

Elements of Geometry Processing

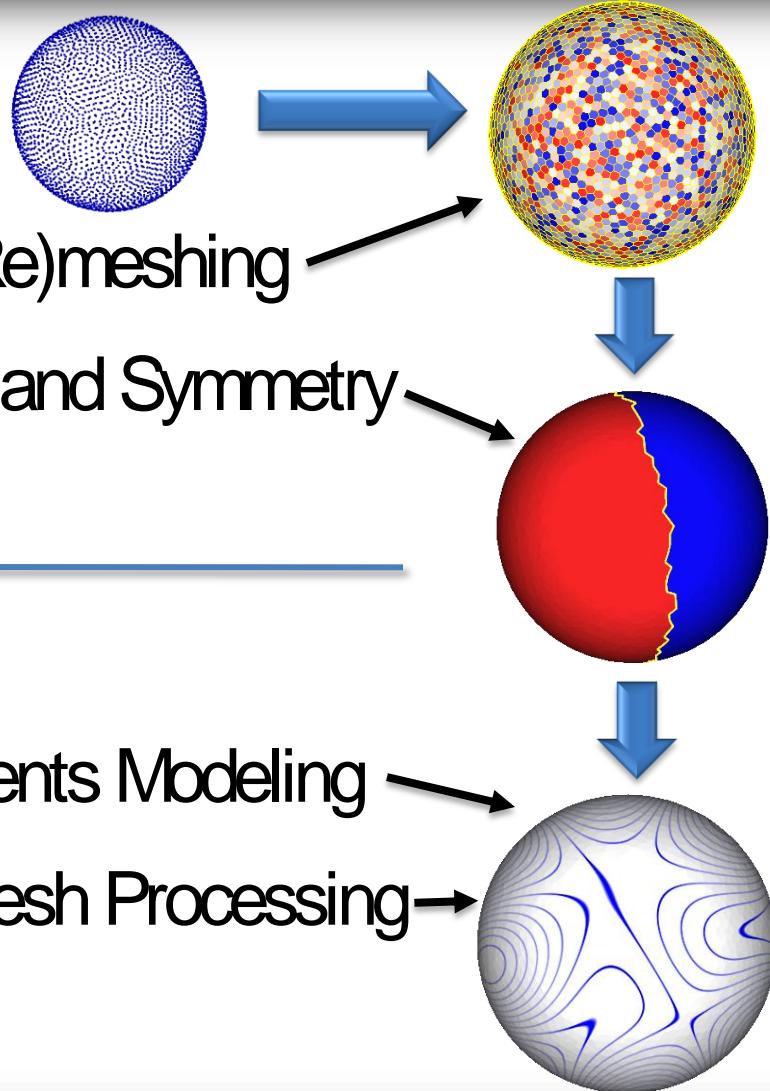
Bruno Lévy and Richard Hao Zhang

Overview

- **Introduction**
- **Low level:** Reconstruction and (Re)meshing
- **High level:** Recovering Structure and Symmetry

Break

- **Function Spaces I:** Finite Elements Modeling
- **Function Spaces II:** Spectral Mesh Processing



