



Eyesi® Indirect Ophthalmoscope



High-End Augmented Reality Simulator for Training of Retinal Examinations

Efficient Training of Diagnostic Skills

Augmented Reality Simulator for Indirect Ophthalmoscopy



Eyesi® Indirect Ophthalmoscope simulator with patient model head, lenses, touch screen, indirect ophthalmoscope mimic, and simulator PC.



Examples of virtual patients' retinas.



Diagnostic Practice for Students and Residents

Eyesi® Indirect is an advanced diagnostic training system for binocular indirect ophthalmoscopy. With a comprehensive database of clinically relevant pathologies, it significantly extends the range of diagnostic training available to ophthalmology and optometry students or residents.

Ophthalmoscopy Training in a Lifelike Setting

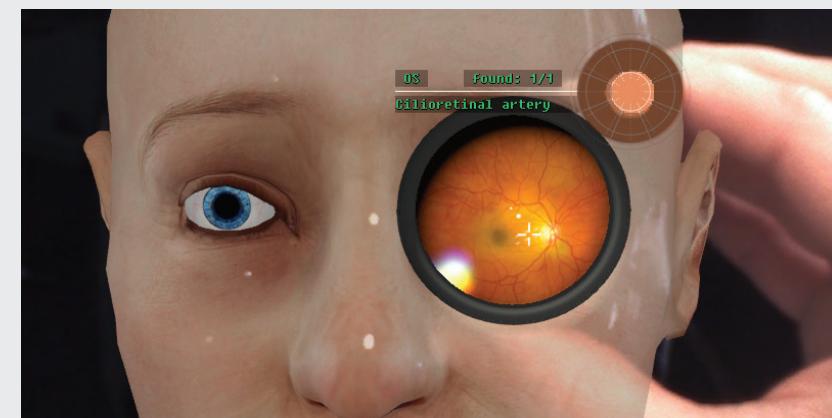
The training simulator mimics an indirect ophthalmoscope down to the last detail using a head-mounted stereo display on an ophthalmoscope headband, two diagnostic lenses, and a patient model head. Further components of the simulator are the touch screen, which displays the user interface and a live view of the examination, and the processing unit that runs the simulator software.

The Virtual Patient Comes Alive

The simulator uses augmented reality, combining real and virtual images. When trainees put on the ophthalmoscope hat, they see a high-fidelity, three-dimensional virtual patient instead of the model head, and their own hand holding the virtual lens. If the lens is positioned correctly, students see an image of the patient's retina in the lens.



Students practicing with Eyesi® Indirect



Trainees see a three-dimensional virtual patient, their own hand, and the lens.

Eye Examinations Close to Reality

Reduced Training Time Through Lifelike Practice



Indirect Ophthalmoscopy is Difficult to Master

The binocular indirect ophthalmoscope has been around for more than 150 years, and it is still indispensable for eye examinations. Indirect ophthalmoscopy is difficult to master, as it requires fine motor skills and the ability to interpret an inverted retina image, in combination with the knowledge necessary to reliably identify the multitude of pathological findings possible.

Eyesi® Indirect is a Highly Efficient Training Method

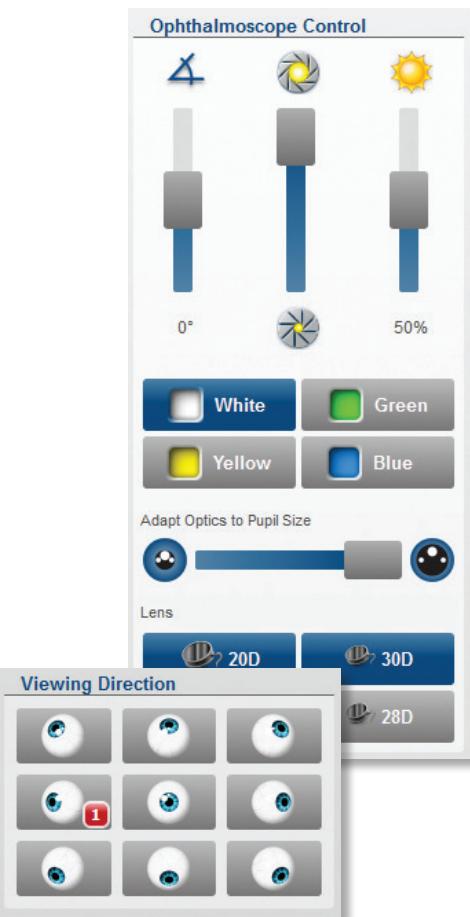
Training with real patients remains important, but it is almost impossible to offer a comparable learning experience to each student relying on real-life practice. Eyesi® Indirect can improve education by providing a broad and standardized clinical experience before students examine their first real patient: Virtual patients with relevant pathologies are always available, students can practice independently and as often as they need, and each examination is evaluated objectively.

