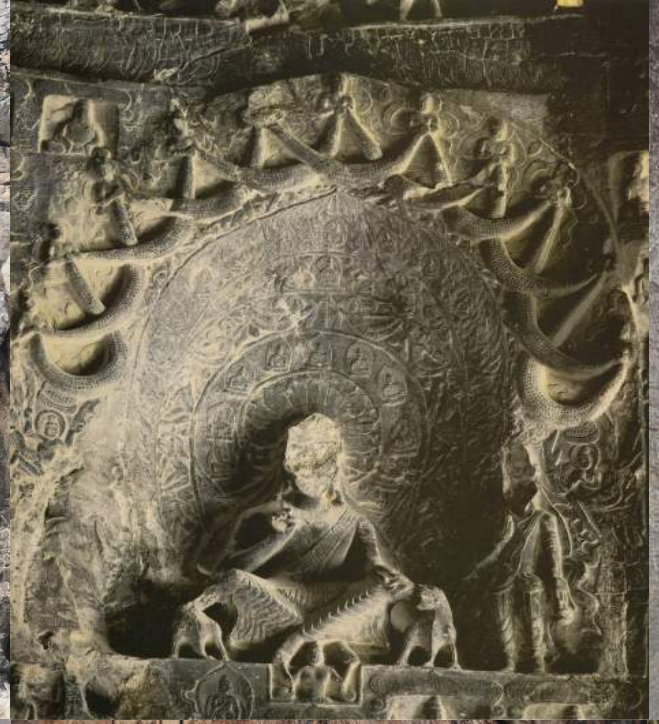
Wu Zetian

Vairocana Buddha

Modern History

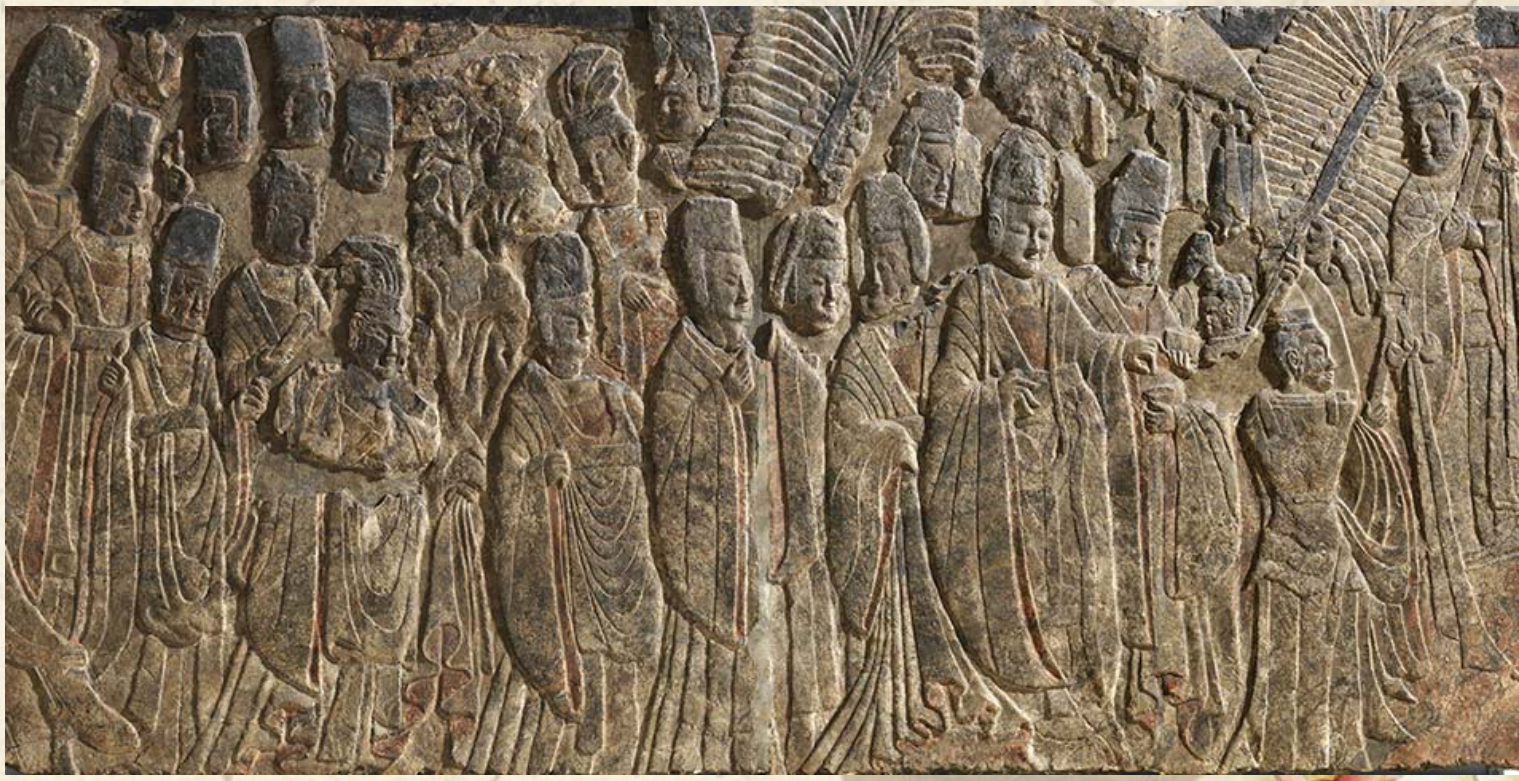
First Opium War, 1840

Destruction of the Old Summer Palace, 1860



Missing Relics

Bodhisattva head
Tokyo National Museum



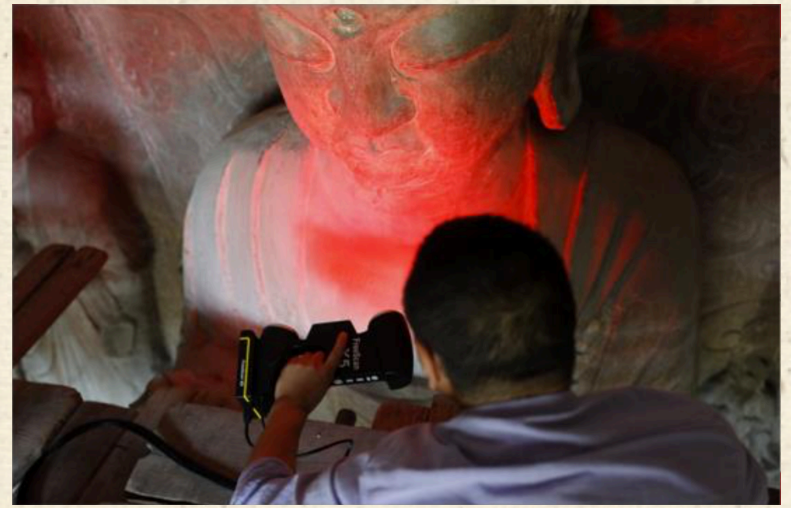
Emperor procession
Metropolitan Museum of Art

