Naviglass
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Goal

- Build a user friendly pair of glasses that will integrate an image onto an LCD display, which will display an image of what is in front of the user, and then display information that will assist the user with navigation and give basic info of what they see.

Motivations and Objectives

Motivations
- We wanted to develop a way for a person to view GPS instructions seamlessly, without needing to shift their vision and focus away from the road.

Objectives
- Be able to construct a pair of glasses that will connect to the user's phone via bluetooth.
- Help the user navigate to their destination via display through one eye.

Research Challenges

- Budget limitations: we initially wanted to project an image onto both eyes, and have 4 cameras that would track both the environment and the user's eyes to center display on eyesight. Now there is one camera and a LCD display.
- User vision: the user has to see both the road as well as navigation instructions. One challenge was figuring out the proper distance to put a magnifying lens away from the eye so the user's eye could focus on the LCD display without moving the display so far away that it obstructs the other eye.
- Bluetooth connection: the android device and Raspberry Pi often had trouble finding each other.
- High latency: the Raspberry Pi struggles to calculate and display the finished image with a good framerate.

Acknowledgement

We would like to thank Grigore Burdea for helping us meet our goal.

Methodology

- Step 1: The android application acquires directions and list of intersections along the route, and gets its own GPS location.
- Step 2: The application sends this information to the Naviglass, controlled by a Raspberry Pi.
- Step 3: The Naviglass looks for the closest road in the camera's picture, and labels it with the road at the next intersection. The Pi also displays the received instructions.

The glasses will have one normal eye and one viewing a LCD screen, which will display the view the camera sees as well as the directions and roads. A biconvex lens allows the user to focus on the screen.

Results

- The completed glasses consists of a Raspberry Pi, a camera, a bluetooth module, battery pack, as well as the glasses themselves. It is controlled some buttons on the side and a android application. The weight is light enough to wear on a head but has straps to alleviate the unbalanced weight.
- The application uses Google Maps to get directions and find and pair with the glasses to transmit necessary information.

References

[1] https://hackaday.io/project/13332/instructions