

2009 Global Iris Biometric Systems  
Technology Innovation of the Year Award

## Smart Sensors Ltd

The Frost & Sullivan "2009 Global Iris Biometric Systems Technology Innovation of the Year Award," is presented to Smart Sensors Ltd (Smart Sensors). The award recognizes the company's outstanding efforts in developing the Monro Iris Recognition Library and INterface Software Development Kit (MIRLIN SDK) - a complete toolkit to build iris biometric engines for image acquisition, enrollment, verification, and iris identity (ID) applications. This is a fully featured C software development kit having four versions, which include Windows PC/XP/Vista, LINUX, Windows CE/Windows Mobile 5, and DSP embedded. This technology is based on the work of Donald Monro – now emeritus Professor of Information Systems at the University of Bath, England. Besides innovating and developing the MIRLIN SDK in 2007, Smart Sensors Ltd also organized collection of the Bath Iris Image Database that consists of more than 32,000 iris images. This iris image database features high quality images from various ethnic backgrounds, and is the largest available database of its type, although its terms of use are restricted to research purposes.

MIRLIN SDK has been the most successful marketing achievement for Smart Sensors during 2007 and 2008– both in terms of innovation and revenue earning. Technology leadership achieved by MIRLIN SDK includes developer access to many low-level software features, with the advantage of excellent cross platform support, so that it can meet varied needs across a wide range of biometric security and identification applications. Smart Sensors has appreciably demonstrated excellence in increasing its presence within the global iris biometric systems market. Since MIRLIN's introduction in 2007, the company has displayed triple digit year-on-year growth rate in revenues. This has also contributed to a proportional increase in the company's research and development expenditure spending.

### MIRLIN SDK's Competitive Advantages

- **Speed:** MIRLIN is an innovative iris recognition toolkit that operates on rectilinear image co-ordinates, rather than working on polar image co-ordinates (as in competitor solutions). In MIRLIN, iris biometric templates are compared via a Hamming Distance metric that uses a weighted Exclusive OR (also known as XOR) of feature vectors. This enables fast iris template matching by the use of simple XOR logic as compared to some other available technologies in the market. XOR logic is a Boolean logic operation, which is extensively used both in cryptography and in generating parity bits for error checking and fault tolerance purposes. Typically 500,000 iris matches per second can be achieved using common PC server configurations, and the performance is scalable by using additional server blades or Field Programmable Gate Array logic (FPGA).
- **Image Resolution standards:** MIRLIN SDK works with iris image characteristics that generally conform to ISO/IEC 19794-6. According to this, the minimum image standard must be of 100 pixels and the recommended image standard is 200 or more pixels in order to obtain the claimed superior performance. MIRLIN can tolerate images that are significantly worse in terms of compression and contrast variation, than are indicated in the standard.
- **Improved Iris Feature Extraction:** MIRLIN uses discrete cosine transform (DCT) feature extraction technology, so that it needs only a small computing footprint to offer the closest estimation of iris texture to the Karhunen Loeve Transform (KLT). KLT is a type of Principal Component Analysis that is accepted as the optimum transform method to provide an image of uncorrelated variables. As iris texture is mostly random, the KLT technique provides a better match with the attributes of such 2D image data. This technology used in MIRLIN is claimed as superior to any of the major competitor solutions and to other types of correlation methods in terms of image accuracy.
- **Better Business Model:** Smart Sensors has improved the iris biometrics business model. The new business model enhances the profitability of both

developers and end users. The customers just need to license the company's software tools that embody the independent international patents, which are owned by Smart Sensors along with its exclusive inventors, such as Prof. Donald Monro and Mr. Martin George. The licensing cost of MIRLIN is comparatively lower than other iris recognition software, as it requires only per product or per server royalty fees, with no per user enrollment fees.

#### **Successful Market Acceptance**

Since its inception in 2007, the success of MIRLIN SDK is evident in its widespread acceptance in the biometrics market. Well-known biometrics companies such as AOptix, Sarnoff, Datastrip, and IrisGuard either demonstrate with or employ in their iris recognition products all or part of this SDK. For instance, AOptix's "Glance and Go" (InSight™) and Sarnoff's "Iris on the Move™" iris systems can use MIRLIN for rapid image processing and matching from images captured at stand-off distances.

#### **Further Developments of MIRLIN SDK**

To meet the ever-increasing needs of customers, Smart Sensors is presently working on adding the new displacement vector method to its MIRLIN portfolio. Professor Monro presented this new method for the first time in September 2007 to the IEEE ICIP Conference in the U.S.A., and it is now the subject of a patent application. Although not yet a part of the standard MIRLIN toolkit, this new method will provide the following features:

- The new vector analysis method provides an orthogonal iris approach, making use of the same digital iris image, and avoiding the need for multiple rotation templates
- It offers the opportunity to gain better performance on poor iris images, such as off-axis images or those having limited visible iris texture
- It creates a fusion of two independent feature extraction methods for each of the two eyes for providing outstanding image discrimination performance
- There is also the possible implementation of "dispute resolution", where several near matches from searches on very large databases can be submitted to the vector engine for "resolution"

