Real-Time Object Search and Detection for the Visually Impaired

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There are over 289 million people with visual disabilities worldwide and that number is expected to grow to 579 million in only 3 decades due to a large aging population. Current techniques to aid the visually disabled are expensive and limited in their ability as they can only detect text in certain areas without giving comprehensive feedback of the objects around a user. We aimed to solve this problem by using computer vision to detect objects and where they are in relation to the user. With our research, we found that the mean average precision (MAP) of different computer vision frameworks increase when they are run and processed simultaneously. By running 4 computer vision architectures simultaneously, we are able to derive more accurate results with more classifications than running any one model alone. Furthermore, using the angular separation of the final bounding boxes in relation to the user allows us to create a method of guiding the user to a certain object. We do this with 4 vibration motors located near the user's wrist. There are 2 motors on the top and bottom of the wrist and 2 on the sides, which vibrate in the direction of the object. This method of searching, however, also requires distance sensors to maintain the user's safety which we have located on several parts of the user's hands and wrists. Our results show that this is an inexpensive and effective way for those with visual disabilities to locate objects in their environment. ?

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