PROJECT RESULT

Integrated information/ communication/ entertainment terminals

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A202: Future storage (FUST)

Mass storage advances boost European systems developments

Mass data storage is a critical strategic issue in the evolution of both consumer and professional microelectronics equipment. The FUST project has resulted in new formats, common systems architectures and components for optical, magnetic and electronic storage media, together with prototype implementations of system-on-chip devices. This will boost European competitiveness and employment in the global systems market – from digital video recorders for the consumer market, through residential gateways for domestic computing and entertainment, to professional video camcorders with built-in DVD recording.

The demand for mass storage is exploding. Multimedia personal computers (PCs) are increasingly commonplace in homes and analogue videocassette recorders (VCRs) are being replaced by products based on digital technology – in the immediate period by optical DVDs. The MEDEA+ A202 FUST project focused on developing system-on-chip (SoC) devices for mass storage applications, with an emphasis on common approaches for all types of storage devices. It has laid the foundation for the development of advanced storage products by covering general architectures, intellectual property and prototype chips.

Fast-changing standards

Technology and standards are evolving very quickly in the area of mass storage, and the FUST project has helped in setting the pace. Work was carried out on Blu-Ray Disc optical recording technology, which offers five times the capacity of current DVD systems, as well as on red-laser recording for DVD+R/RW and micro-optical drives, copy protection using electronic watermarking, and JPEG2000 video compression for professional camcorders. FUST solutions will open up these standards to the mass market. Its common architectures and SoC devices will soon be ready for the market.

The scope of the MEDEA+ project covered almost every aspect of mass storage needs. This is illustrated by the project's work on hard disk drives (HDDs). The future HDD will be a key component for mass-produced consumer video recording products, when used in combination with other storage media such as linear magnetic tape (LMT) and the optical-recording hard drive.

FUST covered many functionalities of the overall system, including source coding for compressing data streams, stream handling, file and disk-content management, copy protection, recording control and network communication with equipment such as camcorders, televisions and PCs.

In many regards, the market is fuelled by the evolution of storage technology, which in turn depends on systems integration. Rewritable (CD-RW) drives and DVD RW units challenged the consumption of computer CD-ROM drives, for example. These have been superseded by combination CD-RW and DVD drives, which are being followed by super-combination drives that add DVD rewriting functionality. Indeed, FUST completed the definition of the architecture for an SOC device for a drive that supports both DVD-RW and DVD+RW formats.

Audio and video components

Source codecs are a key component in this video technology, providing the necessary

coding/compression functionality for converting video signals into a format suitable for storage. Extensive viewer panel tests have been carried out to gain a perceptual evaluation of various processing parameters. These tests have enabled parameters to be set to provide optimum image sharpness and keep visual coding artefacts to a minimum. The findings of these tests will be incorporated in the next hardware implementation of the codec.

Work has also been carried out on a software implementation of a codec for audio compression – both low-end consumer applications and hi-fi quality applications.

The MEDEA+ FUST project also completed the design of a memory controller chip for handling high-definition television (HDTV) data streams when compressed using JPEG2000. The prototype device has been demonstrated by storing video in flash ROM memory. Consortium members Thomson and Philips also carried out initial investigations on the design of a camcorder based on a red laser DVD.

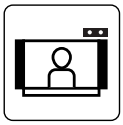
An important issue for developers of mass storage applications is copy protection. Therefore, digital watermarking, where copy-protection data is embedded into the video data stream, was investigated. A generic solution for audio copy protection has also been developed that is able to handle a variety of business models. The key to this generic solution is that it is portable across a variety of storage media.

Strengthened partnerships

Philips initiated FUST following the excellent outcome of the earlier MEDEA A102 project. There was first-rate co-operation between partners, although in certain areas progress was limited due to delays in standardisation. One of the problems with working on a project as large as this is that many options emerge during the course of the work, and this is something that is not easy to predict. Despite these impediments, the general consensus is that the project has been a real success and that partners would have no hesitation in entering a similar collaboration on even more demanding challenges in the future.

MEDEA+ was very supportive of the project, and gave important input that helped to get the consortium together and to secure national funding. An important aspect of MEDEA+ contribution was the consortium framework, which provided flexibility.

For all of the consortium members, the project has brought significant benefits. They can enjoy continued competitiveness and strengthened European partnerships. There is no doubt that the results of the project will also consolidate the overall European position in terms of worldwide standardisation, which can be exploited through the licensing of European intellectual property (IP). This is of strategic importance when considering the lower production costs in the Far East.



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Partners

CiaoLAB Technologies
OnStream Data
Philips Digital Systems Laboratory
Philips Semiconductors
STMicroelectronics
Thomson Broadcast Solutions

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Key project dates

Start: January 2001
End: June 2003

Countries involved

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Italy
The Netherlands

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