

## SEEREAL TECHNOLOGIES

# Stereoscopic Viewing Technology

SeeReal Technologies, based in Dresden, Germany, is a company specialised in display technology. Professionals use today's stereoscopic viewing techniques for visualisation of complex structures and objects using stereo-glasses. SeeReal technology offers the same stereo features, but viewed with the naked eye.

The history of SeeReal began at the Technical University of Dresden in 1995, where Dr Armin Schwerdtner and a group of co-workers asked themselves: why display a world that is not flat, as flat on a computer screen? They began to develop a technology with the ease of use and comfort of computer display but the stereoscopic features of stereo-glasses and head-mounted displays. Commercialisation followed release of the first prototypes in 2000; the researchers started a company and went into the 3D-stereo business. In 2002, impressed by the potential, an investor bought the company and provided substantial financial support for further research. Since then it has grown from sixteen to 45 employees, with a worldwide network of resellers and software partners.

### Focus on R&D

According to SeeReal, within a few years monitors with 3D stereo functionality will become consumer goods. As colour monitors replaced B/W monitors and flat panels are replacing CRT monitors, so 3D-stereo monitors will replace current display technology. The company mission is to develop the enabling technology and processes. Our aim is not to become a large display manufacturer; we want rather to license the technology to companies with manufacturing capability. Licensing the relevant patents is our main business. The background of our staff conveys our emphasis on research and development: 35 of our 45 employees are scientists. In addition to our focus on R&D and licensing, we carry our own brand of 3D-stereo monitors and have built up a distribution network covering most of the world. The current products are aimed at professional users in photogrammetry, defence, oil & gas exploration, medicine and research in general. From the beginning, the development focus has been on usability: a 3D picture of low resolution, low brightness and dull colours does not benefit the user. And to sit in a fixed position to get the 3D effect is a strain. This is the case with today's technology, which has been in existence for many years. The stereoscopic view is obtained through fast CRT computer monitors and special stereo-glasses, and although these are simple and reliable many users get headache or nausea after wearing them for even a short time. Over recent years several companies have produced and marketed autostereoscopic monitors, the "auto" here referring to no glasses being needed. The methods are based either on multi-view technology, where several people see simultaneously in stereo at the cost of reducing the resolution to an eighth of monitor resolution, or on parallax barrier technology. The latter blocks out light of the odd and even pixels to the right and left eye. This reduces brightness by roughly 50% and the user has to sit exactly centred in front of the display to be in the 3D "sweet spot". No limitations or work strain result when using a 3D-stereo monitor.

### Two User Groups

Users of SeeReal monitors can be split into two groups:

- the "nice to have" user whose work requires only a 2D monitor but who enjoys the added comfort and accuracy of true 3D-stereo
- the "need to have" user, who requires 3D-stereo to do the job properly.

Typical examples of "need to have" users are in photogrammetry and GIS, where depth information is essential for many tasks and where it is virtually impossible to get the accuracy needed from a 2D display. After years of research and designing new optical structures, the breakthrough came last year when a monitor was developed with high resolution and 5cm-wide 3D "sweet spot" at a price close to a CRT-stereo system with glasses. This opens up a world of opportunities for our company, especially since the production of the fast CRT monitors has stopped and the current LCD monitors are not fast enough for stereo viewing. This means that anyone setting up a new photogrammetry workstation will have difficulty finding a conventional CRT/glasses set-up, and only very few alternatives. Our monitor is the only glasses-free alternative, and this added comfort should guarantee a fair share of the market.

### Casual User

SeeReal is not aiming only at the professional market. Our ambition is to change the way all computer users see their data. Even though the current technology offers the best picture quality and highest comfort in its class, it also has some "trade-offs". A "need to have" user is willing to sacrifice one feature to get a more important one: a second monitor on the desk, or wearing glasses, is acceptable for gain in functionality. But a casual user, or perhaps a game player, requires a monitor with the same features as a normal 2D monitor plus the added stereo functionality. Our

scientists have already developed a working prototype with all the necessary features, including simultaneous 2D and 3D-stereo display, full resolution and freedom of movement: features no other glasses-free technology has ever been able to offer. When the time is ripe for production, this technology will have the potential to replace current 2D monitors with a 2D/3D monitor in just the same way colour monitors replaced monochrome, and LCD flat-screen monitors are now replacing large CRTs.

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