Delicate Negotiation

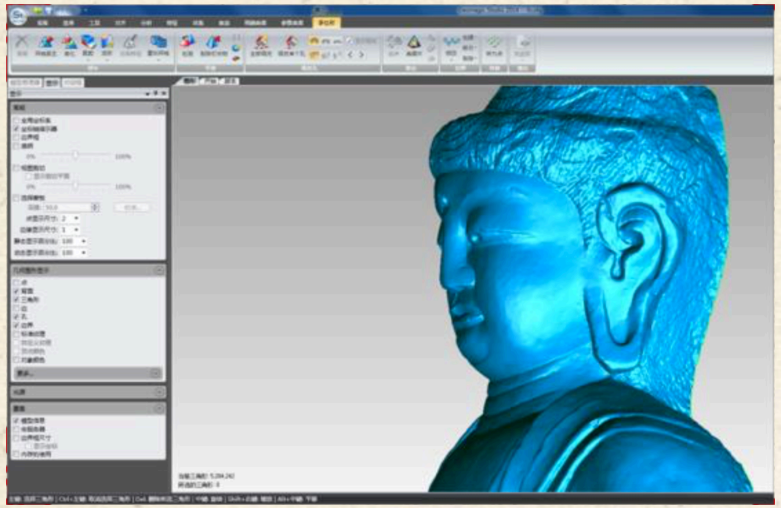
Canada returned a sculpture in 2001

Relief sculpture of the Buddhist disciple Kasyapa

Applications of 3D Technology at Longmen



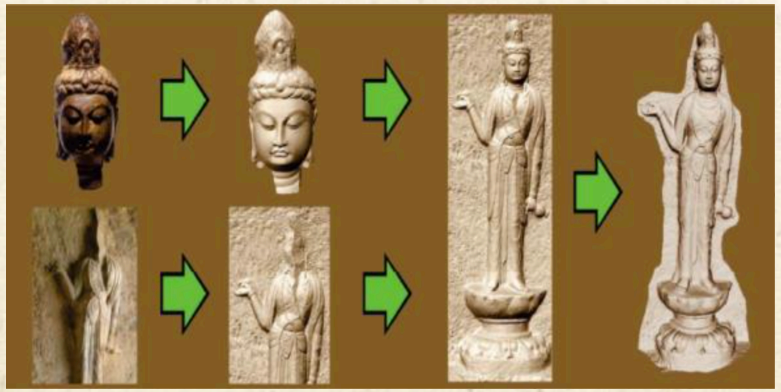
3D scanning



Model processing

3D database

