

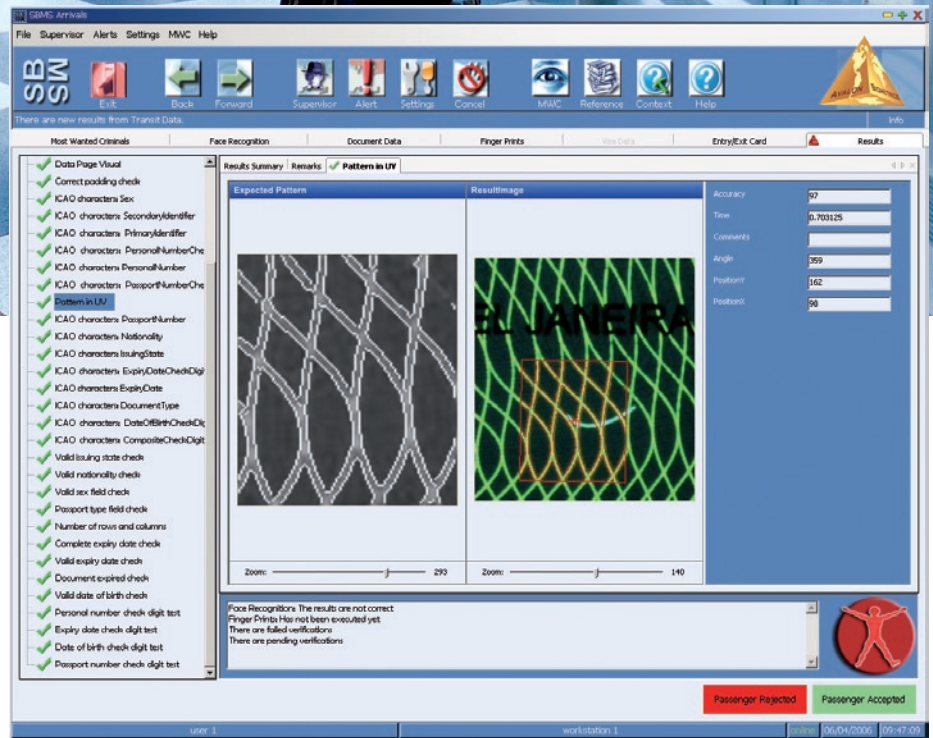
BORDER CONTROL SYSTEM

El Pasaporte, Por Favor!

Imaging Library and a Matching System to Increase Accuracy

Avalon Biometrics was founded in late 2001 as a private company in the UK, and opened as a separate Spanish company in 2004, setting up a new development centre and commercial office. The company implements projects as a system integrator using their own components combined with solutions from leading providers like Matrox Imaging. They are currently implementing the new Spanish Border Control System as a subcontractor for their Spanish partner, Telvent.

Avalon uses the Matrox Imaging Library (MIL) in their SBMS (Secure Border Management System). It is a system to be used by immigration authorities to control the entry and exit to and from a country. The system integrates the latest advances in security technology, and provides immigration authorities with an efficient tool to fend off threats. SBMS supports the new e-passports and e-visas in addition to the automated verification of printed security features inherent in all travel documents, whether they are machine readable or hand written. A variety of innovative features like ICR (Intelligent Character



Recognition) of Entry/Exit Cards, and biometric analysis such as face recognition (including a most wanted list) and fingerprint comparison make this system unique.

