



## Technical Specification

FaceVACS-SDK is a development tool that provides the native face recognition engine to System Integrators, Value Added Resellers and Customers. The basic biometric functionality of enrollment, verification and identification works on either image data or on intensity and shape image data. The interfaces are available in a variety of programming languages and on the most common operating systems without any trailers like required databases, application frameworks, etc. A set of tools and the documentation allow for an efficient development whereby the (re-) deployment requires only a small set of binary libraries.

### FaceVACS® TECHNOLOGY

#### Face Recognition engine is robust against

- Pose (+/- 15° deviation from frontal image)
- Minor partial face occlusion
- Beard and hairstyle changes
- Wearing glasses (except dark sunglasses)
- Moderate lighting changes

#### Based on the latest and best FaceVACS® technology

- Incorporates L1A11T6 (3D), B2T6 (2D) and A12T6 (2D compact) algorithms
- Allows easy update to future technology

#### Minimal intensity image requirements for facial recognition

- Sharp image
- One face is completely visible in the image
- Inter-pupil spacing larger than 32 pixels
- At least 64 grayscales within the face region are required for adequate contrast

### EXTENDED OPTION FOR USING INTENSITY AND RANGE DATA INFORMATION

#### (3D capabilities)

#### Operational modes

- Only Intensity Image (as is); any range information is ignored
- Intensity and Range Image; requires always both, intensity and range image

#### Biometric fusion

- Intelligent score fusion, in case intensity and range images are used

### Processing of raw range images

- Uses spike and hole detection a
- Filtering
- Smoothing
- Image normalization

### Range and intensity image format support

#### Read formats

- FRGC-3D format
- Cognitec proprietary binary

### ACQUISITION / PORTRAIT CHARACTERISTICS MODULE

#### Intensity image capture sources

##### Captures images from

- File (C++ example)
- DirectShow (Windows only, C++ example)

#### Portrait characteristics

- Eye detection at predefined confidence levels
- Glasses detection
- Exposure determination
- Closed eyes determination
- Head size and position determination
- Rotation, cropping, downscaling to fit Token Frontal/Full Frontal Image Type and resolution

#### Intensity image format support

##### Reads formats

- ISO 19794-5, JPG, JPG2000, PGM, PNG, BMP

##### Writes formats

- JPG (configurable quality or predefined memory space)
- PGM
- BMP
- ISO 19794-5 (configurable image type, image quality or predefined memory space)
- Grayscale and color image support

### ENCODING MODULE

Generates biometric encoding (i.e. template) of facial biometric traits as obtained through the Acquisition Module.

- Uses multiple unique facial images of one person to generate a combined template

#### Biometric template

- Single intensity image enrollment template size: 800 Bytes (A12T6 compact representation) and 1800 Byte (B2T6 representation)
- Range and intensity single image enrollment template size: 1623 byte (A11L1T6)

### Disclaimer

*Like any biometrics, face recognition intrinsically cannot provide 100% recognition accuracy. The remaining uncertainty has to be considered by the customer and can be operationally covered to a certain degree.*

## VERIFICATION MODULE

1:1 match of biometric trait evidence captured by the Acquisition Module against the template created by the Encoding Module.

- The calculated score in relation to a predefined threshold is used to make a yes/no verification decision
- Threshold can be estimated based on targeted FAR/FRR rates and vice versa

## IDENTIFICATION MODULE

1:many match of biometric trait evidence captured by the Acquisition Module against a set of templates created by the Encoding Module.

- Returns a list of references to the templates ordered by score
- Size of the returned match list can be limited
- As an extension, the Acquisition module can be configured to detect all visible faces within an image

## BioAPI SUPPORT

- Fully compliant BioAPI implementation of Verification Engine BSP and Identification Engine BSP
- BIR opaque data format is CBEFF compliant/ ISO 19794-5 compliant

## Verification engine BSP

- Load/ Unload; Attach / Detach; Query
- Get/ Free BirHandle; Get Header
- Create template
- Process
- Verify Match

## TECHNICAL FACTS

### Operating system requirements

- Windows XP Professional, Windows 2003 Server
- Linux (libstdc++.so.6.0, not for .NET software development environment)

### Computation performance

- 200.000 template comparisons per second
- generates 5 template per second
- Leveraged by IPP usage on P4 @ 2.8 GHz and 800 MHz FSB

## Minimum hardware requirements for development

- P4 or similar @ 1.600 MHz, 384 MBytes memory
- 400 MBytes free disk space

## Minimum hardware requirements for Redeployment

- P3 or similar @ 800 MHz, 384 MBytes memory
- 190 MBytes free disk space

## BIOMETRIC EVALUATION KIT

- Suite of tools to perform biometric evaluations on facial data residing in SQL databases (Windows only) or files (Windows and Linux)
- Generation of identification match lists
- Generation of similarity matrix data
- Base for calculating CMC or ROC curves

## ENGINEERING ENVIRONMENT

SDK functionality is available through multiple programming languages and software development environments.

- Customer has the flexibility to select their preferred environment
- The concepts and API's are, where possible, homogenous among the different programming languages, allows for easy switching to other environments

### C++ API

- Object oriented API using advanced software patterns and idioms
- Example source code and compiled binaries

### Compiler support

- gcc 3.3 / gcc 4.0 compiler (linux)
- Visual Studio .NET edition compiler 2003 / 2005 (Windows)

### .NET API

- Accessible through Visual Basic, C# and Jscript programming languages
- Windows Only Support
- Example source in C# and compiled binaries

## C API

- The C Language is covered by the BioAPI implementation (see BioAPI Support)
- Verification Engine BSP

## DOCUMENTATION

- Detailed manual including API reference and user guide
- API documentation is aligned to specifically supported programming languages, like java doc for java API
- Fully documented examples illustrating the main use cases and providing hints on how to create customized implementations
- Manual, guides and tutorials are provided in PDF and HTML formats
- Documentation is in English

## LICENSING

Licenses are granted for the following components, whereby any combination is possible.

### Portrait Characteristics module

- Determines photo-ID card relevant characteristics and performs tests following ISO 19794-5 requirements

### Face and Eye Finding module

- Acquires face on images and return the eye positions
- Additional Parameter: Multiple face finding per image

### Encoding module

- Determines biometric sample quality to check suitability for comparison
- Generates and stores biometric template from a given annotated image

### Verification module

- Verifies an image and template

### Identification module

- Compares an image with set of templates
- Additional parameter size of reference template set

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