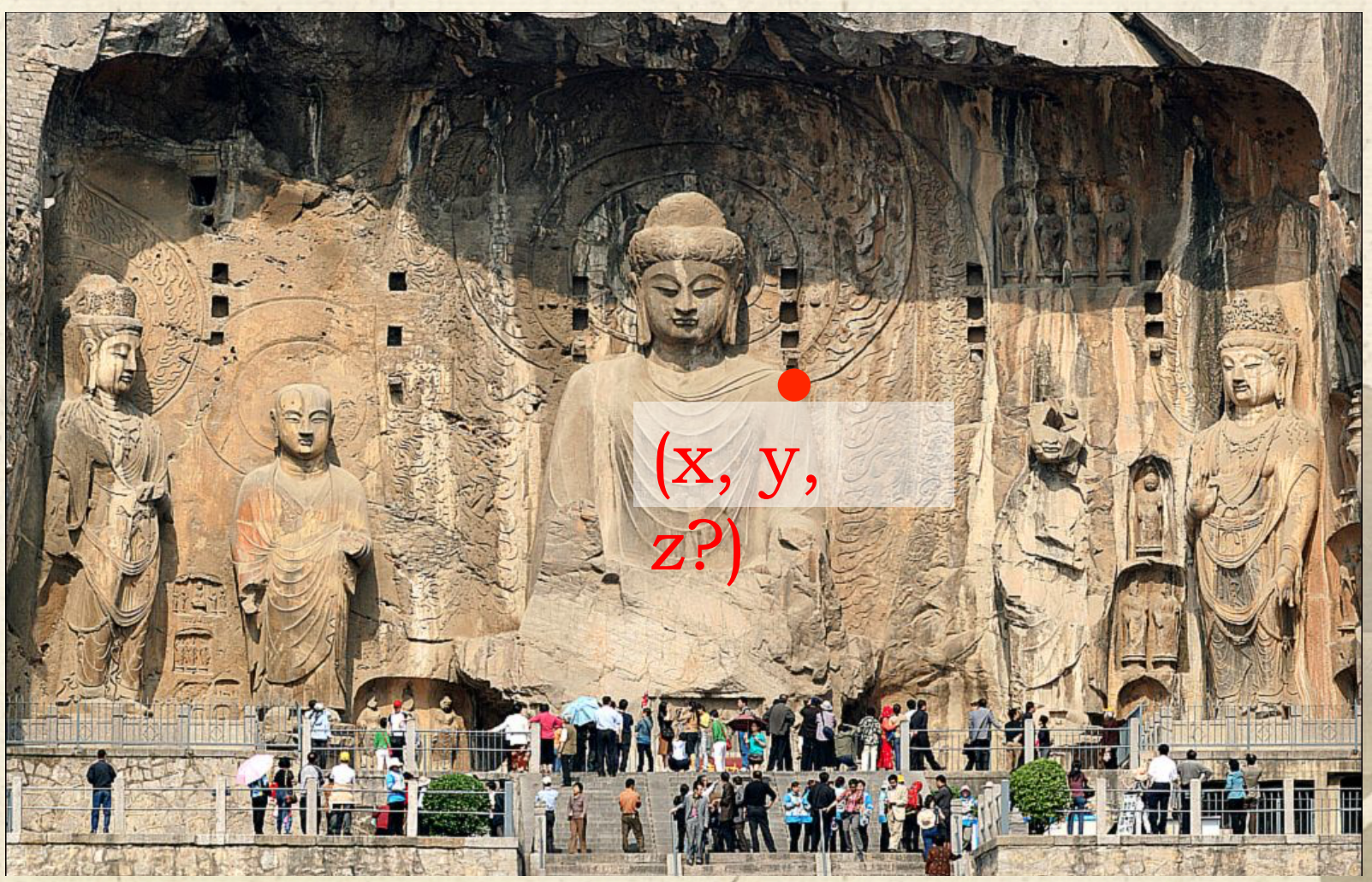
Archaeological drawing



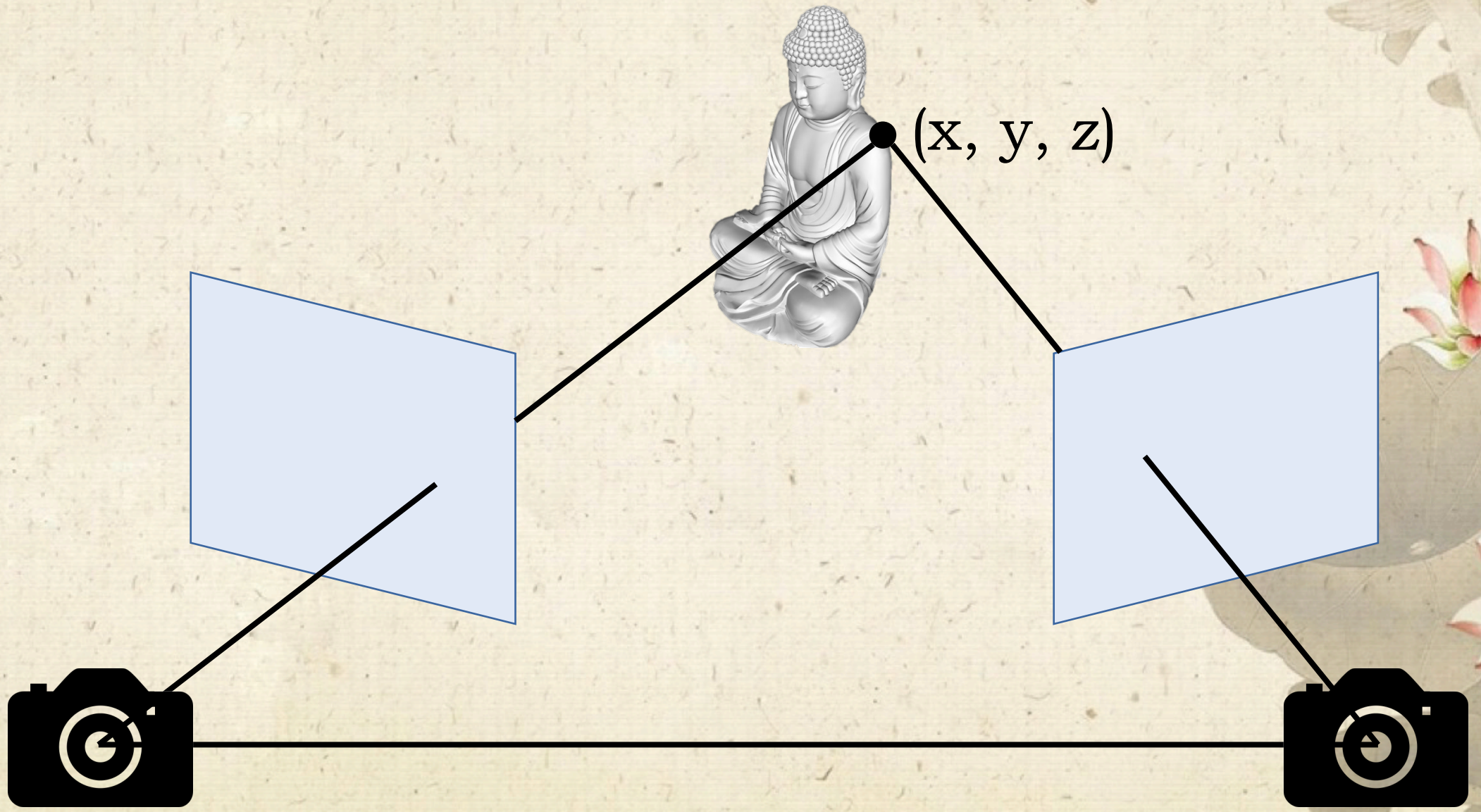
Digital restoration

VR/AR display

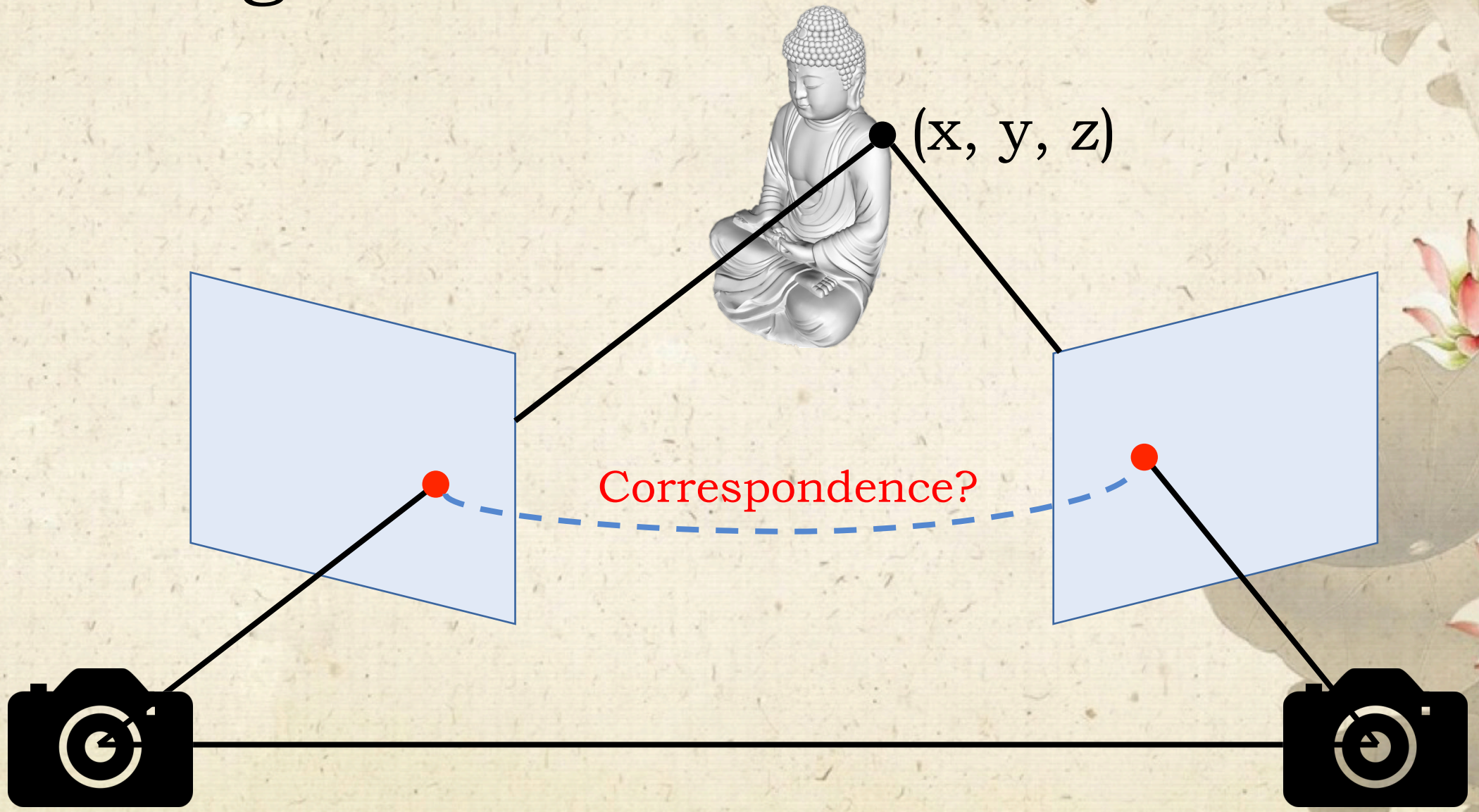
3D Basics



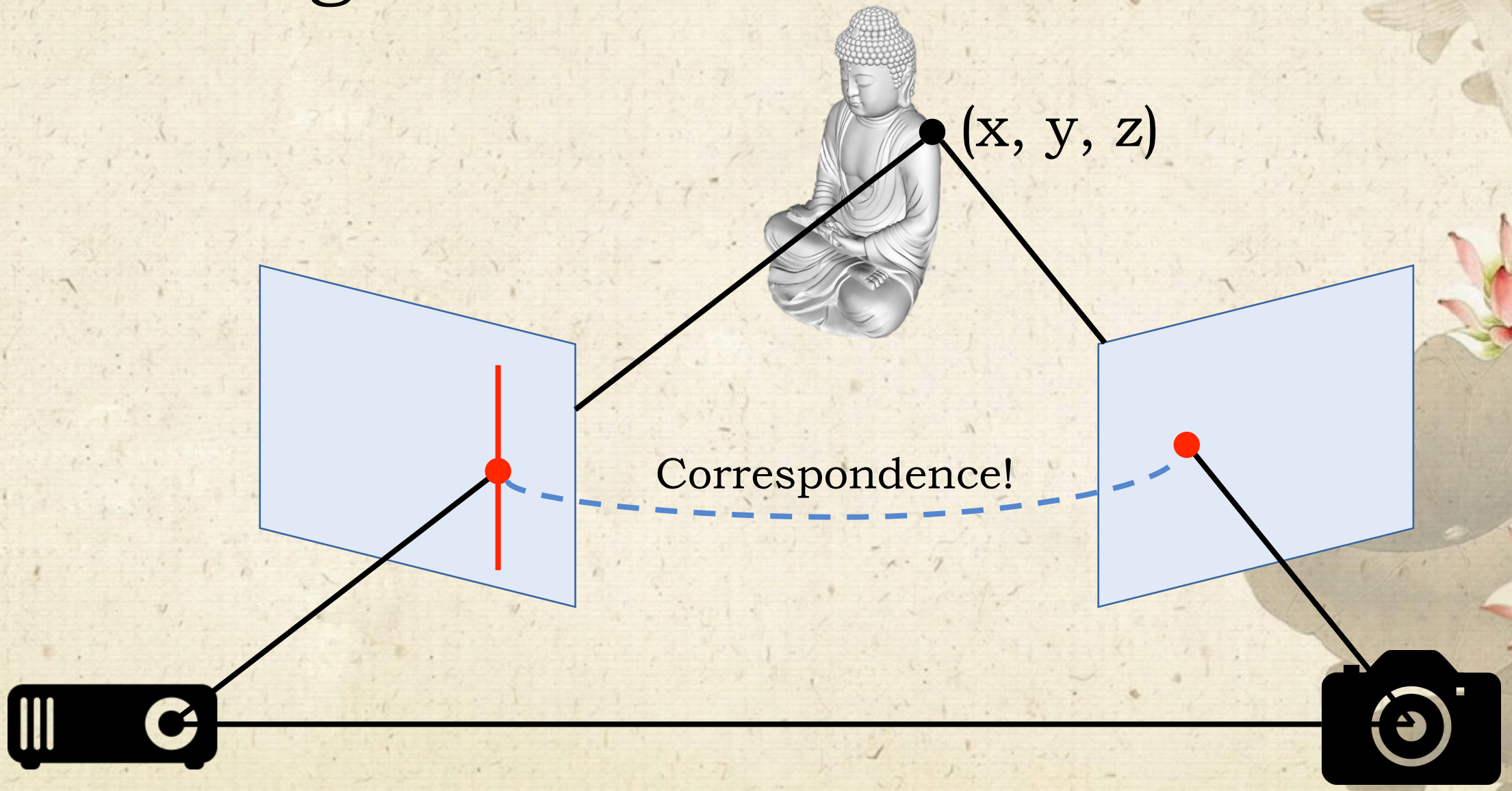
Stereo vision



Triangulation



Triangulation



