Unequal-Error-Protection Error Correction Codes for the Embedded Memories in Digital Signal Processors

In many digital signal processing applications, some parts of a word stored in the embedded static random access memories (SRAMs) are more important than other parts of the word. Due to the differences in importance, memory failures that occur in more important bit locations generally give rise to relatively larger system performance degradation than those in less important locations. This brief presents a low-complexity unequal-error-protection error correcting code (UEEP-ECC) approach for the embedded memories in digital signal processor. In the proposed UEEP-ECC, repetition code is combined with the Bose–Chaudhuri–Hocquenghem code to selectively provide stronger error correction capabilities on more important data portions without a large hardware overhead. An efficient UEEP-ECC generation algorithm that can find the UEEP-ECC code with a minimum power of memory core and ECC logics is also presented. The experimental results show that the UEEP-ECC scheme achieves considerable power savings and data quality improvements in both of the H.264 and fast Fourier transform applications.