

Enhancing Vision: Smart Glasses for the Visually Impaired

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Enhancing Vision: Smart Glasses for the Visually Impaired

285 million people worldwide face visual impairment. Smart glasses provide tech aid for navigation and object recognition. Market expected to reach \$1.5 billion by 2028.



A smart lens is a next-generation optical device, either worn on the eye like a contact lens or implanted surgically, embedded with miniature electronics, sensors, and microprocessors. Designed to assist, enhance, or replace vision for individuals with impaired sight. Acts as a bridge between the external environment and the brain, helping interpret surroundings through advanced imaging and data processing. Micro-cameras: Capture real-world images in real time.

How Visual Impaired Sensor Glasses Work

Sensors

Depth sensors like LiDAR and cameras (RGB/IR) gather environment data.

Processing

Embedded systems analyze data in real-time using AI algorithms.

Output

Audio cues, haptic feedback, and visual overlays assist the user.



Raspberry Pi 3 Model B+

Key Components & Functionality

Object Recognition

Identifies objects and obstacles with 95% accuracy via AI models.

Navigation Assistance

Offers real-time directions and obstacle alerts to enhance mobility.

Text & Facial Recognition

Reads text aloud and recognizes familiar faces to aid interaction.

Benefits and Challenges

Benefits

- Greater independence
- Improved mobility
- Enhanced personal safety

Challenges

- Limited battery life (4-6 hours)
- Device weight (60-80 grams)
- High cost (\$1000-\$6000)
- Social acceptance hurdles

Market Overview and Current Products

OrCam MyEye

Clip-on device with advanced text-to-speech capabilities.

eSight

Full glasses featuring zoom and contrast enhancement.

