Technical Disclosure Commons

Defensive Publications Series

August 14, 2017

# Sensory-Friendly Mode For Mobile Devices

Philip Weaver

Tim Salau

# SENSORY-FRIENDLY MODE FOR MOBILE DEVICES

## ABSTRACT

A system and method are disclosed for a sensory-friendly mode in a mobile device. The system allows users to adjust the display, sound or haptic feedback output of the device to optimize the ability of users to consume the information provided by the device. The system may vary the amount of visual complexity for display based on the user needs, either by blurring the screen to eliminate hard edges, making the unimportant areas of the screen entirely invisible or by applying time-based filters to prevent animations or prevent screen flickering. The system may adjust audio volume automatically when a volume change is detected. The system may ramp up haptic vibrations slowly to avoid startling a sensitive user. The system is intended to make a device much more usable to users with special needs (e.g. autistic users).

## BACKGROUND

People receive a tremendous amount of information from their senses, and use a lot of brainpower making sense of it.  Some people have difficulty with this task, and those with sensory processing issues such as autism or cerebral palsy may become overloaded with the sensory information.

For people to use a mobile (or any computing) device, they must sense the output of the device one way or another.  Sensory information flows from the device from the display (vision), speakers (hearing) or in some cases haptic actuators (touch). Presenting too much information to one person can overwhelm their ability to make sense of the information, and certain sensory inputs can lead to difficulty in perceiving other information. For example, sudden loud noises can evoke a startle response in some people. Excessive visual complexity can prevent people from using their vision in any way. Another example is people with photosensitive epilepsy, where certain visual patterns can cause seizures. Individuals with difficulty in integrating all of the sensor information coming from their mobile device may hence be unable to use some or all of its features.

Currently, there are mobile apps that change the way the visual information is provided in order to adjust to a user's visual needs. However, these technologies are not intended to address complex sensory integration issues. One currently available accessibility application programming interface (API) allows certain apps to learn about the screen content and present an alternate user interface to users. However, this API works too slowly to filter the real time changes that happen on a user interface, and has no filtering for audio or haptic feedback.

## DESCRIPTION

A system and method are disclosed for a sensory-friendly mode in a mobile device for allowing users to adjust the output of the device to optimize the ability of users to consume the information provided by the device as illustrated in Fig. 1. This mode allows adjusting the display, the sound and the haptic feedback of the mobile device based on the user's needs.

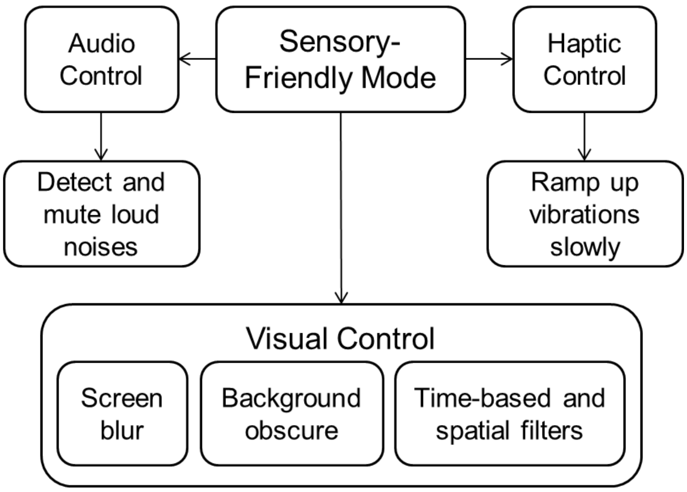


FIG. 1: Sensory-friendly mode for mobile devices

The system may include an interface that allows the user to select the amount of visual complexity for the display based on their needs. The system may adjust the visual complexity by various methods.

One method to reduce the visual complexity is to blur the screen slightly to eliminate the hard edges. The blurring may be done for the entire screen or selectively for the parts of the screen that do not contain critical information such as text. Some images are marked as "not important for accessibility" to indicate that their text information does not need to be shared with accessibility services. So, for such images with markers, any visual complexity in the image is determined to be safely suppressed.

Another method to reduce the complexity is to make unimportant areas of the screen entirely invisible. For example, when an alert dialog appears, the background is dimmed. This method may also involve obscuring the background entirely, if the user finds that it helps to perceive the dialog’s contents.

A further method to reduce the complexity is to apply time-based filters to blur animations or prevent flickering of the screen. These filters may be combined with the spatial filters. Existing graphical processing units (GPU) may be configured to apply such filters. The method may also involve use of machine learning technologies that may be trained to understand particular conditions and identify regions of the screen on which particular transformations would be appropriate.

The system may adjust audio volume automatically when a rapid change in volume is detected, as sudden loud noises are most likely to startle users. The system may apply the volume adjustment selectively to particular frequencies that trigger a user’s reaction or to particular types of sounds.

For example, for non-speech content, the volume may be reduced so that users are able to understand spoken instructions or dialogue without being overwhelmed by other sound effects. To facilitate automatic adjustment of volume, content may be annotated with metadata to alert the system to particularly common triggers like gunshots, or an automated system could examine the audio stream to identify them automatically.

For haptic feedback, the system may ramp up the vibrations slowly to avoid startling a sensitive user while still providing some haptic experience.

The methods described herein may also involve use of machine learning technologies that may be trained to understand particular conditions and identify which particular transformations would be appropriate.

Addressing sensory needs at the lowest possible level in a system allows the problem to be addressed on the widest possible range of content. The disclosed system and method may help users better customize content that is provided to them.

By giving users the ability to constrain the sensory inputs their device gives them, the system would make a device much more usable to users who need such features. They would have access to more of the ecosystem, and would find the ecosystem to be a more welcoming place. For a family that included an individual with autism or another condition that affected their ability to process sensory information, a device and ecosystem that worked for everyone in a family could be a compelling reason to choose a device and stick with it.