From geo-metry to geometry processing

GEOMETRY

From geo-metry to geometry processing

γεωμέτρης

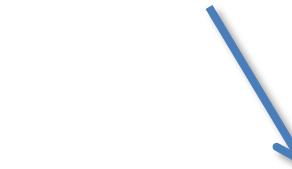
From geo-metry to geometry processing

γεωμέτρης



γή

Gē: *the earth*



μέτρον

Metron: *to measure*

Introduction

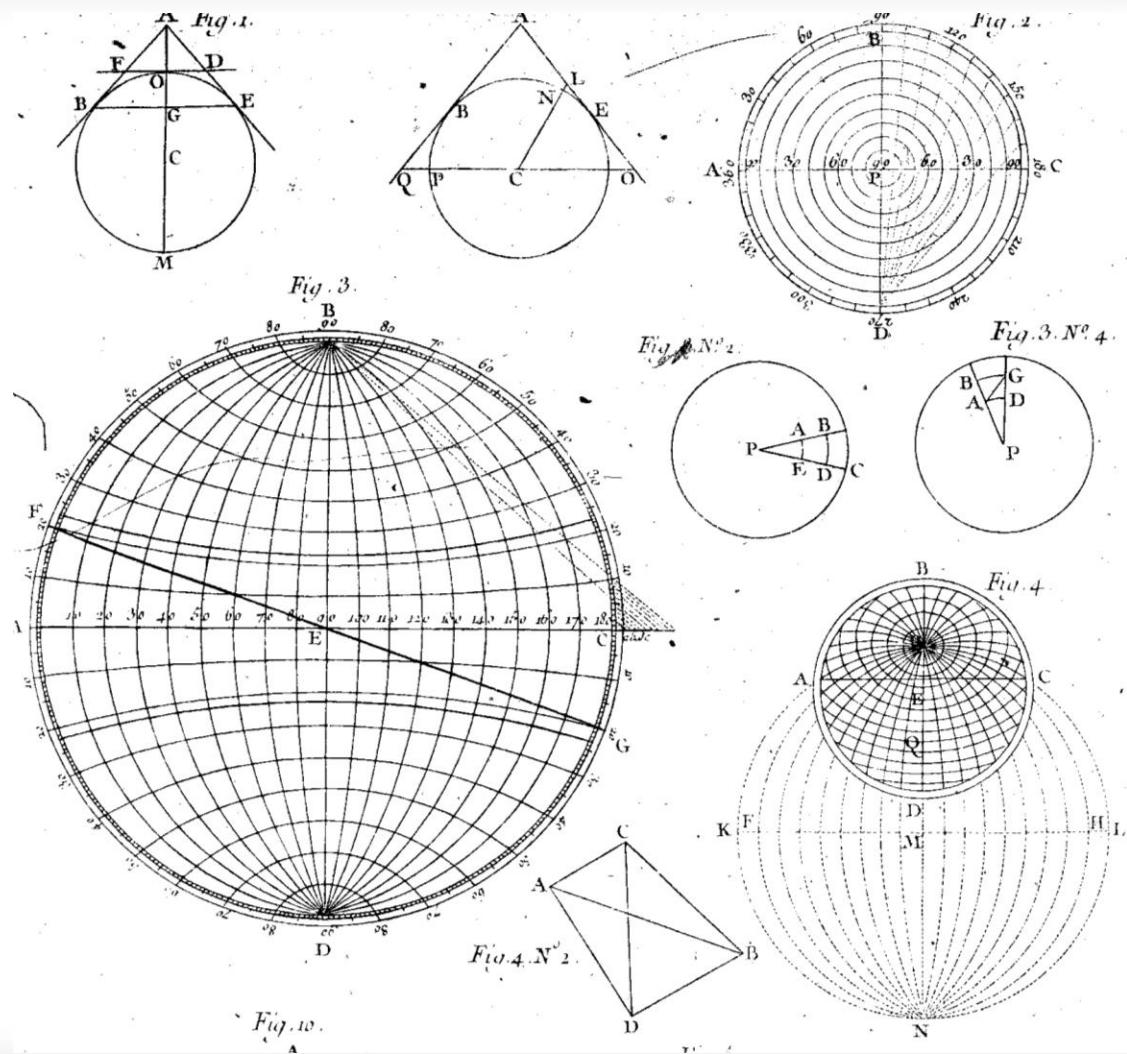
3000 B.C.