Multi-resolution 3D Scanning

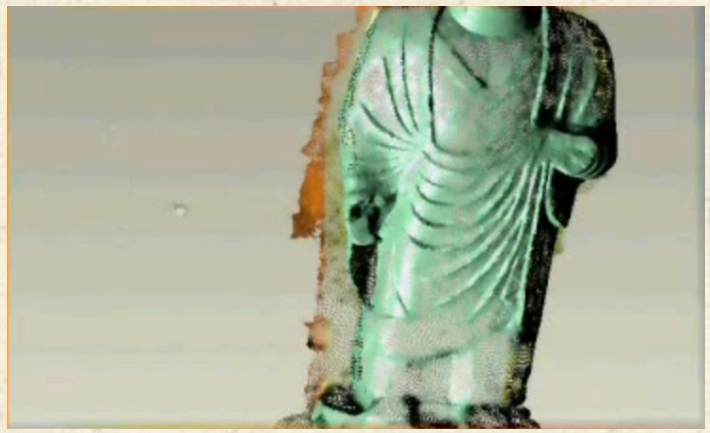
Laser scanners
Convenience

Structured light
High accuracy

Time-of-flight
Large-scale scenes

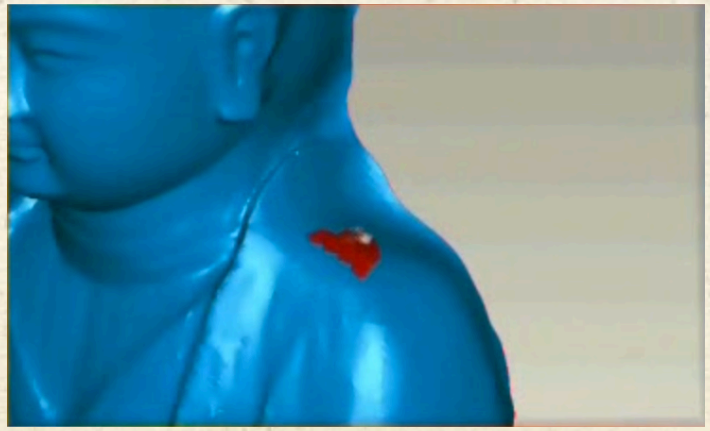
3D Digitization and Its Applications in Cultural Heritage, Digital Heritage 2010

