

Smart Glasses for Improving Mobility of Low Vision People (Phase Two)

Purpose: To improve the mobility of low vision people, for those who drive vehicles and also non-driver's daily lives, the team set out to develop an assistive technology for the people with vision disabilities of central field loss (CFL) and low contrast sensitivity (LCS).

Approach: The team developed technology that includes a pair of super-reality (SR) glasses – providing more details than what the user can see (ex:/ thermal image and contour of pedestrians) – with enhanced image contrast which can highlight objects and detect signs and lanes. These SR glasses are able to fuse real-time sensory information and enhance the image from the reality. The assistive technology also includes speech recognition, indoor navigation, and tactile feedback interfaces.

Key Findings: The team developed three prototypes of the assistive technology:

- **Prototype 1:** *Micro Video Heads-Up Display (HUD) to show live video with a zoom in function. However, it can obscure the view like many Bioptic Telescope products.*
- **Prototype 2:** *Holographic HUD design has enlarged image on top of the lens without obscuring the view.*
- **Prototype 3:** *To avoid blurriness in digital zooming, the team needed to use telescopic lens. To optimize the size and magnification, the team used a miniature 2.2X lens, combining with digital zooming. The test shows that the telescopic lens improves the clarity of the image significantly.*

Conclusion: By developing the prototypes, the team was able to determine that the holographic HUD glasses are more affordable and expendable in comparison to existing phone-based HUD glasses on the market. In the future, the team plans to develop adaptive holographic HUD for outdoor usage, miniaturizing the camera, the embedded computer and batteries, and including more vision-assistance functions such as text recognition and contour enhancement.



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Project Record:

- <https://ppms.cit.cmu.edu/projects/detail/308>

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