VUZIX®

View the Future®

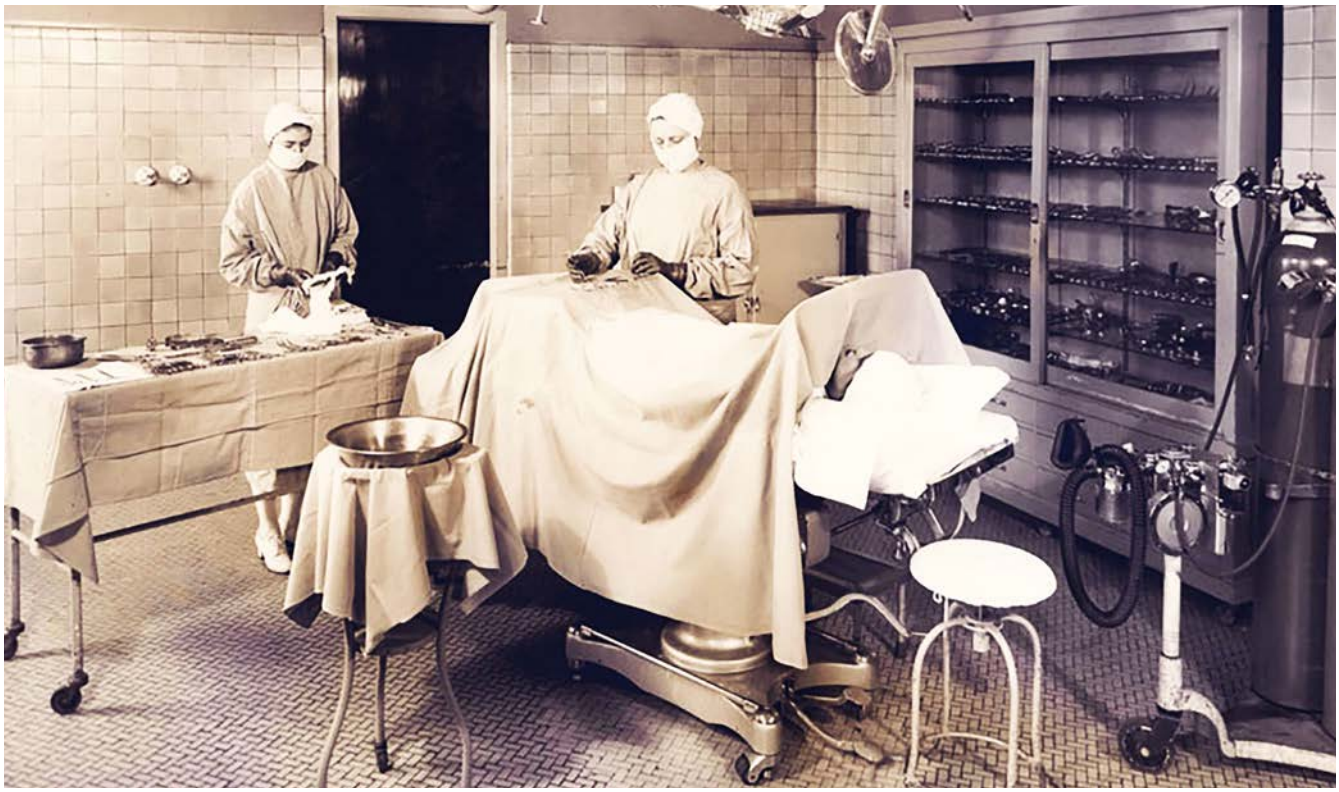
FACILITATING HEALTHCARE DELIVERY WITH VUZIX SMART GLASSES

TABLE OF CONTENTS


HD
IAPs 15 mmHg
IAP 00 mmHg

1 Introduction: Telemedicine Today

While the concept of remotely-delivered healthcare was met with skepticism as recently as ten years ago, telemedicine is now accepted, and flourishing. In the United States, Kaiser Permanente, the country's largest health network, conducted 52% of its 2016 consultations via online portals and virtual visits. In the United Kingdom, remote monitoring of conditions and virtual consultations are becoming the norm, and the global telemedicine market, which was $34 billion in 2018, is projected to reach $185 billion by 2026. Patient satisfaction is high, doctor satisfaction is high, clinical outcomes are generally improved and insurers and providers are seeing sizable reductions in costs.



