The AI Connection With Eyecare
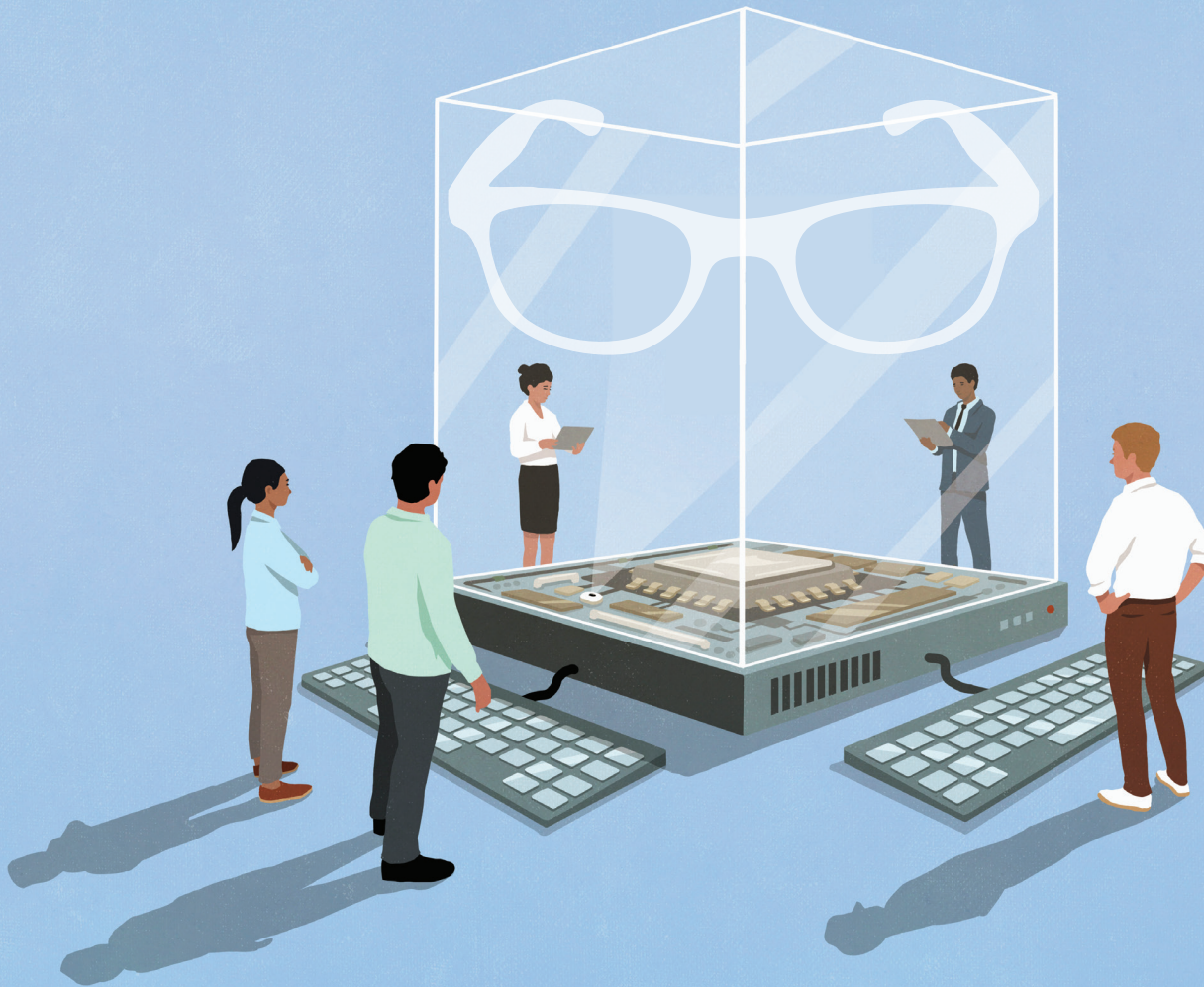## Where Is the Technology Headed?

Image Credit: Getty Images/ Malte Mueller

BY DANIEL BREEMAN / SENIOR EDITOR, BUSINESS & INDUSTRY

As the calendar turns to 2025, artificial intelligence (AI) continues to cast a wide net over nearly every industry, and the optical industry is no exception. Developing at a torrid pace, AI is being implemented by optometrists, ophthalmologists and primary care physicians as a means to increase efficiencies in their practices while still striving for optimal patient outcomes. As the technology continues to evolve, it is being used to enhance applications and perform a variety of tasks such as disease detection and diagnosis, screening and monitoring, expansion of telehealth, personalized medicine, virtual and augmented reality, administrative tasks, drug discovery, and perhaps most importantly, to improve access to care and patients' overall health.

"As AI-driven algorithms identify early indicators of conditions like heart disease, Alzheimer's, and kidney failure through retinal imaging, optometry moves beyond eye health to become an essential bridge between vision care and broader medical management," said Ehsan Vaghefi, Ph.D., president and CEO of **Toku Inc.** https://tokueyes.com/usa/, a technology company that specializes in developing non-invasive, AI-powered diagnostic and screening tools using retinal imaging to measure cardiovascular and other health risk factors.

The global market size of AI in health care is predicted to increase from $19.27 billion in 2023 to approximately $613.81 billion by 2034, according to a report from Precedence Research, a worldwide market research and consulting organization. The North American market size of AI in health care

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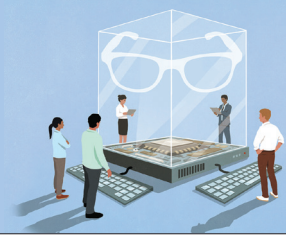
AI Increases Diagnostic Accuracy and Streamlines Workflows

was valued at $8.67 billion in 2023. Artificial intelligence in the health care market is primarily driven by technological advancement, government initiatives and research projects, the report said.

