MEDEA+ TRITON Z

TV Broadcasting in 3D

Shortly after cinemas started showing movies in three dimensions, 3D home cinema sets were already entering the European consumer market. In comparison, the technologies needed to broadcast programs recorded in 3D are still far behind. The market is expected to take-off within the next few years and the TritonZ consortium supported by EUREKA has made a great leap forward towards 3D TV broadcasting.

The market for consumer 3D television sets is expanding at the enormous pace of a 75% annual growth rate, following the trend for popular movies shot in 3D. With this rapidly growing market, comes the need for standardization and affordable equipment. The timing was right for the project as standards for 3D technologies have now reached a peak in their diversity and number. The TritonZ consortium, assisted by the EUREKA Cluster MEDEA+, specialized in nano-electronics, set out to develop more integrated standards and technologies, and did so very successfully. One of the major outcomes of the project is a new worldwide used standard called CoaXPress.

The consortium of Belgian and Dutch companies explored technologies from the front to the end of the 3D TV broadcasting chain. "The first challenge was making sure that cameras could actually film in 3D", says project leader Klass Jan Damstra from teleproduction company Grass Valley. "Now that means of course recording, but also editing and broadcasting, this means that the data processing must be very fast!" The project partners developed technologies that make possible to capture live shows in 3D, although the broadcasting network isn't ready for that yet. At the other end of the broadcasting chain, the researchers focused on new types of screens that would make 3D TV a more pleasant experience than it is the case with the technology currently available on the market.

allow for this increase, but the project team pursued another path as well: adding the third dimension to existing 2D HDTV images, filmed with only one camera. Transmitting a 2D picture plus depth information (2D+Z) uses less transmission bandwidth and provides more flexibility for image display. The result is 'Time of Flight', a technology similar to the one used in radars.

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> **Klaas Jan Damstra -** Grass Valley, The Netherlands

3D Images transmission

The challenge with 3D TV broadcasting lies within the amount of data to be processed. The current filming techniques are based on a stereoscopic pair of two 2D images filmed with two cameras, doubling the data load going through the transmission channel. The consortium first developed faster sensors and transmission cables that

Near-infrared light is emitted by the camera, which measures the time the light needs to travel to an object and back to the camera. This way the camera can calculate for each pixel in the scene the distance to the camera. Time of Flight thus creates a 'depth-map' that will communicate a TV screen the exact depth in the picture. The company Trident Micro Systems developed the algorithms necessary in rendering a

stereo image of the 2D+Z information. The format of a TV screen holds less importance than it is the case for the current technologies as the algorithm used can adapt the image to the size of the screen. The same technology can be used to calculate 'multiple views': allowing more viewing angles from which you can watch a movie and making 3D glasses superfluous.

Opportunities for the manufacturing industry

"Not only the broadcasting industry will benefit from this project", stresses Damstra. "Lots of manufacturing processes are based on video control systems that will check if a component is correctly positioned". The speed of these processes is limited at the moment by the processing power of the recording sensor and the low level of the image resolution. The project partners developed a sensor with a resolution of 12 megapixels and a speed of 250 images per second. In comparison, sensors for the fastest digital photo cameras cannot go faster than 10 images per second. To keep up with this speed it was not only necessary to develop new video processing circuits, but also a completely new digital interface standard.

"The development of better sensors will also give rise to a new range of HD cameras, both for the broadcasting industry and the consumer market. We will see more and more HD programs, not only because they are becoming easier to shoot, but also because the cameras will be cheaper to manufacture", says Damstra. Although the various applications of TritonZ serve entirely different markets, many of the core technologies are similar and it was beneficial for the partners to have development teams cooperate and share ideas in one project. "The companies are in no way competitors of each other. Some of us are focusing on the video capturing, others on transmission. Because of the EUREKA consortium we can freely share information while we don't have to be afraid that it will be used by the competition", Damstra says.

A success for the partners

"The partners within the project consortium have managed to grow their sales, get ahead of competition and set industry standards". Eqcologic has played a major role by developing the high speed data transmission, or coaxial, cables, which gave its name to the CoaXPress standard. The standard itself has already been brought to a higher level by the project partner Adimec, specialized in audiovisual technology, and is now in use as far as Japan, thanks to an agreement with the Japanese Industrial Imagining Association for worldwide standardization. The standard has already been adopted by over 100 companies worldwide. However, the partners are aware of the challenges lying ahead: "we are very glad with the opportunity we had with TritonZ to research this subject, but it will take some years before it is ready for the market", Damstra concludes.

> CoaXPress digital interface is a groundbreaking standard and was even made Official World Standard by the Japan Industrial Imaging Association.
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