

VUZIX[®]
View the Future[®]



OPTIMIZING WORK INSTRUCTIONS
& TRAINING WITH
VUZIX SMART GLASSES

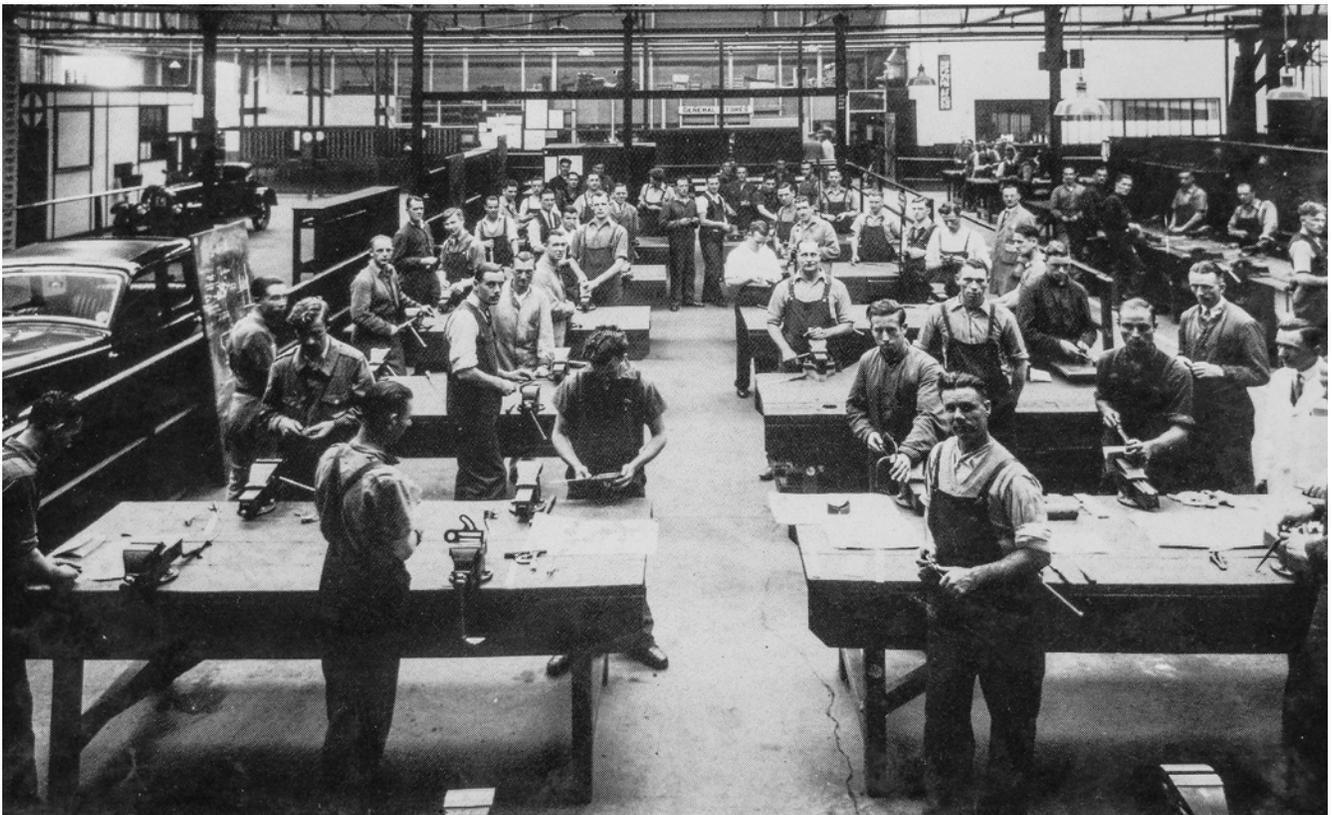
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1 Introduction: Workplace Instruction & Training Today

As senior managers of most businesses are well aware, the success of the company relies on how well its staff members know its products and services, and how to make them, use them, sell them. Workplace Training is now its own field—employers in the US spent \$87 billion in 2018; worldwide, the expenditure was \$285 billion. The per-employee cost of training sits at about \$1000. But the cost of employee turnover is much higher: \$2500. And avoiding that turnover is why it's so important that employers do everything they can to properly and efficiently train new employees, and provide new and ongoing training to existing employees.