A Q1 2024 survey by McKinsey & Company revealed that more than 70 percent of respondents from health care organizations said that they are pursuing or have already implemented generative AI capabilities. About 60 percent of those who have implemented generative AI solutions said they are either already seeing a positive ROI or expect to. Among those surveyed who are implementing generative AI, 59 percent are already partnering with third-party vendors to develop customized solutions, 24 percent report plans to build solutions in-house and 17 percent expect to buy off-the-shelf generative AI products, the survey said.

At Vision Expo West in Las Vegas last September, Jobson Optical Group presented, "The Artificial Intelligence Revolution: Practical Applications in Eye Care Today," an event that included leading companies and a panel of experts in the field of A.I. discussing what technologies are being used and are available for implementation. Specifics covered how A.I. will change clinical care, business operations, R&D, and sales and marketing across the eyecare industry.

"The eyecare industry is on the brink of a technological revolution, thanks to AI," said Dr. Ahmed Al-Ghoul, the innovator behind **CSI Dry Eye Software**, which uses AI and machine learning to diagnose patients with dry eye. "We're seeing AI being used to enhance diagnostic accuracy, streamline workflows and even predict patient outcomes. But the potential goes beyond these areas. AI can provide personalized care by analyzing vast datasets from multiple sources—medical history, diagnostic results and even lifestyle factors—to tailor treatments for each patient."

In this regard, Topcon Healthcare **https://topconhealthcare.com/**, a leading provider of medical devices and intelligent software solutions for the global eyecare community, has been a key player in the AI space. The company has created Healthcare from the Eye, the strategy of applying AI models to imaging data from the eye to facilitate earlier detection and better management of disease. Last year, they partnered with Microsoft Corporation to deliver AI-powered Healthcare from the Eye solutions to improve health care access, cost and quality.

Healthcare from the Eye is powered by Harmony, a cloud-based, vendor-inclusive digital health information platform enabling a connected care ecosystem. Topcon has also partnered with BeeKeeperAI, Inc. to accelerate Healthcare from the Eye. Harmony combined with EscrowAI is intended to accelerate the strategy of applying AI models to imaging data from the eye, facilitating earlier detection and better management of disease, according to the companies.

"We are integrating advanced technology to enhance both patient care and operational efficiency," said Dr. Shane Swatts, owner of Eastern Virginia Eye Associates **https://www.evea2020.com/** in Chesapeake, Va., and a co-founder of OD Immersion **https://www.odimmersion.com/home**, providing dry eye implementation training and consulting services to doctors across North America. "In our specialty dry eye clinic, we utilize CSI Dry Eye to diagnose and manage dry eye conditions by analyzing patient data and providing tailored treatment recommendations. Athelas AI Scribe **https://www.athelas.com/** automates clinical documentation, allowing our team to focus more on patient interaction, thereby enhancing the quality of care. Additionally, chatbots handle patient inquiries, providing instant responses to frequent questions and assisting with appointment scheduling. We are currently testing an AI tool to optimize our appointment booking process."

Dr. Ahmed Al-Ghoul

Dr. Swatts continued, "In the next six to 12 months, we plan to expand our use of AI in personalized patient care, leveraging data-driven insights to tailor treatments. We also aim to enhance our telehealth services with AI, providing more comprehensive remote consultations through tools like Advanced Ophthalmic Systems (AOS develops software to help clinicians perform remote eye exams, analyze images and communicate with patients.) Additionally, we hope to fully implement the appointment scheduling capabilities of AI to improve our scheduling efficiency and reduce no-shows."

Following up on our report from June 2024 **https://www.visionmonday.com/scene-and-heard/todays-read/article/optical-gains-traction-in-adopting-artificial-intelligence-r1/**, *Vision Monday* spoke with AI technology and software companies, contact lens companies and eyecare professionals about what new AI-based offerings are available

Striking a Balance: AI and Personalized Eyecare

Brianna Rhue, OD, owner of West Broward Eyecare Associates and founder of Dr. Contact Lens and Techifeye, is an advocate of utilizing artificial intelligence (AI) to make eyecare more efficient and streamlined for her patients.

"We are currently using AI and finding ways to use AI to elevate our patient care and improve outcomes as well as finding ways to improve our processes and procedures to make how we deliver care more compassionate, more effective and more efficient," said Dr. Rhue.

"There are only so many levers you can pull in a practice, especially when you are limited by space, to take care of our patients, our team, increase production, continue to evolve and grow our practice. We can see more patients effectively and efficiently; this includes billing them correctly. We can sell more contact lenses, we can sell more glasses, or we can focus on different areas of practice like myopia management, dry eye, aesthetics or diseases that we love treating like glaucoma or diabetes," she said.

Despite the current focus on AI in the media as a "new" technology, Dr. Rhue points out its use in applications for the last decade before the term "artificial intelligence" was introduced. There are many ways her practice is embracing AI.

"Applications we are investing in and are using it through are our phone and recall systems (yes that is plural for a reason- recall systems) for call monitoring to find patient opportunities and for coaching opportunities to make sure our practice is offering the support it needs to our community," said Dr. Rhue.

"We are also using it in our dry eye workups to determine the best treatment protocol and to individualize each treatment plan to make sure each patient is more comfortable with their care and going above and beyond for them to make our practice more efficient. We are also using it through applications like Dr. Contact Lens to find opportunities for patients that are overdue for their appointments, those that are due to reorder and digitize contact lens prescriptions, so we are not printing paper copies anymore. Also, vision plan and insurance verification. Anything we can do to make our practice stickier for patients to continue to do business with us is what we are investing in now. We are also using it in meetings as a scribe for note-taking and in business intelligence tools to know our numbers," she said.

Dr. Rhue said she was able to double revenues in her practice by streamlining rote tasks and investing in technology to make her team more effective and efficient.

"This is not only the toys and instruments that we get to play with as doctors but also everything that our team touches to make it easy for our patients to do business with us and cut out double data entry and mundane tasks. Our patients also notice that we continue to advance. Why we continue to advance is for them with a secondary benefit for us. Our contact lens business has grown year over year by 15 percent to 20 percent as well as our specialty side," said Dr. Rhue.

