

Automated 3D Facial Landmarking

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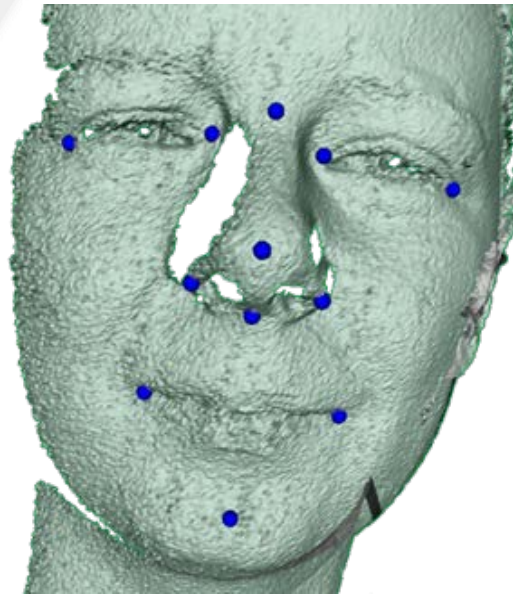
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Background

New insights in developmental biology **indicate** a deep, embryological **intimacy** between morphogenesis (**shape generation**) of certain regions of the **brain** and the **face**

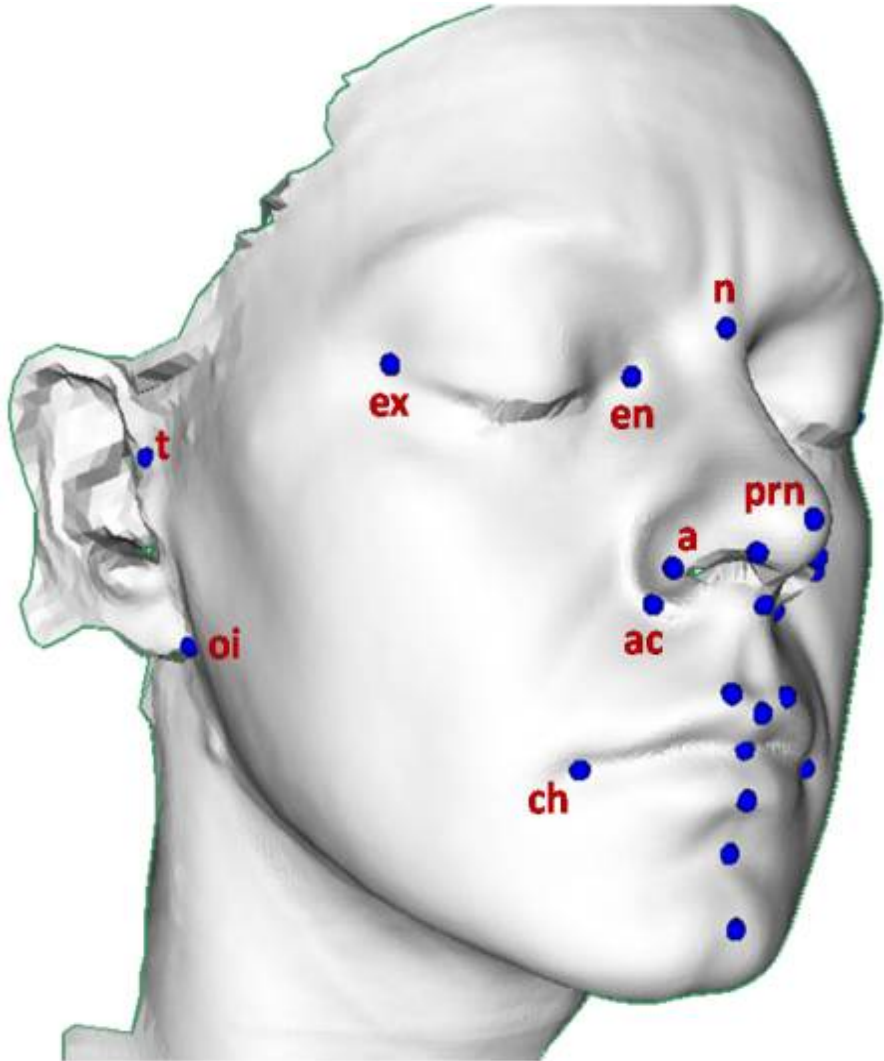
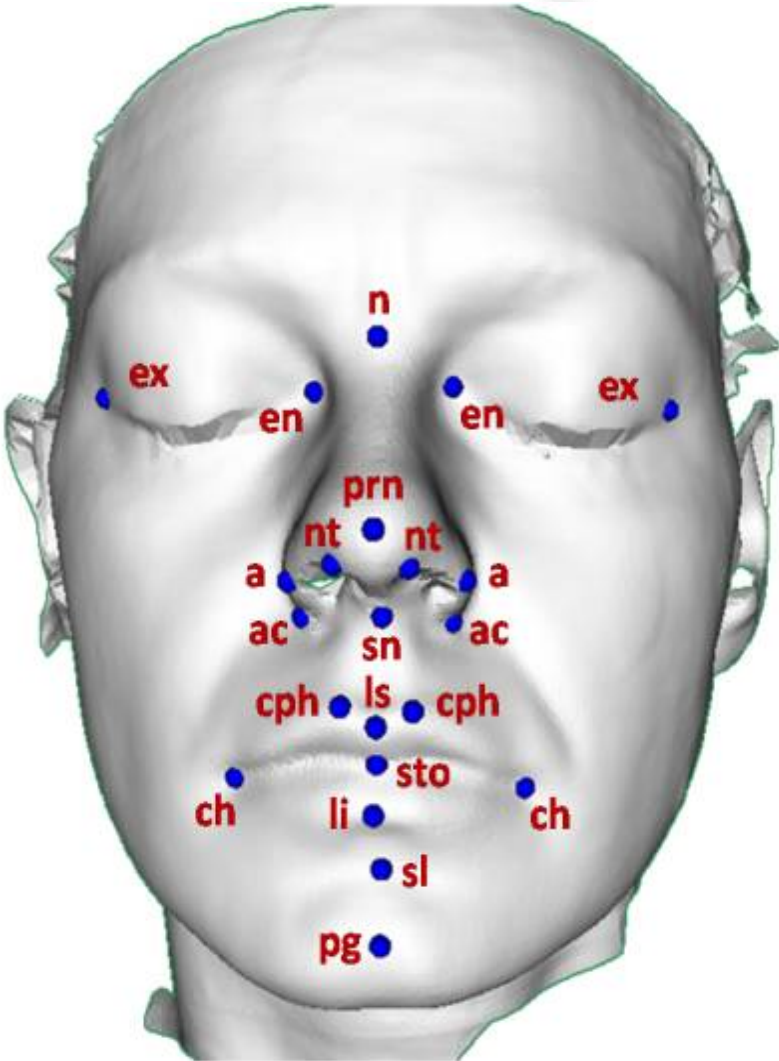
How Can We Measure This?