Operating room at Flower Hospital in the 1930s in Northwest Ohio. Photo credit: University of Toledo Libraries

A typical operating room in the 1980s at the Regional Hospital of Estancia in Brazil. Photo credit: of Wikipedia.org and Wellington Barreto

Today's modern hybrid operating room for cardiovascular surgery at Gemelli Hospital in Rome. Photo credit: Wikipedia.org and Policlinico Agostino Gemelli di Roma

A. Disrupting Factors in Healthcare Delivery

THE NEVER-ENDING NEED FOR EFFICIENCY

A myriad of factors have caused the healthcare system to be over-burdened, with the most pressing being the shrinking doctor-patient ratio. More doctors are specializing and settling in cities, and many are retiring, so there is a dire lack of General Practitioners, particularly in rural areas. Yet housing issues are causing more people to leave cities, especially retirees. Those retirees are mostly Baby Boomers, 10,000 of whom turn 65 every day. People age 65 or older tend to have at least two chronic conditions, and most are living longer.

Then there are health costs and insurance issues. A lack of insurance causes people to put off doctor visits until they can afford them, or to wait until they have many issues, or are severely ill. Then they visit an emergency room. Each ER visit costs about $2,200; Kaiser estimates that, each year, unwarranted ER visits cost hospitals and insurers $32 billion.

DEMAND FROM PROFESSIONALS

Among medical professionals, frustration can result from the fact that their patients have to undergo stress and incur expense in order to visit them, and that many physical visits are unnecessary. In the case of nursing homes, which often have to transfer patients to hospitals for medical treatment, 60%-70% of transfers are for minor issues.

However a full 75% of direct medical costs in the U.S. stem from five chronic conditions: diabetes, congestive heart failure, coronary artery disease, asthma and depression. Where those conditions have been properly treated and are under control, most patients do not require visits to a physician.

NEW TECHNOLOGY AND THE RISE OF E-VISITS

The solution to many of these issues arose when internet-based technologies made it possible for doctors to conduct medical visits remotely. The cost benefits were obvious—so were the benefits to patients. In 2015, a 360-bed facility in New York launched an off-hours telemedicine service as a pilot project. Over the course of six months, 90 hospital admissions were prevented, saving Medicare $1.1 million and improving the outcomes for the patients.

Initially, doctors were able to consult with patients via phone or Skype, perhaps with a nurse at the patient's side. Very quickly, virtual consultation emerged as one of the most convenient methods of doctor-patient interaction. Now it is often the preferred method, and advancements in electronic transmission of health records and prescriptions have allowed it to expand. We have Teleradiology, Telepathology, Teledermatology, Telepsychiatry, Telecardiology and Telesurgery. Governments worldwide are embracing it, insurers are covering it, and medical treatment is now becoming more available to everyone, in even the most remote corners of the world.

B. Mobility & Reach in Healthcare

INTERNATIONAL HEALTHCARE

The international healthcare labor force is a vast multi-disciplinary team of physicians, surgeons, nurses, technicians, laboratory specialists and managers. The majority of these people work in offices, clinics, labs and hospitals. It is community outreach workers who are directly in the field but, in many parts of the world, they have to do the best they can with the limited resources available.

Sub-Saharan Africa, for example, is home to 11% of the world's population, and has 24% of the global burden of disease. Yet it only has 3% of the global health workforce—less than 50% of births are attended by a medical professional. But, with the technology available in Telemedicine, and an internet connection, a doctor can be virtually present and even assist in the most difficult of situations.

WORLDWIDE REQUIREMENTS

Worldwide, an additional 1 million surgical and anaesthesia specialists are needed, just to maintain the status quo. But medical schools have limited space, and medical students in, say, Nairobi may not be able to afford to go to western universities for training. With the new technology available, New York surgeons can train those students—from New York.

This is already happening, with students remotely viewing surgeries with the aid of cameras connected to computers. But this kind of communication is hardware-intensive, space-intensive, and expensive to set up.

