



Identity at the Speed of Life

IMIDTM

In Motion Identification

White Paper

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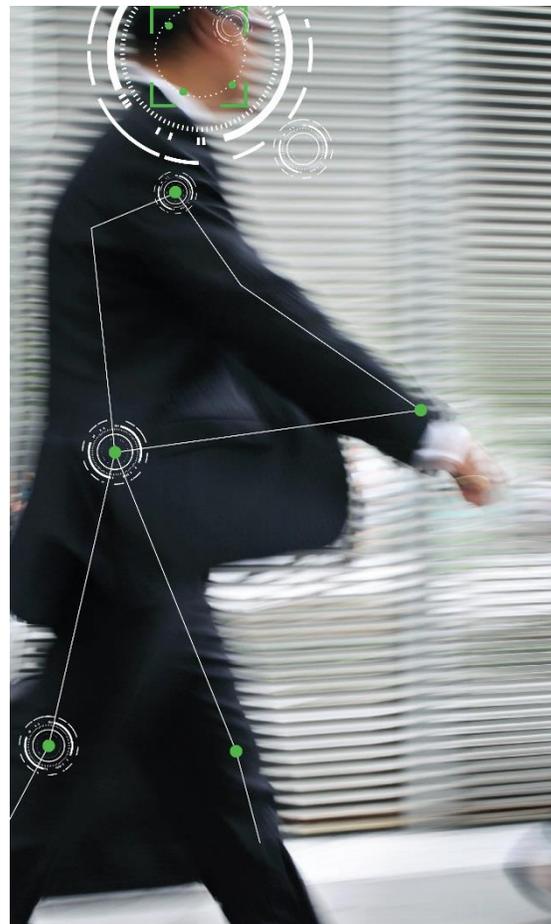
IMID™ Access Overview

In today's world of urbanization, globalization and technology ubiquity, identification is not a simple matter. Issues such as fraud, privacy concerns and, of course, the speed of life today, combine to demand identification solutions that are highly sophisticated and secure, while remaining non-invasive and easy to use. FST Biometrics' identification software, IMID, provides a seamless, accurate and non-invasive user experience with its *In Motion Identification™* technology. This, coupled with its strong protection of the privacy of data, makes it an ideal platform for those contemplating a biometric identification system.

Using a unique fusion of visual identification technologies, including facial recognition and behavior analytics, IMID identifies known users from a distance and in-motion. There is no slowing down, as users are identified seamlessly.

Users do not need to interact with the sensors or cameras. Rather, a simple glance in the general direction of the camera as they are walking will allow authorized individuals to gain access..

To complete the identification process, the system can provide both audio and visual feedback to the user. There is no privacy-sensitive data such as fingerprints or iris scans. Rather, IMID's visual identification technology provides *In Motion Identification™* using standard IP video cameras, making IMID easy to integrate into many existing infrastructures.





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A Fusion of Technologies

IMID is a comprehensive visual identification solution that facilitates identity management. IMID represents a best-in-breed fusion of cutting-edge biometric technologies.

1. **Facial Recognition** is a non-intrusive and intuitive method of automatically identifying a person based on a digital video image. IMID uses facial characteristics and measurements that are unique to specific individuals in order to identify them as they approach.
2. **Behavior Analytics** consists of sophisticated video analytics algorithms and machine cognitive learning in order to detect the walking characteristics, body size and density, and typical behavior.
3. **Fraud Detection** algorithms are used to prevent presentation attacks by fraudsters. IMID is able to detect liveness, and can differentiate between a person and an image of a person.
4. **Deep Learning** algorithms allow IMID to continuously learn and adapt to users' behavior. In addition, IMID performs continuous enrollment of users, solving the biometric aging challenge. These features provide faster, more accurate and seamless identification of users.



High Accuracy



Fast and Efficient



Non-Invasive



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The In Motion Identification™ Challenge

The challenge with *In Motion Identification*TM is identifying a variety of people of different heights coming from different directions, all in-motion. The identification needs to be performed in an area, not in a single spot. The area needs to be a minimum of 6x6x6 feet (approx. 2x2x2 meters).

To achieve focused, high quality pictures of people in motion, the recognition is performed as the identified person is walking in the direction of the camera. The identified person does not need to alter their behavior in order to achieve accurate identification, and the system adapts to the user's behavior.

