A Device for Detecting Fast Moving Objects for Use by the Vision Impaired

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Two billion people are vision impaired globally, of which 43.3 million are blind. 1 in 12 vision impaired people have been involved in a road collision in the last 5 years, with 58% of incidents involving cars. Vision-impaired people struggle to detect fast-moving vehicles, drastically increasing their risk of being involved in fatal road accidents. Current methods help vision impaired individuals detect stationary objects but fail to detect fast-moving objects from a distance - essential for preventing road accidents. Most devices are bulky, indiscreet, and costly. This research aims to develop a novel, bespoke device designed to detect fast-moving objects, and their speed, for use by the vision impaired. Using Machine Learning models, two design approaches were developed; a mobile application, and a personal wearable device in the form of smart glasses. The mobile application uses an image classification model to warn users of fast-moving objects. The smart glasses use a YOLOv8 model, running on a OpenCV framework, to estimate the speed of fast-moving objects. The mobile application has 94.16% object identification accuracy, while the wearable device achieves 82.59% with a 9.90m/h error difference, demonstrating their potential to enhance the safety and independence of vision impaired individuals. This research supports the European Road Safety Charter, the U.S. Department of Transportation's National Roadway Safety Strategy (NRSS), and WHO's 2030 Agenda for Sustainable Development, due to its potential to reduce the incidence of road accidents on a local, regional and global scale.

Awards Won: