

Applications of MicroOLED based HMD in Surgery and Visual Health

Dr. Huajun Peng

Shenzhen NEDOptics Co. Ltd
深圳纳德光学有限公司

Chongqing, China
2026.04.02

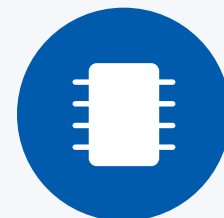
Content: HMD Technology in Medical Applications



01. INTRODUCTION

Overview & Background

History of HMD tech and its medical origins.



02. TECHNOLOGY

Core Principles

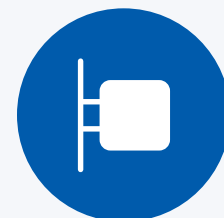
Micro-OLED advantages and HMD mechanism.



03. MARKET

Landscape & Solutions

Evolution of medical HMDs.



04. APPLICATION

Surgical Precision

Enhancing ergonomics and accuracy in ORs.



05. APPLICATION

Visual Health

Transforming diagnosis of eye conditions.

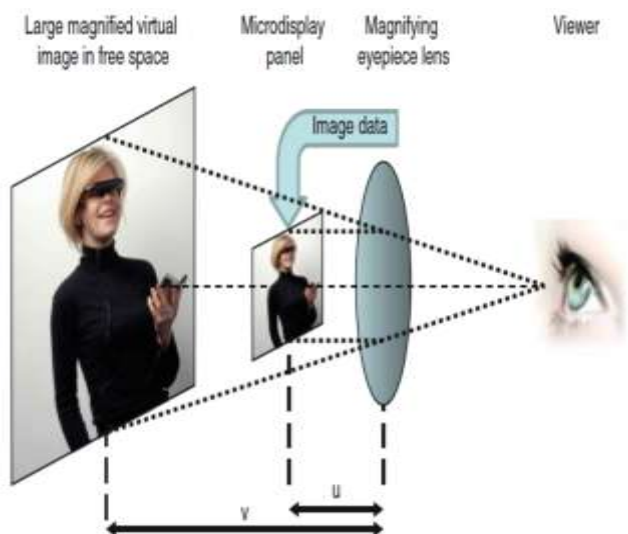


06. OUTLOOK

Conclusion & Future

Trends in medical visualization technology.

Introduction to Head-Mounted Displays (HMD)



Core Components: Display & Optics



Micro Display

Tiny, high-resolution screen emitting light directly for crisp visuals.



Precision Optics System

Lens system that magnifies the display to create a floating virtual image.

Result: "Big Screen in a Small Package" Experience

Key Advantages



Compact Size

Lightweight & portable



Hands-Free

Unrestricted operation



Stereoscopic Vision

True 3D effect



Far Field Optical

Imaging

reduce fatigue and support visual health

Core Technology

A Powerful Tool for Visualization & Medical Innovation

CORE FEATURES



Immersive Viewing
Large, high-res virtual screen directly to eyes.



Hands-Free
Lightweight & portable for free movement.



Stereoscopic Vision
Binocular displays create true 3D depth.



Ergonomic
Natural posture reduces physical strain.

MEDICAL APPLICATIONS



Surgical Navigation
Real-time guidance & visualization during complex procedures.



Training & Simulation
Realistic environments for risk-free medical education.



Visual Health
Advanced diagnosis & treatment of eye conditions.

HMD in Medicine: A 30-Year Evolution

From Niche Surgical Tool to Mainstream Clinical Adoption



The Past: Niche Beginnings

For three decades, HMDs were primarily used for surgical navigation and assistance, remaining a specialized tool for specific procedures.

Foundation for Future Use



The Challenges: Key Barriers

- Image Quality: Poor resolution & clarity
- Ergonomics: Heavy & uncomfortable
- Cost: High price & integration issues

Obstacles to Mass Adoption



The Present: Tech Breakthroughs

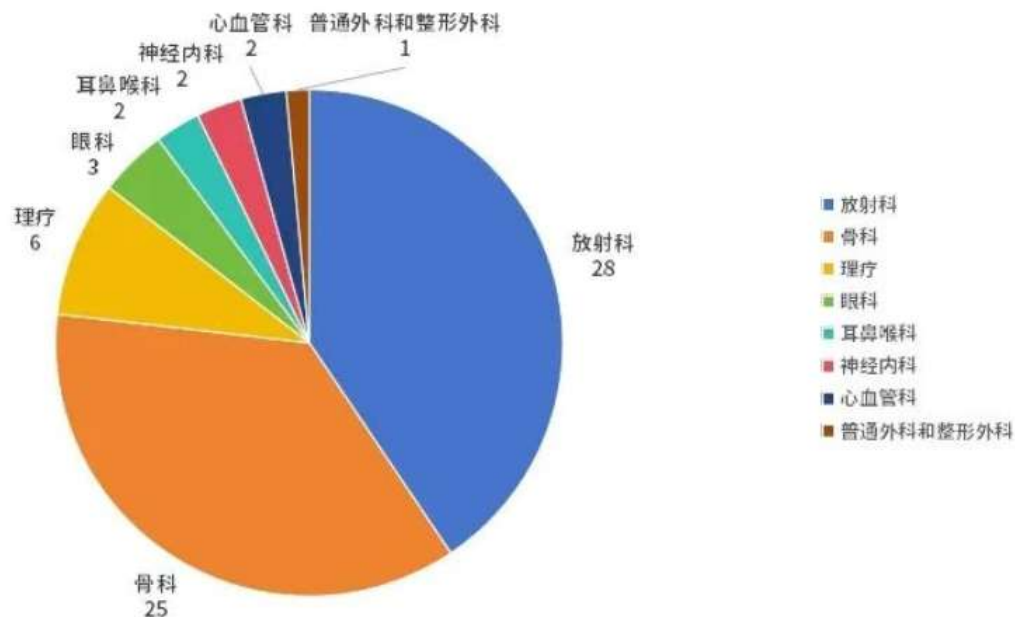
Micro-OLED displays overcome barriers. Products like Apple Vision Pro spark interest, while dedicated medical-grade solutions are now viable.

Towards Mainstream Reality

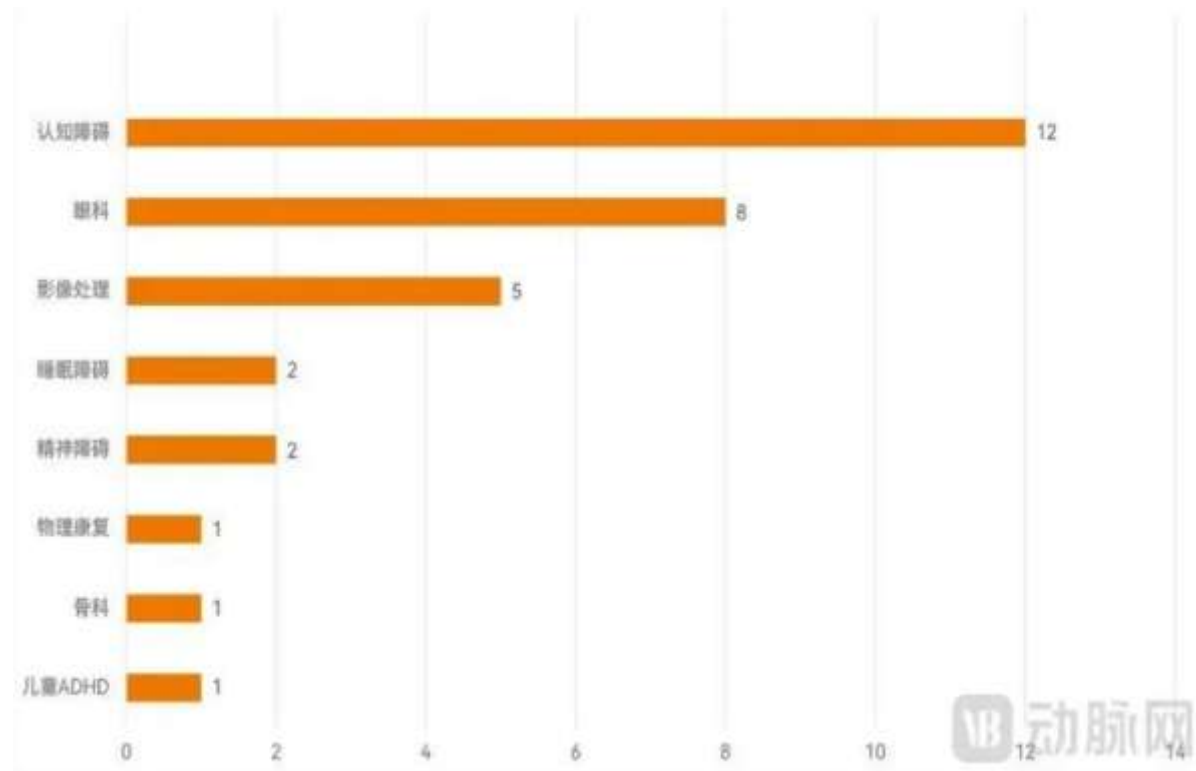


XR设备在医疗和视觉健康领域应用增长迅猛

经FDA授权在美国提供的融合AR/VR的医疗设备主要类别（单位：项）



数据来源：FDA，VR陀螺整理



根据MedTech Spectrum最新报道，美国FDA在2015至2025年间批准了90款AR/VR医疗设备，标志着沉浸式技术在临床护理中的全面崛起。

据动脉网消息，2024年国内全年共有14款XR医疗器械获批，其中认知障碍和眼科是涉及最多的，分别有12款和8款。

Current Challenges in Medical HMDs



Insufficient Image Quality

Low resolution and poor color accuracy compromise diagnostic accuracy and surgical precision.



Poor Wearing Comfort

Heavy, bulky designs cause neck and eye fatigue, limiting long-term clinical use.



Limited Field of View

Restrictive optics limit the surgeon's awareness of the surrounding environment.



NEDOptics' Solution: Our products are specifically engineered to address these challenges, focusing on superior image quality and ergonomic design.

NEDOptics' HMDs—GOOVIS Art and G3 Max



GOOVIS Art



GOOVIS Art : Surgical Visualization

Focused on surgical assistance with ultra-lightweight design, open-view optics, and high-fidelity 3D imaging for precision.



GOOVIS G3 Max: Imaging & Training

Ideal for reviewing pathology slides and medical training. Features exceptional resolution, extended comfort, and versatile connectivity.



GOOVIS G3 Max



Core Advantages: Superior Image Quality, Ergonomic Comfort, Seamless Integration

Key Technical Specifications

Specification	GOOVIS Art	GOVOIS G3 Max
Display Tech	Micro-OLED	Micro OLED
Resolution	1920 × 1080	2560*1440
Virtual Screen Size	≈ 110 inches @ 4m	200 inch @ 4m
Contrast Ratio	> 100,000:1	> 100,000:1
PPD	55	46
Distortion	< 1%	<1.5%
IPD Range	58mm - 74mm	58mm - 74mm
Weight	≈ 200g	~300g
Input	1920*1080	1920*1080/2560*1440 /3840*2160
Vision Correction	Compatible w/ Rx Glasses	support +3D~-7D

Application 1: Laparoscopic Surgery



Surgeon using HMD in Laparoscopic Surgery



Clinical Challenge

Surgeons face neck strain and disrupted focus from constantly looking up at distant monitors during procedures.



HMD Solution

HMD delivers a heads-up view that follows gaze; the entire team shares high-res visuals in real-time.



Key Benefits

- Ergonomic Posture: Reduces physical fatigue in long surgeries
- Improved Focus: Maintains continuous patient visual contact
- Enhanced Collaboration: Aligns all team members' perspective



Application 2: Endoscopic Procedures

A New Perspective for Diagnosis & Treatment



Video: Physician using HMD for enhanced endoscopic visualization



Clinical Challenge

Traditional endoscopy relies on fixed monitors, restricting physician mobility and limiting teaching opportunities.



NEDOptics' Solution

Portable HMD provides a high-quality, eye-level viewing platform for real-time gastroscopy/colonoscopy images.



Key Value Proposition

- Increased Mobility & Ergonomic Comfort
- Immersive First-Person View for Training

TRANSFORMING ENDOSCOPY: FREEDOM OF MOVEMENT & PRECISION

Application 3: Ophthalmic Surgery & Diagnosis

Precision in the Most Delicate Procedures



Clinical Examination Scenario



Clinical Challenge

Exceptional visual acuity and a stable, comfortable working posture are critical demands for ophthalmic procedures.



NEDOptics Solution

HMDs deliver high-fidelity visualization with accurate color reproduction and low latency, meeting stringent requirements.



Natural Posture

Reduces fatigue during long procedures.



Immersive View

Clear view of fine details with minimal distraction.



Enhanced Precision

Supports delicate manipulations critical for surgery.

Application 4. Surgical assistance in Microsurgery



- HMDs liberate surgeons from the constraints of microscope eyepieces, allowing them to maintain more natural surgical postures, focus intently, and work comfortably while reducing occupational strain.
- The "3D cinema-grade" operating room provides a larger and clearer surgical field of view with enhanced spatial stereoscopic perception, facilitating seamless transition from traditional optical microscopes to digital 3D visualization technology.

Application 5: Immersive 3D Vision system for robotic surgery



- Ultra-high-definition display with immersive wide field of view and isolation of surgical field disturbances enables surgeons to maintain greater focus during procedures.
- No need for polarized auxiliary glasses or the binocular crosstalk commonly associated with traditional 3D displays, enabling more precise surgical procedures by physicians.
- Compact size, high compatibility, and easy integration facilitate the miniaturization and integration of surgical robot systems.

Application 6: Medical Imaging & Training



Clinical Challenge

Reviewing pathology slides or CT scans on standard monitors can be tiring and lacks depth perception. ◦



G3 Max Solution

provides a large, high-resolution virtual screen, ideal for the professional review of both 2D and 3D medical images. ◦



Enhanced Review

The large virtual screen makes it easier to detect fine details and tiny lesions.



Stereoscopic Imaging

It enables intuitive 3D visualization of the spatial structure of scanned images.



Immersive Training

It creates highly realistic simulation environments for medical training.

Application 7: Amblyopia & Strabismus Therapy

A New Approach for Pediatric Care: Digital Occlusion & Visual Stimulation



Clinical Scene: Pediatric Vision Therapy



Clinical Challenge: Compliance Issues

Traditional physical eye patches are cumbersome and often rejected by children, leading to poor treatment adherence.



NEDOptics Solution: Digital Occlusion

HMDs provide binocular separation to digitally block the dominant eye while delivering precise visual stimulation to the weaker eye.



Core Value Proposition

- Precise & Customizable: Gradual therapy control
- Engaging: Game-based content for better experience

Application 8: Perimetry (Visual Field Testing)

A Modern Solution for Glaucoma Monitoring



Advanced Glaucoma Care

Portable • Precise • Patient-Centric



Clinical Challenge: Traditional devices are bulky, costly, and often uncomfortable, hindering regular monitoring.



NEDOptics Solution: Adapt HMDs into a portable, lightweight visual field tester for flexible use.



Key Advantage: Precise optical design accurately projects stimuli to detect glaucoma-related defects.



Core Value: Increases screening accessibility, improves patient comfort, and enables early intervention.

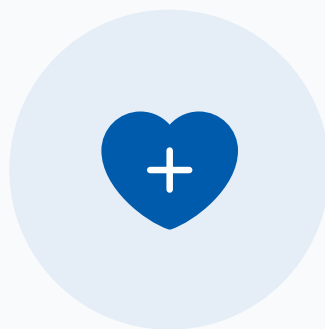
Conclusion: The Value of HMDs in Medicine

Transforming Healthcare Delivery: A Win-Win for Clinicians, Patients, and Systems



For Clinicians

- Increased Efficiency & Workflow
- Enhanced Precision in Treatment
- Improved Ergonomic Posture



For Patients

- Better Outcomes & Faster Recovery
- Enhanced Comfort Experience
- Less Invasive Diagnostic Process

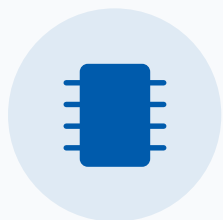


For Healthcare Systems

- Optimized Resource Allocation
- Advanced Medical Training
- Long-term Cost Effectiveness

HMD Technology is a Catalyst for the Future of Medicine

Future Outlook: The Next Frontier in Medical Visualization



Tech

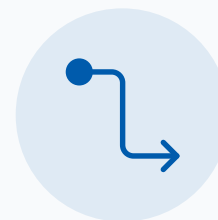
Advancements

Pushing boundaries with even higher resolution and ultra-lightweight ergonomic designs.



AI Integration

Real-time image analysis, AR guidance, and intelligent diagnostics for precision care.



Ecosystem Sync

Seamless data flow with surgical robots, EHRs, and telemedicine platforms.



Expanding Reach

From specialized clinics to widespread primary care for early screening.



OUR VISION

To make advanced visualization tools accessible to every clinician, empowering them to provide the best possible care.

Company Name	Shenzhen NED Optics Co. Ltd
Founded	2015. 1
Founder(s)	Dr. Huajun Peng
Business Focus	Entertainment, Medicine, Education, Training, FPV
Key Products /Services	• Near Eye Display Modules • HMD/AR/VR/MR
Total Investment	0.15 Billion RMB



GOOVIS Art



GOOVIS G3X Max



GOOVIS G3X / G3X Pro



**National-level
"Little Giant"
Enterprise**



**China Patent
Excellence
Award**



NEDO

Professional Head-Mounted Visual System



Head-Mounted
Display



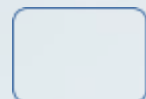
Dedicated Data
Cable



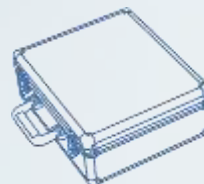
HDMI Cable &
Power Cable



HC20 Video Signal
Converter



Cleaning Cloth



Carrying Case





Thanks For Attention



NEDOptics (纳德光学)



官网: www.nedoptics.com.cn



联系: penghuajun@nedoptics.com.cn