Case-Based Diagnostic Training

Eyesi® Indirect uses a case-based approach to teach diagnostic skills. The case database contains a wide range of training scenarios and clinically relevant pathologies. Students hone their examination and diagnostic skills by repeating the examination procedure with many different patients. As a result, students are better prepared and feel more confident when examining their first real patient.

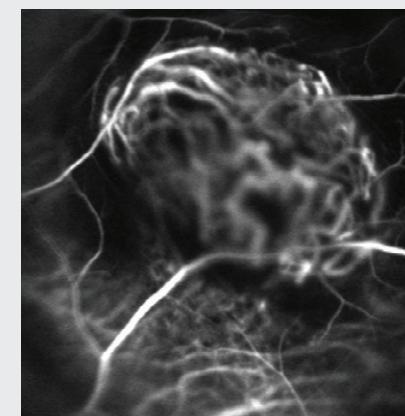
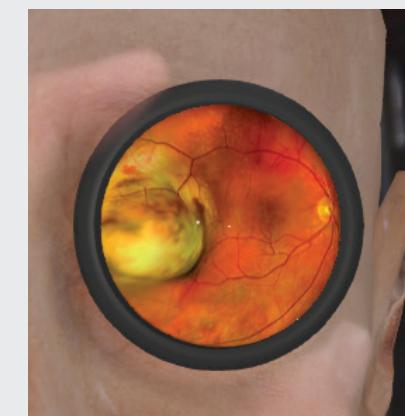
Immediate and Objective Feedback

At the end of each examination, the trainee is presented with a detailed evaluation of the examination and diagnostic performance. Scored parameters include, for example, the percentage of retina examined, the light exposure, and the accuracy of the diagnosis. The simulator's capacity to provide immediate, objective feedback allows for a competency-based assessment and systematic improvement of skills.



Top: Student holding the Eyesi® Indirect lens

Right: Multiple-choice questions on patient history, therapy, or pathologies supplement the clinical cases.



Top: Indirect ophthalmoscope controls displayed on the touch screen

Left: A clinical case dealing with a choroidal melanoma. Results of additional diagnostic procedures are available, for example OCT scans or ICG angiography.

Eyesi® Indirect Training Curriculum

Quality Assured Education – Pre-Installed and Ready-to-Go



Structured and Self-Guided Learning

Eyesi® Indirect comes with a structured curriculum developed in cooperation with ophthalmologists. The curriculum consists of four tiers that contain several courses. Students advance through the curriculum independently by completing the cases within a course. Educators can lock or unlock courses as required.

Tier A Examination Skills

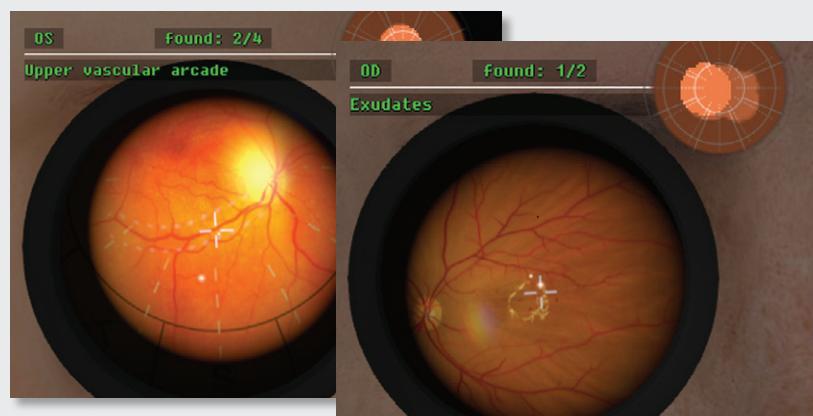
When learning how to use the indirect ophthalmoscope, trainees screen the retina to find abstract objects. They then document the location, shape, and size of these objects on a fundus chart. This helps them to learn how to interpret the inverted image correctly, and memorize findings.

Tier B Anatomical Structures

Tier B offers a variety of healthy retinas from patients of different gender, age, and ethnicity. Trainees learn to identify anatomical features and classify characteristics of healthy retinas.

Tier C Basic Findings and Diagnoses

Tier C introduces common pathologies such as AMD or diabetes and represents the first step in learning how to diagnose pathological patterns. Students practice how to identify and classify signs of specific pathologies.