Government Training Centre established in the 1930s was a forerunner to today's modern skill training centers. Photo courtesy Jonathan Creaser on Flickr.



In-house worker training becomes commonplace in the 20th century.



Today's technicians are working on-site in real-time with a supervisor seeing what the wearer sees, allowing for quick and precise guidance.

A. Disrupting Factors in Workplace Instruction & Training



WORKFORCE AGE, ABILITIES, ASPIRATIONS & AVAILABILITY

In most industries, the available workforce is both shrinking and aging. In some cases, as much as 60% of current employees are due to retire in the next 10 years.

The workers who will replace those retirees, for the most part, have at least some post-secondary education, are technologically savvy, many do not believe that they will stay with one employer for life, and they are keen to advance their careers. They want to learn, constantly. Surveys consistently indicate that 40%-50% of employees who receive poor job training, or whose training is stagnant, leave their positions within the first year, citing the lack of skills training and development as the principal reason for moving on.

In addition, with lower birthrates and challenges to immigration, the workforce is shrinking. A 2015 Deloitte study found that, in the U.S. alone, there will be 3.5 million manufacturing jobs available through 2025, 2 million of which will not be filled. Which means lower productivity, lower sales and reduced profitability. And, keeping in mind that \$2500 cost of replacing an employee, it also means that employers have to offer training as part of an incentive and employee-retention program.



TECHNOLOGY: ADVANCES, ARTIFICIAL INTELLIGENCE & IOT

The modern workplace is defined by technology. All fields—from manufacturing to medicine, education to retail, are experiencing paradigm shifts in the way their practices are put into action.

The emergence of Artificial Intelligence (AI) is causing a technological revolution, as more companies are shifting to greater digitization of work processes. The Internet of Things (IoT) is transforming every aspect of manufacturing, as companies incorporate Industry 4.0 technology and increased automation.

Rapid changes in technology are making many traditional training methods obsolete—notecards and binders are cumbersome, even laptops are awkward. Quality and content of training is also an issue. Although companies and suppliers provide manuals and guides, a good deal of training is informal person-to-person. That opens the door to errors, omissions, subjective judgement and selective reasoning. And technology demands that training be as uniform and precise as possible.

Enhanced skills related to AI, IoT and machine learning are a priority—companies have to invest in new tools and practices for training employees and, in doing so, creating a safe, efficient, productive and profitable workplace.

B. Mobility in Workplace Instruction & Training



Employees need to learn how to safely use and maintain high-tech equipment, but it's important that they not become blindly reliant on new technologies. They need to learn how to interpret, and act upon the feedback provided by devices, e.g. hazards and system updates. And they have to be able to do this in real time. That is where wearable technology comes in.

Wearables, or Smart Glasses, connect humans to machines and software and, if necessary, real time technical support—hands-free. They deliver interactive training, allowing employees to learn by doing, but also while listening, asking and interpreting.

AUGMENTED REALITY & OBJECT RECOGNITION

Augmented Reality superimposes, or overlays, sound, text and images on what we see, as we see it, blending virtual or augmented content with reality. It achieves this through the core technologies of object recognition, and object character recognition.

People are easily able to recognize and identify many different objects, even if they are partially obstructed from view. Machines and electronic devices can't do that, but object recognition allows devices to see their environment; object character recognition, or OCR, allows them to read and understand it. It is OCR that allows devices to scan and process barcodes and serial numbers.

HANDS-FREE IMAGE, VIDEO & AUDIO CAPTURE

Smart Glasses are equipped with high-definition cameras and microphones, allowing users, with a simple touch, gesture or voice command, to instantaneously capture unique pictures, video, and audio, without taking their hands off the task they are working on. They can ask questions, and be answered; make comments, and be instructed. All of this action and interaction becomes content, which can be stored in the device's memory, uploaded to a database, or streamed in real time to a supervisor or colleague.