Automatic extraction of key image features with a view to a **robust and reliable quantitative analysis** of the key information/data within the scene – **computer vision**



Automated Craniofacial Landmarking

3D Craniofacial Landmarks



Collaboration: Core Team

Prof. Paul Whelan
Professor of Computer Vision, DCU

Prof. John Waddington
Professor of Neuroscience, RCSI

Dr. Federico Sukno
Marie Curie Research Fellow

Dr. Mario Rojas
Wellcome Trust Research Fellow


Centre for Image Processing & Analysis



wellcometrust

The University of Glasgow, Institute of Technology (Tralee),
University of Limerick

Behavior Analysis and the Human Face

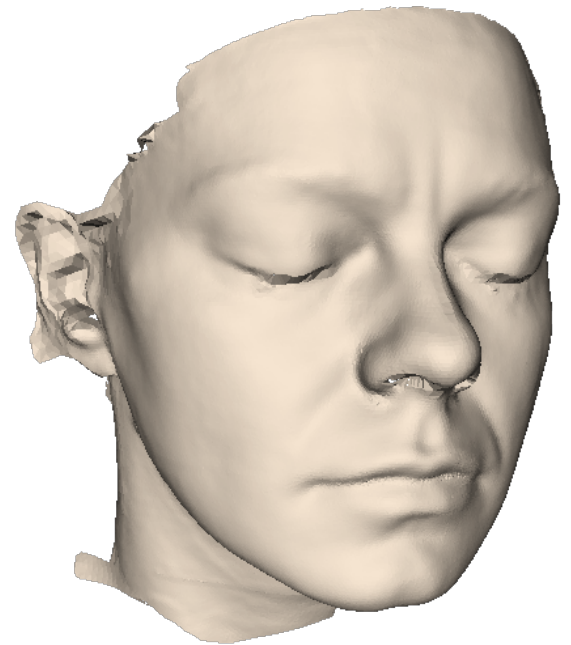
- Enhancement of human-machine interaction
- E-learning
- Social interaction studies
- Car-safety applications
- Personality traits, psychological states, early developmental disorders

Why 3D?

