Hide & Speak: An Online Game for K-12 Education and Psychoacoustic Data Collection

Travis M. Doll • tdoll@drexel.edu • Advisor: Dr. Youngmoo E. Kim
Electrical & Computer Engineering, Drexel University

Abstract
Online collaborative game-based activities have been demonstrated to be effective supplemental tools for mathematics and science education, particularly for younger students in grades K-12 [1]. Such educational activities provide assistance in bridging the gap between abstract classroom concepts and real-world applications. I have developed a game, Hide & Speak, that allows students to explore aspects of different acoustical concepts through an interactive room environment simulator [2]. Also inspired by recent work that utilize games to aid in solving difficult computational problems [3], Hide & Speak facilitates the collection of data on human auditory perception. Analysis of the data may lead to better models of the human auditory system and ultimately better-performing algorithms in speech related tasks.

Educational Objectives
Hide & Speak is designed to educate and inform students about several sound and acoustics concepts through guided exploration, including:

- Acoustic changes due to listener and source positions
- Sound energy conservation in a reverberant environment
- Human auditory perception

More specific to the K-12 curriculum, the activity will eventually be expanded to contain mathematics and science lessons on:

- Sound wave propagation
- Calculations of reflection angles of sound waves
- Sound energy absorption by surfaces
- Estimation of sound wave time of arrival

Data Collection
As a research tool, the game is a platform for collecting psychoacoustic data on human auditory perception. The benefits of this approach are the following:

- Collected data can assist in the development of future algorithms for sound source identification related tasks.
- The interface provides a means for achieving a range of parameter variation that is difficult to achieve for large subject populations using traditional methods.

K-12 Educational Collaboration
The MET-lab currently works with several K-12 outreach programs, providing suitable audiences ability to benefit from the educational components of this game. Hide & Speak is now publicly available via the Internet in order to collect data from a more diverse subject population.

References