



Venezuela's New Biometric Voter Registration System

Based on MegaMatcher biometric technology, the new system enrolls registered voters and verifies identity during local, regional and national elections.

The National Electoral Council (*Consejo Nacional Electoral* or CNE) of Venezuela sought to update their biometric voter registration system with technologies that would be more open and cost-effective, while delivering the high speed, accuracy and reliability required for handling fingerprint-based voter enrollment and identity verification at a national scale. Working with solution provider Ex-Clé, the CNE selected MegaMatcher SDK and MegaMatcher Accelerator from Neurotechnology as the core biometric technologies for the client and server elements of their new biometric voter registration system.

The Electoral Power is one of the five independent powers of the Venezuelan government. The CNE is charged with organizing, overseeing and guaranteeing the transparency of all elections in Venezuela at the local, regional and national levels. The CNE had a biometric voter registry system that had been in place since 2004, however the old system was outdated, used proprietary technology and was expensive to maintain and operate. The CNE decided to upgrade to a new system that would allow the organization to more easily and cost-effectively manage their own system while providing the openness to expand and update as their needs required.

The CNE turned to solution provider Ex-Clé to develop the new biometric platform solution and manage the migration of voter registration data. Beginning in August 2011, Ex-Clé developed the back-end system and client interfaces using MegaMatcher as the core biometric technology for voter enrollment, database de-duplication and verification of identity during the voting process.

The project took about a year to complete, and the system was first used in the 2012 Venezuelan presidential elections. During the first half of 2012, 18 million people (four fingerprints each) were enrolled and verified in the Venezuelan voter registration database.

Background

- ◆ **The customer:** The National Electoral Council (CNE) of Venezuela organizes, oversees and guarantees the transparency of all local, regional and national elections and referendums in the Bolivarian Republic of Venezuela.
- ◆ **The issue:** CNE wanted to replace their out-of-date biometric voter registration system and migrate to a more open technology they could easily administer and manage themselves.
- ◆ **The Integrator:** Based in Buenos Aires, Argentina, Ex-Clé provides integrated biometric solutions to companies and governments throughout Latin America.
- ◆ **The solution:** The integrated biometric platform for the new Venezuelan voter registration system was developed and implemented using the MegaMatcher SDK and MegaMatcher Accelerator hardware/software solution from Neurotechnology.

Why Implement a New Biometric Voter Registration System?

The Venezuelan National Electoral Council originally implemented a fingerprint-based biometric voter registration system in 2004. That system, while reasonably effective, used hardware-based technologies; and because it was a proprietary system, it was costly to implement and maintain. The CNE wanted to migrate to a more open system that they could maintain and administer themselves for all local, regional and national elections.

The CNE also wanted a scalable system that would enable them to eventually incorporate additional biometric technologies, such as facial recognition, and allow them to continue to scale the system for broader civil identification uses, such as civil registry and civil verification services to other government agencies.

Since the original biometric registry was implemented in 2004, 11 million voters' fingerprints had been registered in the national voter database. These records were merged with Venezuela's Administrative Service Identification and Immigration (SAIME) database and with the fingerprint data acquired through the pre-election fast fingerprint registration application (this application was deployed nationwide and captured more than 1 million new records). The system now has nearly 18 million people registered with fingerprints. Since the database was constructed from several different systems, some fingerprint images were of higher quality than others. An added advantage of the new system is the ability to update existing fingerprint records when higher quality fingerprints are obtained.

Ex-Clé Provided a Fast, Reliable, Open and Scalable New System Based on MegaMatcher Biometric Technology

Ex-Clé, based in Buenos Aires, Argentina, is one of Neurotechnology's oldest partners, providing an array of biometric solutions based on Neurotechnology biometric technologies since 1998. As one of the top biometric solution providers in Latin America, Ex-Clé has trusted relationships with companies and governments throughout the continent and has worked with the Venezuelan CNE since 2004.

The CNE hired Ex-Clé to develop their new biometric voter registration and database de-duplication system based on MegaMatcher and MegaMatcher Accelerator technologies from Neurotechnology. The first stage of the project was to migrate the existing voter database and merge the data with Venezuela's SAIME database that is used for the production of national documents such as IDs and passports. Ex-Clé used the MegaMatcher Software Development Kit (SDK) to develop an integrated platform with both client and server components that are used for the registration and verification of voters and also to ensure that the voter database includes the best available fingerprints from all government sources and that no voters are duplicated in the system.

The back end system, based on MegaMatcher SDK and MegaMatcher Accelerator, is used to generate a local client database. The new client interfaces integrate seamlessly with the voting system to capture, extract and match voters' fingerprints against the database.

"We have worked with Neurotechnology since 1998 and have used their products in the development of many solutions. We prefer their biometric technologies because they are not tied to a particular brand of scanner, database or operating system and because they offer superior scalability, speed and accuracy for biometric identification and database de-duplication."

– Hernan Sorell, CTO of Ex-Clé

How the Biometric Electoral Registry and Voting System Works:

The client components of the system use MegaMatcher to enroll voters during the electoral registration process and ten fingerprints are obtained for each voter. The voter's fingerprints are then used to verify the voter's identity using either an online system or batch process, depending on conditions at the registration site. After registration, MegaMatcher is used to perform a 1:1 match to determine if the registry already exists in the national database. If this succeeds, a quality check is performed on the fingerprint image, and if the new fingerprint is of better quality than the fingerprint originally enrolled in the system, the old fingerprint image is replaced. For all new voters and for voters for whom a fingerprint replacement is performed, the MegaMatcher Accelerator system performs 1:N identification to discard duplicates in the database.

40,000 voting machines running MegaMatcher client are deployed nationwide.