1850 B.C.: "Rhind" papyrus (British Museum)



Introduction

Gérard Mercator
1530

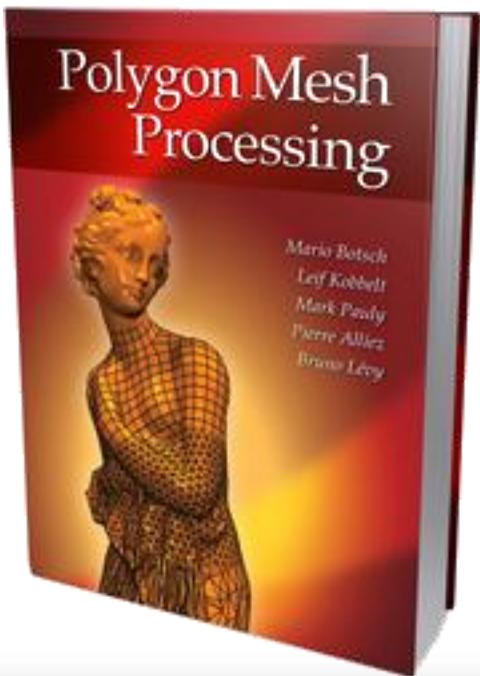


Introduction

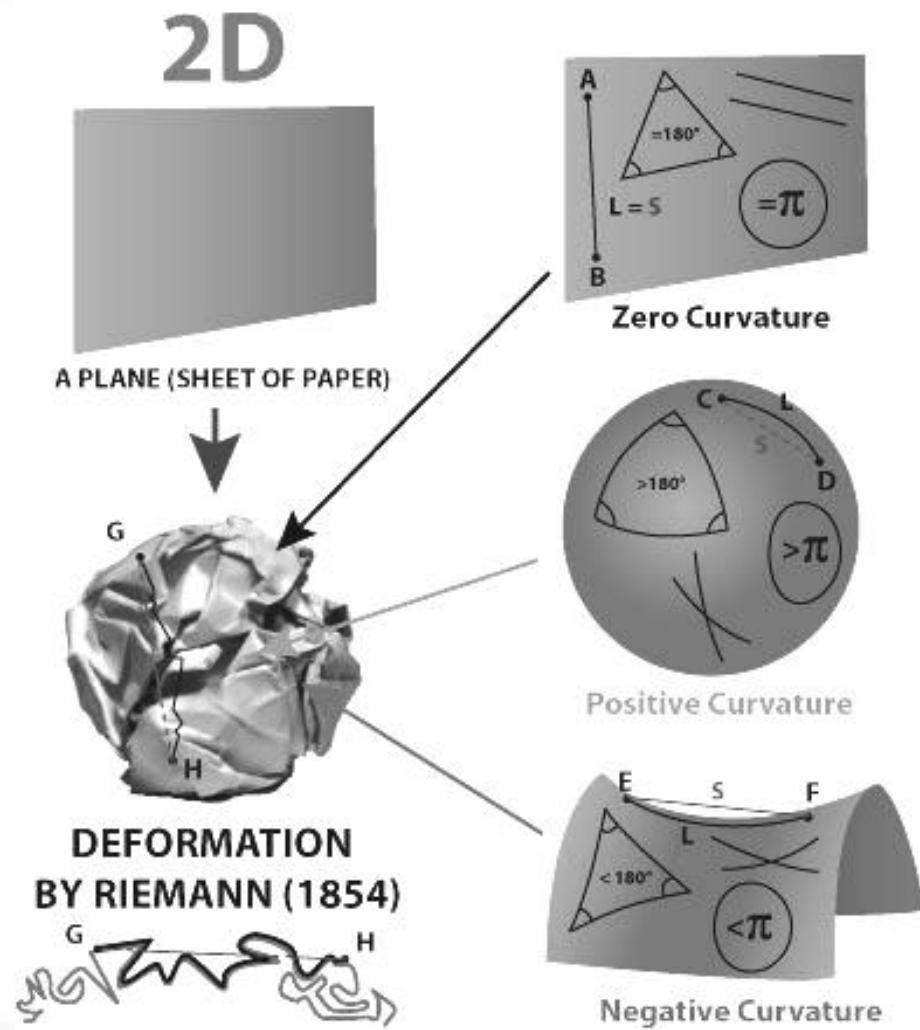
