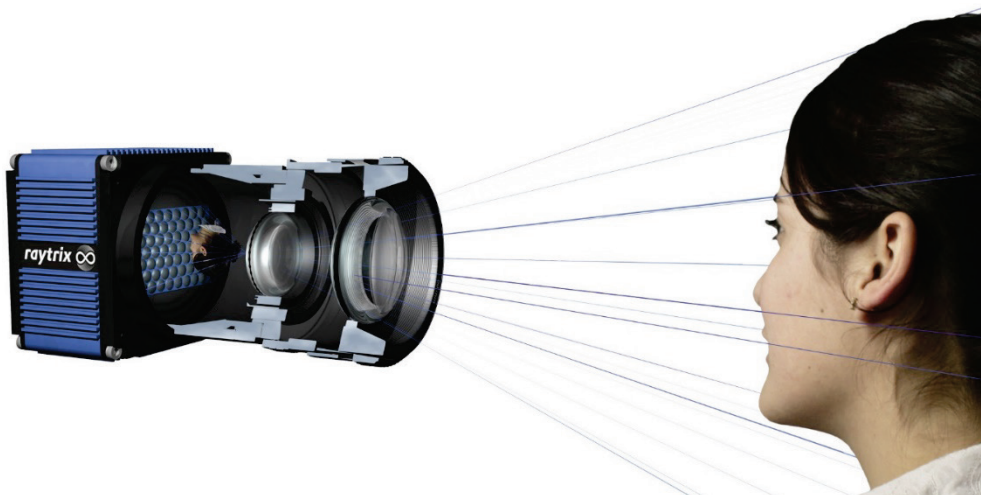


Raytrix Overview

Raytrix was founded in 2009 and sells 3D light field cameras for industrial applications and research since 2010. Today Raytrix is worldwide leader in 3D light field camera technology. We started with the goal to explore the potential of light field technology and make it feasible for industrial applications. By now we are a team of 15 highly motivated developers continually improving the quality of our light field cameras and exploring new application areas.

Technology

Light Field cameras are a new type of 3D-cameras that capture a standard image together with the depth information of a scene. Metric 3D information can be captured with a single light field camera through a single lens in a single shot using just the available light. Raytrix has specialized on developing light field cameras for industrial applications. A patented micro lens array design allows for an optimal compromise between high effective resolution and large depth of field.



The technology works by placing a micro lens array (MLA) in front of the image sensor of a standard camera. The main lens of the camera is set to generate an intermediate image in front of the MLA. The micro lenses now act as micro cameras that each see part of the intermediate image from a slightly different perspective. In other words, the main lens shrinks the scene and the MLA acts as a micro camera array looking at this shrunken scene. From the different micro images the scene depth and a standard 2D image are calculated. As usual, there is no free lunch: the effective image resolution of a Raytrix light field camera is at most a quarter of the image sensor resolution.

Currently all processing is done on the GPU of a PC the light field camera is attached to. This allows for high processing speeds of up to 80 frames per second from a 25 megapixel image sensor, which results in an effective resolution of up to 7 megapixel.

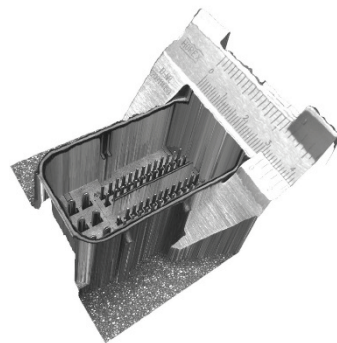
Applications

Raytrix cameras are already in use in a number of applications. The main applications are automated optical inspection, volumetric particle velocimetry, plant phenotyping and microscopy. The general advantages of the Raytrix light field technology compared to other 3D measurement systems are:

- Only a single camera is needed with standard lighting. This means that the 2D camera systems present in current systems can simply be replaced with a combined 2D+3D sensor without increasing the amount of space needed.
- Only a single exposure is needed. This means the system also works with a flash, for example, when fast moving objects have to be recorded.
- The measurement volume is determined by the choice of main lens. This means a Raytrix light field camera can be used with a microscope, a telecentric lens, a standard lens and even a telescope. In any case, the Raytrix light field technology increases the depth-of-field as compared to a standard camera with the same lens.

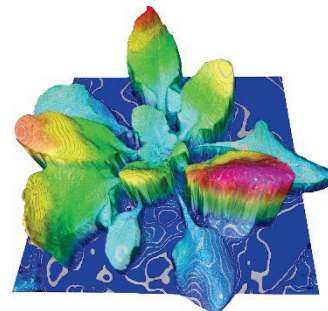
Automated Optical Inspection

Typical applications are the inspection of surface quality, measurement of connector pin heights and bonding wire inspection. The technology is also well suited for 3D inspection of surfaces surrounded by a tall cylindrical enclosure, since everything is recorded from a single camera and not a system of two devices as needed for stereo camera or laser line systems. For more examples see inspect.raytrix.de.



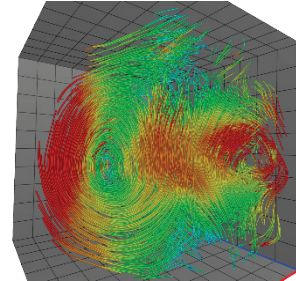
Plant Phenotyping

One example where the 3D measurement of plants is essential, is plant breeding. The Raytrix light field technology a color 2D images and the 3D shape can be recorded in single shot using only the available light, so as not to influence the plant growth by measuring it. Since only a single shot is needed, the Raytrix cameras are also well suited for recording plants in the field, where wind can be a problematic influence for laser scanning systems.



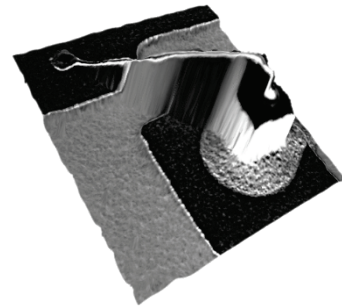
Particle Image Velocimetry

Measuring the flow of fluids or air is important in research and development. For example, to design or quality check a fuel injector the flow of the fuel droplets has to be measured. Measuring the flow of blood through stands is another important application. The Raytrix light field technology has the advantage that only a single access point is needed and also microscopic flow can be easily captured through a microscope. For more examples see flow.raytrix.de.



3D Microscopy

With a Raytrix light field camera a standard microscope can be converted into a 3D microscope. This has many applications in industrial inspection, biology and medicine. For example, surface defects in the range of a couple of micrometers can be detected or the 3D shape of microscopic bonding wires can be measured.



Awards



Chip Award 2012
"Innovation of the Year"



Image Engineering
Innovation Award 2013



iF Design Award 2014



reddot design award

Reddot Design Award 2014



Machine Vision Award 2017