SEE-WHAT-I-SEE COMMUNICATION, IN REAL TIME

Smart Glasses are particularly important for technical training and support. Senior technicians and mentors see what the wearer sees, allowing for quick and precise guidance. And because Smart Glasses are connected via Bluetooth or Wi-Fi, it doesn't matter where the wearer is—NASA uses Smart Glasses to communicate with astronauts; its engineers and technicians monitor the repairs that astronauts are making in Space.

Back on Earth, that remote function allows for support and training in the grittiest of environments, e.g. hydro company employees can be trained in the field with underground wires just a glance away, for both the technician and the wearer.

2 Next-Generation Mobility Workplace Instruction & Training: Vuzix M-Series Smart Glasses



Vuzix Smart Glasses can combine artificial intelligence, augmented reality and object recognition to provide learning- and decision-making support for the people who wear them. This support, and the depth and scope of information that can be included, makes Vuzix Smart Glasses an indispensable training tool. They are easy to operate, they allow users to learn while doing and interacting with instructors, and they deliver real-time information and guidance.

Smart Glasses can provide a much-improved user experience over manuals, bulky binders and hand-held devices, all of which can slow or impede learning. The innovation lies in putting information in employees' line of vision, when they need it.

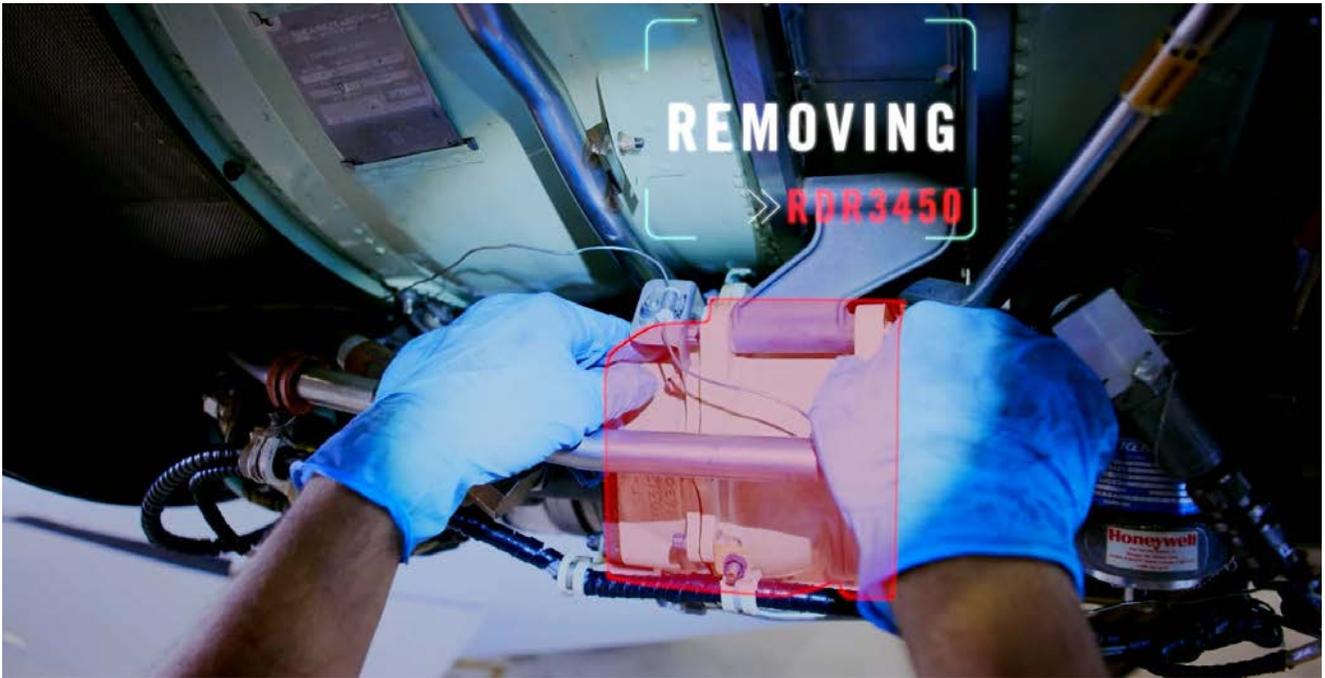
VUZIX SMART GLASSES ENABLE:

- Hands-free access to information (step-by-step instructions, diagrams, videos);
- Real-time, see-what-I-see communication (for remote collaboration and support from a technician or supervisor);
- Hands-free, point-of-view corporate documentation and logging (audio and visual);
- AR overlays for remote support and communication (audio and visual);
- Object and image recognition (for scanning codes, text, numbers, step verification, task completion);
- Workers can access self-help guidance resulting in call avoidance requiring a supervisor to solve their problem.