"Our most valuable and limited resource in our practices is our team members' time but it is also the one part of our practice that too many of us overlook and take for granted and don't calculate correctly. If we have one person logging into four different websites to order contacts… does that sound like a good use of their time… NO! This is where it is critical to be a team member for a day and watch what they do and continue to ask why they do what they do until you can't ask why anymore," she said.

Though Dr. Rhue is enthusiastic about the benefits of AI as it relates to her business, she also acknowledges the challenges inherent to working with emerging technologies.
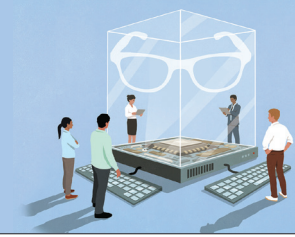
"You can sometimes forget the human element of health care and that is why I take great care of our patients that are looking for us to solve a particular issue they are having and to listen to them all the way," she said. "So many times, we find ourselves with a busy schedule and a million things on our to-do list that just seems we are constantly on to the next patient. We are finding ways to make sure each patient encounter counts."

From a diagnostic perspective, Dr. Rhue believes that AI can also be a valuable tool to enhance a practitioner's ability to detect eye changes as soon as possible, while they can be treated most effectively.

"One area where AI is getting really good is in retinal imaging to detect early changes and manage things before it is too late. Patients point out in reviews of our office that we have the latest and greatest, not only from how we examine their eyes but how they do business with us," she said.

"We make sure we make every decision by first determining if it is good for our patients, then our team and then our practice. If all those answers are yes, then we continue to evolve in the right way." ■

- Stefani Kim, Senior Editor, Lenses & Technology

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Brianna Rhue, OD

Improving Patients Outcomes With AI

Continued from page 28

and how ECPs are using the ever-changing technology to enhance their practices and patient experiences heading into the new year. We also asked them to look ahead over the course of 2025 to predict how AI may influence product development choices, technology and staffing options in their practices.

Digital Diagnostics https://www.digitaldiagnostics.com/ is a health care technology company that designs and implements AI systems that can diagnose disease by analyzing high-quality images. Digital Diagnostics said its flagship product, LumineticsCore, is an AI system designed to diagnose diabetes-related eye disease without the need for a physician to look at the images. According to the company, LumineticsCore can help increase patient access to care by bringing diagnostic results to where the patient already is, referring only those patients that need follow-up care.

"One of the top benefits to eyecare professionals is improved productivity. With LumineticsCore, physicians don't have to spend time reviewing retinal scans for the markers that indicate diabetic retinopathy," said John Bertrand, co-founder and CEO, Digital Diagnostics. "Additionally, physicians don't even have to be the ones operating the system. With minimal training, anyone—from an ophthalmologist to a primary care physician to a health care assistant—can operate LumineticsCore. This increased productivity benefits patients, too, by allowing for more personalized care."

Over the next year, Bertrand stated that Digital Diagnostics will continue to innovate in the eyecare space by developing several patient-centered algorithms. The company is focused on disease detectable technology using fundus imaging where patients are in most need to prevent blindness, and similar life-altering complications using algorithms to find glaucoma, diabetic macular edema and age-related macular degeneration.

John Bertrand

Bertrand continued, "In the long term, I believe that AI in the optical industry will be patient-first. We're already seeing this play out—a few years ago, just the term 'AI' was enough to get your foot in the door, but eyecare professionals, health care systems and investors are becoming more discerning. As the novelty wears off, decision-makers will look at AI tools with two very specific questions in mind. First, how does this improve patient outcomes, and second, how will this make us more productive and allow us to bring care to as many patients as possible?

"I also believe that AI in the optical space will come to work closer and closer with whole-body health. The eyes provide a window into many of the body's major systems, and advanced AI can glean all sorts of information about a range of outcomes from imaging a patient's eye," Bertrand said.


Digital Diagnostics' LumineticsCore is an AI system designed to diagnose diabetes-related eye disease.

HarmonEyes, https://harmoneyes.com/ launched in 2024, was born out of a 12-year-old company called RightEye, an eye-tracking-based device that delivers vision assessments in areas such as dynamic vision, sensorimotor, sports vision and reading. RightEye has sold thousands of devices in eyecare, neurorehabilitation, and sports industries over the past 10 years, according to Adam Gross, CEO and co-founder.

"We created HarmonEyes to combine AI with our large eye-tracking database (including 130 scientifically validated datasets), and our state-of-the-art eye-tracking data analytics platform to detect and predict the state of a person—anywhere, anytime and on any device," Gross said. "Examples include real-time identification and prediction of fatigue (including visual fatigue), cognitive load (an indi-

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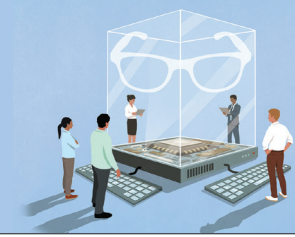
Generative AI Takes a Seat in the Clinical Setting

Some eyecare practitioners are incorporating AI technology into their practices to streamline rote administrative tasks so they can spend more time with patients. The clinical application of AI technology in ophthalmology has not yet been widely adopted.

"If you look at the research in AI and ophthalmology there is a lot of progress," said Alvin Liu, MD, an assistant professor of ophthalmology and the founding director of the Wilmer Precision Ophthalmology Center of Excellence at Johns Hopkins Medicine. "And if you look at the FDA-approved products, there are very few. And if you look at the actual usage of it, it's in its infancy."

According to Dr. Liu, one of the most common uses of AI in a clinical setting is the detection of diabetic retinopathy in retinal photographs, typically done in a primary care physician's office. If abnormalities are found, they are sent to an ophthalmologist for review. Additionally, AI may be used in optical coherence tomography (OCT), to screen for age-related macular degeneration (AMD) or diabetic retinopathy.