In tiers B and C, students learn to identify anatomical features and pathological findings. Detected findings are highlighted so that students can memorize them.

Tier D Clinical Cases

The clinical cases are modeled on real patient cases and help trainees to develop clinical skills such as making diagnoses and therapeutic decisions. Clinical cases may have complicated pathologies that need to be distinguished from differential diagnoses.

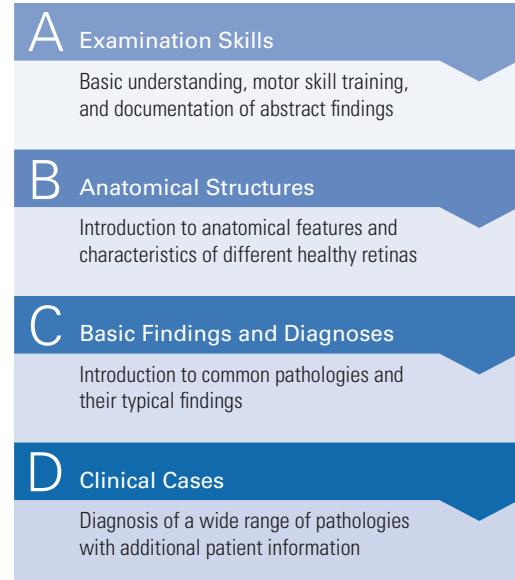
Educational Guidance and Medical Content for Students

When a trainee detects a finding in tier B or C, it is highlighted on the retina and a findings tile with a brief description is shown on the touch screen. The trainee can tap the tile to view additional medical information. All detected findings are stored in the trainee's personal findings library, which can be viewed at any time.

Patient Information and Additional Diagnostics

The training system provides medical background information to guide trainees in the process of evolving a diagnosis. The clinical cases present extensive information on the virtual patient, including patient history, referral cause, and results of diagnostic procedures such as OCT imaging, angiography, or perimetry. Many cases are supplemented by multiple-choice questions and commentaries from ophthalmologists.

When a student detects a finding, additional medical information is displayed on the touch screen. The findings are collected in the student's individual findings library.

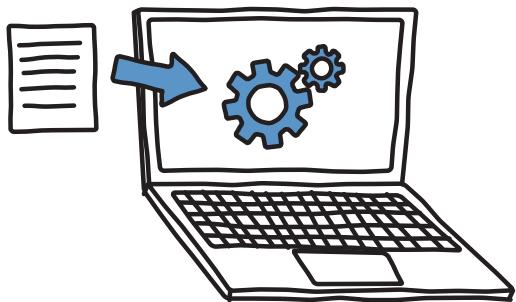


In advanced cases, findings and diagnoses must be specified in multiple-choice input forms.

Teaching Large Classes Efficiently

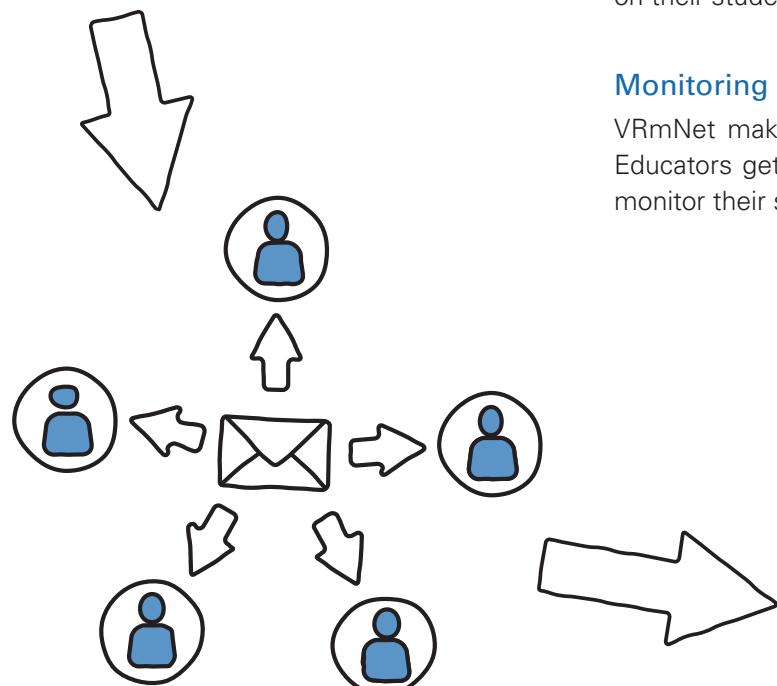
Web-Based User Administration and Online Training History

VRmNet in a Nutshell



#1 Automatic User Creation

You can create user accounts with only a few clicks. All you need to do is upload a list with names.