Model Processing



Preprocessing points

Polygonization

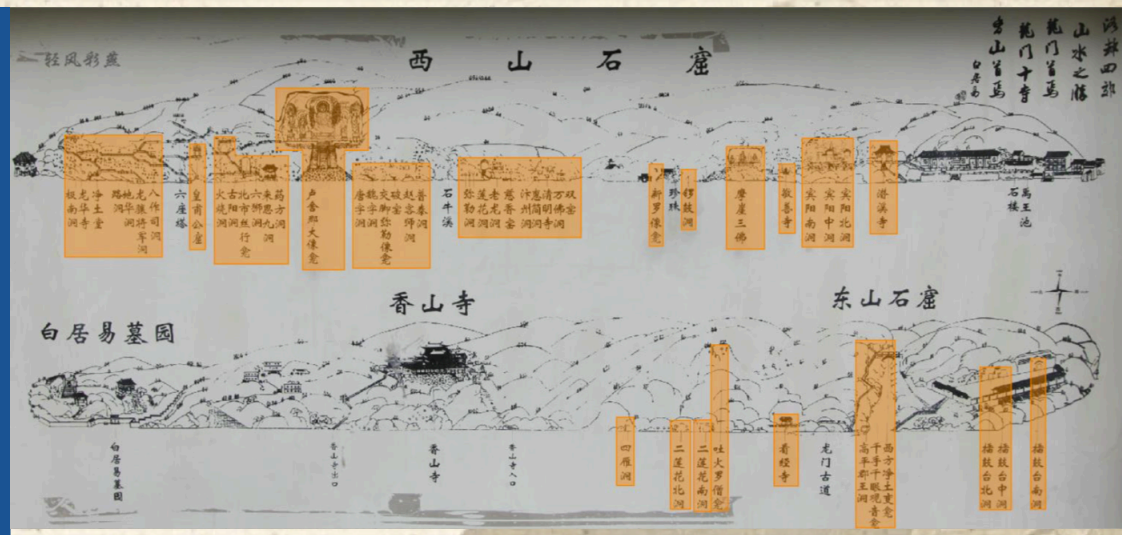


Filling holes

Texture mapping

扫描

3D Database

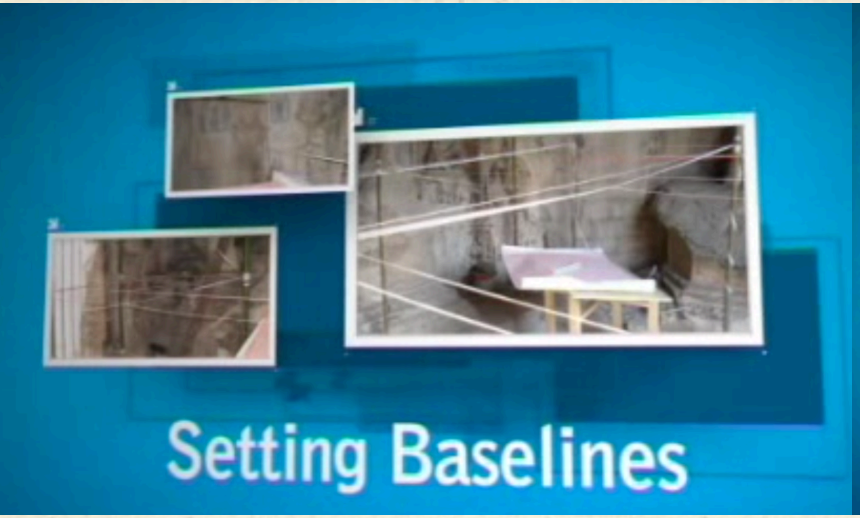


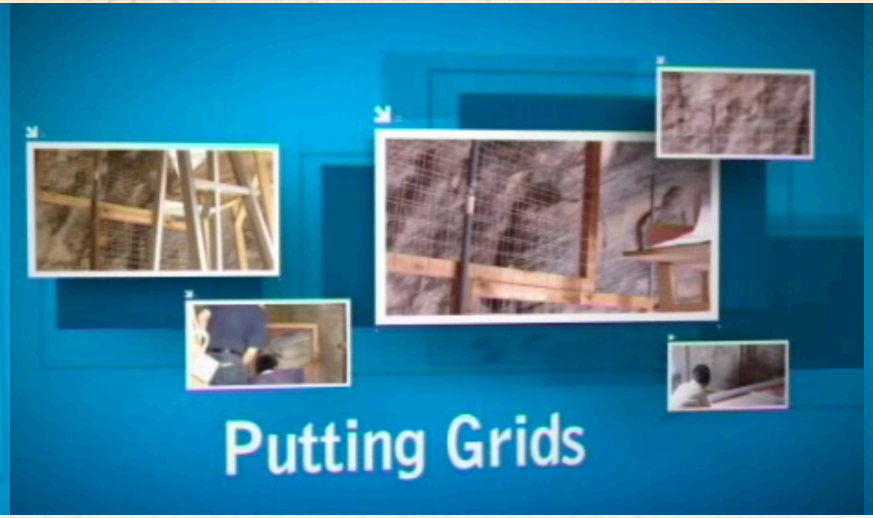
90% digitization finished

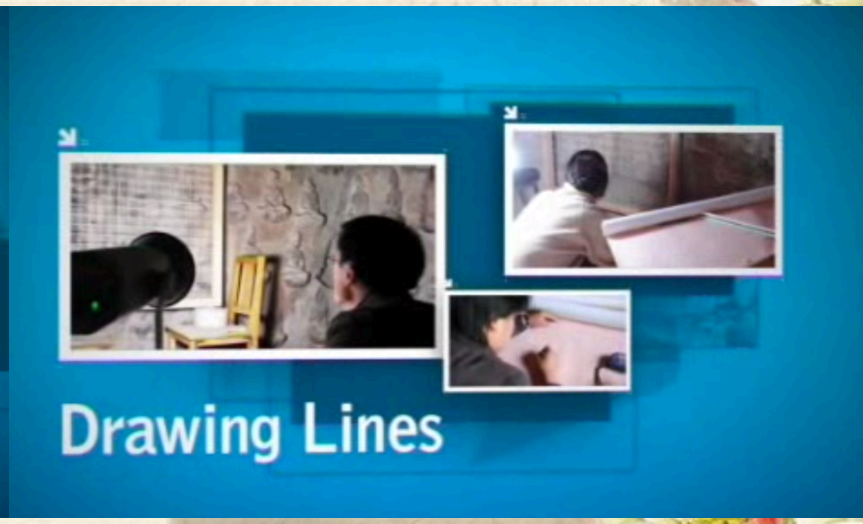
Also refer to
http://graphics.cs.yale.edu/site/cher-ob-open-source-platform-shared-analysis-cultural-heritage-research

Archaeological Drawing

Traditional line drawing







Archaeological Drawing

Computer assisted line drawing

3D Line Drawing for Archaeological Illustration, IJCV 2011
Computer-Assisted Archaeological Line Drawing, IEEE Computer

