

## Real-time 3D facial recognition systems

Claimed as a World first, A4Vision's real-time 3D facial recognition systems work independently of the user, and hence can be potentially used covertly in public places.

A4Vision's real-time 3D facial recognition system does not require cooperation from the subject and can be used to regenerate a full facial image. Non-cooperative biometric systems work independently of the user and, therefore, can be covert.

The 3D facial imaging and identification technology works by illuminating the subject's face with a grid of infrared light. Distortion of the grid is proportional to the curve of the features. This provides actual measurements of the facial characteristics. By concentrating on the "hard surfaces" the problem of ageing is removed.

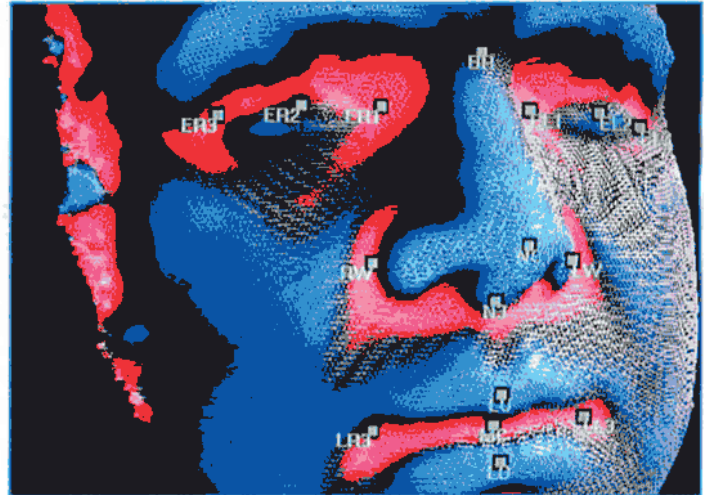
The system does not need standard light to work but is independent of the lighting conditions, unlike 2D facial. In addition, this system has a major advantage of being backward compatible to 2D facial systems. Three distinct functions are carried out in this system.

A4Vision's proprietary hardware for Face Capturing – or the acquisition of facial data – works on the principle of structured or coded lighting. The essence of structured lighting consists in projecting a pattern of known space structure at the subject's face. The picture of the initial lighting is distorted by the individual facial geometry, and the form of the scanned surface unambiguously defines these distortions. Having defined compatibility between elements of the initial and determined structure of the coded light beam, by means of reconstruction algorithms, it is possible to precisely restore the geometry of the registered surface.

Face Capturing refers to the moment when the camera and the special light take a "picture" of the target. This module includes the software necessary to automate the acquisition process by mean of PCs. The software controls the hardware functionality and synchronises all the necessary steps of the acquisition process. The second step is the Reconstruction of the 3D face. This module uses a set of proprietary algorithms, designed for surface reconstruction and optimisation, based on data received from the Hardware Device. After receiving raw data (the distorted pattern on the target object), the 3D Reconstruction Algorithms perform image filtering (noise reduction), and then instantly reconstructs the 3D surface, smoothing and interpolating data to avoid holes and optimise the mesh.

The algorithm has to recognise the pattern projected onto the surface and calculate, by means of triangulation, the three co-ordinates of all the sampled points on the surface. This will result in the surface being described by a cloud of points. After this step, the system will interpolate all the points by means of a mesh.

Next, if the colour surface was captured by A4Enrolment



device, then the surface can be calculated and over-imposed onto the mesh. The texture can be overlapped (after an automatic adaptation) on the 3D surface. This stage is not relevant for devices using the 3D-video unit, where the surface texture is not captured.

It is important to stress that the texture is not needed for recognition purposes.

The output of this module is the optimised 3D surface or 3D mesh, suitable for further use in the recognition process.

This system offers a very powerful tool to control access and identify suspects in real time. This technology is now being tested at border crossings, football grounds, and airports as well as other public places and is available from Premier Electronics.

[Premier Electronics](http://www.premierelect.co.uk)

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### Watch out for Ramtron

Prim'Time Technology, a French company, has selected Ramtron International's FM24CL16 ferroelectric random access memory (FRAM) for use in its e-Prim'Time communicating wristwatch for children.

Instead of numbers, the clockface displays animations representing activities appropriate to the time of day enabling very young children keep track of time until they are old enough to read numbers. The wristwatch can be set to either school or holiday mode.

An electronic identity card for the child can also be downloaded to the watch from any Bluetooth enabled communications device such as a PC, pda or mobile phone.

[Ramtron International](http://www.ramtron.com)  
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