

# Embedded Fingerprint Systems With DSPs Enhance Security

By Ram Sathappan

Unauthorized access to rooms and buildings, as well as to computer networks and personal accounts and identities, are exponentially growing threats. Biometric means of identification and authentication, such as fingerprint, iris scan, retinal scan, voiceprint, signature, handprint and facial features, are increasingly being used as a bulwark against these threats. Of these, fingerprint technology is a familiar and optimal biometric means in terms of cost, system size and accuracy.

Many fingerprint systems, including PC-based systems, are too bulky and expensive to be used at some fixed access sites, or as mobile or handheld recognition systems. Compared with DSPs, Pentium boards are large, costly and often too powerful for small form-factor systems like handhelds. Newer portable and standalone embedded systems have made fingerprint technology more affordable and convenient to use without compromising performance—and either DSPs or RISC processors drive them.

DSPs that meet the needs for biometric systems are specially designed, single-chip digital microcomputers that rapidly process electrical signals generated by electronic sensors, such as fingerprint sensors, cameras, etc. The basic

biometric authentication process consists of image capture, image enhancement, pattern matching and minutiae comparison algorithms. Either a programmable DSP with architecture well suited for implementing complex mathematical algorithms, or a RISC processor can efficiently address all the processing needs of a biometric system. Both enable

small, portable biometric systems while maintaining power-efficient performance.

Two advantages of DSPs over RISC processors are faster authentication and lower power consumption:

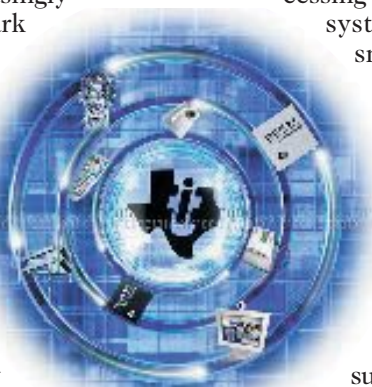
- The complex mathematical algorithms that DSP architecture supports, such as Fast Fourier transforms, involve a significant amount of MAC (multiplication and addition) functionality. Most image enhancement and pattern matching algorithms require a great many MAC operations. While DSPs can execute the multiply/add feature in a single cycle, RISC processors take several cycles to do so. To meet the same time requirements—less than a two-to-three-second wait for authentication—RISC processors may have to compromise their algorithms. High performance DSPs then deliver faster, more accurate authentication than standard, off-the-shelf RISC processors.

- DSPs' lower power consumption allows them to run cooler than RISC processors. This is especially important for small form-factor, high performance products. Because of the DSP's high performance capabilities, the total recognition time of the system can be reduced without increasing power consumption, as is generally required by faster processors. The DSP's low-power consumption provides users with a powerful, cool-running processor for multiple biometric applications at low cost.

Growing security needs have spurred an emerging market for such systems. Frost & Sullivan's revenue projections for biometrics are expected to grow from \$222 million in 2002 to \$1.916 billion in 2006.

A person's physical characteristics cannot be lost or stolen like keys, credit cards or social security numbers; forgotten like passwords or PINs; or duplicated. Biometric forms like fingerprint are finding increased use in both physical and network access control applications.

Affordable, portable or standalone, DSP-based embedded fingerprint systems, best answer today's need for greater security without compromising convenience or performance.



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