The system is used to verify identity at local polling centers during elections. At the polling center, voters' fingerprints are captured using an Integrated Authentication System (SAI), a USB peripheral device that includes a keypad and biometric fingerprint scanner and is 100% integrated into the voting machines. After the election ends, the voting machine processes and transmits the election figures. Later, when the machines are re-collected, biometric information is loaded into the backend system to validate and/or update existing records. The server components of the system operate on 12 MegaMatcher Accelerators and are responsible for ensuring database integrity and for the generation of the local databases for the voting process. The server components contain integration protocols for automatic synchronization with the SAIME databases. The system configuration and operation is web-based and has a manual expert subsystem to solve any questionable cases.



The Biometric Authentication Device SAI

When an elector arrives at the polling center, the elector presents his or her national ID card to the operator in charge who then types the ID number into the SAI biometric interface and asks the voter to place a finger on the scanner. The fingerprint scan is taken and if the identity of the voter is verified against the local database, the voting machine is unlocked and allows one vote. **The votes are counted automatically by the voting machine.** The biometric device interfaces with the voting machine but has two different systems installed with no communication between them. This is to ensure a secret vote – because there

is no relation between the biometric identification and the voter's choice, it is impossible to reconstruct the sequence (this system has been audited by the specialist technicians from the different political factions that participate in the electoral contest). After each vote the voting machine electronically registers the selection and issues a ticket containing the voter's choice, which is then inserted into a sealed box that is used at the end of the process to confirm the automated information.

In the 2012 Venezuelan presidential election 39,018 biometrically-enabled voting machines were deployed in over 14,000 polling centers around the country. Nearly 19,000,000 citizens registered to vote in the presidential elections and voter turnout was around 81% – the highest figure in Venezuelan electoral history. All voters who participated in the election in Venezuelan territory used the new, automated system (those who voted from other countries used a manual system) and the CNE was able to publish official election results only minutes after the last polling station closed.

Key Benefits of MegaMatcher Biometric Technology:

- **Accuracy** – The MegaMatcher biometric fingerprint algorithm is NIST MINEX-compliant and has received some of the highest ratings for accuracy in international tests.
- **Speed** – A single MegaMatcher Accelerator can match 100 million fingerprints per second and with the available cluster software Accelerators can be combined to provide nearly unlimited speed. It is one of the fastest biometric technologies available for de-duplicating databases.
- **Open technology** – With MegaMatcher, the CNE is not tied to using any particular brand of scanner, database or operating system.
- **Scalability** – The system is scalable for future expansion and development and there is no additional cost for fingerprint expansion. MegaMatcher also provides multi-biometric capabilities for the use of fingerprint, face, iris, palmprint or voiceprint biometrics in any combination.
- **Cost-effective** – MegaMatcher comes with free tech support, a lifetime guarantee and free software updates for the life of the system.
- **Easy to buy and implement** – Neurotechnology allows potential customers to test the system before purchase and provides constant support before, during and after the sale.

System Highlights:

Ex-Clé developed the client interfaces which were then implemented in the voting machines. The system developed and implemented for CNE by Ex-Clé included:

- MegaMatcher SDK
- 50,000 client licenses of MegaMatcher Fingerprint Extractor, Fingerprint Matcher, Face Extractor and Face Matcher.
- 12 MegaMatcher Accelerator servers

Ex-Clé provided the following services to CNE:

- Hardware and software provisioning
- Consulting and software development
- Hardware and software implementation
- Database migration
- Database integration
- Initial database load
- Expert manual revision services
- Support during the generation of the Electoral Databases
- Project Management

About Neurotechnology Biometric Technologies

MegaMatcher SDK is designed for the development of large-scale automated fingerprint identification systems (AFIS) and multi-biometric identification systems using any combination of fingerprint, facial, iris or palmprint biometrics. The identification algorithms in MegaMatcher were designed from the ground up to work alone or in combination to provide very fast 1:N (1 to many) matching with even higher reliability than AFIS or any other single biometric.

MegaMatcher's matching algorithm can match up to 1,200,000 faces per second, 160,000 fingerprint matches per second or 1,440,000 irises per second on a single processor (based on Intel Core2 processor with 4 cores running at 2.66 GHz). With Neurotechnology's fault-tolerant, scalable MegaMatcher Cluster Server cluster software, these numbers can be multiplied across multiple PCs.

For very large applications **MegaMatcher Accelerator** or an Accelerator cluster can be used. Each single MegaMatcher Accelerator Extended system can store 40 million fingerprints or 50 million irises and matches 100 million fingerprints or 200 million irises per second. MegaMatcher's latent fingerprint template editing capabilities also allow it to be used in forensic AFIS applications.

MegaMatcher supports most biometric industry standards. The iris engine in MegaMatcher is NIST IREX-proven, and because the MegaMatcher fingerprint recognition algorithm is NIST MINEX-compliant, it is suitable for use in US Government Personal Identity Verification program fingerprint recognition applications.

For More Information:

Ex-Clé s.a. Biometric Solutions

Based in Buenos Aires, Argentina, Ex-Clé S.A. develops and implements complete biometric solutions for access control, time & attendance, visitor registry and information processing system protection.

Ex-Clé also provides consulting services to developers, integrators and end users to facilitate the incorporation of biometric technology into a wide range of applications and pre-existing information systems.

For more information about Ex-Clé, go to: <http://www.ex-cle.com>

Neurotechnology

Neurotechnology is a provider of high-precision biometric fingerprint, face, iris, palmprint and voice identification algorithms, object recognition technology and software development products. More than 2500 system integrators, security companies and hardware providers integrate Neurotechnology's algorithms into their products, with millions of customer installations worldwide.

For more information about pricing, product capabilities and specifications as well as other products from Neurotechnology, go to: <http://www.neurotechnology.com>

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