"People use the word AI really loosely nowadays," said Dr. Liu. "Generative AI, the technology related to Chat GPT, which is the real AI, has been deployed in the revenue cycle/management side of things when it comes to preauthorization and coding. I am involved in those efforts as well and they don't require FDA approval. It's not widespread in ophthalmology but is definitely being used in other fields of medicine already."

Given that ophthalmology is generally outpatient-based, and issues are fixed "on the spot in the clinic," Dr. Liu said there may be less need for AI tools like generative AI to craft patient communication. But ultimately, AI technology is a work in progress in a clinical setting.

"There are two major obstacles to the scaling of AI when it comes to clinical decision-making," said Dr. Liu. "Number one is the regulatory hurdle is quite high for the FDA to get that approval, much higher than CE marking in Europe, so that is going to impede the adoption.

"The second thing is, a lot of these AI tools, even for the clinical decision support ones, do work well scientifically, but often times when you deploy them in the real world, we see a drop in performance, or a difference in performance from the original studies. These AI tools are just tools. They need to be reworked into the current workflow. A lot of work needs to be done on the implementation side. Without the right workflow and change management in place, we won't be able to use them and if we can't demonstrate the ROI of these tools, the decision-makers won't deploy them." ∎

Alvin Liu, MD

- Stefani Kim, Senior Editor, Lenses & Technology

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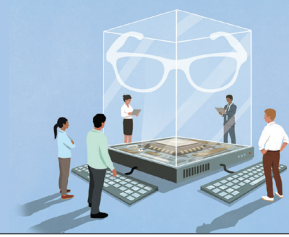
AI Technology Allows ODs to Reach More Patients

cator for stress and anxiety) motion sickness and more. The idea is that if we know ahead of time when a person will reach a high level, interventions can be delivered to prevent bad outcomes whether they are performance related or vision related."

HarmonEyes is also currently working to migrate some of the original RightEye products so they will be delivered via webcams. According to Gross, this opens the door for anyone with a laptop or desktop to access some of RightEye's products that are currently limited to the bespoke device.

"Most of the current AI developments I've read about are focused on the operational and administrative side of the eyecare industry," Gross said. "Our focus is on using AI to improve patient experiences and outcomes, and we believe that this will develop into an area of interest for ECPs over time.

"With our new division, HarmonEyes, we can work in the eyecare industry in multiple ways. Our solutions can be an ingredient to enhance existing eyecare medical devices (AR/VR, PCs), we can deliver our existing RightEye products in a more convenient way, and we can solve real problems for ECPs as they deliver eyecare in new and amazing ways. We are excited to play a part during this transformational time," Gross said.

Heru https://www.seeheru.com/ is University of Miami's Bascom Palmer Eye Institute spin-off company that has developed patented autonomous AI-powered diagnostics and vision augmentation. The company has built downloadable software applications for use on commercially available augmented reality/virtual reality (AR/VR) glasses that diagnose and correct for visual field defects, double vision and visual distortions, among other vision defects.

Heru Prime is a virtual reality (VR) diagnostic platform powered by AI. By automating and digitizing critical components of diagnostic testing, it addresses the very real challenges we face today and positions optometry for a future defined by ef-

Adam Gross

ficiency, accuracy, and accessibility, according to CEO Mohamed Abou Shousha, MD, FRCS, PhD.

"For decades, pretesting has relied heavily on manual processes, leading to inconsistencies and variability across clinics," said Dr. Shousha. "These inconsistencies, combined with rising turnover rates among ophthalmic technicians, contribute to errors and inefficiencies in care delivery."

Heru eliminates this variability by replacing manual testing with standardized, automated protocols. AI algorithms, such as Heru's proprietary re:Imagine technology, streamline visual field testing by predicting patient responses and optimizing testing sequences in real-time.

Dr. Shousha continued, "The value of an optometrist's time cannot be overstated. As clinicians, our expertise lies in analyzing data, forming differential diagnoses and crafting individualized treatment plans—not in performing routine pretesting. Yet, historically, ancillary tests such as cover testing, extraocular motility, and pupil exams have required manual input from the optometrist, taking time away from more meaningful aspects of patient care. Heru Prime automates these ancillary tests with the

Mohamed Abou Shousha, MD

Heru has built downloadable software applications for use on commercially available augmented reality/virtual reality glasses to diagnose vision defects.

Eye Disease Research Is Utilizing AI to Benefit Eyecare Patients

Tareq Nabhan, OD, an associate clinical professor at the University of Missouri-St. Louis (UMSL) College of Optometry, and lead attending physician in the optometry department at Affinia Healthcare, teaches his students how to navigate the basics of artificial intelligence (AI) and its impact on their future practices. His research focuses on the beneficial aspects of AI as it relates to increasing patient access to eyecare.

"In my didactic instruction, I teach a telehealth course along with the Introduction to Optometry course at UMSL," said Dr. Nabhan. "The students are introduced to AI as a primer, then we get into AI solutions used in optometry/ophthalmology. I also include an assignment for our students to use large language models [LLMs] (e.g., ChatGPT). I introduce the students to the capabilities of image and video generators such as DALLE and SORA."

Nabhan continued, "A clinical complement is a tele-retina service at a 15-site federal-qualified health center (FQHC). We have just begun discussions on what leveraging end-user AI solutions might look like with diabetic retinopathy screenings at other sites or in mobile clinics.

"And another aspect of our research includes leveraging geospatial data to identify other variables that play into access, awareness and affordability barriers to eyecare services. Geospatial data has been leveraging AI well before eyecare, and we're excited to explore ways we begin to identify relationships and trends that can be addressed at scale," he said.

Dr. Nabhan also points to efficiency in patient education and remote diagnosing of eye conditions as two areas where AI could be particularly valuable to eyecare practitioners.