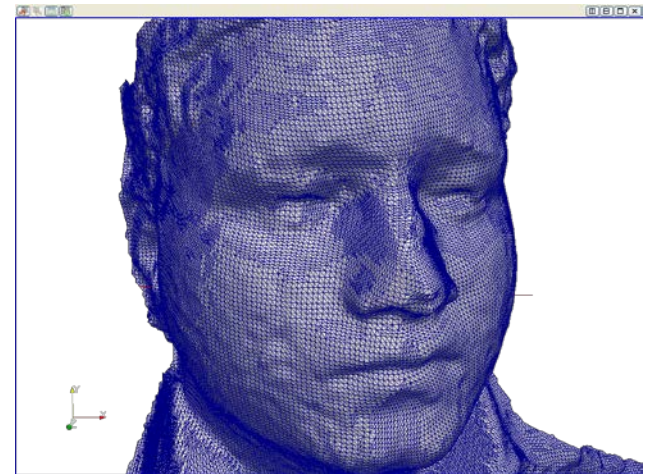
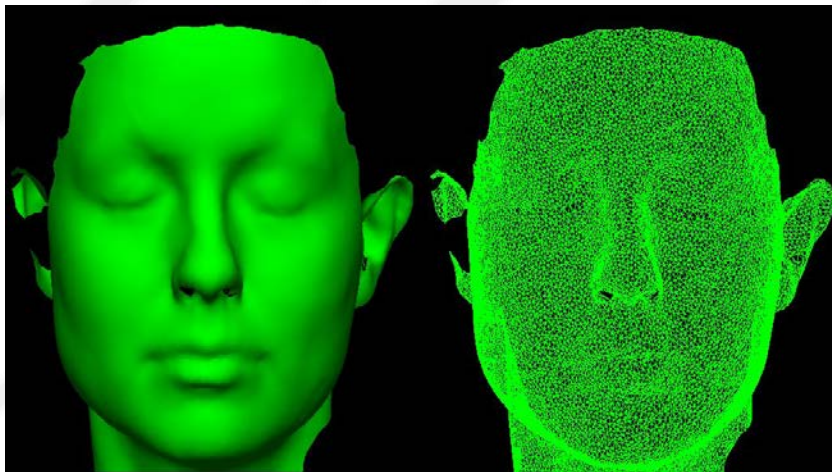
Growing availability of 3D

The human face is a deformable 3D object

Quantitative comparisons between 2D and 3D data



3D Image Acquisition (Laser & Stereo)



