



CALIFORNIA STATE SCIENCE FAIR 2013 PROJECT SUMMARY

Name(s) Julia Cho; Josh Kim	Project Number S1403
Project Title Creating a Clearer Voice Chat/Conference by Using Sound Localization	
Abstract Objectives/Goals In a multi-speaker voice chat or online conference, it can be very difficult to differentiate between speakers; by using a sound localization engine, our project aims to create a clearer conference experience. The engine will increase the productivity and efficiency of voice chats, which many students, businessmen, and casual users utilize. Methods/Materials To create a clearer voice chat, we will allow users to assign a location to a person's voice on the audio spatial scene. We implement Interaural Time Difference (ITD) and Interaural Level Difference (ILD) between the left and right ears, which are essential cues that allow humans to localize sounds, based on the location of a person. Our GUI displays the participants of the chat, represented as icons. When an icon is moved, its x and y coordinates are sent to the sound localization engine. The engine applies ITD and ILD to the monaural voice of each participant, and combines the resulting voices into a stereo audio that is sent to the user through headphones. Materials used during this project include a Mac, a PC, and Java integrated development environments like Eclipse and NetBeans. Results To test ILD, we positioned the speakers from left to right in ascending speaker number (0-4 with 2 in the middle of the screen) and printed the amplitudes received by each ear from each speaker's voice. We received results that showed that the ILD engine works: speakers 0 and 1's left ear amplitudes were greater than the right ear's, speaker 2's amplitudes were equal, and speaker 3 and 4's left ear amplitudes were less than the right ear's. We tested the ITD engine in a similar fashion and received similar results: when laid out from left to right in ascending speaker order, speaker 0 had the greatest right ear delay and speaker 4 had the greatest left ear delay. Overall we could hear the effects of the sound localization engine very clearly. We received a mono audio and outputted a stereo audio, with ILD and ITD applied. Conclusions/Discussion The results of our testing, combined with our knowledge of sound localization show that our program achieves its engineering goal. ITD and ILD, combined with the visual cues presented in the GUI, help the user to experience an interactive audio spatial scene.	
Summary Statement We are creating a program that will help users to differentiate between speakers in a voice chat/online conference by implementing ILD/ITD/visual cues from the GUI.	
Help Received Our dads helped the team in finding resources about sound localization and taught us needed Java programming skills. Josh's mom helped with posterboard.	