Differential geometry

Carl Friedrich Gauss 1800

Bernhard Riemann 1850

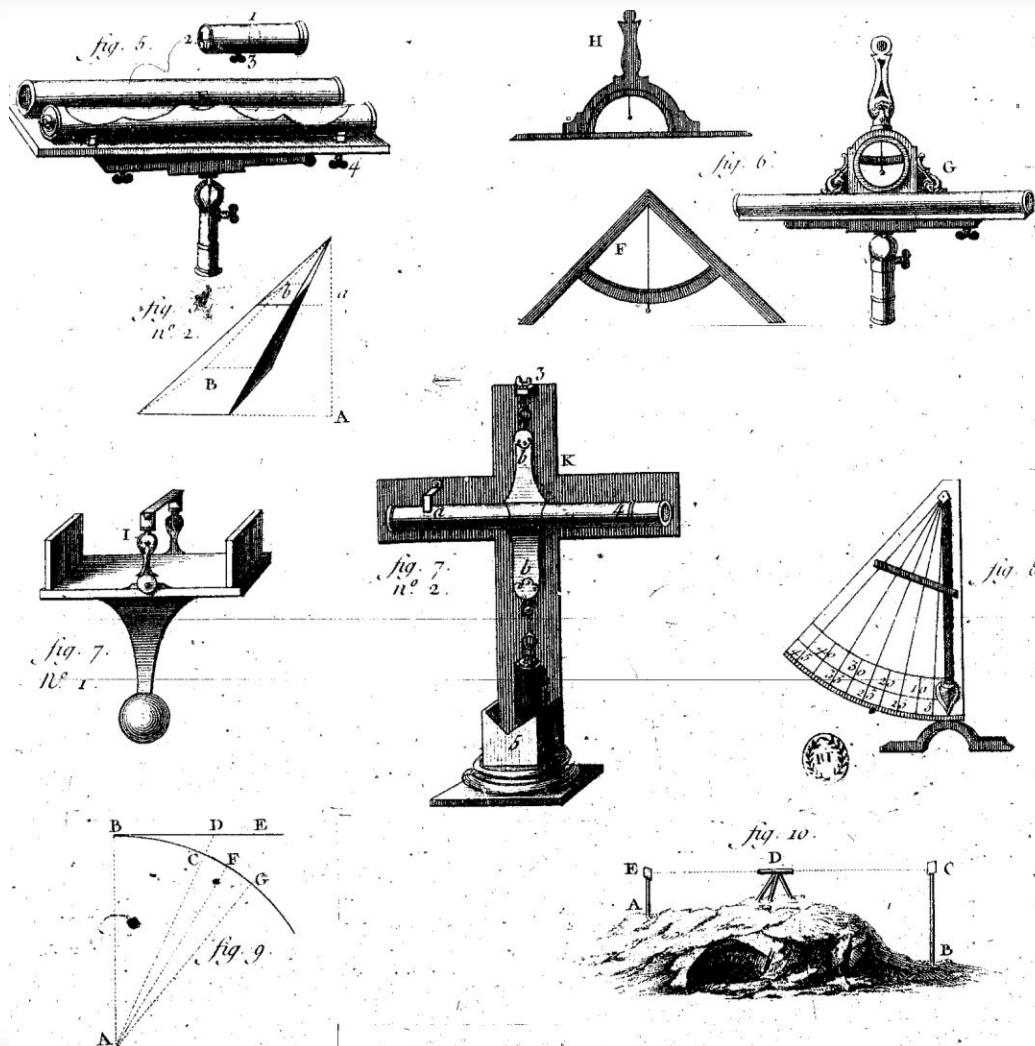
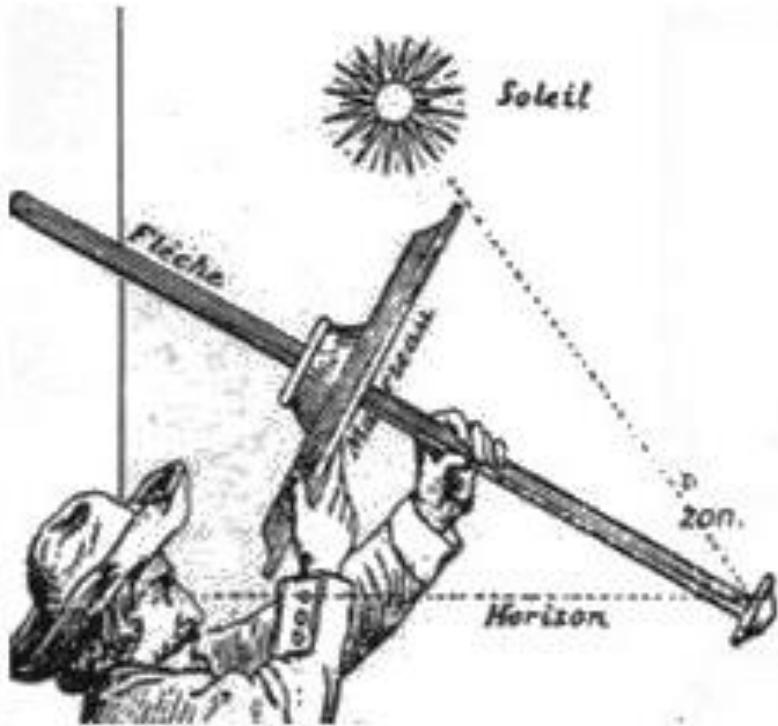


