Research on digital image and audio signal processing technologies based on a micro-controller unit with embedded DRAM

2000

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The objective of this research is to establish digital image and audio signal processing technologies based on a micro-controller unit (MCU) with embedded DRAM, which has some constraints in built-in herdware resources, the processing speed and so forth.

Existing digital image and audio signal processing technologies have a problem that these cannot realize practical processing speed on MCU's application system, because these are not suitable for the processing speed of MCUs and accessing speed to DRAM used as external supplementary memory.

Thesefore, the research has been done by focusing to the following aspects : algorithms and implementation techniques utilizing characteristics of MCU's architecture with embedded DRAM. In the aspect of algorithms, fast signal processing algorithms,elimination of redundant operations based upon human visual and psycho-acoustic model and fixed decimal point deta representation adjusting decimal point location were researched.In the aspect of implementation techniques methods to realize multiplication and divisions operations with a multiplier and to assigning data to memory and accessing data were researched.

The results of these researches are applied to actual software which realize four fields of digital image and audio signal processing, that is, signal processing in digital still cameras, image compression of still pictures, three-dimensional graphics and digital audio decoding.Its effectiveness was confirmed by running the software on an evaluation device having a 32-bit MCU.

As a result, it was confirmed that these four fields could be realized within practical processing time.This derives a fact that the problems of existing digital image and audio signal processing technologies were overcome. Thesefore, the digital image and audio signal processing based on MCUs with embedded DRAM is established.