Pre-screen Report

The operator has an option to generate automatic pre-screen report using the conclusions from image analysis. User interface features are provided to capture patient demographics and health condition. The set of four eye images are automatically imported into the pre-screen report. The operator has an option to select and replace any of these images for inclusion.

The images in the report can also be printed in color ⇨

Patient Profile	Name, ID, Age/DOB, Address
Health Condition	Allergies, Height, Weight, Temperature, Pulse, BP, FBS, PPBS and Symptoms
Cornea Image Study	Indication of Cataract, if any
Retina Image Study	Indication of Diabetic Retinopathy and Glaucoma, if any

E-Consultation with Experts

If the 3nethra is connected to internet, the patient's medical record comprising of historical and current visit information, captured images, derived images as well as the conclusions from automatic analysis can be communicated to an expert for a professional study and advice.

Email Report	A Pre-screen report along with four embedded images is sent to remote expert as an email.
Email EMR	The Medical Record including all images is stored on a central database and a hyperlink to it is sent to remote expert as an email. Remote expert will need a browser to access the EMR and study the case

Patient History

A unique medical record number is assigned to each registered patient. Medical records pertaining to this patient are stored and retrieved using this number as the access key. All data sets pertaining to this patient during his subsequent visits are also stored using this access key. Thus this MRN and the visit date / time will provide the means to access patient records for trend analysis.

MRN	A unique medical record number is assigned to each patient visiting the vision centre. Medical records pertaining to this patient are fetched directly using the MRN
Patient Visit	Each record of patient visit is saved on the central database using MRN number as the key. Track history of patient's can be inferred by studying the Medical records pertaining to each visit of an MRN

"3nethra is an essential, cost effective and easily transportable tool for a comprehensive community eye health care programme so as to conduct a mass screening camp with immediate documentation of the critical retinal condition at a remote place."

- Dr. Swapan K. Samanta, MS, CCEH (ICEH, London)
Hony. General Secretary, Association of Community Ophthalmologists of India
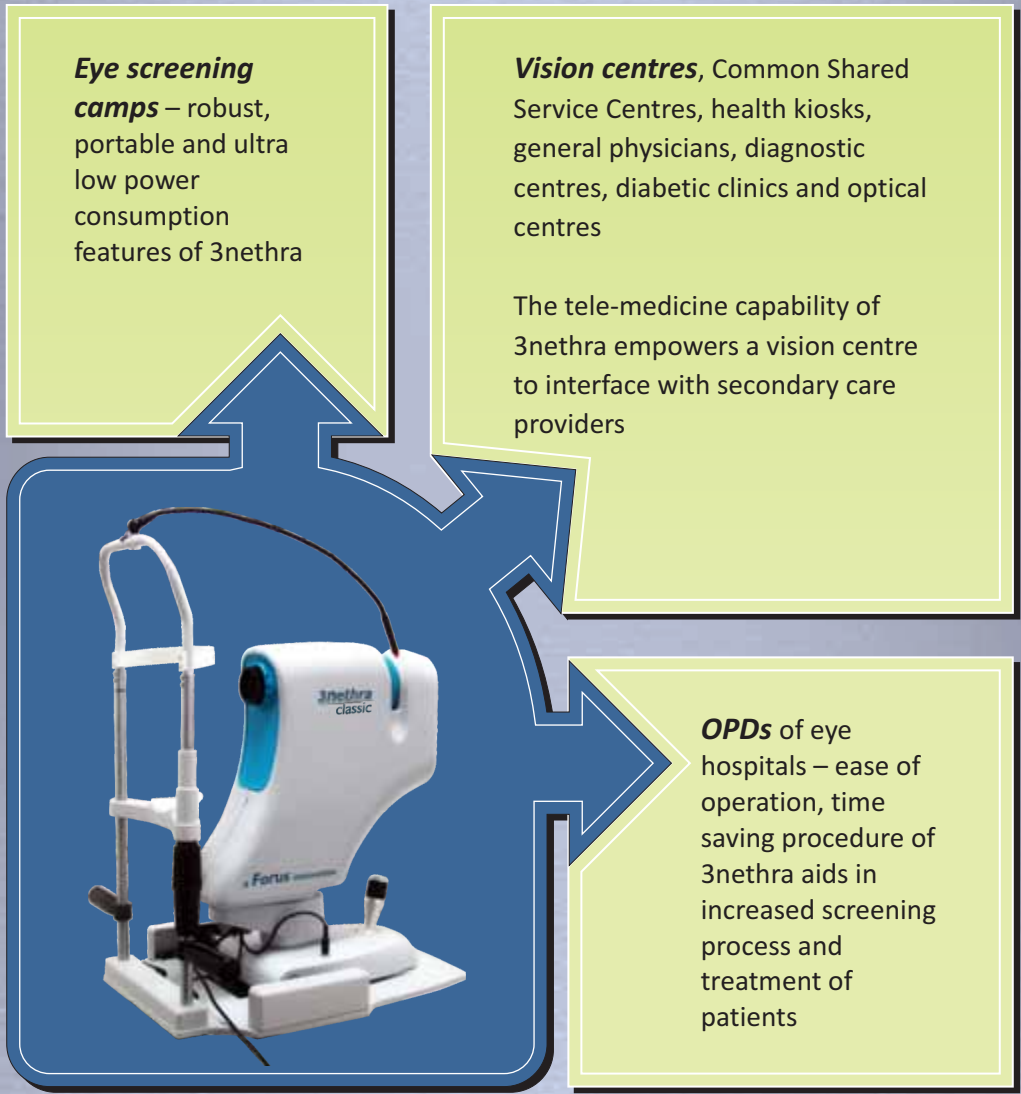
Usage Considerations