This is where wearable technology comes in. Wearables, or Smart Glasses, connect humans to machines and software—hands-free. They can deliver full interaction and communications, including images and sound, between medical professionals, between doctors and students, and between professionals and patients.

2 Next-Generation Mobility in Healthcare Delivery & Training: Vuzix M-Series Smart Glasses

Photos courtesy of Vuzix European Partner: 1Minuut Innovation

Vuzix Smart Glasses can combine Artificial Intelligence, Augmented Reality and Object Recognition to provide real-time visual and audio references, and decision-making support, for users who wear them. They're easy to operate, allow users to work with both hands, and deliver real-time information and communication.

Smart Glasses allow users to work heads-up and hands-free, and remain contextually aware. They are generally simple to operate, and can be the most efficient way to receive information and record data. They are capable of full voice control and can allow voice dictation notes to be taken on the spot. They provide optimum mobility and information access for the wearer, and because the user interface can include Augmented Reality with audio and visual overlays, they deliver better real-time capabilities and information than other types of mobile devices.

Smart Glasses provide a much-improved user experience over cameras and laptops. They allow students to see what the instructor is doing, and seeing. They allow specialists to remotely examine patients anywhere, from anywhere. They allow instant review and updating of medical records. To ensure their confidentiality and security, all patient data can be protected to most regulatory standards with the right software installed.

The innovation lies in putting information in the users' line of vision—hands-free, when and as they need it. These functions, and the depth and scope of information that can be included with the right software infrastructure can make Vuzix Smart Glasses an indispensable tool.

VUZIX SMART GLASSES CAN ENABLE:

- Hands-free access to information (medical records, test results, x-rays),
- Real-time, see-what-I-see communication (for remote collaboration and support from instructors or colleagues),
- Hands-free, point-of-view examination of patient symptoms and physical issues (audio and visual),
- A vast reduction in the need for time-consuming paperwork and reports,
- The ability of doctors to consult with more patients in one day,
- Critical savings in time (test results, x-rays, ambulance travel).

These capabilities are essential for delivering the benefits of advanced sensor technology, AI and remote training, patient care, and support to first responders and medical personnel.

Augmenting Healthcare Service Delivery with Vuzix Smart Glasses

Vuzix Smart Glasses enable medical doctors to examine, diagnose and treat patients accurately and efficiently from remote locations.

With a form factor that assists wearers in focusing on complex tasks, and their hands-free user-experience functions that enhance quick knowledge capture, Vuzix Smart Glasses can allow medical professionals to examine, diagnose and treat patients in an accurate and efficient manner. They can increase the speed and efficiency of technicians, deliver test results much more quickly, and provide immediate, real-time remote support.

When navigating the increasingly crowded enterprise and medical hardware market, two things stand out in Smart Glasses: wearability and ruggedness. Users cannot properly concentrate if the device is uncomfortable and/or ill-fitting, and the device has to be able to stand up to a wide variety of conditions and wearer behavior.

The Vuzix M-Series Smart Glasses are the most wearable, secure and ergonomically versatile on the market. With multiple mounting options and an array of ingenious accessories, they can be worn by anyone, regardless of which eye is dominant, and whether or not the user is wearing prescription glasses or a medical protective facial device.

