Bitmanagement Software GmbH

Whitepaper

Stereoscopic 3D visualization

Bitmanagement offers software for stereoscopic rendering of 3D content – such as pictures, films, 3d models – from stereoscopic projections to cave solutions up to auto stereoscopic screens without special eyewear

Table of content

1. The market for stereoscopic visualization

At present market reviews and informative figures for the market of stereoscopy are very few. However a multiplicity of applications and/or technical solutions is to be found in the literature. The market participants are on the one side suppliers of terminals (hardware), which need high performance 3D visualization software for the stereoscopic rendering of 3D contents, such as pictures, films and models and software suppliers on the other side. The product bundle consisting of hard and software is sold to the end users as a complete system. Stereoscopic solutions with special software can be looked for by more or less all market-player who utilize 3D technologies. Aside from the service sector, the medical industry, research labs and science institutions, mainly the advertising industry is interested in stereoscopic applications, particularly for presentation. On a long-term basis also the television services and the film industry are ranking among the prospective customers and users of stereoscopic replication of images.

A professional employment for such applications however is still pending at present what the broader public is concerned. Anyway, auto stereoscopic displays already attained readiness for marketing and, according to market experts, specific applications will soon outperform and should bring the break-through for the stereoscopic rendering market.

Bitmanagement Software GmbH
Oberlandstraße 26
82335 Berg
Germany

Geschäftsführer
Peter Schickel
AG München HRB 143734
UST ID DE 224651645

Deutsche Bank 24 AG
BLZ 700 700 24
Kto 1530211

Tel. 0049 (0)8151 97170-8
Fax. 0049 (0)8151 97170-9
http://www.bitmanagement.de
mail. info@bitmanagement.de

However, already now it can be stated that the cost of stereoscopic solutions has reached a level which allows even to medium-sized companies to utilize stereoscopic technologies. Thus, such firms can benefit from company image improvement, which bigger enterprises already experience using the innovative, multimedia „state of the art" stereoscopy. Beyond that the step to economic 3D monitors in many more private households is not any longer a larger obstacle.

As the stereoscopic marketplace will further develop to become a mass-market in the near future, experts are expecting crucial impulses from the further market penetration of „video on demand "on every computer, followed by „stereo video on demand". The next level of development will be reached with the introduction of „ stereo television ". Then the mass-market will definitely be opened. For the TV service stations then the time has come at the latest to radiate 3D television programs in a broad coverage. In order to support this technical evolution the 2D and 3D capable hardware would have to be marketed more intensively.

2. Applications

Beside stereoscopic projections and cave systems the auto stereoscopic range provides many clear advantages to users who enrich their solutions such as professional videos and interactive applications, for example in maintenance, repair services or in the medical sector, with stereoscopy. Mainly in the medical sector a surgeon benefits from better size - and distance estimation when he is operating inside the body of a patient. Thus for example also an antrum inside the human body can be represented three-dimensionally by applying stereoscopic endoscopes. It also provides the medical doctor with additional depth information.

With the use of Telerobots in dangerous and inaccessible environments (e.g. blast furnaces, aluminium furnaces with temperatures higher than one thousand degrees Celsius) the stereoscopy permits a more exact steering of the robot than in case of non stereoscopic visualization.

The stereoscopy will further develop to become a mass-market within a time frame from approximately 10 years, as industry connoisseurs anticipate. As a matter of fact both the techno-logy and the appropriate software are available on today's markets.

3. Single View and Multi View applications

The auto stereoscopic visualization of 3D images is certainly one the most interesting advancement within the area of 3D visualization, also towards the quality of multimedia applications. Herewith one has to differentiate between two applications: Single viewer and multi view.

A single view solution is dedicated for one spectator. It offers in fact a higher rendering quality than a multi viewer solution (for technical reasons). However the necessary visualization software should be designed for integration into both single and multi user applications - apart from the multiplicity of other requirements.

Single view applications above all offering the advantage for the utilization in the medical sector, in research labs and development centres since they offer a higher effective image resolution and provide images of much higher quality unlike multi viewer systems. Beyond that single view solutions allow to show stereoscopic contents on terminals with a much smaller budget.

Since with both single view and multi view-solutions 3D-Videos can be presented in real time or live stereo cameras can be installed, nothing gets in the way of stereoscopic presentation in the near future, e.g. during a medical operation or during general monitoring tasks and similar applications.

The 3D stereoscopy will be used as a multi view application, when stereoscopic content for several observers is to be presented at the same time, like in the promotion and advertisement branch, one of the main operational areas of multi viewer application. Beyond that this Multi View systems could be

used in the future in 3D-Displays for game consoles or in 3D-television terminals.

Accordingly the manufacturers of stereoscopic technologies are about to substantially increase the resolution of images, developing also movie cameras, which can map synchronously e.g. eight pictures or more. Depending of the used technology, information from at least eight different view points are needed to create 3D-images on multi viewer displays in best rendering quality. At the time being also mobile solutions for handhelds and mini laptops are in process.

