

# Non-rigid pinna registration for the calculation of head-related transfer functions

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Humans are able to perceive auditory events at a certain spatial position. This is achieved by evaluating the sound filtered by a binaural pair of so-called head-related transfer functions (HRTFs). These functions can be numerically calculated based on a 3D model of the torso, head, and pinnae, with the latter being most distinctive for a personalised sound-localisation ability. A personalised 3D pinna model can be obtained by photogrammetrically processing 2D photos of a pinna. Unfortunately, such a model is often noisy and shows artefacts in areas insufficiently captured by the camera, e.g., the helix brim or the cavum conchae. These artefacts have to be corrected manually.

In my work, I consider non-rigid registration algorithms as a step towards an automated process avoiding pinna artefacts. In the process of non-rigid registration, a clean and high-resolution template model is distorted and automatically aligned with a noisy, photogrammetrically obtained model of the targeted pinna. Several non-rigid registration algorithms will be systematically evaluated and the most promising one will be improved. The results will be evaluated by means of geometrical errors between actual and registered models. Further, the HRTFs calculated for the registered meshes will be compared by means of sound-localization errors obtained by auditory models and psychoacoustic experiment. The outcome will help fostering the accessibility of personalised HRTFs for a broad audience.