Operators need to be familiar with basic eye anatomy, operational computer knowledge and sufficient soft skills to communicate with patients in local language.

They need not be tech-savvy or have any advanced training on Ophthalmology as a paramedic.

The efficiency of the device in non-condusive rural environment is maintained with a rugged construction and design.

Power Supply	AC 100-240 V, 50/60 Hz
Power Consumption	5-20 Watts
Dimensions	340 (W) x 450 (D) x 620 (H) mm
Weight	14.2 Kgs
Operating Temperature	5° to 40° C

Deployment scenario

Eye screening camps – robust, portable and ultra low power consumption features of 3nethra

Vision centres, Common Shared Service Centres, health kiosks, general physicians, diagnostic centres, diabetic clinics and optical centres

The tele-medicine capability of 3nethra empowers a vision centre to interface with secondary care providers

OPDs of eye hospitals – ease of operation, time saving procedure of 3nethra aids in increased screening process and treatment of patients

Forus

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3nethra classic

Ophthalmology Pre-screening Device

Forus as the name stands for, means "For us" - me and my community. We are an innovation led technology enterprise managed by very experienced professionals. We strongly believe that healthcare solutions for emerging countries have to be different both in terms of the development as well as deployment. Our products combined with our comprehensive software solutions enable not only screening at the patients doorstep but treatment as well.

We develop affordable technology solutions that can easily be used by a minimally trained technician thereby making health service accessible and scalable. We strongly believe that by *"Democratizing Wellness"*, we can play an active role in the addressing India's healthcare issues.

The Product

The **3nethra classic** is a multi-function non-invasive ophthalmic imaging system, designed as a non-mydriatic camera to be operated by ophthalmic technicians.

- Its main objective is to complement the services of a cataract specialist, a diabetic retinopathy specialist and a glaucoma specialist into remote geographies, through the process of pre-screening.
- 3nethra is uniquely designed to include all those functions of a typical Fundus camera, a Slit lamp that are essential for a pre-screening.
- 3nethra incorporates an intelligent system that enables non-mydriatic screening and semi-skilled operation.

The *3nethra classic* is an indigenous non-mydriatic camera, comprising an 'Imaging Unit' and, an 'Operator Console'.

The Imaging unit consists of a camera mounted on a stand for positioning the subject's eyes for corneal and retinal imaging.

The Operator Console is an off-the-shelf Windows PC, running the '3nethra software', that aids in imaging, analysis and communication.

A minimal installation consists of a 3nethra Imaging unit, a dedicated Operator Console System, connected over an USB-2.0 interface.

Imaging Unit   Operator Console

An additional PC or a Laptop computer on the network, running the 3nethra software can be configured as a review station, for an expert study of the images captured by the operator.

