



HarpA

Innovative noise-cancelling headphones use an integrated app for selective cancellation, allowing critical safety sounds like warnings and alarms to be heard clearly while muffling hazardous background noise for improved worker safety and comfort in loud environments.

Researchers at Purdue University have developed an innovative new model of noise-cancelling headphones that work with an integrated app to selectively cancel certain noises while allowing others to be heard clearly. Users can choose which noises to allow through the paired phone app, enabling total customization suited to their exact needs. This technology is tailored for construction workers but can be used by anyone who needs noise-cancelling headphones.

Noise pollution from construction is a major factor jeopardizing occupational health. Over 30 million construction workers are exposed to prolonged noise on a daily basis, which causes discomfort and can often lead to long-term adverse health effects. To combat the noisy environment, many workers choose to wear earplugs or noise-cancelling headphones, but this can create dangerous situations in which workers are left unaware of their surroundings. With this innovative technology, the comfort and safety of workers can be assured in both the long- and short-term.

Technology Validation:

Through a combination of comprehensive research methodologies, including user interviews, competitive analysis, and thematic qualitative data analysis, the project integrates innovative features such as active noise cancellation, ergonomic design, and gamified feedback through a companion app. These advancements demonstrate a practical application of research insights to create solutions tailored to the specific needs of construction workers.

Advantages:

- Customizable and user-friendly
- Effective noise cancellation muffles unwanted or hazardous noise

Technology ID

2021-JAHA-69283

Category

Buildings, Infrastructure, &
Construction/Smart Building
Systems & Automation
Artificial Intelligence & Machine
Learning/Audio Sensing & Signal
Processing

Authors

Mahdi Afkhamiaghda
Hamid Basaeri
Shima Jahani
Sam Miri
Barham Rajabifar

Further information

Dipak Narula
dnarula@prf.org

View online



- Selective noise cancellation allows important sounds, like warnings and alarms, to be heard clearly
- Improved communication in noisy environments
- Ergonomic design
- Gamified app features improve motivation
- Durable and sustainable with some reusable components
- Improved workplace safety
- Improved worker comfort in noisy environments

Applications:

- Construction
- Manufacturing/fabrication
- Any workplace environments in which bothersome noise is a problem

Publications:

Jahani, Shima (2023). Enhancing Construction Workers Safety: The Design and Implementation of Interactive-Motivational Noise-Cancelling Headphones. Purdue University Graduate School. Thesis.
<https://doi.org/10.25394/PGS.23749257.v1>

TRL: 5

Intellectual Property:

Provisional-Patent, 2021-04-12, United States | Provisional-Patent, 2022-04-13, United States | Utility Patent, 2023-04-13, United States

Keywords: selective noise cancellation, construction safety, occupational hearing protection, active noise cancellation, smart hearing protection, customizable noise control, industrial worker safety, ergonomic headphones, noise pollution solution, safety communication technology, Computer Technology, customizable noise cancellation, deep learning, interactive app, Mechanical Engineering, Noise Cancellation, noise cancelling headphones, workplace safety

Explore other available products test at [The Office of Technology Commercialization Online Licensing Store](#)