*Not covered here
More on this in
Chapter 3*



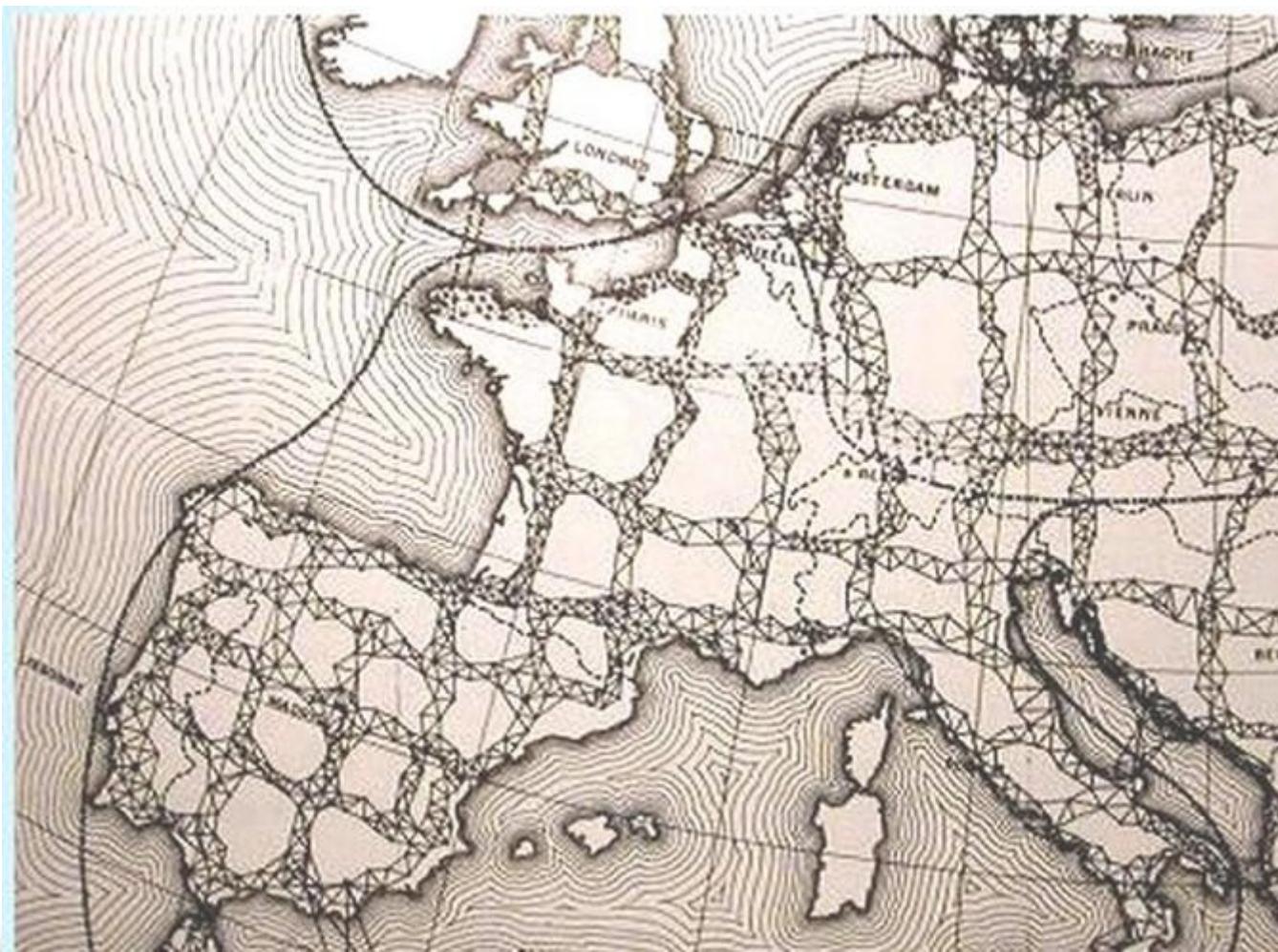
Introduction

XVIIIth century:
Advances in instruments
(optics, measurement of angles)



Introduction

XVIIIth century: large-scale triangulations (Europe-wide)



