EUROTECH

Keeping the Homeland Safe

Using Multi-Modal Biometrics to Identify Threats

Abstract

The enemies that threaten the USA homeland are dispersed around the world, and move from theater to theater with ease. Combatants in Iraq or Afghanistan may have previously been in other countries - including the USA. Identifying these 'bad actors' wherever they appear is critical to our safety. A company that recognizes the importance of identification management is MaxID, a US headquartered manufacturer of handheld computers, who has risen to the challenge of integrating the best biometric hardware technology to address the challenges of identifying the 'bad actors' wherever they may be encountered. In designing their next generation technology to provide the best possible equipment, MaxID created a solution using the Intel® Atom™ processor, Microsoft's Windows Embedded OS and integration by Eurotech Inc.

Introduction

For years, MaxID has pioneered the use of technology for reliable and practical identity solutions. Their systems have been used for law enforcement, financial transaction security and voter registration solutions among others. More than 60,000 devices based on MaxID technology have been deployed over the last few years. Most recently, MaxID has been working closely with US Government agencies to provide practical biometric solutions to enable identification of terrorists posing a threat to homeland security.

The Challenge

Any single biometric technology has limits.

Fingerprints can be ineffective if prints are dirty, deliberately disfigured or have Psoriasis and are heavily weathered. Iris scans work well, but are invasive, and require cooperation. Face recognition produces many false positives and false negatives, and voiceprints have similar limitations. A truly effective identification solution requires that multiple biometrics be used simultaneously to create a truly valid identification against a database.

But the nature of biometric readings and the quantity of measurements in a database pose a special problem. Biometric measurements are not simple numbers or character strings like a badge number - they are complete sets of numbers as in the relative locations of fingerprint, iris or facial features. These 'coordinates' are not searched in a database for an exact match, but for a quantitative best match determined by statistical methods. Many, many calculations, not just a simple lookup, are required, and the exact form of these calculations is the subject for technology development by many software suppliers.

The positive identification of one person against one biometric is relatively easy. For example it is easy to compare a fingerprint or iris scan to a record of one, accessed perhaps by ID card number or even stored on the ID card. A small PDA-class microprocessor can do this. What is difficult to do, is to perform a positive identification, or exclusion, of multiple biometrics against a database of tens or hundreds of thousands of known 'bad actors.' The compute effort required increases at least proportionally with the number of biometrics multiplied by the size of the database.

The next technical challenge is posed by the environment where identification must be undertaken. Typically, the identification is not done in an office with AC power, air-conditioning and plenty of time. The place where identification must be done is a desert road checkpoint, an urban office building entrance, or a cargo ship being boarded on the high seas. This means that high speed compute power- with plenty of interfaces to best available biometric readers- must be packaged as a battery powered device suitable for high temperature, high stress service.

The final challenge is to make the solution adaptable and universal, within a technology that is rapidly evolving. New biometrics are being developed every day. Upcoming technologies include gait recognition, handwriting, 3-dimensional faceprints, vascular patterns, even identification of an individual's chemical footprint (odor). A worldclass system needs to work with the best in class biometrics today, and the ones that will be developed in the future. A pervasive and ubiquitous interface, driver environment, and OS API are needed.

The Solution

MaxID searched for a technology that could provide the required processing and IO power and they found the Intel Atom processor with the Intel SCH US15W companion chip. "The Atom processor was the natural choice for us," said Steve Bowen, US Technical Director for MaxID. "It offers the best MIPS per Milliwatt for any solution, and on top of that the Intel Architecture offers universal compatibility." But more than just a CPU was needed. To deploy the Atom technology into a ruggedized, handheld, battery powered device with multiple biometric interfaces, MaxID worked with one of the Intel Embedded and Communications Alliance integrators, Eurotech. Eurotech's Huntsville Alabama development center was an early adopter of Atom technology, and had proven Atom modules ready to go. What was very important was that Eurotech could supply a custom BiOS, with the precise initialization routines that MaxID needed. The Huntsville design center also offered multi-level power management built in; not only for the processor chip, but for all subsystems on the board. "We were happy with the work Eurotech did for us," Steve Bowen remarks. "They function as an extension of our system engineering department."

For an OS, MaxID went with Microsoft, in particular Windows Embedded Standard. Steve Bowen of Max ID explains, "It was important for us to work with any biometric, and any biometric database; so the universal driver structure and universal API of Windows was a big plus. Had we tried to create our device with a different processor and OS, just driver development and integrations would have added months to the project timeline."

The Results

MaxID's BHC-100 is in advanced testing and certification now, only 6 months from the start of work. The rugged device meets 810 Mil Spec, IP.64, 1.2m drop, dust, salt spray, and other service qualifications. The entire device – weighing just under four pounds, carries 3.15 pounds of batteries, which are dual units swappable in the field, to allow for extended operation away from AC power. The device supports a variety of interfaces, and additional USB ports for future biometric devices under development. It has integrated wireless interfaces of various types, and supports barcode and smart card identification systems as well.

MaxID's suppliers are pleased with the work and prepared to support it for the long haul. Intel's Tony Franklin, Sector Marketing Manager, Medical, Military, Aerospace & Government, Embedded Computing Division, commented "The BHC-100 is an excellent application for the Intel Atom processor. Our extended product lifecycle support of the Intel Atom processor ensures customers of the BHC-100 that it will be available for many years."

For more information on MaxID, click here http://www.maxid.net

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