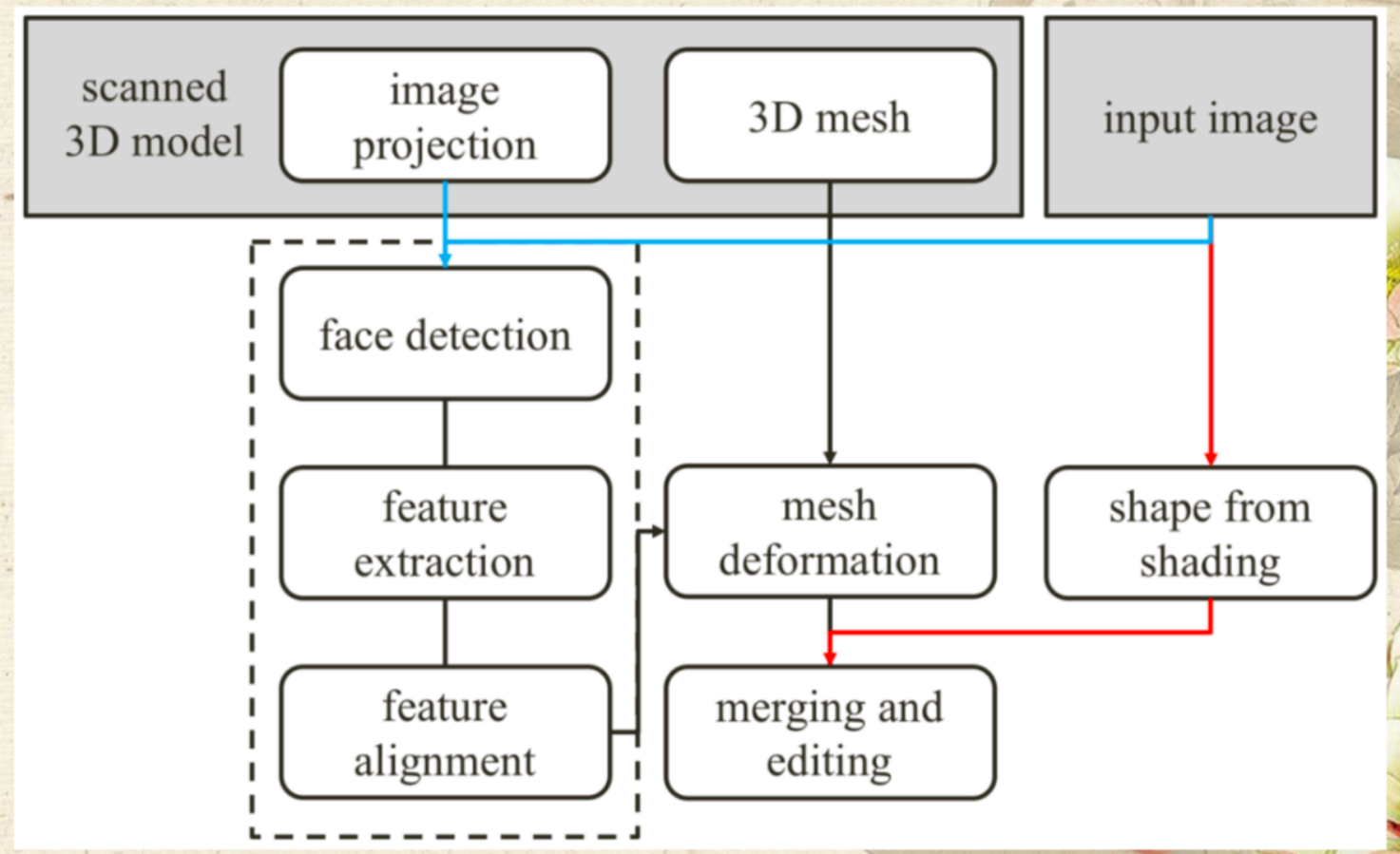
Digital Restoration

Based on 3D models

Based on old photos

火頂洞左脇侍菩薩

虛擬拼接及修復

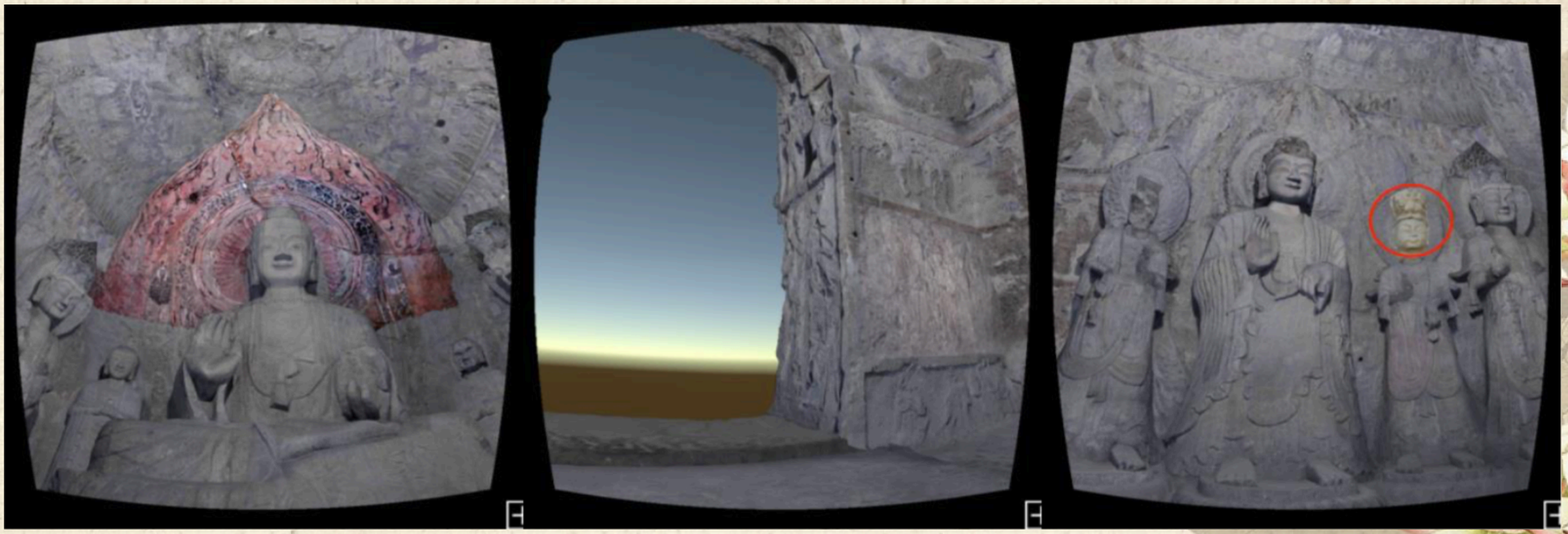


Digital Longmen Project: A Free Walking VR System with Image-based Restoration, ACCV 2016

