White Paper Basic Outline

1. Audience: Someone with a basic understanding of Computer Science.
2. Problem: Sound
    a. Hearing can be damaged at a decibel of 85 when exposed to it for long periods of time, however you won't experience pain until 120db-130db.
    b. Younger children tend to not understand just how loud they are being, Having a way to measure and show how loud they are being will be a valuable asset in classrooms and potentially homes.
3. Solution:
    a. A device that can be used to measure how loud the sounds around it are and to then display the level of sound in an easy to understand way using LEDs and different light levels using the typical stoplight colors of green yellow and red. The device will have the ability to change the "sensitivity" of the sensor in order to be usable in Mutiple situations. The idea is to have this as a tool to have around the house, something to turn on when operating equipment such as in a garage, workshop, or while mowing the lawn.
    b. It can just as easily be used by teachers or parents at home to help create a baseline for "loudness" in a classroom.
    c. In future versions we plan on making the microphone more sensitive to different sounds, as well as to create a way to better finetune the break lines for the green, yellow, and red LED lights, thereby creating a tool that can be used to measure the decibel of sounds so you can understand just how loud you can be in your home without the people outside being able to hear you. We will also invest in creating an app that would allow you to also use this as a baby/child monitor alerting you when the sound increases in the room that you have the device in. This app would also be used in order to make the customization of the break points easier and more streamlined. This would require adding bluetooth hardware and functionality to the device which we currently don't have the budget to add to the device.

References

Medical

https://www.asha.org/public/hearing/loud-noise-dangers/?srsltid=AfmBOoouDqtbv4jLg3CD3RcszgNfY7vs41iwRAR_BDeIgJDvcNGIGePi
Loud Noise Dangers

https://www.nidcd.nih.gov/health/noise-induced-hearing-loss Hearing loss due to loud noise

https://pmc.ncbi.nlm.nih.gov/articles/PMC6712832/ Loudness of Classrooms impacts student understanding and comprehension

Technical

https://www.lewitt-audio.com/blog/how-does-a-microphone-work How does a microphone work

https://www.ikoustic.co.uk/the-decibel-scale/?srsltid=AfmBOop21zgS_nBsBYj8hNHR_1ol2d3qVSoYfDioBiRW6CoVxtB5B2CK

Difference in Decibels