Both for reference purposes and visualization tasks the regional computing centre of Niedersachsen (RRZN, University of Hanover) has developed a new mobile “3D-VR presentation system”. Thanks to this new application stereoscopic 3D-presentations can be shown locally during lectures.

4. Four procedures to realize the depth effects

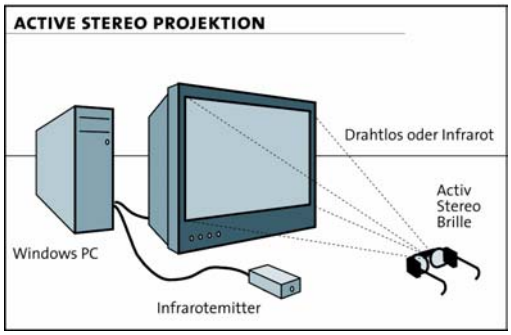
Generating the stereo-effect - the depth effect of digital pictures - four different procedures can be used. For this purpose the following solutions are included: the anaglyphic stereo-, active stereo-, passive stereo and the auto stereoscopic projection. It is common to all derivates that in each case different images are send to the eyes of a human being. Ten different pictures will be composed from the human brain to spatial images. This spatial impression is called „the stereo-effect “. This effect is created in the same way; our brain perceives the real world around us - without any technical support

4.1. Anaglyphic Stereo Projection

To separate two single pictures, different colour filters are used in 3D-eye wear, e.g. red filters for the left eye and a green one fore the right eye. When a human being is looking at a projection the red filter extinguishes the red film images whereas the green filter becomes black. On the other hand the green filter extinguishes the green colour pictures and then the red becomes black. Since both eyes see now different pictures respectively, the human brain recognizes a spatial picture.

4.2. Active Stereo Projection

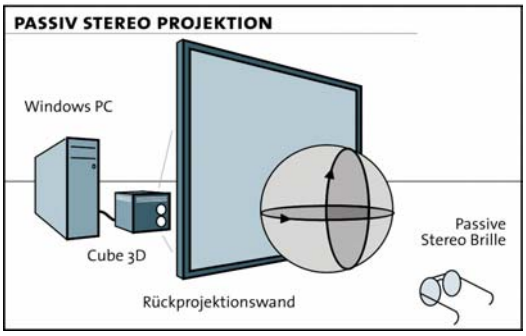
In the case of active stereoscopic visualization a screen with a high frequent image regeneration rate (100-160 cycles per second) produces the stereo-effect using either active stereo eyeglasses or a head mounted display. The eyeglasses consists of lattice structures, which can fade out and fade in single lines.



Fading out and fading in is also named “shut”. The eyeglasses - thus actively – lock or shut the field of view in a fast manner, whereby the depth effect is generated.

4.3. Passive Stereo – Projection

As to this most common projection technology the separation of single images will be achieved by polarized light. The stereo glasses of the viewer therefore must not actively lock the lines, but only filter passively. In addition there are in each case 90°shifted pole-filter-foils in front of the projection and in the passive stereo pictures. Thus the left eye only sees the left picture and the right eye only the right picture. The left picture extinguishes the right eye and vice versa. This fading out and fading in creates in each case different pictures for the watching person.



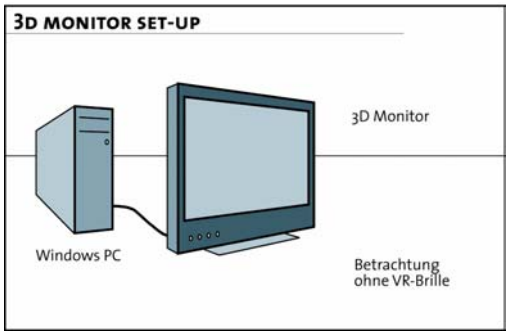
To maintain the polarization status of the light a metallic laminated screen is needed. A normal white screen would disperse the light; the separation of the channel would vanish. This projection technology offers as its greatest advantage a brilliant quality of colours of the presented pictures.

4.4 CAVE solutions

CAVE solutions at the high end use active as well as passive stereo to strengthen the spatial effect by projection of 3D content on different sides of the CAVE and even by projections on floor and ceiling. The position of the user can be determined by magnetic or optical tracking, which improves the depth effect and immersion.

4.5. Auto stereoscopic displays

Auto stereoscopic displays separate the pictures for the two eyes directly on the screen. Accordingly no additional eyeglasses are needed. A light modulator effectuates that the left eye and the right eye are seeing only the matching picture..



The software renders the picture two times in Single View mode (one user in front of a stereoscopic display with full stereo effect); in Multi View mode (multiple users with full stereo effect) the pictures are rendering two times e.g. five (in case there are five stereoscopic slots). The stereoscopic effect emerges without special glasses, enables multiple advantages in handling and using the display.

