

## **Synchronized audio recording and real-time MR imaging of fluent speech**

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Introduction: MRI is an ideal tool for imaging dynamic vocal tract changes during speech. However, acquiring high-quality audio recordings that are perfectly (sub-ms) synchronized with the MRI acquisition is challenging. We present a novel hardware-based approach that uses the 10 MHz system clock to control audio-video synchronization.

Methods: FPGA-based synchronization hardware is used to interface the MRI scanner hardware to an audio acquisition system. Audio recording is initiated automatically when the MRI scan begins. The audio setup features two MRI compatible fiber-optical microphones and a noise canceling filter. The real-time MR imaging uses a short (.5 ms) slice-selective excitation and interleaved spiral readouts (2.5 ms duration), and obtains a frame rate of approximately 11 frames per second. Audio and video are merged with a synchronization error of < 1 microsec.

Results: Several video clips will be presented that show real-time images of a mid-sagittal view of the vocal tract. The effectiveness of the synchronized audio acquisition with noise canceling will be demonstrated.

Discussion: High-quality, synchronized audio and video recordings of fluent speech are possible using MR-compatible microphones and a hardware-based time-synchronization approach.

[1] Preliminary results have been submitted (E. Bresch, et al., 'Synchronized audio recordings during MRI scans,' Letter to the editor, JASA 2005, submitted.)