"This addition [AI] allows us to send patients home with appropriate information to help them better understand their condition and our man-

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Tareq Nabhan, OD

agement approach(es)," said Dr. Nabhan. "We believe this significantly helps patients by creating appropriate and realistic expectations in their condition(s) and our management plans.

"With regard to autonomous disease detection in clinics, we know what some solutions can and can't do, which we value not only for our clinic but for our patients and our profession overall. Identifying quality solutions and sharing our results with the optometric and ophthalmologic communities allows us to all better identify ways we can use these solutions, along with ways we shouldn't. Moreover, partnering with developers to create, challenge and validate solutions is a responsibility we believe we carry. To that end, we have been heavily engaged in helping develop autonomous solutions capable of multi-disease detection capabilities that have shown best-in-class performances on many large, public datasets," he said.

In practice, Dr. Nabhan said he has utilized AI infographics to illustrate how technology can work in tandem with practitioners to help detect eye abnormalities during routine exams.

"We have shown our patients what AI lesion detections look like through heatmaps, emphasizing that what we see as abnormal, so has the AI," he said. "We believe this can help improve patient acceptance toward these solutions by showing our agreements with it along with our testing of these autonomous solutions.

"We're working on developing our own gallery of solutions for the training of opticians and students, domestic and abroad. With the graphic design demands involved in creating these solutions, we're excited to utilize generative AI solutions such as DALLE and SORA for our illustrations and animations," he said.

For the next generation of optometrists, Dr. Nabhan says, working with technology is second nature. His students are eager to learn how AI can enhance their work with patients.

"AI and machine learning solutions are here, and our schools and colleges of optometry carry a significant responsibility to introduce our students to AI and how these emerging technologies will change the way we practice and learn," he said. ∎

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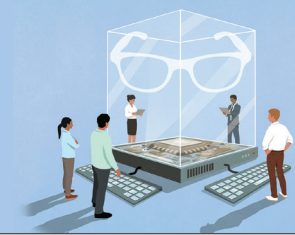
ODs See Real-Time Results Using AI-powered Tools

same precision and efficiency it brings to visual field diagnostics. Through AI-powered tools, optometrists get real-time results—a win for both efficiency and accuracy."

Xenon Ophthalmics https://xophthalmics.com/ has developed fully integrated products combining hardware for data collection, real-time AI and advanced data analytics. The XO Exam System consolidates 12+ diagnostic tests into a single wearable device, eliminating the need for bulky tabletop machines. According to Zeshan Khan, president, founder and CEO at Xenon, this integration enables faster diagnostics and reduces test times to under 10 minutes; converts non-quantifiable data into actionable insights, providing doctors with precise information; empowers real-time monitoring and analytics, allowing doctors to make immediate, accurate diagnoses; and supports telehealth, enabling remote diagnostics for underserved areas, further increasing efficiency.

Beyond the XO Exam System, Xenon said it is preparing to launch the XO Lens, a pocket-sized refractor powered by patented liquid lens technology. According to Khan, the company is also working on advanced AI algorithms to support real-time monitoring and long-term patient tracking, enabling doctors to monitor disease progression and treatment efficacy, along with providing seamless integration with electronic medical records to streamline data management and improve patient care.

"AI has the potential to revolutionize vision care by improving diagnostic speed, expanding access by enabling telehealth solutions, automating routine tasks, enhancing preventive care and reducing costs," said Khan. "At Xenon Ophthalmics, we aim to redefine global vision care by combining real-time AI, advanced hardware and seamless data analytics."

CSI Dry Eye Software https://csidryeye.com/ is an advanced AI-powered platform designed specifically to help doctors improve the diagnosis and management of dry eye disease. The company's software reduces diagnosis guesswork by analyz-


Zeshan Khan

The XO Exam System from Xenon Ophthalmics consolidates 12+ diagnostic tests into a single wearable device.

ing clinical inputs—like diagnostic testing, patient history and environmental factors—to provide accurate, data-driven information that guides clinicians toward a better diagnosis, the company said. CSI Dry Eye Software uses predictive algorithms to assist doctors in determining the type and severity of dry eye disease. Based on these predictions, it allows for personalized treatment plans tailored to the individual patient.

"In the next decade, I believe AI will become indispensable in both diagnostics and patient management," said CSI's Dr. Al-Ghoul. "Eyecare professionals are increasingly embracing AI, especially as they see its potential to enhance patient care and reduce the administrative burden. However, challenges remain, including skepticism about technology's accuracy and concerns about replacing


Maria Znamenska, MD
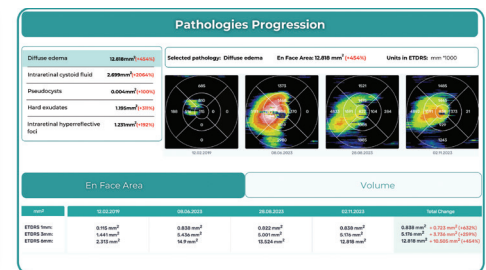
Altris has developed an ophthalmic images management system powered by AI that automates the selection of pathological OCT scans and the detection of 70+ pathologies and biomarkers.

the human touch in health care. Our goal with CSI Dry Eye Software is to augment—not replace—the clinician's expertise. By providing insights and recommendations, the software enables clinicians to make informed, confident decisions while fostering patient trust."

Altris Inc., https://www.altris.ai/ a company that develops AI platforms for analyzing eye scans, reports it has built a unique ophthalmic image management system powered by AI that automates the selection of pathological optical coherence tomography (OCT) scans and the detection of 70+ pathologies and biomarkers, including early signs of glaucoma. As a web-based tool, it can be used by anyone with internet access, eliminating the need for complex installations or specialized hardware.