#2 Automatic Email

An automatic email with an individual user account and a link to the VRmNet website is sent to each student.

VRmNet – The New Web-Based Training Portal

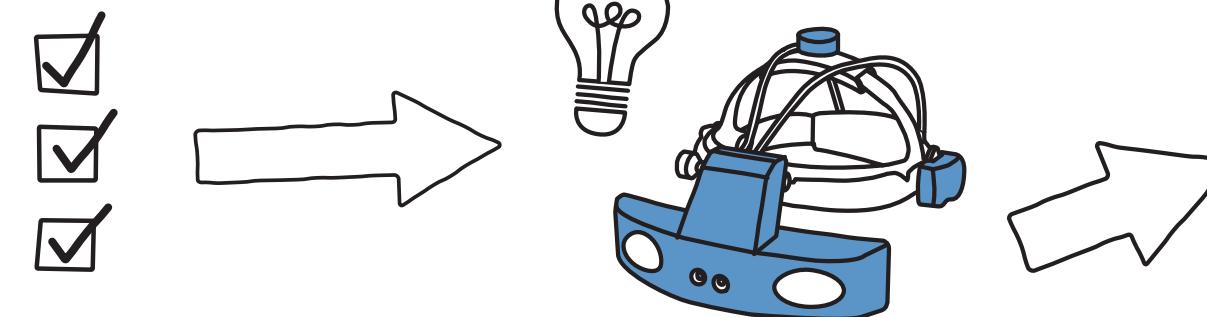
VRmNet is a new web-based training portal from VRmagic. Through the networking feature of VRmagic's simulators, all user and training data can be stored on a central server and securely accessed via any PC or mobile device 24/7. Students log in into VRmNet to access an online orientation course, their training history, and medical content. Educators can use VRmNet to comfortably set up users, manage courses, and monitor their students' training progress.

Comfortable Administration

Educators can manage their classes easily. Creating and distributing user accounts for students can be done online within a few minutes. As soon as students have received their user accounts via an automatic email, they can start training. Additionally, automatic reports and notifications on important milestones keep educators informed on their students' progress.

Monitoring of Training Data

VRmNet makes access to training data both simple and powerful. Educators get an overview of their classes' training history and can monitor their students' individual progress.



#3 Online Orientation

Trainees log in to the VRmNet website and complete an online orientation to activate their user accounts for simulator access.

VRmNet

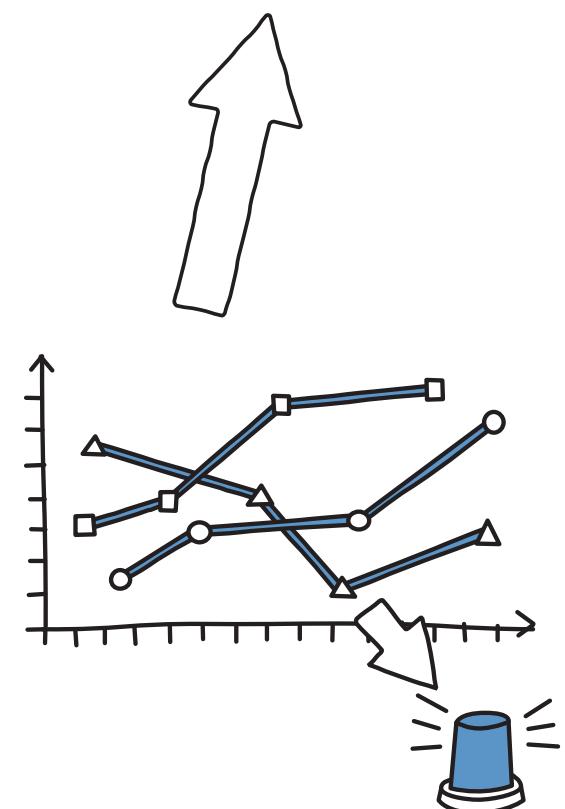
Continuous Training through Data Synchronization

By networking all simulators of an institution through the VRmnet platform, training data is synchronized between devices. Students can continue their training on any connected simulator at any time.



#6 Certificate and Assessment

Students automatically receive a certificate after completion, and can view an objective assessment of their skills.



#4 Independent Practice

Trainees start training independently and receive immediate, objective feedback on their performance.

#5 Monitoring and Notifications

You can monitor your students' training progress online. Configurable notifications and reports keep you informed on important milestones.

