

### Mesh Optimization as a Service

An important feature of our fully automatic processing pipeline is the embedding into our Web-based service architecture **instant3Dhub**. A commonly used term for this technology is **Mesh Optimization as a Service (MOaaS)**.

Using instant3Dhub, our 3D optimization pipeline can be easily integrated into external applications. Our service architecture already provides several important features, which are crucial for efficient, automated processing of large amounts of data:

- Load balancing of transcoding jobs,
- Caching of requested result data,
- Flexible RESTful API, based on HTTP.

### Our Service

Our interdisciplinary competence center **Visual Computing System Technologies** provides industry-strength products and services within the field of visual computing technologies. We also provide expertise regarding the visualization of 3D data on the Web.

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FOR APPLIED RESEARCH IN VISUAL COMPUTING

## CONTACT

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Further information about the Competence Center:  
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Further information about the technology:  
[www.instant3dhub.org](http://www.instant3dhub.org)



## AUTOMATIC 3D MESH OPTIMIZATION



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Textured 3D Polygon Meshes are nowadays used within several fields of application. Popular examples include: 3D object galleries on the Web, immersive VR applications for education and training and computer games.

### Creating textured 3D polygon meshes

The creation of digital 3D assets, represented as textured polygon meshes, usually starts with the creation of a high-resolution mesh, consisting of up to several million polygons. This mesh may be the result of a 3D scanning process, or it might have been created manually using common 3D modeling tools, such as 3D sculpting software.

However, to faster visualize a high-resolution 3D asset inside a real-time rendering application, it must be simplified to a more compact textured 3D polygon mesh. This usually involves a lot of manual interaction, influences the quality and can hence become time-critical, especially if a large number of 3D assets needs to be optimized. This is where the technology of Fraunhofer IGD comes in.

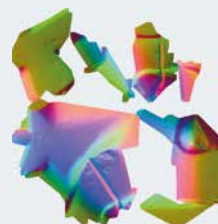
Even for highly complex input data, our 3D mesh optimization pipeline creates **compact 3D representations** in a fully **automatic** fashion. Several variants of the 3D asset, tailored into a maximum of a few thousands of polygons towards the specific

**INPUT:**  
High-Resolution Mesh  
with about 300.000  
polygons



Mesh Simplification

Mesh Parameterization  
& Texture Synthesis



**OUTPUT:**  
Optimized Compact Mesh  
with about 600 polygons



needs of different device classes, can be easily generated - without any manual interaction.

### Optimal quality at minimum mesh complexity

To realize our cutting-edge mesh processing tools, we employ established approaches, as well as latest research results, from the fields of mesh processing and computer graphics:

- First, input data is geometrically simplified (**Mesh Simplification**), with the aim of preserving the overall shape of the input mesh as closely as possible.
- Next, a mapping from each object's 3D surface to a 2D image domain is computed (**Mesh Parameterization**). This, finally, enables the preservation of the high-resolution surface details within texture images (**Texture Synthesis**).
- At the end of the optimization process, a compact, textured 3D polygon mesh has been created. This optimized mesh is **visually nearly identical** when compared to the original 3D asset, but it consumes much **less bandwidth and storage space**.

The technology of Fraunhofer IGD enables application developers to visualize high-resolution 3D assets on arbitrary client devices. Our tools ensure an optimum visual quality, and at the same time provide a fully automatic processing pipeline.