

Design Proposal Template:

School: G.M. Walters Middle School State: CA Division: Middle School

Team Members' Names: Kanya Annamalai & Tavisha Samarya

Project Title: Readers should have a general sense for what the project is about and want to read more. (20 word maximum)

HarmoniTouch: A glove that will change the way the deaf perceive music.

Inequity Being Addressed: Describe the inequity that you will attempt to address with your proposed solution, and why you chose this inequity. Students are able to consider a global perspective related to their inequity. (75 word maximum)

According to the World Health Organization, 466 million people globally experience hearing loss. Music, a universal icebreaker, often becomes a barrier, deepening the social inclusion gap highlighted by UN Goal 10.2. Many hearing individuals hesitate to connect with HOH individuals, assuming the differences are too vast. By addressing this inequity, we can share the joy of music with those who may have never fully experienced it, fostering connection and inclusion across diverse communities.

Community Research and User Identification: Explain the process used to identify the inequity and select your user. Include any research done to identify issues in your community and understand which groups face challenges because of these issues. (150 word maximum)

We explored how HOH individuals experience music by connecting with the Fremont School for the Deaf and attending a California School for the Deaf (CSD) open house. There, Stefanie Ellis-Gonzalez, a Deaf Studies counselor, shared how society overlooks deaf individuals in music discussions. At CSD, we saw students feeling speakers, responding to beats through vibration. A staff member told us, *"We don't need to hear music to love it, we just need to feel it."*

Stefanie explained that while bass and rhythm are accessible, most music lacks full vibrational depth. She also emphasized the importance of keeping hands free for sign language. Inspired by her insights, we developed **HarmoniTouch**: a glove that translates beats into vibrations, allowing HOH individuals to experience music more fully. By bridging the gap between sound and touch, HarmoniTouch fosters inclusion, proving that music isn't just something you hear—it's something you feel.

User Profile: Provide a detailed description of your selected user. Include information about challenges they face, how those challenges impact their lives, and specific project needs based on user feedback. (150 word maximum)

Stefanie Ellis-Gonzalez, our selected user, is profoundly deaf and comes from a generationally deaf family. While she enjoys rhythm and bass, she often feels excluded from music conversations.

“People talk about their favorite songs, but I feel like I can’t join in because music is made for hearing people,” she told us.

She explained that while speakers and bone conduction provide some access, they fail to capture the depth of music. *“I can feel the bass, but what about the melody? The details? The emotion?”* she asked. She emphasized that different instruments create distinct vibrations, which most devices fail to convey.

Stefanie also stressed accessibility, noting that many wearables interfere with signing. *“I need my hands to communicate—if your device takes that away, it’s not for me.”* Inspired by her insights, we designed HarmoniTouch: a glove that translates music into vibrations without restricting movement, making music truly inclusive.

Project Goals: List your project goals and explain how these goals will address the inequity. Project goals should define the desired outcomes, not specific features of the proposed solution. (150 word maximum)

Our first and foremost goal for this project is to promote social inclusion of all, irrespective of hearing ability. As stated above, hard-of-hearing individuals are commonly excluded from conversations about music. HarmoniTouch gives hard-of-hearing individuals a tactile music experience.

Another goal for this project is to ensure that our program accurately substitutes the beats in the song for vibrations that feel good and satisfy the user without it feeling restricting. It's essential for us to ensure that our prototype helps the user feel the music. This helps address the issue of social inclusion and comfort.

Our final goal for our project is to make a difference in communities worldwide. We want to help HOH individuals feel more included in their societies. HarmoniTouch creates connections and brings people together regardless of their hearing ability.

Proposed Solution: Describe your proposed solution, including any innovative and unique features, and explain how this solution will address your users' needs and the inequity they face. (150 word maximum)

HarmoniTouch is a soft, smart glove that translates music into dynamic, layered vibrations across the hand. Using real-time audio analysis, it separates a song into bass, tempo, snare, and rhythm, each mapped to distinct motor zones. This allows users to physically feel different parts of the music—deep pulses in the palm for bass, quick bursts on the fingertips for snare, and flowing patterns for tempo and rhythm. The result is an immersive, tactile musical experience.

To respect sign language use, the glove is lightweight, flexible, and leaves fingers free for movement. It's designed to be worn comfortably for long periods, with adjustable vibration strength based on user sensitivity. Our web app allows users to customize their music experience.

By meeting the user's desire for depth, comfort, and freedom, HarmoniTouch makes music more than heard or seen—it makes it felt.

Initial Design: A single graphic of your first design idea with key features adequately labeled. It should be easy to understand and the reader should have a general understanding of how the prototype functions by looking at the graphic. Max size 8.5" x 11"

