S.M.A.R.T Device for the Visually Impaired (Supportive, Mobility, Assistant, Recovery, Technology)

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This project aims to improve the lives of over 300 million colorblind individuals and 2.2 billion people with visual impairments worldwide. Vision loss often leads to social and psychological challenges, with studies showing one in four individuals with visual impairments experience anxiety or depression. Inspired by the experience of a colorblind individual, the S.M.A.R.T. Device was created to help visually impaired people independently identify colors and objects, reducing daily barriers and fostering a more inclusive future. The S.M.A.R.T. Device is an assistive technology designed to support mobility, assist with tasks, enhance recovery, and improve independence. The device features a sensor attached to a pair of everyday glasses that detects light frequencies, similar to how the human eye perceives color through wavelengths. It uses red, green, and blue (RGB) LEDs to analyze and interpret colors. In addition to color detection, the device employs machine learning algorithms, tested with Python, OpenCV, and Edge Impulse, to recognize objects. To improve accessibility, the device is equipped with SMARTI, an intelligent voice-activated assistant that provides real-time auditory feedback. Once a color or object is detected, SMARTI vocalizes the information using a Respeaker Pi HAT connected to a Raspberry Pi 3. Users can interact with SMARTI to identify detected colors or objects and access other features that support their daily needs. By combining tactile (device-based) and auditory (voice-assisted) feedback, the S.M.A.R.T. Device empowers visually impaired users to navigate their environment with greater confidence and independence.

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