These capabilities are essential for delivering precise, correct and comprehensive training to all employees, regardless of where they are and what they're learning.



Augmenting Workplace Instruction & Training



Product variation, inadequate training methods, and incomplete work instructions that slow down employees are common issues negatively impacting service and technical operations.

With a form factor that complements on-the-job training, and user-experience functions that enhance quick knowledge capture, Vuzix Smart Glasses promise to help organizations improve learning systems, and move employees through training programs in a faster, more efficient manner.

When navigating the increasingly crowded enterprise hardware market, two things stand out in Smart Glasses: wearability and ruggedness. Workers 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 virtually anyone, regardless of which eye is dominant, and whether or not the employee is wearing prescription glasses, a cap, or a hardhat.



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

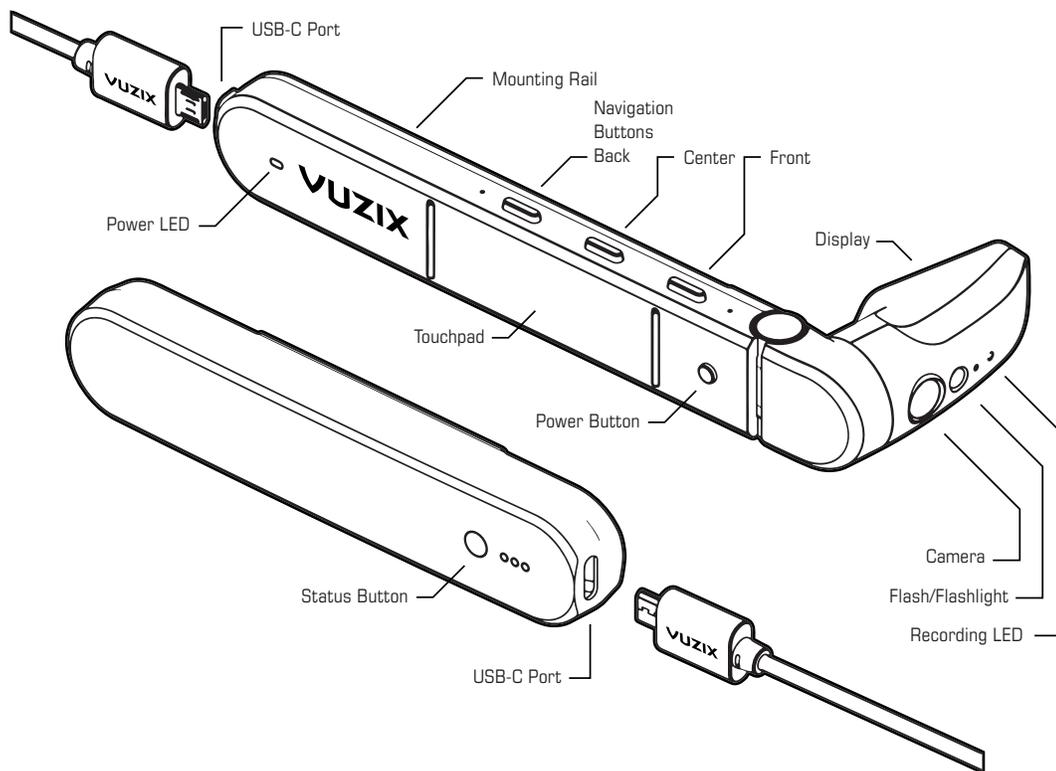
State-of-the-Art Training: Next-Generation – Vuzix M400 Smart Glasses

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.

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.

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 personnel to be trained on the job, helping them get more done in less time.



