DOIT
plenoptic

DOIT 3D MICRO

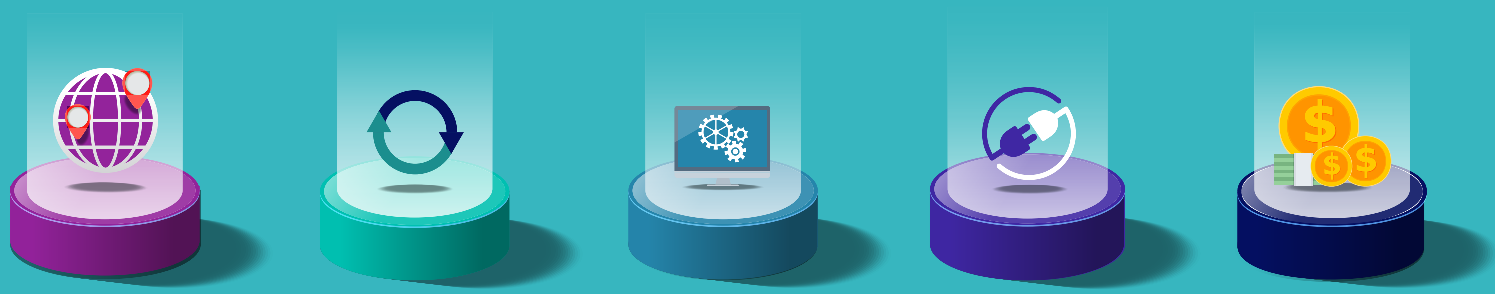
3D MICROSCOPY FOR ALL

Transform your microscope into a 3D digital microscope

Devices based on DOIT® (Digital Optical Imaging Technology) register many images from different perspectives in a single-shot, thus allowing to perform live 3D imaging.

DOIT 3D MICRO

The first plenoptic eyepiece in the market.



Universal | Versatile | Handy | Plug & Play | Affordable

DOIT 3D MICRO is a small and manageable device that allows you to convert a conventional microscope into a 3D digital microscope.

It is easily inserted and removed from the ocular port, therefore changing from 2D to 3D visual inspection and vice-versa is immediate. You can record live 3D videos of your samples instantly!

It works with visible or infrared light source, and it is sensible to CCD or CMOS sensors.

DOIT 3D MICRO

is exchangeable and fits in different microscopes.

Transform any microscope into a 3D light-field microscope.

See the microscopic world through **the eyes of an insect.**

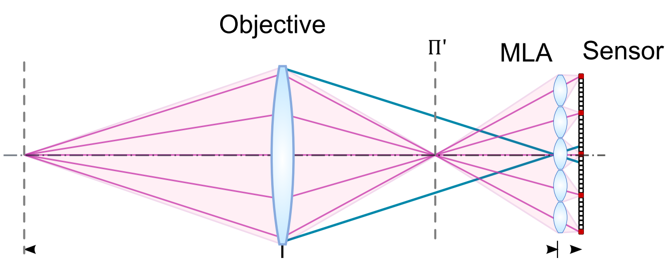
Just like an insect's compound eye works. With the microlens array, we can capture multi-perspective images that unveil the hidden volumetric information.

DOIT® applied to microscopy

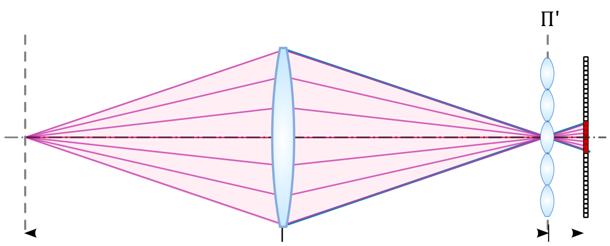
The key difference with the conventional methods for light-field applied to microscopy capture is that every device based on DOIT® registers the aperture stop of the objective on the microlens array instead of behind each microlens. In this way, our device directly registers a set of orthogonal views, which leads to increased resolution, and it enables it to be used with objectives of different numerical apertures.

DOIT® represents a paradigm shift in the capture of plenoptic information. Instead of capturing this information near the image plane, our design captures it in a plane where the space-angular information appears transposed. In this way, the orthographic perspectives are obtained directly and without the need for any digital process.