Right Eye Mountable
Over Glasses

Safety Glasses
With Optional Prescriptions

Head Band
Left or Right Eye Capable

Hard Hat
Left or Right Eye Capable

Left Eye Mountable
Over Glasses

Remote Battery
All Day Operation

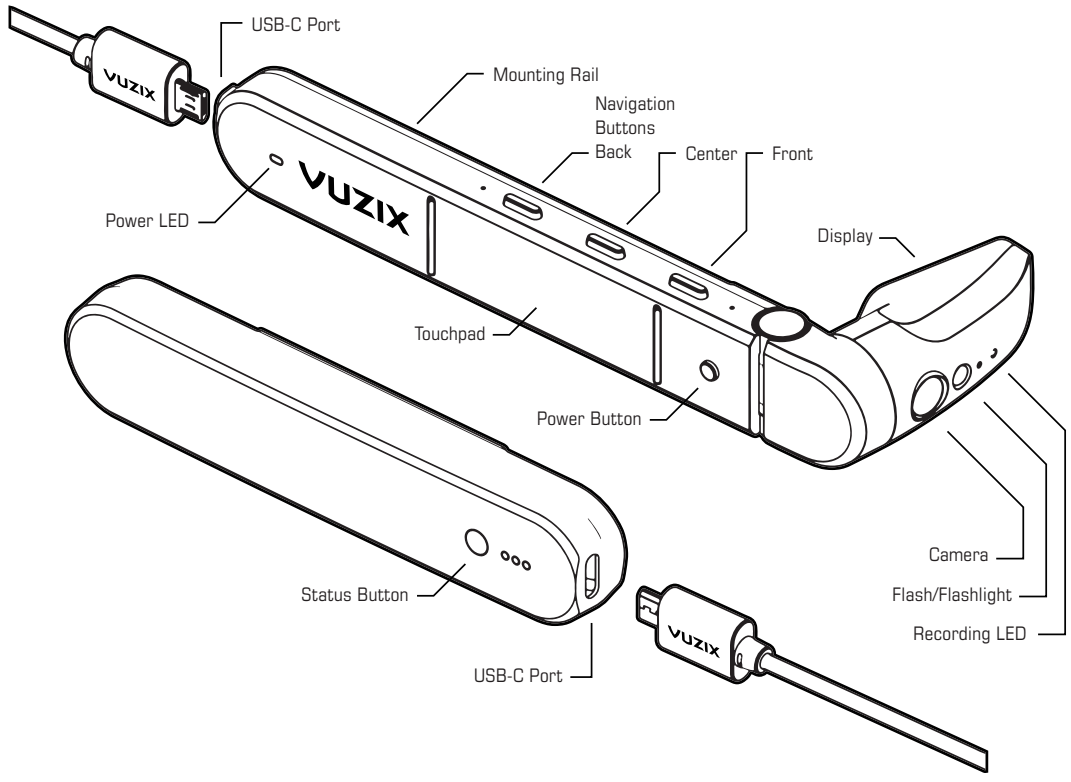
State-of-the-Art Healthcare Delivery & Training: Next-Generation – Vuzix M400 Smart Glasses

Vuzix M400 Smart Glasses provide most of the features and capabilities of a modern smartphone, in a hands-free wearable device. Bluetooth 4.0 connectivity allows them to pair with Android devices or connect wirelessly with Wi-Fi. Integrated head-tracking provides an angle of current view for unprecedented situational awareness.

In addition, the M400s include the Qualcomm® Snapdragon™ XR1 platform, the first dedicated XR platform designed to accelerate high-quality video, audio and interaction on Smart Glasses. There is even GPS to use for locational tracking and recording, as required.

The Vuzix focus on wearability and ergonomic form factor, combined with the power of the Snapdragon XR1, drives Smart Glasses performance and functionality to the next level.

The Vuzix M400 Smart Glasses are ruggedized against water, dust and dirt, and operate via voice, button-press, and gesture controls. All of this allows for comprehensive and precise healthcare delivery, anywhere.



Vuzix M400 Smart Glasses: Specifications & Features

TECHNICAL SPECIFICATIONS[1]

OPTICS

- Display resolution: nHD color display
- Display type: OLED
- Aspect ratio: 16:9
- Field of View (diagonal): 16.8 degrees, equivalent to a 5 in. mobile device screen seen at 17 inches
- Brightness: > 2000 nits
- Contrast: > 10,000:1
- 24-bit color with true black
- Supports left or right eye use

SYSTEM

- 8 Core 2.52Ghz Qualcomm XR1
- 6GB LPDDR4 RAM
- 64GB internal flash memory
- Android 8.1 OS
- OS and apps OTA upgradeable
- MDM available from multiple partners

CERTIFICATIONS

- IP67
- Drop safe to 2 meters

UNIVERSAL M-SERIES RAIL FOR VARIOUS MOUNTING OPTIONS

- Vuzix M-Series Rail Eyeglass frames without lens (standard)
- Weighs less than 3 oz.
- Eyeglass frames with lens
- Safety glasses
- Hard hat mount
- Headband mount
- Peltor headphone mount

