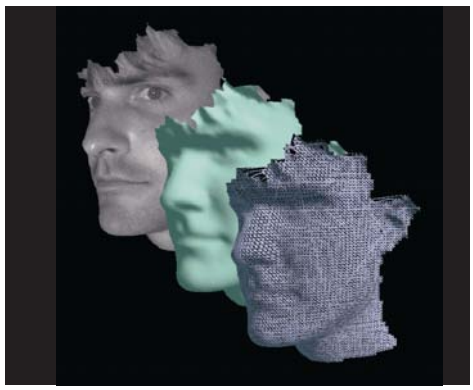
# FaceEnforce

The FaceEnforce system is a fast and robust 3D-3D and 3D-2D facial recognition system developed for the most demanding of Biometric security applications.



## FEATURES

**Face recognition robust to variations in:**

- **Position and angle of the face**
- **Lighting conditions.**
- **Background clutter.**
- **Matches 3D images to 3D or 2D image databases.**
- **System still operates rapidly on large numbers of faces.**
- **Available on Sun enterprise systems for greater robustness.**
- **Hardware support available for greater speed, security and scalability.**
- **Operates in validation and recognition modes.**
- **Supports a range of different 3D cameras.**

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# Facial Biometric System

## Overview

FaceEnforce is a scalable and robust face recognition system based on combining the latest advances in 3D facial image capture with advanced AURA pattern recognition methods and powerful processing methods.

FaceEnforce uses patented 3D methods that give significant unique advantages over current 2D facial biometric systems, in particular greater robustness to:

***The position and rotation of the face***
The angle and position of the face in relation to the camera do not prevent the face from being recognised.

***Lighting conditions***
Variations in lighting do not upset the system as it uses the 3D surface extracted from the face image for recognition.

***Background clutter***
Objects and images behind the face do not upset the system.

FaceEnforce is scalable to large numbers of images while maintaining it's operating speed.

For optimal recognition accuracy FaceEnforce matches a 3D image to a set of 3D examples stored in a database (FaceEnforce 3D-3D). In many situations databases of 2D examples may only be available, such as watchlists. FaceEnforce is also uniquely able to match 3D images to these 2D databases with only a small reduction in recognition accuracy (FaceEnforce 3D-2D).

FaceEnforce is a unique combination of 3 components to achieve its goals: a camera capable of capturing high quality 3D images of faces; the powerful AURA based image match engine; and *optional* high performance AURA hardware.

The 3D camera is capable of capturing a 3D image of a face within a very small amount of time, allowing its operation on moving faces. Covert, IR based operation is also possible. A range of camera's can be integrated to the AURA image match engine to meet the operational and cost life cycle requirements of each installation.

Cybula's FaceEnforce recognition system is a robust implementation based on the AURA match engine which is a patented and mature technology. The AURA technology underpins many of Cybulas products.

The hardware assist is an optional system that has been developed specifically for supporting high performance pattern matching tasks on large datasets. It is based on industry standard PCI bus thus is available for conventional PC as well as enterprise wide system implementations.

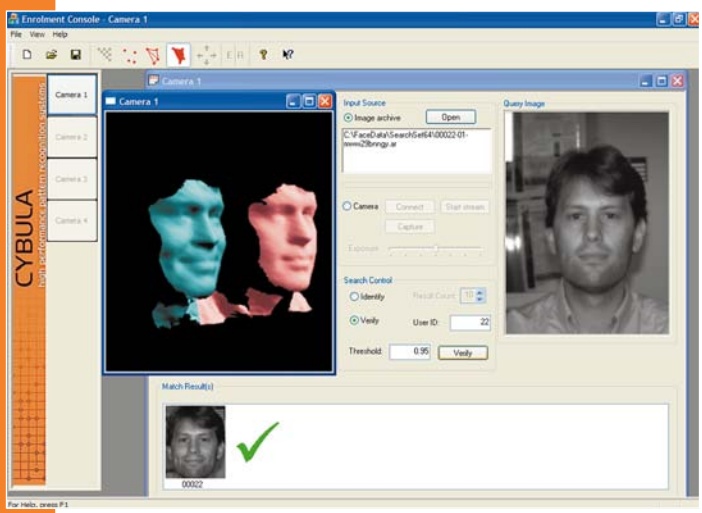
# FaceEnforce

## Operation of FaceEnforce

FaceEnforce is designed as an access control system where a user is attempting to pass a control point. They need not orient their face towards the camera or remain still during image capture, as the methods are robust to these effects.

FaceEnforce operates principally in two modes, *verification* or *recognition*:

**Identification:** Here FaceEnforce captures a 3D image of a face and matches it against a large database of 3D or 2D faces. This is aimed at providing an identification capability for known individuals, such as watchlists and internal law enforcement databases. FaceEnforce has the unique capability to scale to very large numbers of faces and still operate readily. This is achieved using Cybula's own dedicated processor technology, Presence II. This high performance technology can be used in industry standard computer systems.

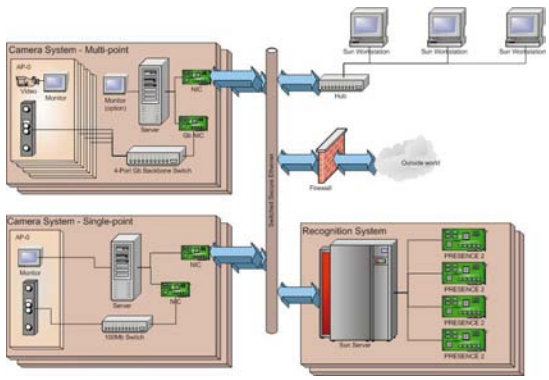



**Verification:** In this case FaceEnforce is used to check that a subjects image being presented matches with the individuals face within the database. The image may be stored on a smart card or in a database.

## Implementation

FaceEnforce is available as a stand-alone system or as a C++ API. It is available on a variety of operating systems including Linux, Solaris and Windows. To enable the application in the most demanding applications where robustness and scalability are paramount FaceEnforce is supplied on Sun Enterprise systems under Solaris. The hardware assist is also targeted at Sun platforms. The hardware provides added security by holding images within an encrypted storage system within the hardware system.

FaceEnforce has been validated against large databases of faces, allowing us to provide accurate and validated recognition performance (available on request).




## SPECIFICATIONS

FaceEnforce supports a range of 3D Cameras depending on application requirements.

- Typical operating specifications: Camera operating range: 2.5m.
- Field of view: at 2.5m is 0.8m vertical x 0.6m horizontal.
- Data capture speed: 2 to 8 milliseconds based on 2.5m to subject.
- Enabled to take single to multiple camera feeds into a networked system.

**Implementation:** Available as a C++ library on Sun Solaris, Linux and Windows. Interactive demonstration application available on request.

Number of face keys: Scalable to any number.

Recognition accuracy analysis under varying conditions available on request.

For more information, please contact Cybula at the address below.

*powered by* **AURA**

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high performance pattern recognition systems