Introduction

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1969 – Henri Gouraud



Introduction

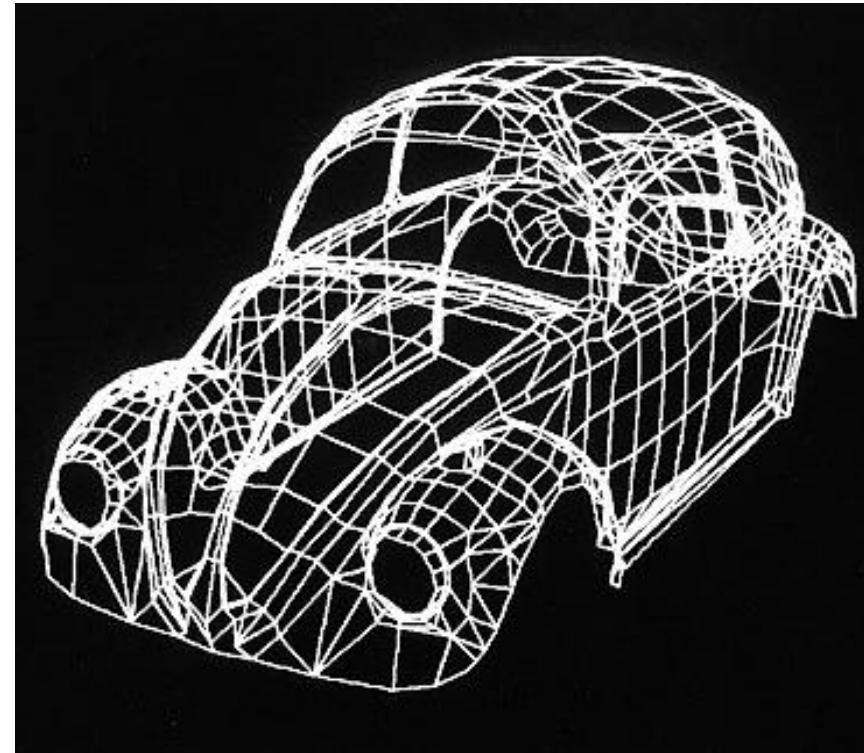
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1969 – Henri Gouraud



