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*Sound Source Triangulation*

This project's purpose was to develop various methods of calculation to identify the location of a sound. The goal was to be within ten feet and five degrees of the actual location. Sound traveling from one point to another has a time delay which can be measured then calculated into a distance. Three microphones were used in an arrangement. A sound was recorded and the differences in response time for each microphone were measured. The differences were then used in two equations that would triangulate on the sound source. Three different mathematical methods were developed to determine the distance and direction of the sound. Each method required assuming a value of "a", the length from microphone 1 to the sound source, and verifying that it satisfied the equations. Method 1 used the convergent of two angular equations. Method 2 used an angular equation for microphone 1-2 and x,y coordinates to verify difference 2. Method 3 was similar to Method 2 except the microphone pairs were swapped. Method 3 was the most accurate. Calculations averaged 14.3 feet and 3.1 degrees difference from the actual location. The distance goal was not met but the directional goal was. Method 1 would only converge 50% of the time. Method 2 had two possible solutions to triangulate on which required more steps. This project has a military application. Using the mathematics from this experiment, the source of an attack can be calculating and allow defenses to be taken quickly and accurately.