

# The IHA database of human geometries including torso, head and complete outer ears for acoustic research



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## Content:

This is the very first version of the IHA database, which is being created in the project HAPPAA C1 funded by the Deutsche Forschungsgemeinschaft (DFG) – Projektnummer 352015383 - SFB 1330 C1. (<https://uol.de/en/sfb-1330-hearing-acoustics>)

The database includes a subsample of 10 human geometries comprising the torso, head and the entire outer ear including the ear canal and eardrum. The data are available in two different 3D object formats: ply binary file, stl binary file.

*Table 1: demographic data of the subjects, as well as body measurements*

geometry number	sex	age [years]	height [cm]	weight [kg]
1	f	28	174	57
2	m	53	184	75
3	f	33	170	57
4	f	21	172	65
5	m	27	193	90
6	m	41	177	80
7	m	26	181	90
8	f	30	167	61
9	m	27	180	75
10	m	39	186	84

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## Methods of creation & accuracy

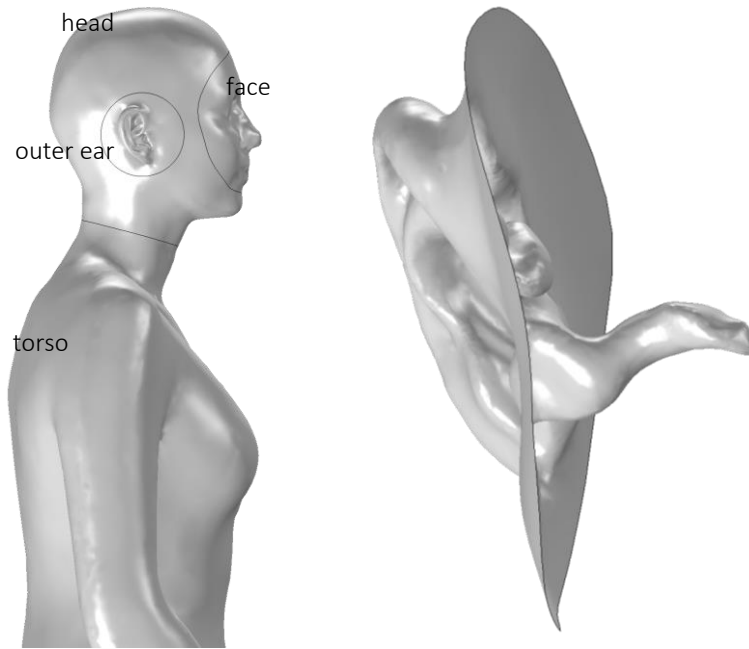
By the use of various optical hand-held 3D scanners, as well as magnetic resonance imaging (MRI), subject's head, torso and outer ear geometries with the ear canals and the eardrums were determined.

The acquisition of individual geometries is described in [1]. There the assessment of the subjects, scanning of head, torso and outer ear geometries, the imaging of the medial part of the ear canal and the assembling of the geometry is explained in detail.

The interaural centre of each geometry was placed approximately at the coordinate origin using the left and right tragus and the tip of the nose. The geometries were truncated 0.5 m below the xy-plane. The final re-meshing were done in COMSOL 5.6. with parameters that can be seen in Table 2.

*Table 2: parameters for the re-meshing defining the final accuracy*

surface	Min element size [mm]	Max element size [mm]	Max element growth rate	Curvature factor	Resolution of narrow regions
outer ears	0.01	0.4	1.3	5	10
head	2	3	1.5	5	5
face	30	30	1.5	0.6	0.01
torso	5	10	1.5	0.6	2



*Figure 1: example for geometry 3, showing single surfaces and the fine resolution of the outer ear*

## References:

[1] Roden, R. & Blau, M. (2020). The IHA database of human geometries including torso, head and complete outer ears for acoustic research, in Proc. Internoise, Seoul, Korea, Aug. 2020, pp. 4226-4237.

<https://www.ingentaconnect.com/content/ince/incec/2020/00000261/00000002/art00026>

[2] 10.5281/zenodo.5528766