Reasons for Eyesi® Indirect

The Most Sophisticated Training System for Indirect Ophthalmoscopy

1 Highly Realistic Training Experience

The Eyesi® Indirect Ophthalmoscope Simulator uses augmented reality and real ophthalmoscope components to offer a highly immersive and realistic experience. Trainees will learn to diagnose pathologies reliably on lifelike retinas using correct ophthalmoscopy techniques – without risk to patients and independent of patient flow.

2 Unlimited Independent Practice

Diagnostic skills can only be gained through intense practice. At the same time, teaching time is an ongoing cost for medical schools. The use of high fidelity simulation allows medical students to practice independently until they feel confident using the ophthalmoscope.

3 Standardized and Broad Experience

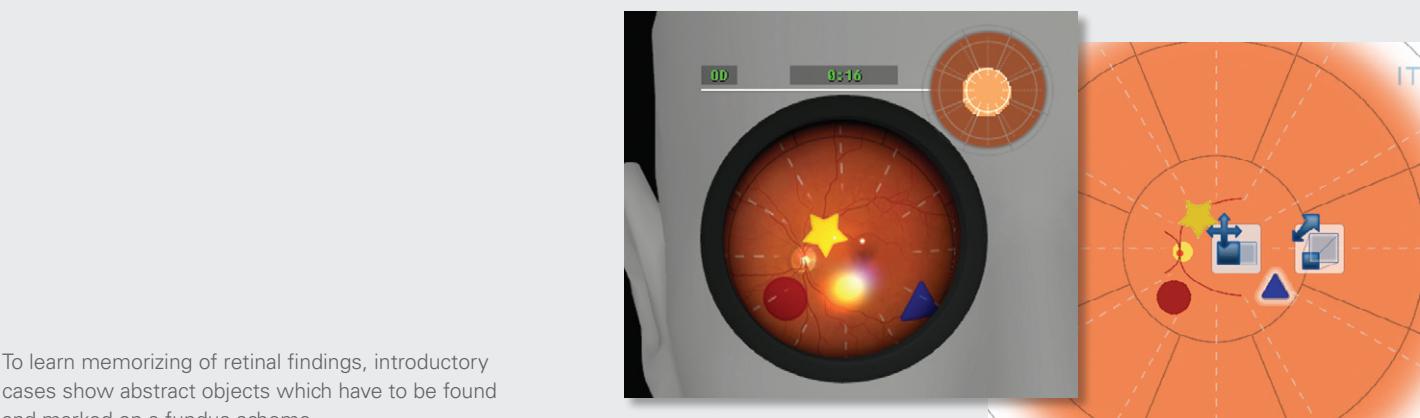
The simulator curriculum offers a broad clinical experience for every student. After learning the basic skill of handling the ophthalmoscope, trainees continue with the examination of patients with pathologies in different stages. This fosters a solid foundation of diagnostic skills, which is difficult to achieve when training on healthy fellow students.

4 Competency-Based Assessment

Eyesi® Indirect provides objective and immediate feedback after each virtual exam, so that students can systematically improve their skills. This way, educators can keep track of training progress and assess students' skill levels as they advance through the curriculum.

5 Online Teaching Solution with VRmNet

The online features of VRmNet help you to keep track of your trainees' skills. Manage user accounts with the web-based user administration, get trainees up to speed quickly using the online orientation, and have their training progress always at your fingertips via a user-friendly web interface.



To learn memorizing of retinal findings, introductory cases show abstract objects which have to be found and marked on a fundus scheme.



Examined Retina		Classification	
Score: 26.0 pts (Range: 0 - 30 pts)		Score: 33.3 pts (Range: 0 - 50 pts)	
Retina examined: 86.6%		actual yours	
Vitreous	Intravitreal hemorrhages	No	No
Proliferations	Yes	No	
Optic disc	Subhyaloidal hemorrhages	No	No
Neovascularisations (NVD)	No	No	
Vessels	Dilation or beading	No	No
IRMA (intraretinal microvascular anomalies)	No	No	
Macula	Edema or detachment	No	No
Choroid and retina	Cotton-wool spots	No	No
Detachment	Yes	No	

After the examination, different aspects are evaluated and presented to the student.

For more information on the Eyesi® Surgical Simulator or on the Eyesi® Indirect and Direct Ophthalmoscope Simulators, please contact:



VRmagic GmbH
Turley-Str. 20
68167 Mannheim
Germany
Phone +49 621 400 416-0
Fax +49 621 400 416-99

info@vrmagic.com
www.vrmagic.com

VRmagic Inc.
245 First Street, 18th floor
Cambridge, MA 02142
USA
Phone +1 617 444-8761
Fax +1 617 444-8405

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