LIDAR-Based Navigational Aid for the Artificial Reconstruction of Facial Vision for the Visually Impaired

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In the United States, an estimated 26.9 million adults live with some sort of visual impairment. Many VI individuals make use of a phenomenon called "facial vision," which is the ability of some non-sighted people to be able to detect objects in front of them up to around a meter away. This ability is based off of the interpretation of changes in an environment's ambient noise, and in most cases depends on the repurposing of visual cortical areas of the brain for auditory computation. While this tactic is extremely helpful for some individuals, it depends on the loss of sight occurring before critical stages of brain development as well as uninhibited auditory perception. The goal of this project was to use light-based distance sensing and haptic feedback to create a device that could function similarly to facial vision for VI individuals who are not able to naturally develop the ability. The completed prototype consists of multiple LIDAR sensors positioned in an arc across an elastic band with haptic feedback motors which vibrate at different intensities corresponding to the distances detected by the sensors. All hardware is coordinated through a custom etched circuit board and housed in 3D-printed cases.

Awards Won: