2A207: Tri-dimensional technologies over networks (TritonZ)

NETWORKED ICE TERMINALS

Partners:

Adimec
CMOSIS
EqcoLogic
Grass Valley Cameras
NXP Semiconductors

Project leader:

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Countries involved:

Belgium
The Netherlands

Three-dimensional television (3DTV) offers the next great leap in technological terms for the consumer-entertainment sector, with a greater impact expected on the human perception of the world than achieved by colour or digital TV. However, a number of technical challenges remain in capturing the 3D image and ensuring reliable storage, transmission and distribution. The TritonZ project is focusing on overall end-to-end management of the 3DTV image chain to build European expertise in manufacturing products and services for what promises to be a huge global market for both systems and semiconductor manufacturers. Results will also impact high resolution professional image-capture applications.

Digital video broadcasting (DVB) created a market for digital TV that has worked as lever for the semiconductor industry in consumer electronics. Now high-definition TV (HDTV) is established, the next leap forward for the broadcast industry is three-dimensional TV (3DTV). Advanced 3DTV systems are set to be the driving force behind the next phase of consumer-electronics chips.

3DTV has advanced quickly, and major Far Eastern TV manufacturers are already launching systems onto world markets, despite the limited range of 3DTV content available. European semiconductor manufacturers and imaging-systems houses therefore urgently need the right technologies to compete with Japan and Korea in this evolution to 3DTV and beyond.

The MEDEA+ 2A207 TritonZ project will help European semiconductor design and manufacturing companies develop the technologies for 3DTV and even higher data-rate processing. TritonZ brings together technology suppliers for the imaging chain in the broadcast, consumer entertainment and industrial markets, concentrating on image-capture and image-management including transmission and on-set pre-visualisation.

Underpinning building blocks

Until recently, 3D developments concentrated mainly on technology advances and setting standards for displays as well as using 3D on Blu-ray Disc players. The image-capture part of the challenge has hardly been taken into account. TritonZ is focusing specifically on the building blocks required to underpin high-quality image capture for 3DTV.

Future TV media will also need higher resolutions and frame rates, so an important focus is high data rate, high resolution 2D technologies, bringing together technology suppliers in the broadcast and industrial markets. Because the partners serve different markets but have a need for similar technologies, many synergistic advantages are expected.

The project focuses in particular on 'beyond HD' standard image acquisition at 2D+Z – a way of presenting depth information on normal two-dimensional displays – and 3D-enabled connectivity for on-set pre-visualisation. In the medium term, the intention is to create technologies that can effectively sustain and develop the interests of European companies and media by

establishing innovative products and business models in 2D+Z image-capture solutions.

Focusing on direct applications

3DTV and the necessary storage technology for consumer and professional applications represent an essential step on the road to fully functional virtual environments, something that is likely to become a reality by around 2030. However, for European companies to have a place, they need to create strong business interests in intermediate higher pixel rate and 3DTV applications. From these initial interests, steps can be taken towards the objective of a full multi-view holographic display in the home.

By focusing on the most direct applications of 3DTV, TritonZ expects to help European technology companies improve their expertise in:

- 3DTV display technology for commercial and consumer applications;
- Image-capture technologies for 3DTV and other imaging applications;
- Standards for 3DTV in world markets; and
- Demonstrating the economic impact of 3DTV for the semiconductor industry.

The technologies developed will form the basis for commercial R&D and create a European role in core 3DTV technologies, for example 3DTV for professional and consumer high data-rate applications.

Moreover, 3DTV has the potential for more than just consumer applications. It can be used to monitor fine positioning of components in assembly processes, especially in automated high-speed production. However, both spatial and temporal resolution capabilities have to improve

for 3D vision to make a useful contribution in such areas; such improvements are part of the project's focus.

TritonZ will also work on a high resolution, high speed – 180 frames/sec – image sensor. Although it will be demonstrated for an industrial application, the knowledge can be reused in sensors for ultra-HD broadcast cameras, 3D cameras using a lenticular lens array to capture 4D data and broadcast cameras running at higher frame rates to improve slow-motion image capture.

One of two initiatives

TritonZ is one of two MEDEA+ projects in 3DTV technology research. TritonZ itself concentrates on the overall end-to-end content delivery chain. This covers image capture, transmission, reception and display of a single 3D view. It has a business model that progresses from public displays to applications in hotels and for home cinema.

The project's work is complementary to the iGLANCE project, which focuses on multiple views of a 3D scene. The aim of iGLANCE is to define and demonstrate the advanced image processing that is required to interpolate multiple 3D video streams in terms of texture plus depth, so as to enable 3D video independent of the 3D display type used. iGLANCE focuses on the receivers, and will work mainly on decoding.

Both projects start from the vision of employing a texture and depth format for 3DTV systems. This format has been standardised in the MPEG 3DAV working group for a single view, but the multi-view 3DAV standard is still under construction. The two projects both have

sufficient knowledge to propose jointly European extensions to the standard for multi-view applications.

Guiding research in Europe

TritonZ is part of the '3DTV from Europe' group, which brings together major chipmakers and systems houses to guide 3DTV research and encourage joint standardisation activities. The MEDEA+ TritonZ and iGLANCE projects represent the first steps in a much longer trajectory towards full deployment of 3DTV within Europe that has already been anticipated in a new CATRENE 'lighthouse group' on 3DTV.

Many professional applications of 3DTV are foreseen – such as medical and healthcare applications, gaming, 3D infrastructures, civil engineering, aerospace and transport, as well as military applications. In the consumer market, video gaming could be the 'killer' application that is able to accelerate the introduction of 3D free-viewpoint TV – making it possible to look at an object or scene from different angles. Its deployment does not need the modification of the value chain, but it does require standardisation and low-cost solutions.

This MEDEA+ project is helping European broadcast equipment and software producers to move towards new standards and applications beyond HDTV, and helping them expand their role as key semiconductor suppliers to global consumer-products markets and the machine-vision industry. By developing proven 3D transmission technology and corresponding storage systems, the TritonZ consortium is building bridges between 3D technology actors, such as computer, video game studio and consumer electronics products.