Single Lens 3D FAQ

What is Single Lens 3D and how does it work?
Single Lens 3D - the name really does say it all but how can that be possible? In a typical consumer camera all parts are combined in the same case – lens to capture the light/imagery and camera to process the imagery/light provided. In industrial, medical and other applications it is common for there to be individual cases for the light capture and light processing, sometimes separated by many feet.

High-resolution 3D images are created by using our software-driven, high speed shutter to select the 3D image fields from the light path coming through the single lens. The shutter assembly is placed between the lens (light capture) and camera (light processing) equipment. This configuration allows all standard 2D accessories, features, mechanics, etc to operate as they normally do including zooming, focusing and shifting. This design provides full 3D capture and image alignment throughout all these activities.

Hi-speed shutter - Should I be concerned with moving parts breaking or sound issues?
No, our shutters are completely electronic with no moving parts.

What is the point of a software driven shutter?
It allows variable spacing that is easily selected through the software

What resolution of imagery is available?
Full screen 1080p 3D

Is there any type of encoding or other steps needed to provide the final 3D imagery?
No - anything you record or photograph is automatically captured in 3D in real-time.

I tend to get eye strain when viewing a lot of the 3D that I have seen, will this be the same?
The 3D eye strain is typically caused by issues created when trying to maintain a perfect alignment between 2 different lens/capture systems. Because the paired images are always in alignment (since they are coming from a single lens), nausea, eye strain or fatigue resulting from misalignment is eliminated

Are you saying that this system is compatible with HD Cameras?
Yes, The Single Lens 3D system is fully compatible with HD cameras. Dual synchronized recording is not required

What is the value of this technology?
Typical stereo is created by using 2 separate lens/camera combinations mounted together while each capture and process imagery. Focus, zoom and other optical functions must be coordinated and synchronized, increasing complexity and cost. Typically a minimum of post-image capture interlacing or processing is required prior to recording or display.

There are 3 primary reasons why Single Lens 3D is desirable:

1. It makes creating 3D much easier as it removes the most difficult issue with creating 3D – finding perfectly matched individual lens and camera combinations and then keeping them perfectly matched throughout the image capturing process. This is a truly difficult process and a great deal of time, energy and money is spent managing this issue. If these issue could be removed there would be multiple levels of cost reduction including:
    a. Equipment costs (only 1 image capture system instead of 2)
    b. Labor expended to create the perfect match of equipment and maintain that match at all times during use
    c. Time spent in post-production working through issues created when image capture became out of synch (typical, even with all the effort to stop it)

    These all add up quickly and over time can create a significant reduction in cost

2. Opens new platforms for use of stereoscopy in multiple applications. There are 3 areas of support for opening new platforms:
    a. Size of the product– There are many areas, such as Minimally Invasive Surgical procedures, where although it is understood that stereoscopic viewing is desired the standard paired lens system is just too large to be functional.
        i. Our single Lens 3D system resolves this issue by providing HD3D from a lens as small as 2mm. This opens many new arenas that were previously closed to stereoscopic applications.

    b. Stabilization of the unit – Our system allows certain industrial/military applications to utilize 3D image capture where before vibration or constant motion, as in industrial robot applications, could cause alignment issues leading to in effective or uncomfortable 3D.

    c. Cost and ease of conversion from 2d image capture to 3D image capture
    Along with a consistently growing interest in stereoscopic 3D there are, as always, fiscal constraints to be resolved.

i. In the past, switching to stereoscopic meant discarding the existing image capture system and installing a completely new one that might not fit in the current mounting system.
ii. Now the current system can be kept and needs only the integration of the shutter technology between the lens and the camera.
iii. This is simple and much more cost effective to perform – again opening up new areas to bring stereoscopy platforms to existing system and products.
iv. The system can record directly to existing HD camera equipment and playback in 3D through the use of a provided 3D player software or "fed" straight to the 3D display if it has a built in player (as many 3D TV's do)

Once you capture the stereo 3D imagery how will it be viewed?
There have been significant advancements in stereo displays. There are numerous high quality and very affordable options available. These include the passive or active glasses TV's available in any electronics stores well as specialty monitors and even a few Autostereoscopic 3D (no-glasses-needed/AS-3D) single viewer monitors.

What type of intellectual property protection is currently in place?
There is a current patent in place at this time (see below) and two (2) others that are soon to be submitted. There are also a number of trade secrets and proprietary technologies.

What types of applications are suitable for this technology and is there interest in these areas for stereoscopic utilization?
The specific applications are too numerous to go into here however we will discuss different industries and general applications within them. The driving force here is the depth information available from stereoscopic 3D visualization. This depth capability is significant in areas where there is no direct visualization (Minimally Invasive Surgery) or where there is no human interaction (industrial robots) and incredibly useful in tactical applications

Applications
Medical
Minimally Invasive Surgery (endoscopes of all kinds)
3D Microscopes (Stereo Microscopy) both for laboratory and Surgical applications

Military/Defense
Drone camera system
Soldier carried cameras

Industrial Robots
Welding

Choosing parts from a bin

Commercial Cameras

Professional Cameras
Cell phone cameras

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[54] **STEREOSCOPIC IMAGING ARRANGEMENT AND VIEWING ARRANGEMENT**

[76] Inventor: **Jonathan Robert Watts**, c/o Liquid Vision Ltd, The Old Workshops, Farringdon, Exeter, Devon, United Kingdom, EX5 2JD

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[58] **Field of Search** 359/462, 464, 359/465, 466, 475, 482, 376, 377, 378; 348/45, 49, 53, 56, 59; 600/111, 112

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Primary Examiner—Cassandra C. Spyrou
Assistant Examiner—Audrey Chang
Attorney, Agent, or Firm—Ladas & Parry

[57] **ABSTRACT**

A stereoscopic imaging arrangement comprises a) an optical device **(1)** having an objective **(2)** and further lens means **(3)** located remotely from but in the optical path of the objective and b) a stereoscopic imaging device **(4)** arranged to receive light from said further lens means and form an image on a photosensitive image plane **(7)**, the stereoscopic imaging device having shutter means **(5)** arranged to selectively occlude light exiting from left and right regions of said further lens means to form right and left images on said image plane and having means for combining said right and left images to form a stereoscopic representation of the field of view of said objective. The image may be displayed on a monitor **(9)** and viewed stereoscopically with switching spectacles **(10)**.

13 Claims, 4 Drawing Sheets