Because the identification is performed in an open area, there is no limitation on the number of people that walk together in the direction of the camera. The identification needs to be performed on all the people who are walking simultaneously in the direction of the camera via the recognition area. The estimation is that up to eight people will be recognized at the same time and in-motion.

In comparison to standard face recognition systems that require the identified person to stand at a specific point, fitting their face to the identification area and standing still until identified, FST's *In Motion Identification*TM only requires that the light on the face be sufficient in the recognition area. Individuals and groups do not need to stop at any specific recognition spot.

To achieve high accuracy recognition, a minimum resolution of 50 pixels per inch (20 pixels per centimeter) on the people in the recognition area is needed.

Face locating and tracking algorithms are used to locate people's faces and location within the streaming video. The processing time challenge increases when there is a need to analyze video streams from multiple cameras streaming multiple frames per second from all cameras.



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The Basics of the FST Biometrics Solution

- Uses standard IP cameras with resolutions between 3Mpixel to 5Mpixel, transmitting M-JPEG or H.264 compressed images to the server while running all processing procedures on the main server.
- Minimum lighting conditions must enable shutter speeds of 1/125 second or higher (50 LUX average).
- There is an immediate visible feedback option next to the camera for interfacing the user and for attracting his/her attention in the direction of the camera.
- Setting up a server with sufficient processing power running Linux OS and the IMID software.
- Selected and installed hardware must be based on FST Biometrics' approved hardware list and in accordance with FST Biometrics' specifications and instructions.



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Facial Recognition Accuracy

In any biometric technology, False Accept Rate (FAR) can never be isolated without considering the corresponding False Rejection Rate (FRR). FST Biometrics created a patented fusion function that incorporates recognition information from vertical biometric algorithms, thereby creating a system that provides very low false accept rate and at the same time maintains a low false reject rate.

These two figures show the performance of the FST Biometrics Face Recognition in two scenarios 1:N and 1:1.

Figure A:
The 1:N recognition ratio



The graph indicates the ratio between the percentages of false reject (no-detection) to false accept (false detection) rates. The percentages of false accept are three cases out of 10,000 (3/10,000) when the false reject is at two cases out of 1,000 (2/1,000). When higher security is set and the percentages of false accept are one case out of 10,000 (1/10,000), the false reject rate will provide 15 cases out of 1,000 (15/1,000).

Figure B:
The 1:1 recognition ratio



The graph indicates the ratio between the percentages of false reject (no-detection) to false accept (false detection) rates. The percentages of false accept are five cases out of 1,000,000 (5/1,000,000) when the false reject is at two cases out of 1,000 (2/1,000). When higher security is set and the percentages of false accept are two cases out of 1,000,000 (2/1,000,000) the false reject rate will provide 28 cases out of 1,000 (28/1,000).



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Analysis Basis

Below is a statistical analysis of false rejects and false accepts in an IMID visual identification system from FST Biometrics. The analysis was done by collecting statistical information from multiple systems working in real conditions, mainly in the U.S.

8,540 people* participated in the sample divided by:

Gender:	53 %	Female
	47 %	Male
Age:	8 %	6-18
	33 %	19-35
	38 %	36-60
	21 %	61+
Ethnic Origin:	6%	Asian
	16 %	African American
	78 %	Caucasian

* On average, each participant was identified 10 times in the sample data.

General Conditions of System Operation

- Identify minimum resolution 100 pixels between the eyes
- The lighting level in the identification may be 50 LUX
- All identifications were provided with a light-controlled interior
- Enrollment is performed only through the filtration system of FST Biometrics
- Minimum resolution between the eyes for enrollment is 150 pixels
- Lighting level for enrollment is higher than 500 LUX



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Advantages over RFID Card-Based System

In low security identification, the RFID card-based system could be sufficient. However, with an RFID card alone, the RFID reader identifies only the card itself, rather than the holder of the card. As such, an unauthorized person who obtains a card could pose as someone else; there is the additional possibility of duplicating or creating fraudulent cards. IMID eliminates the hindrances and challenges that exist when using only an RFID card-based system. There is no slowing down to swipe a card, and there is no chance of duplicated or fraudulent cards. Users are identified as they walk through using our unique fusion of biometric identification technologies.

IMID with *In Motion Identification*TM seamlessly and accurately identifies users. There is no need for slowing down or stopping. Users simply walk through as the system provides identification at the speed of life.