5. The basis of BS Contact Stereo is the ISO standard VRML/X3D

The format, which BS Contact Stereo is based on, is the ISO standard VRML/X3D. It is both usable interactively and therefore in real time applications and in particular in web applications. BS Contact VRML/X3D and BS Contact Stereo accomplish the requirements for 3D rendering of pictures, videos and models in highest quality. As a matured and for more than 10 years enhanced 3D software it offers all advantages of a „state of the art“ standard.

Performance characteristics of BS Contact Vrml/X3D and BS Contact Stereo

- It is compliant to the ISO standard formats VRMl/X3D, which also is continuously enhanced by own standardization activities in the Web3D consortium in the US.
- The software can simply be integrated, because Software Developing Kits (SDK) gives extensive support to developers.

- The concept know-how of the customer is protected by encryption software (BS Encrypt)
- the high rendering performance and operating stability is the basis for real time capability and interactivity and thereby fundamental for new business models, which incorporates user directly.
- the software supports the use of trends and new business models, like the increasing digitisation, or the 3D visualization of geo data to develop „digital maps“ or covering new markets and sales prospects.
- BS Contact VRML/X3D is internet ready, because the software needs only small bandwidths and is therefore prepared for mass markets.

6. BS Contact Stereo - the software for stereoscopy with high visualization quality

The 3D software BS Contact Stereo fulfils the high requirements, which have to be met for stereoscopic visualization. It can be obtained from Bitmanagement Software GmbH, Berg near Starnberg, Germany. The Company has developed this software particularly for the visualization of stereoscopic 3D presentation applications.

For the rendering quality the native integration of hard and software plays an important role. Consequently the 3D software must assure that modern features which displays today can perform will be also tranformed into highest possible visualization quality.

BS Contact Stereo meets the software requirements necessary for Stereo displays regarding the image quality, resolution, brightness, contrast and colour reproduction. Only this way it is assured that such the stereoscopic rendering produces a significantly stronger presence and attractiveness and thus is leading to a higher readiness to use stereoscopic applications.

Bitmanagement supports screens by co-operating with different manufacturers like Newsight, Seereal, Richardson electronics, Sharp, Spatial View, Techxpert and many more.

7. Stereoscopy - topic of numerous European and overseas institutions

APS – association, Berlin, Germany, is playing an important role for the promotion of European co-operation in research and development and education programs. This association is supported by companies like the German Post authority, Siemens and N24. In this forum approximately 50 further companies are participating, among them also the German publishing house Bertelsmann Group. Besides other duties and responsibilities APS spreads information about new technical developments.

Concerning stereoscopy the association has recently published: “Quality increases with 3D pictures by using stereoscopy “. The article refers particularly to the HFVM procedure (Hirarchical feature Vector Matching), which can help to lower the cost to improve the rendering quality.

More institutions: DGS (German society for stereoscopy, SGS (Swiss society for stereoscopy in Bern), the RRZN, (regional computer centre, Niedersachsen, University of Hanover), which is intensively engaged in the topic of 3D technologies for stereoscopy; among others also in the ISO 3D standard VRML.

Beyond that there are numerous further European and overseas institutions, for example the Stereoskopic Society in Dorset, UK, and the Stéréo Club Francais, in Verriéres de Buisonn, France, the Stereoskopic Society of America, Fort Collins, Colorado, USA and The Victorian 3D Society, in Melbourne, Australia.

Bitmanagement Software GmbH
Oberlandstraße 26
82335 Berg
Germany

Geschäftsführer
Peter Schickel
AG München HRB 143734
UST ID DE 224651645

Deutsche Bank 24 AG
BLZ 700 700 24
Kto 1530211

Tel. 0049 (0)8151 97170-8
Fax. 0049 (0)8151 97170-9
http://www.bitmanagement.de
mail. info@bitmanagement.de

8. Our target group for BS Contact Stereo

We are addressing our 3D software offer and sell our BS Contact Stereo software particularly to display manufacturers, Software developers for specific solutions within the area of medical- imaging, research and science institution as well as to relevant exhibitors and the advertising industry.

We are also looking forward to the discussion of individual ideas with which 3D applications would make stereoscopy more attractive. Please contact with us. We help you to realize your ideas. We also are ready to propose new business models as well as new applications.
We have the deepest knowledge of the performance of our software „ BS Contact Stereo “and „BS Contact VRML/X3D “. We would like to share our knowledge with you.

9. Contact

Please find our product portfolio, demos and test-download of our software at:

Bitmanagement Software GmbH
Oberlandstrasse 26
82333 Berg near Munich
Germany

www.bitmanagement.com Telefon: ++49 (0)8151-971708
info@bitmanagement.com Telefax: ++49 (0)8151-971709

Berg, June 2006