The Features

The salient features of 3nethra classic are:

- Cornea Imaging
- Retina Imaging
- Image Analysis
- Pre-screen Report
- e-consultation with Experts
- Patient History

Each patient is assigned a unique identity and all images of the patient are stored as one set corresponding to the patient's visit. All patient image sets corresponding to multiple visits are stored as Electronic Medical Records.

The images are captured using a 3 megapixel CMOS camera unit on a stand that enables the following:
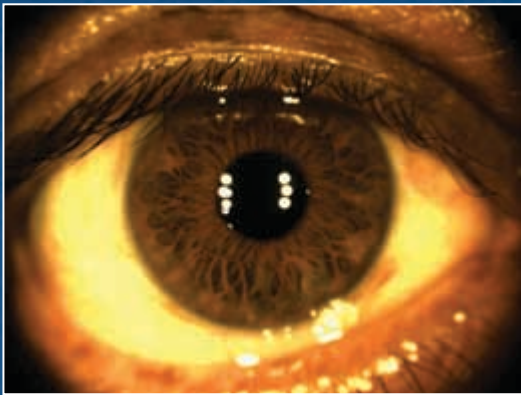
Cornea Imaging

Scientifically well positioned white light and infrared light sources provide right levels of exposure for photography in non-mydriatic mode. Patient's cornea is viewed on the console monitor as a video in grey scale using Infrared imaging. Images in color as well as grey scale are captured and stored in lossless jpeg format and DICOM format for further analysis.

The images have adequate detail in them to recognise typical corneal diseases. The opacity in the image of pupil is clear enough to recognize the cataract.

Image Resolution	1024 x 768
Pre-image Capture Adjustments	Intensity Control, Gamma Mapping, Image Balance
Post-image Capture Adjustments	Brightness, Contrast, Noise Reduction
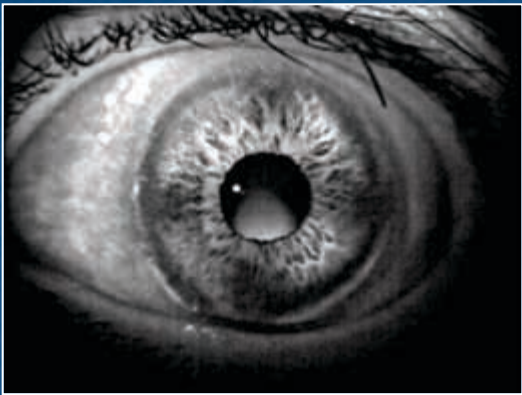
Cornea Image in IR Light   Cornea Image in White Light

Retina Imaging

Specially designed light source is used to focus infrared light on the retina through the pupil for non-mydriatic imaging. Resulting grey scale images are viewed as a video on the console monitor to navigate and focus on the fundus. Flexible fixation lamp provides a means to get the right section of fundus in view. Accurately controlled short duration burst of white light flash is used to capture the fundus image in white light. Images in color as well as grey scale are captured and stored in lossless jpeg format and DICOM format for further analysis.

The images highlight blood vessels, the optic disc, the macula. The red or yellow lesions, if present, are clearly visible to be able to recognize indications of retinopathy or AMD. The detail within the optic disc is clearly visible to study anomalies and to compute various parameters including Cup-to-disc ratio and I-S-N-T distances.

Image Resolution	1024 x 768 - 24 bits per pixel
Minimum Pupil Diameter	4 mm
Field of View	45 degrees
Pre Image Capture Adjustments	Intensity Control, Gamma Mapping, Image Balance
Focus Guidance	Graphics to aid automatic capture of image when perfect focus is attained
Post Image Capture Adjustments	Brightness, Contrast, Noise Reduction, Feature Enhancement

Retina Image in IR Light   Retina Image in White Light

Image Analysis

In the clinical pre-screening trials, our automatic analysis has proven itself in the determination of ailments, based on the symptoms observed through the captured images. In the development of 3nethra, care has been taken to adhere to the accepted international standards.

Cornea Imaging	Opacity measurements of the pupil Pupil size
Retina Imaging	Cup to Disc Ratio I-S-N-T measurements Left-Right anamolies Red / Yellow Lesion statistics