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Box 1: Overview, Key Words, and Subtopic Name

The desired outcome of the proposed activity will be an android application that can be used to act as an interface between users wearing headphones and incoming audio stimuli. Specific goals in terms of functionality include alerting users about upcoming heavy traffic and crime using GPS location services, changing the volume levels of your device based both on general and specific audio, like your name or screaming, honking, and other things of the nature, and finally creating customized profiles for specific locations so users can have preset conditions for the application settings that will activate whenever they enter a preset radius of that said location. Keywords and phrases include audio processing, audio filtering, machine learning, application development, and android mobile systems. The subtopic name is IT11. Human-Computer Interaction; Virtual Reality; Augmented Reality.

Keywords: Pedestrian Safety, Machine Learning, Audio Processing, Speech Detection, NLP, Android

Box 2: Intellectual Merit

This Small Business Innovation Research Phase I project will provide insight into the capabilities of smartphone sensors and the ability integrate headphone users into their environment. The overall plan for our application is to combine system applications, like microphones and location services, and machine-learning based algorithms to 1) detect and classify real world sounds and 2) give alerts to the user based on the sound. To do this, we created a python-based keras neural network model using an urban sounds dataset and then deploying our trained model onto our application.

Box 3: Broader/Commercial Impact

The Application will fill a societal need: it will provide a system to warn pedestrians who are listening to music about various possible hazards, including crime and traffic. Many people, especially teens and young people, become trapped in a "bubble" while listening to music while acting as pedestrians in lively cities. In a study published in *Injury Prevention*, it was found that that both the number of pedestrians killed while listening to music has risen substantially and that in nearly 70% of the cases, the accident was fatal. Thus, the monetization route could be as simple as being a paid app on the app store. Targeted consumers could parents who pay for it to run on their children's devices as well as young people who live in urban areas with large traffic. Another such route could be implementing running advertisements on our device.