BATTERY

- 135mAh internal battery supports hot swapping of external batteries
- 1000 mAh head-worn USB-C external battery with 3-level LED indicator
- Can be powered by 3rd-party USB battery packs in place of head-worn battery
- 2 – 12 hours of operation based on external battery choice

CONTROLS

- 3 control buttons
- Voice control – customizable and supports multiple languages
- 2 axis touchpad with multi-finger support

AUDIO

- Integrated speaker (up to 97db output)
- Triple noise-cancelling microphones
- BT audio: HSP / A2DP

CAMERA

- Up to 12.8-megapixel stills
- Up to 4k30 video
- Improved auto-focus (PDAF)
- Improved optical image stabilization
- LED flash/scene illumination
- Barcode scanning

CONNECTIVITY

- USB 3.1 Gen 2 on USB Type-C
- Wi-Fi 2.4/5Ghz 802.11 a/b/g/n/ac
- Bluetooth 5.0 BR/EDR/LE

INTEGRATED HEAD TRACKER

- 3-degree of freedom head tracking
- 3 axis gyro
- 3 axis accelerometer
- 3 axis mag/integrated compass

GPS

- GPS / GLONASS

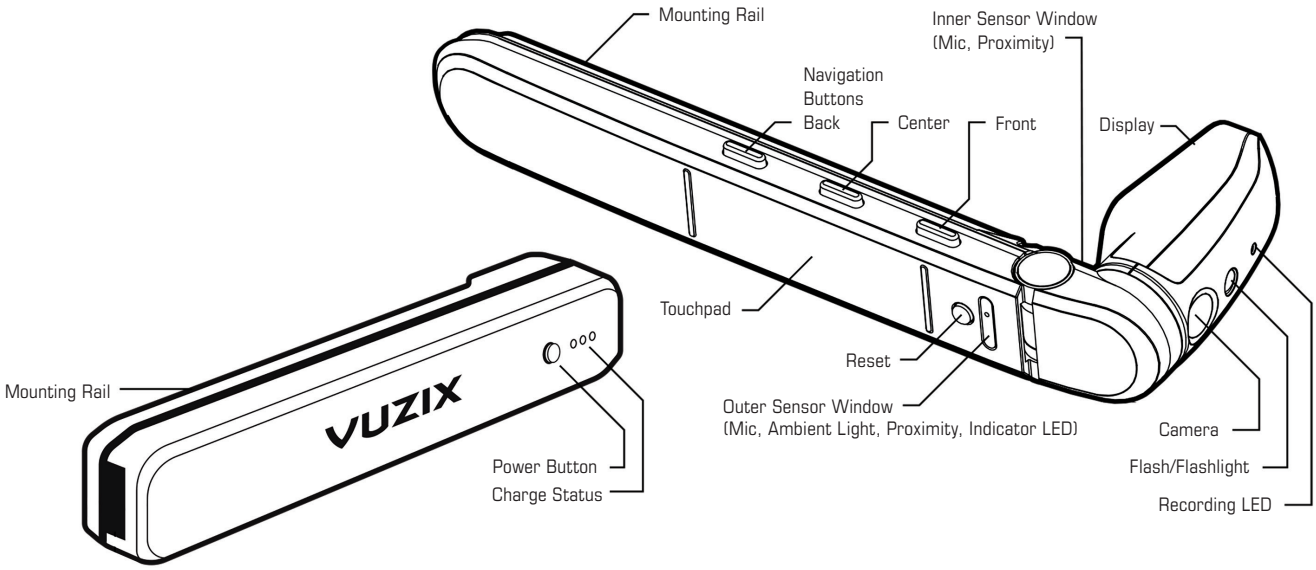
Compare all Vuzix products here:
www.vuzix.com/products/compare-vuzix-smart-glasses

[1]*Specifications are subject to change*

State-of-the-Art Healthcare Delivery & Training: Vuzix M300XL Smart Glasses

Vuzix M300XL Smart Glasses provide most of the features and capabilities of a modern smartphone, in a hands-free wearable device. Bluetooth 4.0 connectivity allows them to pair with Android devices or connect wirelessly with Wi-Fi. Integrated head tracking provides an angle of current view for unprecedented situational awareness.

