Scenario

Millions of people around the world are continually bombarded with noise pollution, from a variety of sources, such as traffic, construction equipment, vacuum cleaners, and sirens. Although these noises often provide helpful information about the world, constant exposure to this invisible noise pollution can lead to multiple negative health outcomes. These include increased incidence of hearing loss, stress, cardiovascular diseases and psychological problems. Broadening the health consequences of noise pollution, certain noises can also trigger intense, negative emotional and physical experiences. These experiences may make some social, school, and work-related activities inaccessible.

Recently, scientists have used their understanding of sound waves to invent new technologies that can make the world more accessible by helping people cope with the harmful effects of noise pollution and re-engage with a noisy world. One such innovation is Active Noise Canceling (ANC) technology, which uses the science of sound to alter the shape and amount of sound waves that enter our ears. It is likely that you are familiar with ANC's use in noise canceling headphones. However, noise canceling headphones are just one application of this technology. In this challenge, you will need to find an innovative way to apply ANC to make the world more accessible.

Challenge

Your challenge is to invent a product that harnesses active noise canceling (ANC) technology to reduce noise pollution and make the world more accessible.

Your solution should:

1. **Using ANC technology.** Describe the noise that is being canceled and the various components of that sound wave. Model a sound wave that could be used to cancel out this specific noise.
2. **Work for various sound waves.** Show how your device will work when the frequency and/or amplitude changes.
3. **Minimize undesirable impacts on the user.** Describe how your solution serves the needs of your targeted user without creating a different set of undesirable outcomes.