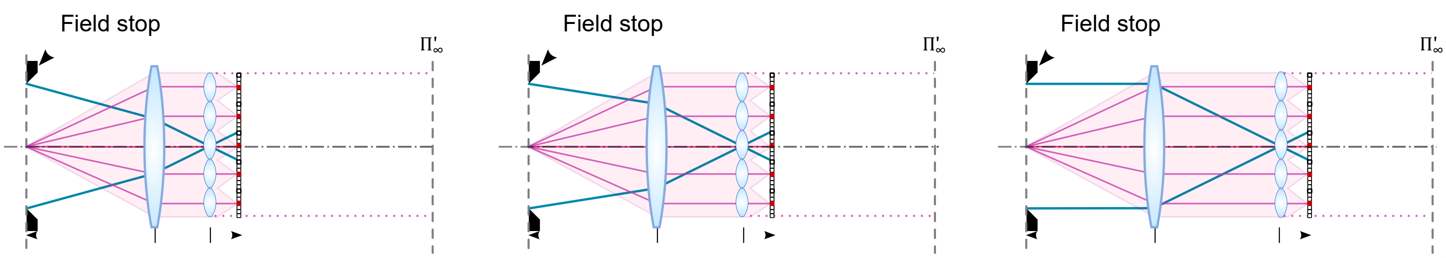
Focused mode



Unfocused mode



Orthographic mode

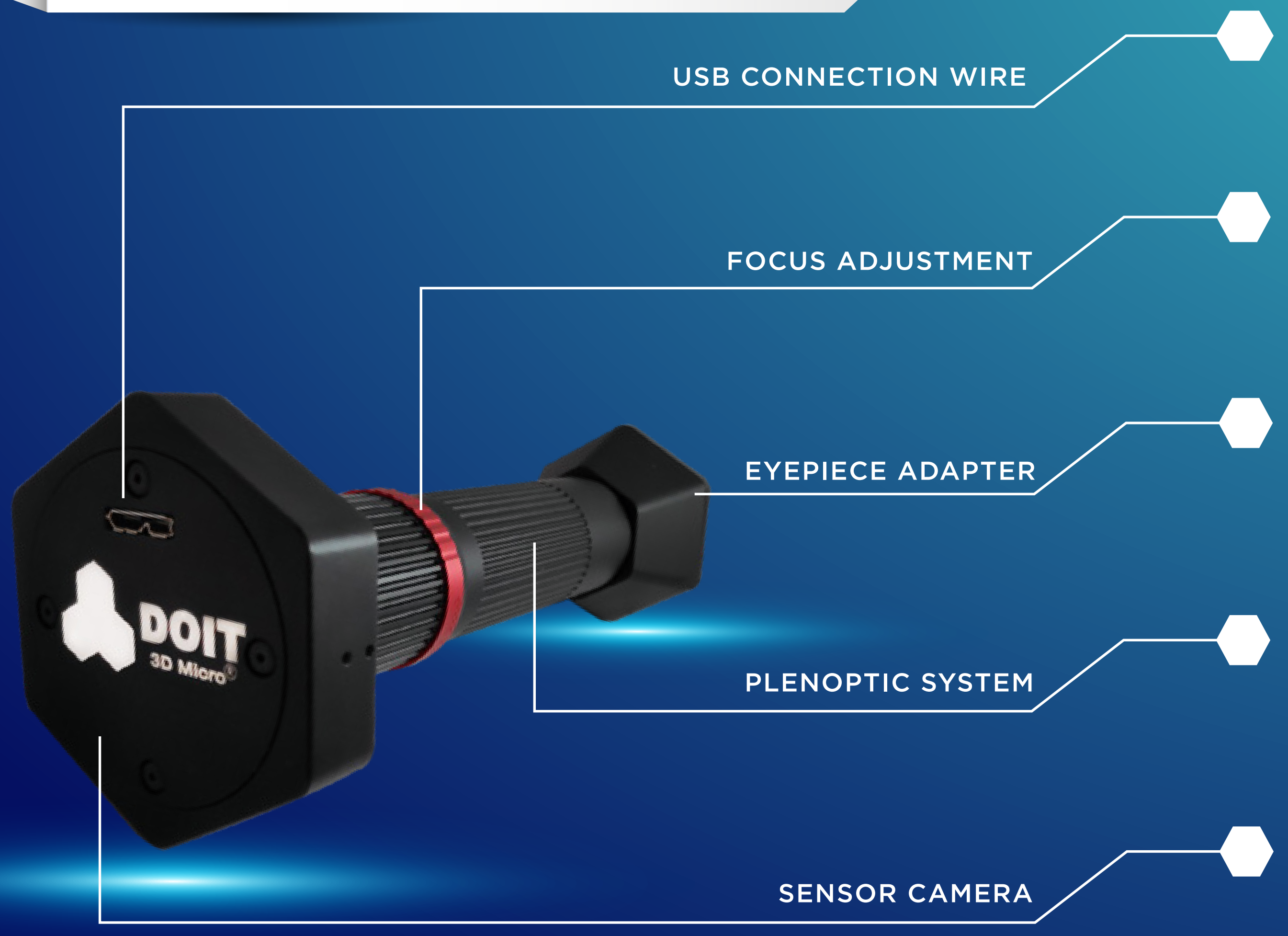


(a) (b) (c)

Light-field microscopy problems solved!