VR/AR Display

Multi-people free walking VR
Smartphone + goggle + MoCap

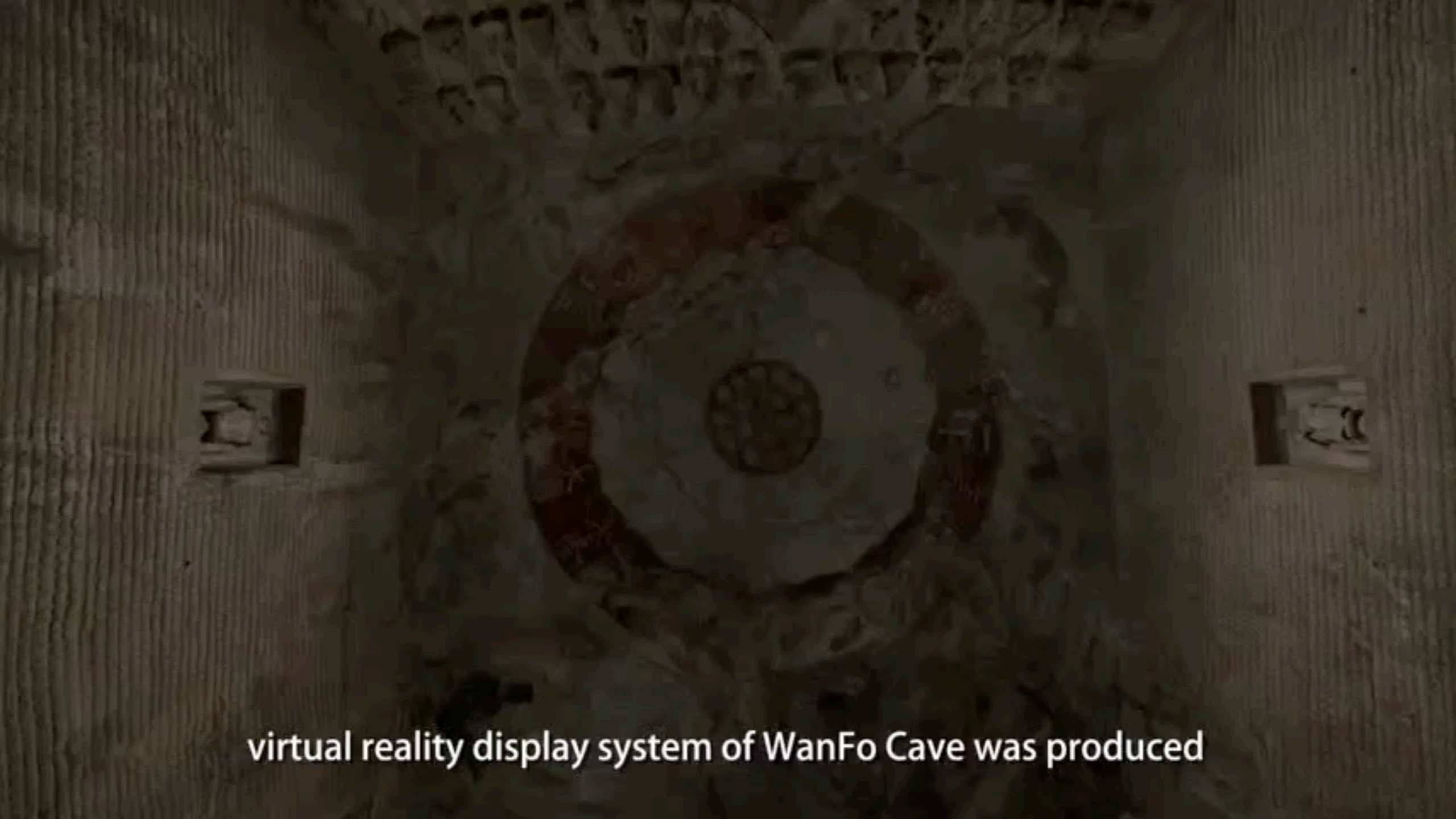
VR/AR Display



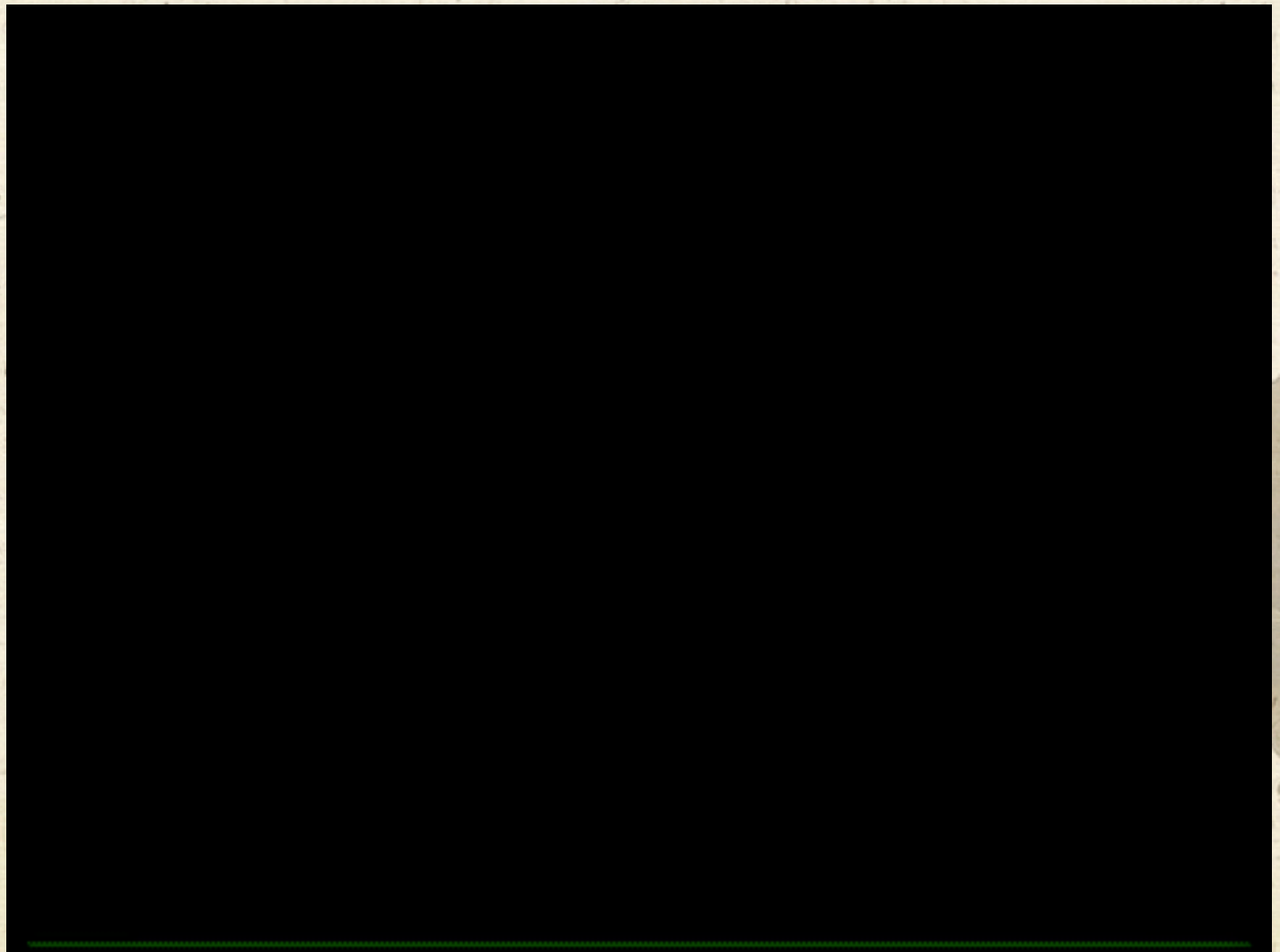
Texture enhancement

Relief restoration

Model restoration


virtual reality display system of WanFo Cave was produced

Digital Michelangelo



Bayon Temple

Build Rome in a Day

Temple of Baalshamin

Thanks to technology,
heritage belongs to all of us.

If you are interested…

- Email me at zeyu.wang@yale.edu to discuss more

- For Yalies
  - Contact members of Yale Graphics Group
  - CPSC 276 Applications in the Digital Humanities
  - CPSC 478 Computer Graphics
  - Consider the major of Computing and the Arts

Computer Science Core Studies

6 courses, including
CPSC 201, 202, and 223

Architecture

6 courses from ARCH

Art

6 courses from ART

Art History

6 courses, 5 from HSAR and one studio art course

Music

6 courses from MUSI

Theater Studies

6 courses, 3 from THST and 3 courses in dramatic literature or theater history

Yale | CREATIVE CONSILIENCE of Computing and the Arts