They are ruggedized against water, dust and dirt, and operate via voice, button-press, and gesture controls. This enables instant record-checking, and allows healthcare providers to teach and learn, diagnose and treat, anywhere.



Vuzix M300XL Smart Glasses: Specifications & Features

TECHNICAL SPECIFICATIONS[1]

OPTICS

- Display resolution: nHD color display
- Aspect ratio: 16:9
- Field of View (diagonal): 16.7 degrees, equivalent to a 5 in. mobile device screen seen at 17 inches
- Brightness: >2000 nits
- 24 bit color
- Supports left or right eye use
- Dual Core Intel Atom CPU
- 2GB system RAM
- Android 6 OS
- 64GB internal flash memory

CONTROLS

- 4 standard Android control buttons
- Voice control – customizable and supports multiple languages
- 2 Axis touch pad with gesture

UNIVERSAL MOUNTING OPTIONS AVAILABLE

- Eyeglass frames with or without lens
- Safety glasses
- Hard hat mount
- Headband mount

BATTERY

- 160mAh internal battery supports hot swapping of external batteries
- 860mAh external battery
- Can be powered by a USB battery pack for extended run time
- 2 – 12 hours of operation based on external battery choice

INTEGRATED HEAD TRACKER

- 3-degree of freedom head tracking
- 3 axis gyro
- 3 axis accelerometer
- 3 axis mag/integrated compass

CONNECTIVITY

- USB Micro-B 2.0
- Wi-Fi b/g/n/ac – Dual-B 2.4/5 GHz
- BT 4.1/2.1+EDR

AUDIO

- Ear speaker
- Dual noise canceling microphones

CAMERA

- Up to 10 megapixel stills
- Up to 1080p video
- Auto-Focus
- Optical Image Stabilization
- Flash/scene illumination

SENSOR SYSTEMS

- Proximity inward facing
- Proximity/ALS outward facing

Compare all Vuzix products here:
www.vuzix.com/products/compare-vuzix-smart-glasses

[1]*Specifications are subject to change*

3 The Future of Vuzix M-Series Smart Glasses in Healthcare Training & Services Delivery

Technological advancement and artificial intelligence are revolutionizing the way healthcare professionals conduct training, and diagnose and treat patients, whether the changes take place in offices, in ambulances, in medical facilities, or across the globe.

The last piece of the puzzle is people: in order for healthcare services to be properly provided, the people who deliver them need efficient tools. Given the benefits involved in hands-free work, technology that delivers that capability is key.

Vuzix M-Series Smart Glasses connect humans with smart machines, critical knowledge sources, and each other. They are rapidly replacing hand-held devices, phones and paper, and can apply to nearly all health services functions. How revolutionary a hands-free computer and display in a heads-up form factor is cannot be overstated. The use of Vuzix Smart Glasses facilitates significant gains in cost savings, service delivery and positive outcomes.

Within the crowded Wearable Technology sector, the Vuzix M-Series stands out. Its ergonomic design, range of capabilities, software partnerships and device accessories have earned Vuzix a 20-year success record. In addition to proprietary hardware designs, production techniques, and an innovative Smart Glassses software platform, those years of experience include thousands of conversations, pilot programs and deployments with Fortune 1000 companies. Today, Vuzix Smart Glasses are among the most widely deployed devices across the globe, digitally transforming service provision in the widest variety of use cases for any single wearable device.

To learn more about this exciting technological tool, visit: www.vuzix.com

A new dawn arrives at the headquarters and production facility of the world renown Vuzix smart glasses and augmented reality manufacturer in Rochester NY, USA.

VUZIX®

View the Future®

vuzix.com

US HEADQUARTERS	Vuzix Corporation	25 Hendrix Road, West Henrietta, NY 14586 USA - T +1 585-359-5900 - TF 800-436-7838	vuzix.com
EUROPEAN OFFICE	Vuzix (Europe) Ltd.	St. John's House, 5 South Parade, OX2 7JL Summertown, Oxford, United Kingdom - T +44 (0) 1865 865506	vuzix.eu
JAPAN OFFICE	Vuzix Corporation	4-1-1, SHIMA Akasaka Bldg. 4F - Akasaka, Minato-kuTokyo 107-0052 - Japan - T +81-3-6234-4170	vuzix.jp