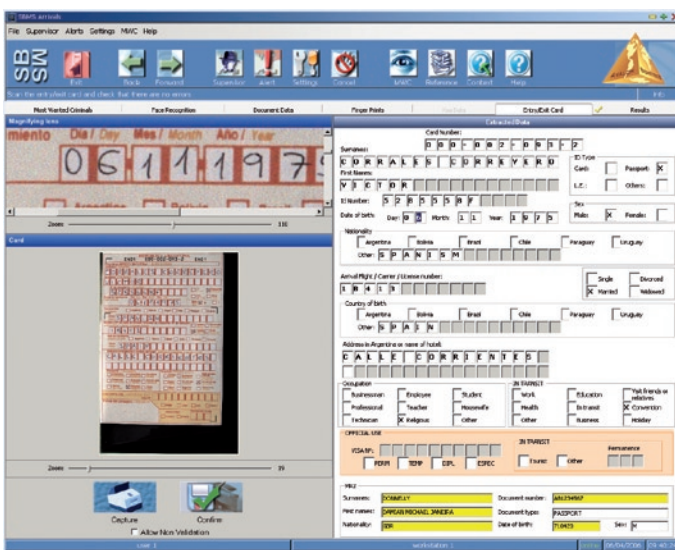
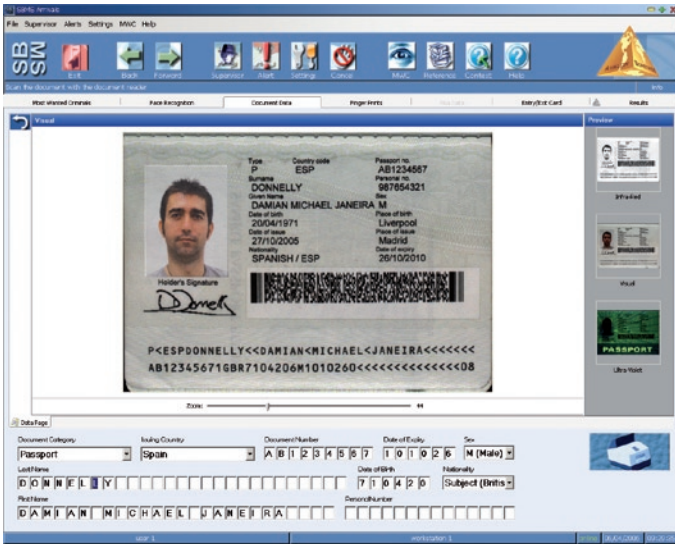
Data Capture and Document Verification

Two of the most important components of SBMS are Automatic Document Identification (ADI) and Document Verification. ADI is the first step in the validation process because one has to know exactly the type of document that is presented for verification. To maintain efficiency and speed during passenger processing, this process must be automatic, so there are over 500 templates of various documents for comparison purposes. MIL is used to extract much of the document's information for this process.

Many document types feature a Machine Readable Zone (MRZ). SBMS automatically reads the information from the MRZ, and captures images of the document itself and its textual information under different light sources such as UV,

Infrared, Retro reflective laminates, and normal light. The data contained in passports that are not machine readable can be manually entered by smart fields that feature default values, preset values and drop-down boxes. For the e-passports and e-visas, SBMS performs automated data capture from the electronic document's RFID (Radio Frequency Identification) chip in a single step. All data captured from any type of document is checked against the control list.

The document verification module provides comprehensive and fully automated validation of travel documents. Document verification determines the authenticity and integrity of the travel document, checking that it has not been tampered with. The security features are checked against the templates stored in the database. As with ADI, all verification is performed automatically by analyzing images and comparing security patterns and features under various light sources. Furthermore, all information related to the MRZ and information in the Visual Inspection Zone are read and compared using a state of the art OCR engine.



Matrox

Matrox Imaging was chosen primarily as the result of Avalon's investigation of the image processing packages available on the market. The wide range of functionality offered in the MIL package eliminated any need to work with more than one provider - a factor that positively affects the development period and the final cost of the solution.

All document processing is performed automatically, and using MIL one is able to extract a large amount of statistical information from the document images in various light sources. Using Avalon's own matching system in conjunction with MIL they increased the accuracy for automatic document identification to more than 99% and document verification to 97%. All this implies that when a docu-

ment is scanned using a document reader, the system knows exactly which type of document it is in less than a second, as well as the version, the country of issue, the document type, to list a few examples. This action is one of the most critical in the system; without accurate document identification the system would be totally unusable, as one would be comparing documents against the wrong templates.

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