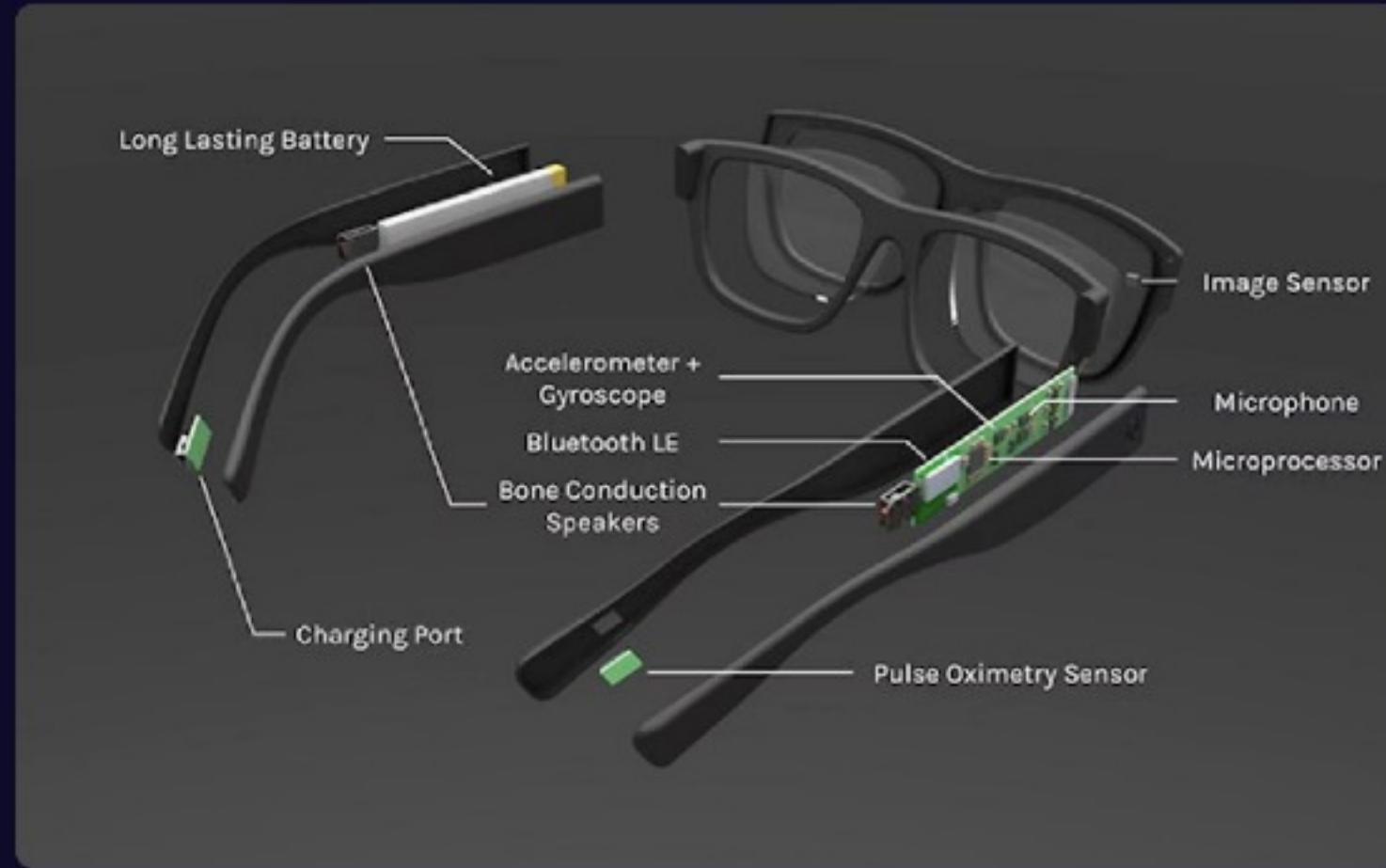
GiveVision

Focuses on navigation and object recognition technology.

Key Players

- OrCam
- eSight
- GiveVision
- Visus Technology





Key technologies used

Smart lenses rely on extremely small, flexible electronic components. Miniaturised sensors, cameras, and processors are embedded within the lens material without affecting comfort or visibility. AI algorithms analyze the environment in real-time, identifying important objects like obstacles, faces, or text. Machine learning helps the lens system adapt to different lighting conditions, user habits, and dynamic environments.

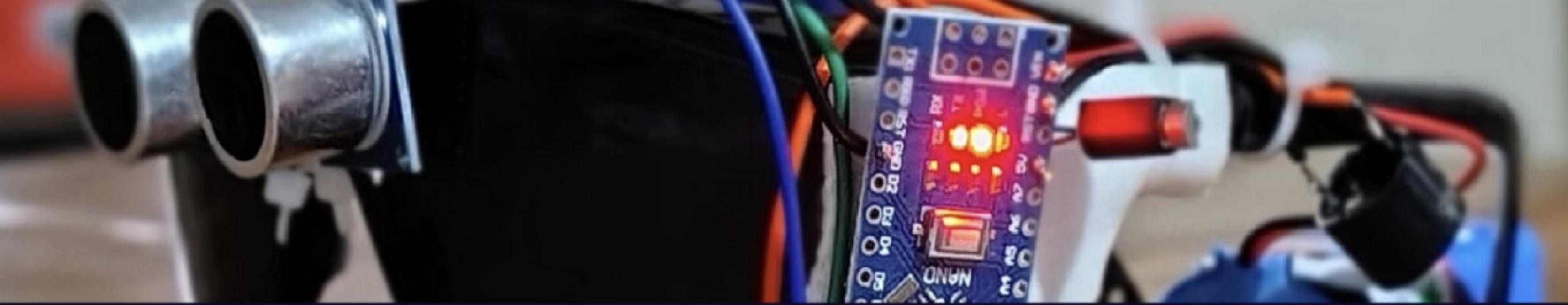
Advantages

- **Enhanced Navigation:** Uses GPS, object recognition, and obstacle detection (e.g., via LiDAR or cameras) to help users move around more safely and independently.
- **Increased Independence:** Reduces reliance on caregivers or guide dogs for certain tasks, enabling more self-sufficient living.

Disadvantages

High Cost: Many models are expensive, with prices ranging from hundreds to several thousand dollars, making them inaccessible for many users.

Learning Curve: Users may need time and training to get comfortable with the interface, especially if they are not tech-savvy.

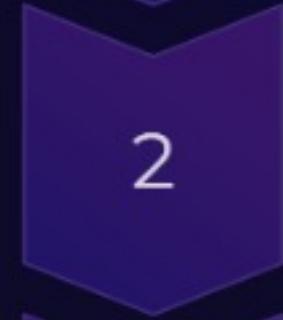


The Future of Smart Glasses for Visual Impairment



1 Miniaturization & Battery

Smaller devices with longer-lasting battery life.



2 AI Integration

Advanced scene understanding and predictive assistance.



3 Affordability

More accessible pricing to expand reach globally.



4 AR/VR Tech

Combining augmented and virtual reality for immersive aid.

Predicted 40% adoption by visually impaired persons by 2030.