Vuzix M400 Smart Glasses: Specifications & Features

TECHNICAL SPECIFICATIONS¹

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

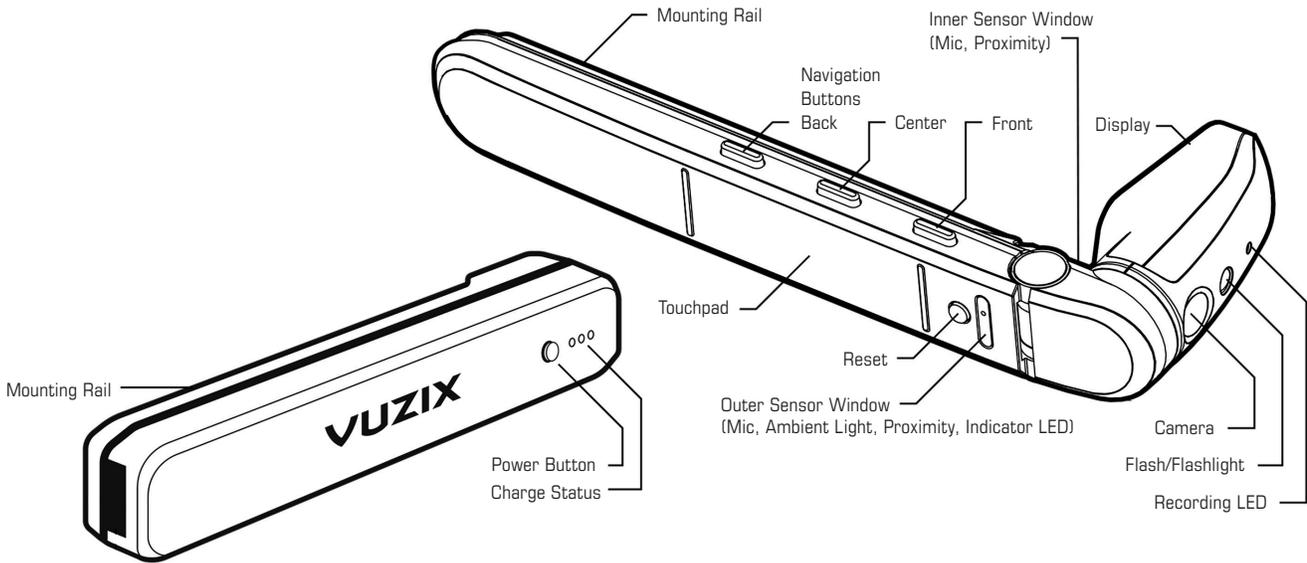
¹Specifications are subject to change

State-of-the-Art 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. All of this allows for comprehensive and precise training, for all jobs, anywhere.

Whether training for the job is service, manufacturing, or warehouse/logistics-focused, Vuzix Smart Glasses enable personnel to be more effectively trained on the job, helping them get more done in less time.