- No need for coupling between the numerical aperture of the objective and that of the microlenses.
- No need to work with excessively small microlenses.
- No poor resolution.
- No vignetting effect.
- No complex, expensive, and huge mechanisms.

Parts of the device



DOIT 3D MICRO

PERFORMANCE

Results obtained with a Nikon Microscope Mod. Eclipse and a 200 mm focal length tube lens.

PARAMETER IN MICRONS	ONLY BRIGTFIELD	OPTIMIZED FOR FLUORESCENCE	ONLY BRIGTFIELD	OPTIMIZED FOR FLUORESCENCE
Lateral Field of View	776	776	339	353
Effective Lateral Resolution at Object Plane	2.5	4.9	0.9	2.2
Depth of Field	160	160	35	35
Minimun Axial Step	4.0	8.5	1.0	1.7
OBJETIVES	20X NA 0.5		40X NA 0.75	

BENEFITS

DOIT plenoptic

01 Ready to use: plug & play, just insert it in the ocular port... like any eyepiece!

02 Use your 2D Cam: you can still use your 2D HD camera while using the 3D eyepiece. Enhanced 3D + 2D high-resolution. Get the best 3D & 2D simultaneously!

03 Live 3D video-recording: because some samples are not immobile, you get live imaging on your screen while analyzing 3D information.

04 Wide range potential: an all-in-one solution for different applications and tasks.

05 Use all kinds of light: DOIT 3D Micro works with most light microscope techniques including transmitted light, reflected light, brightfield, darkfield, phase contrast, polarization, and fluorescence. Choose which illumination is best for your task and get 3D information.

06 Use it anywhere: our plenoptic eyepiece is portable so you can carry it with you effortlessly and use it in different microscopes.

Minimum system requirements

System requirements	
Interface	USB 3.0 port
CPU	Intel i5 or better
Memory	min. 2 GB
Disk space	min. 500MB
Operating System	Windows,64-bit
Screen resolution	min. 1920x1080

Microscope requirements
Tube lens focal length 180mm to 200mm

Applications

DOIT plenoptic

Life Sciences

01 **Biochemistry**
3D imaging help to see chemical processes that occur within organisms

02 **Bacteriology**
3D imaging allows to study and identify bacteria, corresponding to the field of microbiology

03 **Biotechnology**
3D imaging for development of genetically modified organisms in the food or health sector

04 **Neuroscience**
3D live imaging of neural activities to improve research of aging degenerative diseases

05 **Pharma & Biology**
3D imaging of in-vivo cells and organoids for new pharmacological developments

Clinical

01 **Embryology**
3D imaging for the study of gametes, embryos, and fetuses

02 **Cell culture**
3D imaging allows studying the cultivation of fungi and microbes, to follow-up their growth and development

03 **Pathological Anatomy**
3D imaging on every hospital for the analysis of pathologies in tissues and organs

04 **Microsurgery**
For neurosurgery, reconstructive, pediatric, ophthalmology, ENT, spine surgery, plastic surgery, microdentistry

05 **IVF & Embryology**
3D imaging for quality control of the ovule and collected sperm. Embryo studying

Industry

01 **Aerospace**
3D imaging allows you to see details in metallic materials, plastics, wood, glass, etc. All this related to the inspection of aerospace parts, such as capsule satellites and rockets

02 **Forensics**
3D imaging samples relevant for forensic medical and crime scene investigations reconstruction, to ensure its validity and subsequent acceptance in court

03 **Microelectronics**
3D imaging for electronic circuit development, device manufacturing, and assembly