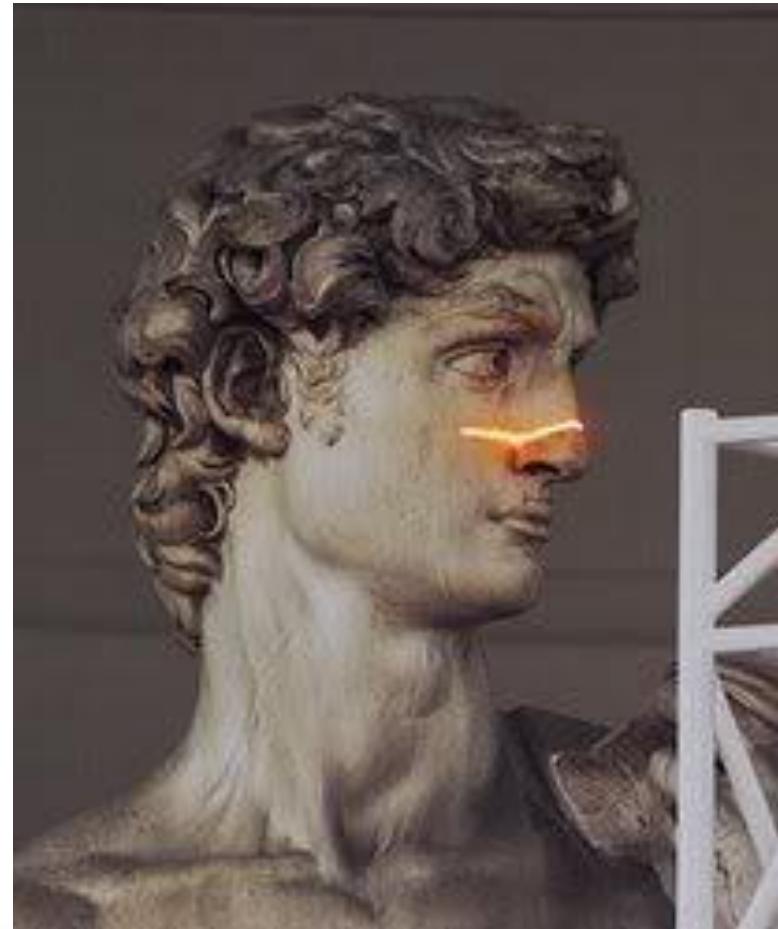
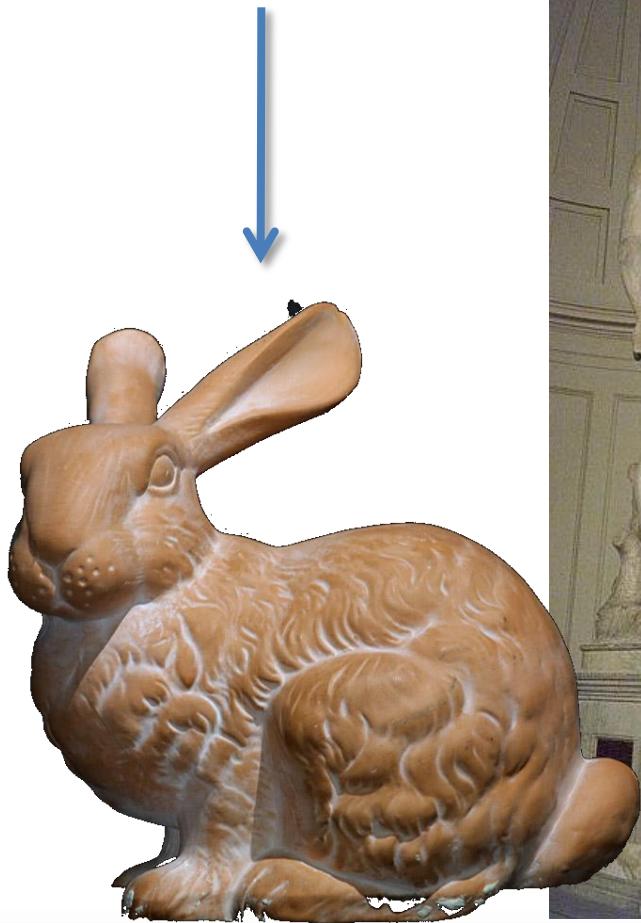
Introduction

1970 – Ivan Sutherland digitizes his car



Introduction

Levoy & Turk, Stanford 1994 1998-1999



Introduction

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3D acquisition of a car

