A Novel Solution for the Visually Impaired Utilizing Computer Vision and Vibrohaptics

Kandan, Mani

One approach to help visually-impaired individuals is to provide a form of visual information through a different sense. Most of the devices use ultrasonic and image-capturing sensors. These convert information to audio and haptic (touch) feedback. Current solutions are either obtrusive or cumbersome. My alternative is favorable as it stays below clothing. The use of vibration as a tactile communication for visual information was investigated. Two different ‘vibration patches’ with 3 different setups (9 vibration motor-square, 100 vibration motor-square and circle) were created to be worn by the user. The vibration patches were programmed to communicate key information about the subject’s immediate environment obtained from a webcam to two connected PSoCs. The PSoC would turn on vibration motors worn by the user. The number (resolution) and arrangement of vibration motors connected to the communication device were tested to determine the impact on subject’s ability to identify the presence and location of nearby objects. Different device setups were tested on me, with twenty tests for each of the three trials. I discovered that the square vibration patch communicated the presence and location of potentially harmful objects with the highest accuracy to the user. The next phase of research is to detach the device from the laptop. This will be achieved by moving the entire device’s computing system to a Raspberry Pi Model 2. The RPi 2 is an extremely portable computing system. Other additions for future research will include developing a professional wearable, a 3D printed vest with integrated circular vibration motors and an embedded RPi 2. With success, the results of this research will be used to create effective devices for the visually impaired.