04 **Agri-food**
3D imaging to carry out quality control on food manufacturing

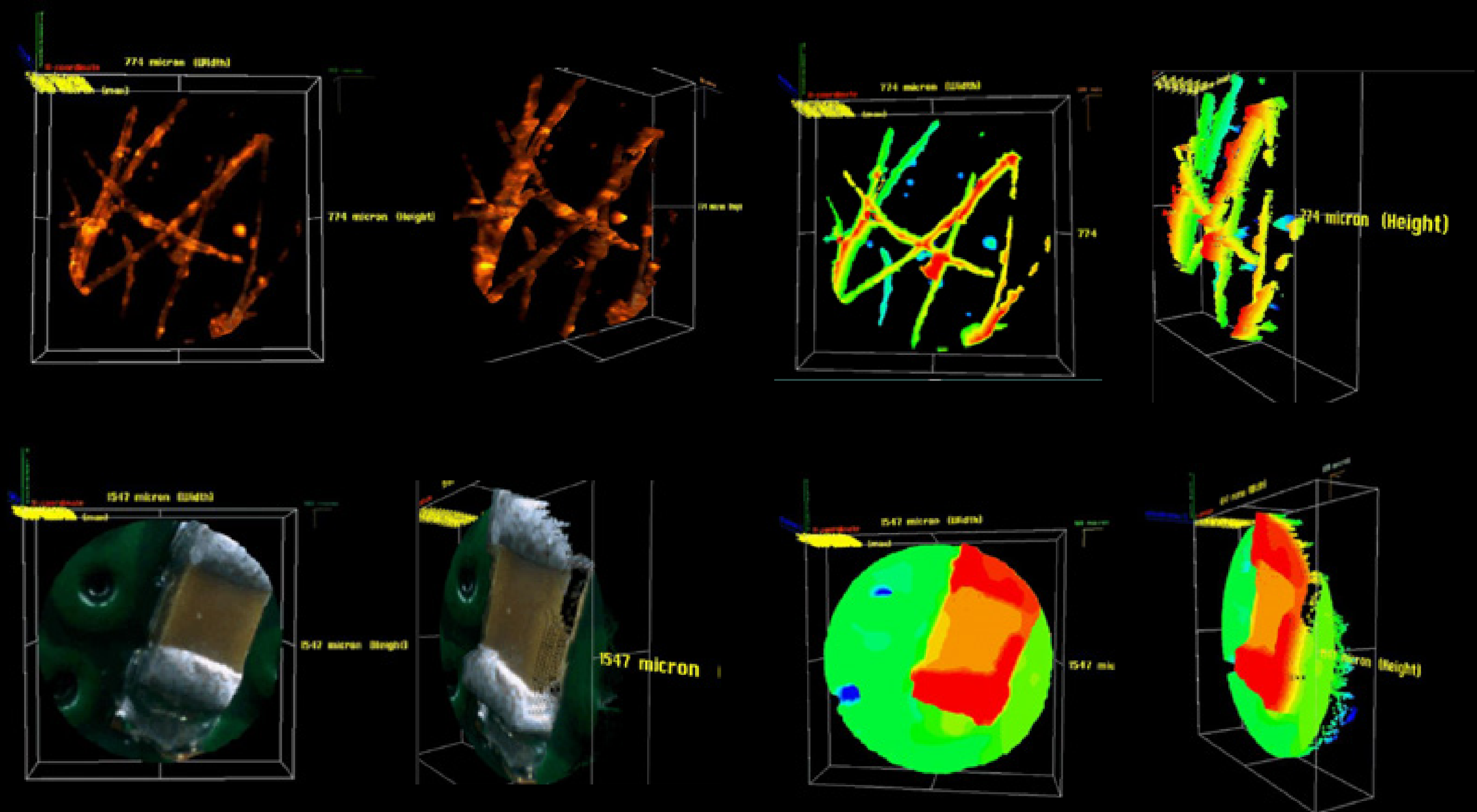
05 **Education**
3D imaging to educate students in scientific degrees

The software

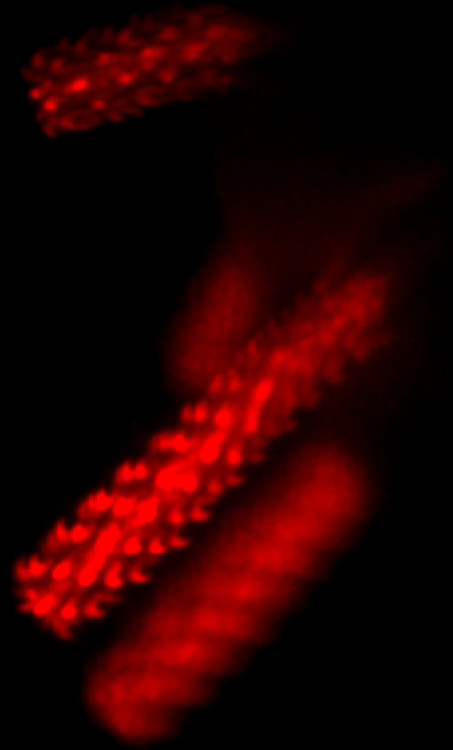
To display the images, the eyepiece is connected to a computer with a screen.