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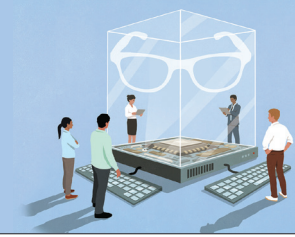
AI Provides Diagnostic Decision-Making Support

In addition to detecting retinal pathologies, Altris AI offers advanced features such as automated quantification of biomarkers and pathology tracking. According to Maria Znamenska, MD, Ph.D., ophthalmology and chief medical officer at Altris AI, these capabilities empower eyecare professionals by providing robust diagnostic decision support, improving accuracy and efficiency in patient care.

"The Altris AI platform is valuable to any physician as it has wide functionality that will meet the needs of any practice," said Dr. Znamenska. "There are five clear benefits for eyecare professionals and patients. First, AI enables more efficient patient triage. Second, Altris AI provides diagnostic decision-making support: eyecare specialists get an opportunity to have a second opinion on OCT scans. Third, Altris AI provides an objective quantification of all retina pathologies and biomarkers. Fourth, automated objective progression tracking allows users to assess the effectiveness of treatment. And fifth, patients also benefit from Altris AI: color-coded images are easy to understand so they learn about their disease and see the value of OCT diagnostics."

She added, "It is very important to understand that AI will never substitute eyecare specialists but will certainly become a reliable assistant. Why won't AI replace optometrists as many fear? Simply because the final diagnosis will always be on the eyecare specialist who will have to take into account many additional parameters for diagnosis: other diagnostic test results, lab test results, patient clinical history, concomitant diseases, family clinical history, etc. AI for OCT scan analysis will rather serve as a colleague who provides a valid second opinion with additional data. Eyecare specialists want to be empowered with AI to assist with OCT scan analysis."

Eyebot https://www.eyebot.co/ uses advanced AI-driven algorithms and touch-free imaging technology to conduct 90-second vision tests that en-

able tele-doctors to write accurate and well-tolerated eyeglass prescriptions remotely, the company said. The Eyebot vision test is fully autonomous and adapts to the user's body, height and position. The AI technology analyzes the collected test data from refraction, visual acuity, lensometry and intake to suggest a well-tolerated Rx to the tele-doctor. The tele-doctor can then make adjustments to the Rx or directly approve the Eyebot-generated Rx.

Eyebot kiosks combine the AI-enabled automated vision test technology with an intuitive user interface that works for a broad spectrum of the population, making vision care more accessible.

The S1 Eyebot vision test kiosk terminal is compact, self-serve, and works in any environment. With the push of a button, users get a free vision test in 90 seconds that educates them on their vision quality, indicates if their current eyeglasses are outdated, and offers the ability to get a doctor-reviewed prescription. Plug it in and you have a simple and convenient Rx solution in-store, Eyebot said.

The company said its S1 + G1 kiosk is a self-serve, custom-branded presence for any company. It has eye-scanning technology plus customizable merchandising real estate in the wrapper, TV screen and top sign.

Matthias Hofmann

The S1 Eyebot vision test kiosk terminal is compact, self-serve and works in any environment. With the push of a button, users can get a free vision test in 90 seconds.

"Our kiosks bring vision care to convenient locations, eliminating the need for booking appointments. We can educate the public on the quality of their vision and provide appropriate solutions—such as a new prescription, eyeglasses or a referral to an in-person exam," said Matthias Hofmann, CEO of Eyebot. "They free up time for doctors to focus on eye health, complex cases and other clinical responsibilities while helping reach underserved or hard-to-access communities by providing vision testing in non-traditional settings and health deserts."

In the coming months, Hofmann said the company plans to introduce its Gen 2.0 model that incorporates multimodal clinical datasets to better address challenging edge cases; introduce AI auto-screening tools for early detection of eye health issues like cataracts, keratoconus, amblyopia and anisocoria; and use AI to recommend eyewear options tailored to individual prescriptions and preferences.

"At Eyebot, our mission is to make vision care accessible to everyone, equally. We see a future where technology and AI work seamlessly with eyecare professionals to expand access to personalized vision care for all those who need it," Hofmann said.

ECPs Use AI to Increase Access to Remote Diagnostic Care

For patients who are located far from an eye-care practitioner, AI technologies can provide access to remote diagnostics that can help spot early signs of treatable eye diseases.

Roya Attar, OD, M.B.A., D.H.A, associate professor and director of optometric services at the Department of Ophthalmology, University of Mississippi Medical Center (UMMC), has focused her research on serving those in the surrounding community.

"In the upcoming months, we plan to expand our AI initiatives by developing more predictive models tailored to patient care and enhancing educational tools for our students," said Dr. Attar. "There's also ongoing research into AI applications for early detection of eye diseases, and AI-powered telemedicine platforms to improve access to care."

As an optometrist in an academic medical center, Dr. Attar is primarily focused on testing AI's capabilities in a research setting as well as educating students about its potential, but other departments within UMMC are already using AI in some aspects of patient care.

"We use generative AI in our electronic health record system, Epic, to streamline routine tasks such as replying to patient messages," she said. "Additionally, AI-driven ambient listening systems help reduce post-visit follow-up work for clinicians."

UMMC also uses predictive modeling tools in the ER to forecast patient admissions, as well as AI-driven monitoring systems to predict patient falls and pressure injuries. Dr. Attar said that AI has led to clinicians becoming more efficient and streamlined when it comes to administrative tasks, allowing them to focus more on patient care. And early data shows patient safety and resource allocation improvements.

"AI has the potential to significantly improve efficiency by automating routine tasks and provid-

Roya Attar, OD

ing valuable insights," Dr. Attar said. "However, it is important to note that AI is a tool that should be used in conjunction with human expertise."

Although UMMC faculty and students have been excited about the possibility of using AI tools, it is also tempered with a healthy mix of skepticism from those who worry about the potential for harm.

"While AI offers numerous advantages, there are concerns regarding data privacy, the reliability of AI-generated insights and the potential for overreliance on technology. We are addressing these issues through the development of a robust AI-use policy that emphasizes ethical standards," she said.

As a part of their effort to offer cutting-edge care, UMMC aims to integrate AI-related advancements to assist in patient communications.

