Everyone needs a voice! Speech sets us apart from other mammals, it is our primary connection to the world, and it has a pivotal function in modern society. However, the physics of the vocal apparatus are surprisingly complex, and also hidden from normal view. After decades of research, speech technologists are still looking for ways to make artificial voices sound more natural. For clinicians needing to understand how voice problems arise, and how they should be diagnosed and treated, an accurate, dynamic visualisation of the biomechanics would lead quickly to significant progress. Students of languages and of vocal arts would be immensely helped by animated renderings of what actually goes on inside the body during speech and song. A detailed simulation of the human voice is needed both for basic science and for numerous applications.

The iPAT, as a part of the European collaboration project EUNISON (Extensive UNIfied-domain SimulatiON of the human voice), has a focus on the experimental point of view. We investigate the fluid-structure-acoustic interaction of the human phonation process in synthetic larynxes by integrating modern, laser-based measurement techniques.

The structural motion is measured by laser vibrometry, delivering information on the flow-induced vibration of the self-oscillating vocal folds and the larynx in general. Additionally, a state-of-the-art PIV technique is used to analyse the flow field of the phonation process. Phase-resolved measurements of an oscillation cycle provide quantitative velocity information of the flow vectors. Acoustic measurements complement the fluid-structure-acoustic interaction investigations and the acoustic sources of the phonation are determined.

For further information, visit: http://fp7eunison.com