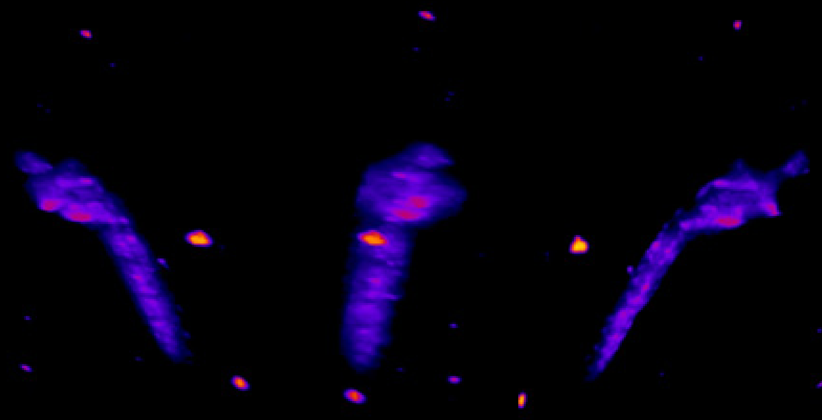
Through our powerful software, the perspectives are processed, and the 3D images are presented to the user in different ways. Apart from the conventional 2D flat image, the image is displayed in 3D modes. Different modules enhance different characteristics for a detailed analysis according to the techniques and standards required for each application.

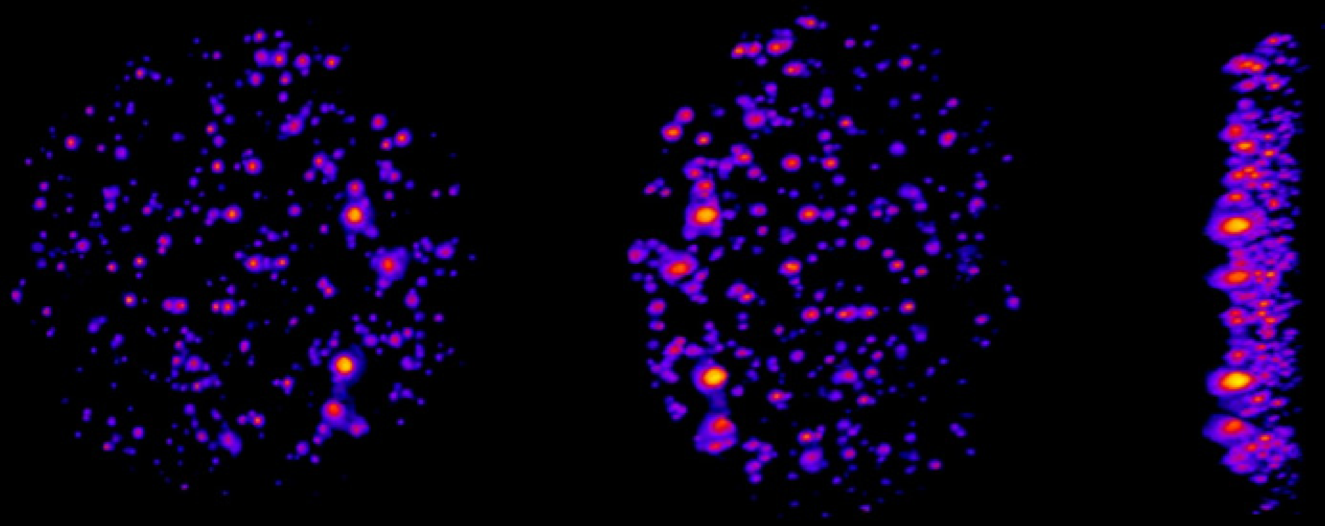
These characteristics are views from different observation points, a volumetric reconstruction of the sample, visualization of occluded parts of the scene, a selection at will of the focus plane —with great optical sectioning capacity—, a color-coded depth map, or a topography map of the surface of the sample, among others. In addition, the views can be transformed into a stereo pair that allows seeing the three-dimensional scene with virtual reality glasses. Moreover, they can also be transformed into an integral 3D image that can be seen from an autostereoscopic or holographic light-field display



Light-field microscopy







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