"Specifically, for my low vision patients, I do take extra time to discuss utilization of AI-powered assistive devices, such as tools like smart glasses and screen readers that use AI to identify objects, read text aloud and with navigation, as well as phone apps that use AI technology for visual assistance," Dr. Attar said. ∎

- Stefani Kim, Senior Editor, Lenses & Technology

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> **Specifically, for my low vision patients, I do take extra time to discuss utilization of AI-powered assistive devices, such as tools like smart glasses and screen readers that use AI to identify objects, read text aloud and with navigation, as well as phone apps that use AI technology for visual assistance."**
>
> **- Roya Attar, OD, M.B.A., D.H.A, associate professor and director of optometric services at the Department of Ophthalmology, University of Mississippi Medical Center (UMMC)**

The AI Connection With Eyecare
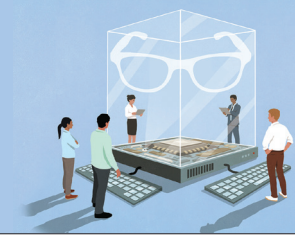
Practice Management for ODs Is Simplified With AI

Eyenuk Inc.'s https://www.eyenuk.com/us-en/ AI-powered EyeArt AI system provides fully autonomous screening for vision-threatening eye diseases based on international clinical standards and immediate reporting in a single office visit during a patient's regular exam, according to the company. The EyeArt AI system is the first and only AI technology to have U.S. Food and Drug Administration (FDA) clearance for autonomous detection of both more-than-mild and vision-threatening diabetic retinopathy, the company said.

"AI is fundamentally transforming eyecare by democratizing access to specialized diagnostics," said Eyenuk CEO Gaurav Agarwal. "We're seeing AI systems handle routine diabetic retinopathy screenings with remarkable accuracy. In doing so, these systems are not just supporting clinicians but actively enhancing their capabilities, allowing them to focus on the most critical aspects of patient care."

He added, "Looking ahead to the next six to 12 months, I anticipate AI will continue to expand beyond diabetic retinopathy screening into other critical areas of eye health. We'll likely see increased integration of AI systems into standard clinical workflows, improved interoperability with existing health care systems, and potentially new applications in early detection of other eye conditions. The focus will be on making these technologies more accessible to primary care settings, ultimately helping to address the growing demand for eyecare services."

Cognoptix, https://cognoptix.com/ a leading medical diagnostics company for Alzheimer's, offers a non-invasive eye scan that detects beta-amyloid deposits in the lens. Amyloid is the earliest biomarker of Alzheimer's disease, and the company said its system can detect it years or decades before amyloid appears in the brain.

RetinAI Inc. https://www.retinai.com/ launched RetinAI Discovery for Clinics earlier this year, with two product versions to address the needs of ophthalmologists and optometrists. Discovery for Clinics and its expert-level AI models have been designed to

Gaurav Agarwal

accelerate and enhance clinical decision workflows, teleophthalmology management, referral decisions and patient management generating data efficiencies, and enhancing decisions for clinics, the company said.

Barti https://www.barti.com/ uses AI to transform electronic health records (EHR) and simplify practice management for eyecare professionals. With the first AI scribe in optometry, Barti said it enables doctors to automatically capture, structure and summarize key details in real time during patient consultations, reducing documentation time and easing cognitive load.

The company said its AI Office Copilot, developed in partnership with Google Cloud Platform, seamlessly manages incoming calls through Barti's built-in VoIP phone system. It schedules appointments, collects patient information, and instantly updates Barti's calendar—all in real time. This allows eyecare professionals and staff to focus on patient care without interruptions from routine calls. Its AI Smart Agent on barti.com delivers quick and accurate answers to questions about the company's products and services. It helps eyecare professionals easily explore Barti's features, schedule demos and access support resources, ensuring a seamless and informative experience.

"Barti delivers significant benefits to eyecare professionals by minimizing documentation time

Colton Calandrella

and allowing providers to focus more on delivering exceptional patient care," said Colton Calandrella, CEO and co-founder of Barti. "Our AI-powered tools, such as AI Scribe and AI Office Copilot, automate time-consuming manual tasks and enhance operational efficiency. Barti is specifically designed for eyecare professionals, ensuring tailored solutions that meet the unique needs of optometrists and ophthalmologists."

AOAExcel, a member-benefit and for-profit subsidiary of the American Optometric Association, recently made a financial investment in Barti. In addition, AOAExcel has endorsed Barti Software, marking the first time that AOAExcel has endorsed an eyecare EHR.

Over the next six to 12 months, Barti plans to infuse AI into every aspect of its platform, according to Calandrella. Some of these projects include: AI Image analysis for OCT, retinal photos and other diagnostic data; AI agents to scrub, submit and appeal denied insurance claims to double the productivity of a biller; and an AI chatbot that has access to a full patient record.

"At Barti, we believe in empowering eyecare professionals with tools that are simple, efficient and innovative. By combining AI with a user-friendly EHR platform, we're redefining what's possible in eyecare practice management," said Calandrella.

The AI Connection With Eyecare
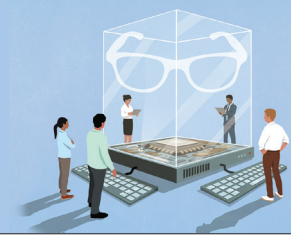
Contact Lens Companies Expanding AI Reach

Weave https://www.getweave.com/, an all-in-one customer experience software and payments platform, recently launched a modern, intuitive interface that integrates powerful AI tools, enhanced communication, scheduling, and billing and payment options directly into communication workflows. Designed for simplicity and efficiency, the company said the platform improves practice operations by consolidating tasks into a more unified, easier-to-use system.

Weave's Call Intelligence solves two significant challenges for health care practices: limited call insights and time-consuming manual data analysis. According to the company, providers can quickly identify why calls don't convert into appointments without taking time away from patient interactions or business-critical activities like scheduling and billing.