Vuzix M300XL Smart Glasses: Specifications & Features

TECHNICAL SPECIFICATIONS¹

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

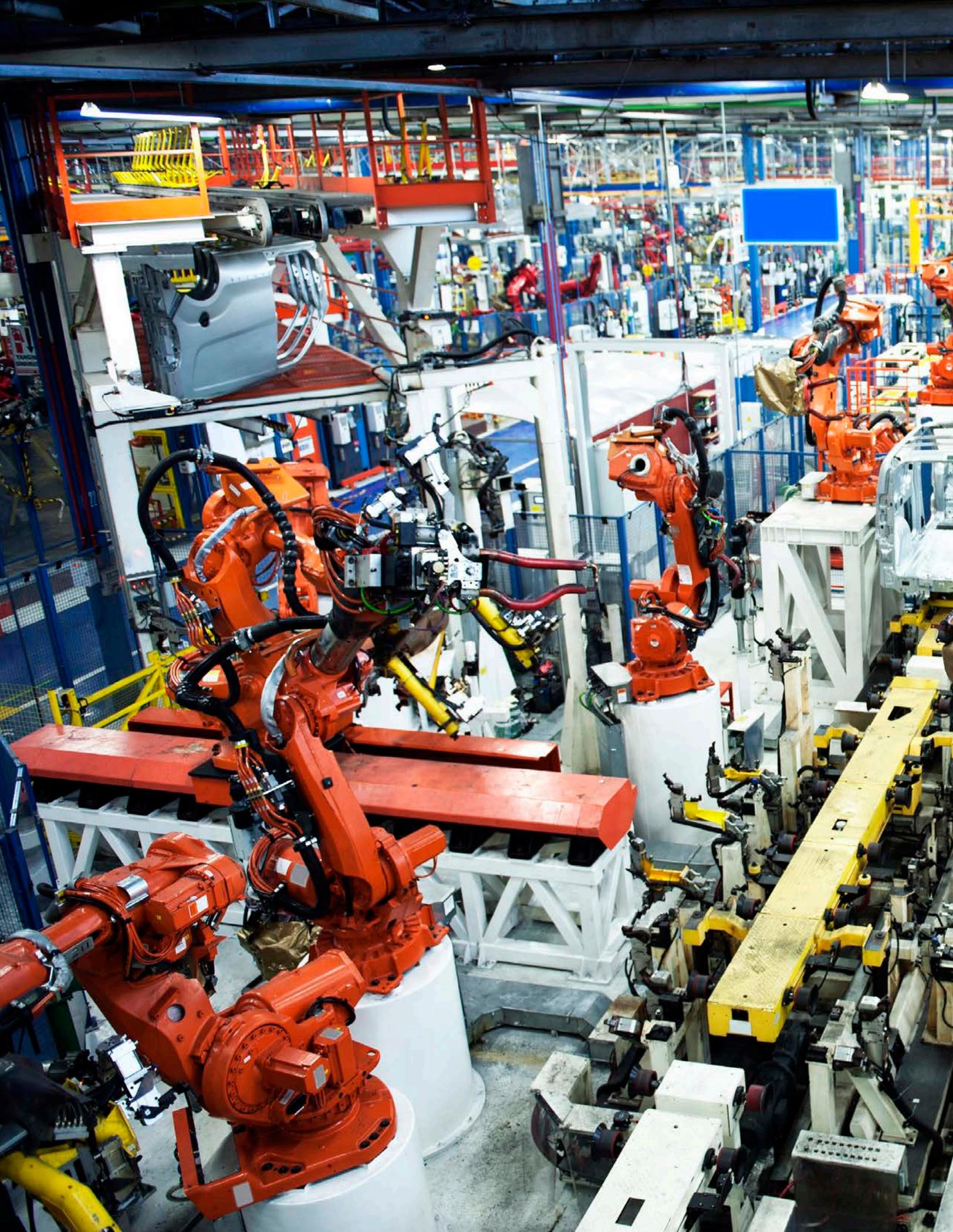
SENSOR SYSTEMS

- Proximity inward facing
- Proximity/ALS outward facing

Compare all Vuzix products here:

www.vuzix.com/products/compare-vuzix-smart-glasses

¹Specifications are subject to change



3 The Future of Vuzix M-Series Smart Glasses in Worker Instruction & Training

Technological advancement, data analytics, and artificial intelligence are revolutionizing the way corporations run and are managed, whether the changes take place in the office, in the field or on the factory floor.

The last piece of the puzzle is the workforce. No company can operate efficiently and profitably unless its employees are well trained. Given the cost and time involved in training, the ability to be hands-free and wear the technology that delivers training and access to knowledge is key.

Vuzix M-Series Smart Glasses connect human workers with smart machines, critical knowledge sources, and each other. Smart glasses are rapidly replacing hand-held devices, phones and paper everywhere, from oil fields to hospitals, offices to building sites. How revolutionary a hands-free, heads-up form factor is cannot be overstated. The use of Vuzix Smart Glasses facilitates significant gains in operational efficiency, product knowledge and safety, and significant reductions in errors, downtime and employee turnover.

Within the Smart Glasses 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 hardware design and production, 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 businesses in the widest variety of use cases for any single wearable device.

To learn more about improving existing workflows and opening new opportunities for your business with Vuzix M-Series Smart Glasses, visit: www.vuzix.com





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

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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

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