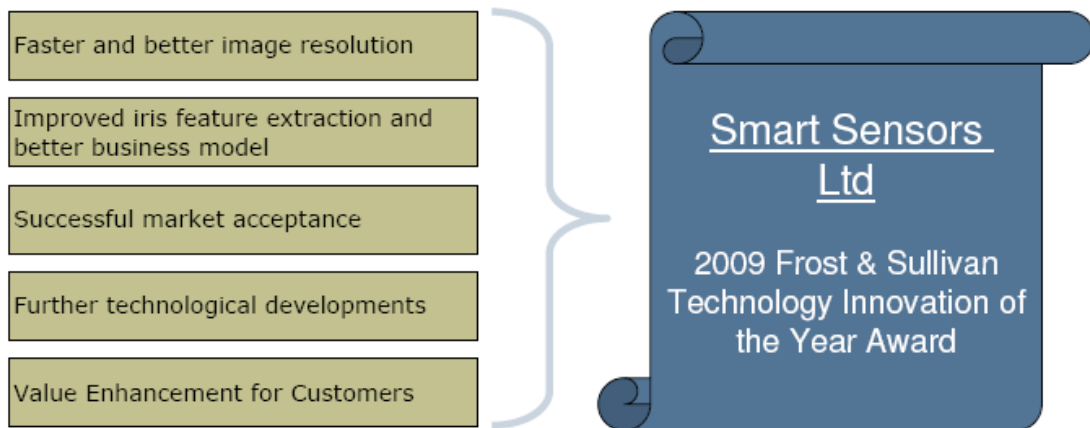
**Value Enhancement for Customers**

To satisfy the existing customers and to attract new customers, Smart Sensors has created a service level agreement (SLA) which comes into effect when a customer licenses the company’s solutions. According to the SLA, customers are offered various service levels under which Smart Sensors provide bug fixes, product enhancements or continuing technology refresh as improvements are developed, so as to ensure that customers can be in the best possible position to maintain a competitive product or system offering to their own clients.

Chart 1.1 presents the factors that make Smart Sensors the worthy recipient of the Frost & Sullivan Technology Innovation Award in the global iris biometric systems market in 2009.

**Chart 1.1**

**Iris Biometric Systems Market: Factors Contributing to the Frost & Sullivan Technology Innovation Award for Smart Sensors (Global), 2009**



*Source: Frost & Sullivan*

### Conclusion

Smart Sensors has embodied its unique technology into an iris recognition toolkit for building iris ID applications, iris recognition enrollment/verification/duplication, and iris acquisition engines for cameras. The innovative technology used in MIRLIN SDK enables faster and more accurate iris matches without the help of any special computer server configuration. The other distinguishing features of this SDK include improved iris feature extraction, excellent range of functionality and diagnostics available to the developer, enhanced ability to scale to smaller or larger platforms, and a better business model. Presently, Smart Sensors is developing its new displacement vector method to add to the MIRLIN portfolio. This will not only generate increased revenues to the company, but also address customers' needs for improved identity assurance as systems and applications grow in size to encompass large populations. The significant contributions made by this innovative technology make Smart Sensors the worthy recipient of the "2009 Global Iris Biometric Systems Technology Innovation of the Year Award".

### Award Description

Frost & Sullivan's Technology Innovation of the Year Award is bestowed upon a company (or individual) that has carried out new research, which has resulted in innovation(s) that have or are expected to bring significant contributions to the industry in terms of adoption, change, and competitive posture. This award recognizes the quality and depth of a company's research and development program as well as the vision and risk-taking that enabled it to undertake such an endeavor.

### Research Methodology

To choose the award recipient, Frost & Sullivan's analyst team tracks innovation in key hi-tech markets. The selection process includes primary participant interviews and extensive primary and secondary research via the bottom-up approach. The analyst team shortlists candidates on the basis of a set of qualitative and quantitative measurements. The analysts also consider the pace of research and technology innovation, and the significance or potential relevance of the innovation

to the overall industry. The ultimate award recipient is chosen after a thorough evaluation of this research.

### Measurement Criteria

In addition to the methodology described above, there are specific criteria used to determine the final rankings. The recipient of this award has excelled based on one or more of the following criteria:

- Significance of the innovation(s) in the industry, and across industries (if applicable)
- Potential of the products of innovation(s) to become industry standard(s)
- Competitive advantage of innovation vis-à-vis other related innovations
- Impact (or potential impact) of innovation(s) on company or industry mind share and/or company bottom line
- Breadth of intellectual property related to the innovation(s), that is, patents, scientific publications, papers in peer-reviewed journals.

#### About Best Practices

Frost & Sullivan Best Practices Awards recognize companies in a variety of regional and global markets for demonstrating outstanding achievement and superior performance in areas such as leadership, technological innovation, customer service, and strategic product development. Industry analysts compare market participants and measure performance through in-depth interviews, analysis, and extensive secondary research in order to identify best practices in the industry.

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