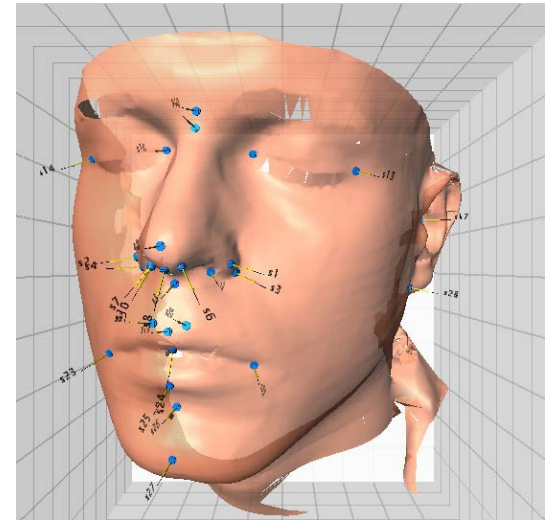
High Precision Landmarking

Anatomically meaningful

Typically too sparse to describe the surface

Manual localization

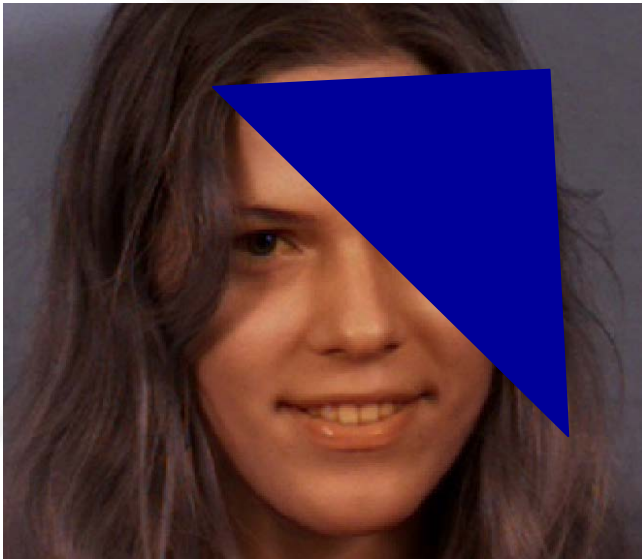
Automatic localization



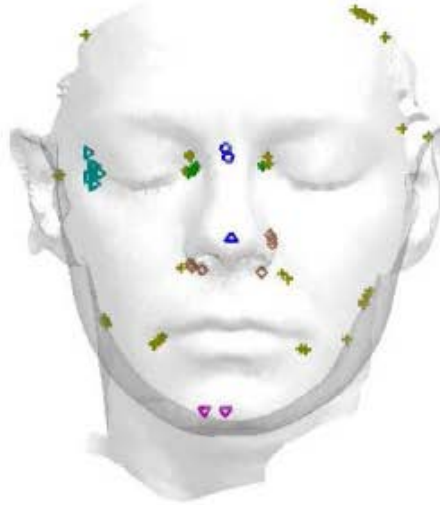
Our Approach

Accept we will **not** find all landmarks

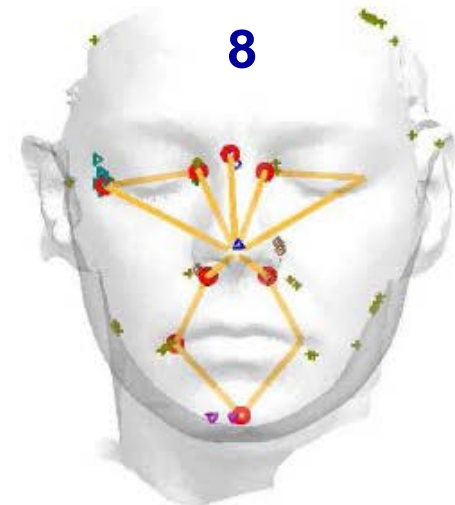
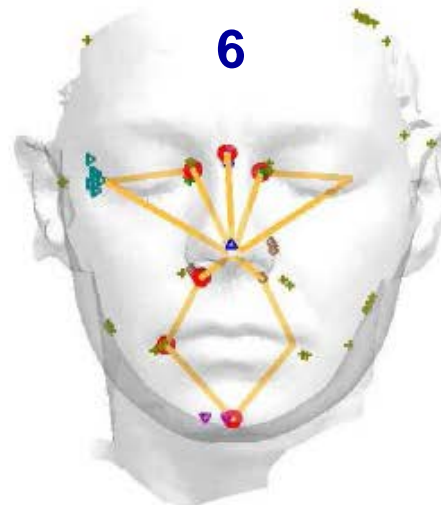
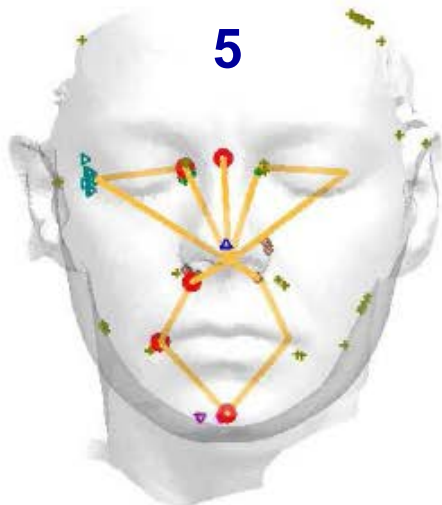
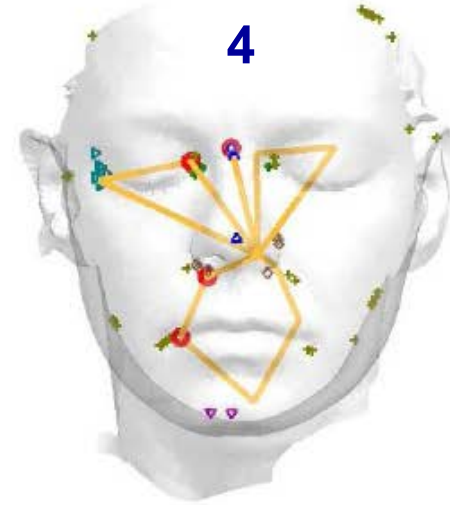
Use statistical inference to **complete** missing landmarks



Incremental Inclusion of Landmarks



- ◆ Nasion
- ▲ Pronasale
- ▼ Pogonion
- ★ Endocanthion
- ▶ Exocanthion
- Nostril base
- ★ Cheilion



Challenges

Significant research, technical (engineering) and clinical **challenges remain.**

Testing & validation across **diverse data sets.**

Require **multi disciplinary** research & development teams.

Require cross discipline **training.**

Not enough expertise nationally – require broader international effort.

Key role of DOCTRID fellows in bridging these gaps

Acknowledgments

Face3D Consortium (www.face3d.ac.uk)

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Dublin City University

Institute of Technology, Tralee

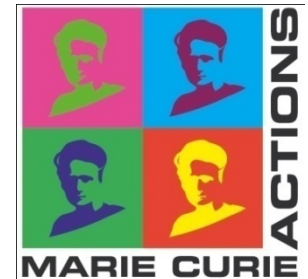
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Video Demos: www.youtube.com/user/PaulFWhelan 

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