Contact Lens Companies Embrace AI

Alcon https://www.alcon.com/, a leader in eyecare and a manufacturer of contact lenses, is using "responsible" artificial intelligence (AI) under Alcon's AI policy and framework in many different ways, according to Ian Bell, senior vice president, chief operating officer at Alcon. This includes optimizing the company's ability to innovate and create products to meet the growing eyecare needs around the world.

"We are also using AI technology to enhance the associate experience at Alcon and identifying ways to use AI to save time, allowing for even greater focus on supporting our customers and patients across the globe," Bell said. "There are many potential benefits of AI for eyecare professionals and patients. For example, in ophthalmology, leveraging AI could help create even more customized treatment plans for patients' unique needs. This includes helping to evaluate patient data and tak-

Ian Bell

ing into account surgeon preferences, preferred formulas and lens types."

Bell continued, "Currently across the larger health care industry, we are facing significant physician shortages. We believe AI will play a larger

ODs Increase Efficiency in Patient Care With AI

Dunes Eye Consultants is on the verge of adopting AI technology to help streamline patient scheduling tasks. Practice owner Steven Ferguson, OD, plans to launch his first AI integration in January, with more to follow encompassing intake, education and insurance verification processes.

"We're developing custom applications combining best-in-class large language models (LLMs) to optimize user experience, ensure security and guardrail for accuracy," Dr. Ferguson said. "I have confidence our processes will become significantly more efficient as we integrate AI.

"We're not yet promoting broad introduction in the use of AI to patients; however, we have test marketed a subset of patients with pilot demos receiving very positive feedback," he said.

He plans to involve key staff in the development and training of AI agents; he said his staff

> "With staff involved in AI development, it ensures they are up to speed and will take ownership in constant improvement as they are helping to mold the AI agent to meet best-practices focus."
>
> **- Steven Ferguson, OD, owner, Dunes Eye Consultants**

Steven Ferguson, OD

is aware that AI technology will help reduce the burden of routine tasks, helping enhance their job performance and increase productivity.

"With staff involved in AI development, it ensures they are up to speed and will take ownership in constant improvement as they are helping to mold the AI agent to meet best-practices focus," said Dr. Ferguson.

"We will train custom agents on increasingly complex elements of our administrative burden over the

next 6 to 12 months and layer functions with controlled guidelines," he said. "Taking part in development of the agents has thus far created a positive staff experience.

"If responsibly applied, I have trouble seeing any downside, as long as we stay attuned to users' comfort with the agent and trust in their task outcomes," he said. ■

- Stefani Kim, Senior Editor, Lenses & Technology
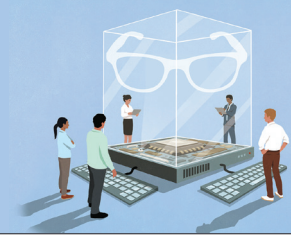
Contact Lens Companies Expanding AI Reach

role in building efficiencies into our systems to help support eyecare professionals and their patients. In the next several years, we anticipate the industry will be leveraging AI using different datasets and formulas to generate recommendations and further streamline planning processes. We also expect to leverage AI features to help practices run more efficiently."

Bell emphasized that Alcon is focused on bringing bold innovation to markets to advance optimal patient outcomes. "We are looking at tomorrow' s patient needs— not just today, which means looking into the best uses of AI in a responsible manner to accelerate innovation and integrate AI capabilities into our next-gen technologies," he said.

CooperVision https://coopervision.com/ is using AI alongside its teams' deep industry knowledge to help identify growth opportunities for eyecare practices, identify specifically tailored data and recommended actions. "In addition, we're using AI to better understand what type of information is most relevant to each of our customers, which respects their individual needs while reducing content overload," said Michele Andrews, OD, vice president, marketing and professional affairs, Americas, at CooperVision. "For instance, AI helps to assess what's working for customers, then uses those criteria to recognize new opportunities. This partnership pinpoints options that practices can use for better decision making."

She added, "The combination of AI with our team's deep industry knowledge is helping customers become more efficient, in turn helping them become more profitable. AI-derived data highlights where the best opportunities may be, which enables our sales force to spend more time with customers in those areas. By better understanding each practice's opportunities, we can tailor their experience with CooperVision and improve their outcomes."

Despite the early benefits CooperVision is experiencing with AI, Andrews recommends a slow and

Michele Andrews, OD

steady approach when it comes to implementing the new technology.

"You cannot rush adoption, since people need time to understand how it works and to build trust in the data and underlying system. Remember that you always need the human element to complement AI," Andrews said. "Use AI with caution. There's always bias with AI, since humans are building the models. Our people's industry and professional knowledge provides more context to the data, adding specific knowledge that the AI does not have. We are mindful that human intelligence and interaction has to remain a big part of the picture."

J&J Vision https://www.jjvision.com/ is actively leveraging AI in responsible ways, according to Mark Gaynor, chief digital officer, Vision, Johnson & Johnson, to help deliver content generation, patient profiles/guided health pathways to strengthen engagement and meet customers where they are; fitting calculators to help the doctor determine correct lens/correction, help streamline the fitting experience; and simulators, using VR to help patients experience what IOLs can do for their vision.

Gaynor said, "As we look to the future, within the vision industry, there are potential opportunities to leverage AI in thoughtful, responsible ways to help solve dropout rates for contact lens wearers. We

Mark Gaynor

Brent Saunders

know that dropout is a big issue with building loyalty for contact lens users. So, finding opportunities to leverage AI to help support ECPs is something really interesting and promising. Also, AI can be used for large scale analysis of medical imaging, for multiple purposes, such as disease identification."

Bausch + Lomb https://www.bausch.com/, another leading contact lens manufacturer, is also beginning to discover the advantages of AI. "We believe AI has the potential to transform drug discovery, improve product development, enhance workflows and support predictive maintenance in automated production lines—advancements we're already beginning to explore," said CEO Brent Saunders. ∎