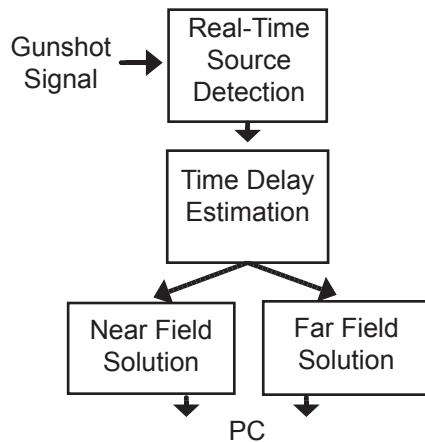


A SHOT IN THE DARK

Acoustic Point-Source Localization of a Gunshot

Acoustic point-source localization of a sound has numerous applications, from voice tracking to beam steering. Identifying the location of a gunshot is a useful tool for law enforcement. Having sensor systems installed in high-traffic areas can give early warning of a crime in progress and increase the available information at the scene of a crime.

The critical steps of an implementable solution are real-time source detection and accurate estimation of time delays between microphones.



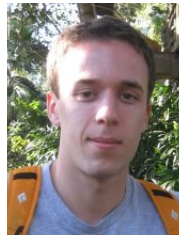
A point-source is sampled and filtered in real-time to detect a gunshot. Once a gunshot has been detected, signal data is sent to a two-stage localization algorithm. Time delay estimates between each microphone are first computed using a generalized cross-correlation algorithm. These estimates are then used to compute a near field solution, using the linear Gillette-Silverman algorithm, and a far field solution of the localization problem.



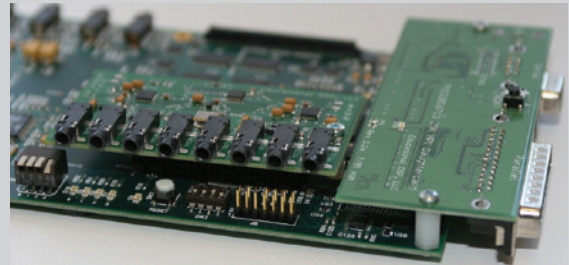
Pranay Jain



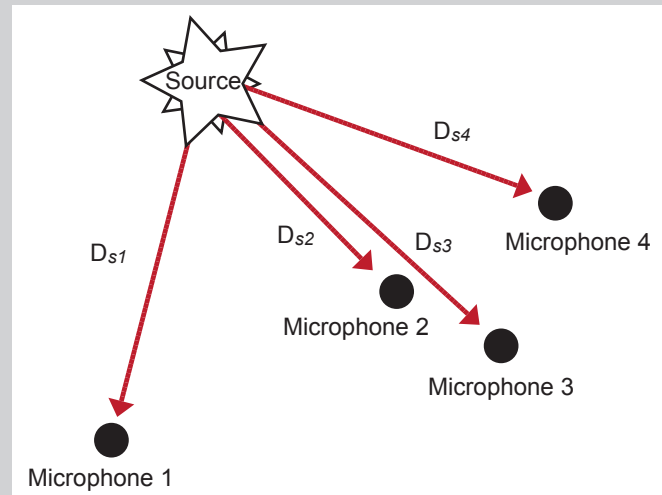
Arda Orhan



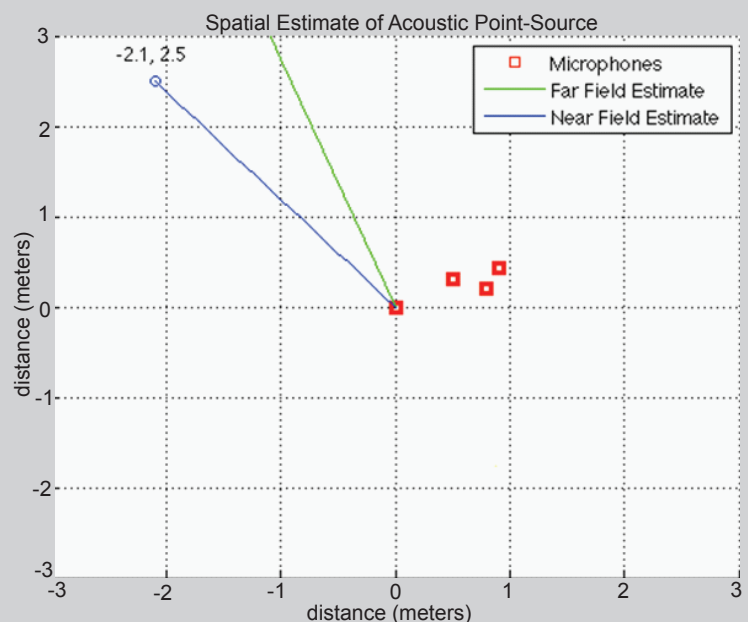
Oren Wright



Texas Instruments C67 DSK with attached Educational DSP DSK_AUDIO4 and DSK6XXXHPI daughter cards



The system uses differential times of arrival between microphones to estimate a point-source position



A PC interface displays microphone positions and both near field and far field solutions