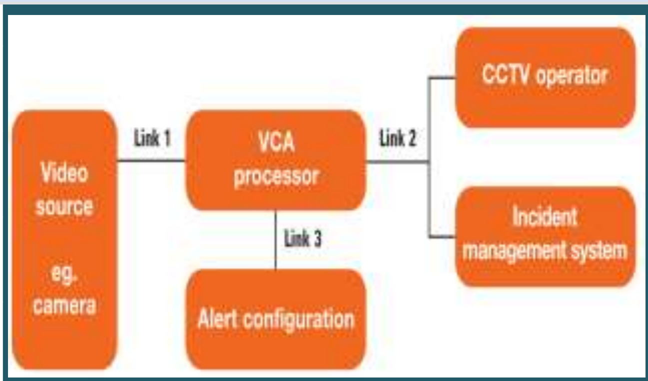
2015

Covert CCTV Walk-by People Screening



Homeland Security Research Corp.

Covert CCTV Walk-by People Screening – 2015

August 2015

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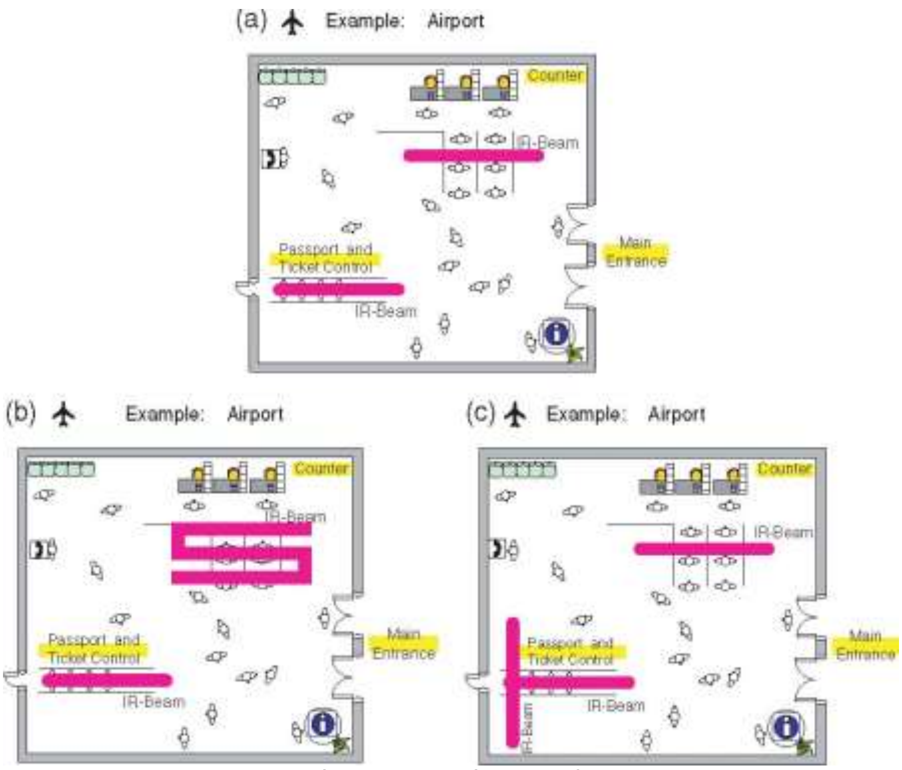
1.1 Walk-by Fourier Transform Infrared (FTIR) Spectroscopy Systems

FTIR is used to collect infrared spectra. Instead of recording the amount of energy absorbed when the wavelength of the infra-red light is varied (monochromator), the IR light is guided through an interferometer. After passing through a sample, the measured signal is the interferogram. Performing a Fourier transform on this signal results in a spectrum identical to that from conventional (dispersive) infrared spectroscopy.

Because building an interferometer is easier than the fabrication of a monochromator, FTIR spectrometers are cheaper than conventional spectrometers. In addition, because the information at all frequencies is collected simultaneously, measurement of a single spectrum is faster for the FTIR technique. This allows multiple samples to be collected and averaged together resulting in an improved sensitivity. Virtually all modern infrared spectrometers are FTIR instruments.

(**Source:** Weber et. al.)

Figure 1 - Example of FTIR Application at Border Checkpoint Facilities



(**Source:** Weber et. al)

The figure above illustrates possible deployment options for an open-path FTIR system within an airport:

A: Top view of two beams of two open-path FTIR systems positioned above counters and passport/ticket control.

B: Folded measurement beam positioned above ticket counters.

C: Crossed measurement beams (left hand side) for pinpointing a single person.

1.2 Covert Walk-by CCTV Based Detection Corridors

There has been considerable work in face-recognition and other biometrics including a DARPA program in human identification at a distance. That program evaluated face-recognition under extreme lighting and at over 50m as well as gait recognition at similar distances and iris recognition at 2-3 meters. However, these results were obtained under controlled, daylight conditions with cooperative subjects.

Achieving effective biometric face and iris recognition at 1-7 meters requires significant improvements in the operational field-of-view to account for uncooperative subjects, handling wide ranges of poses and illumination, advances in stabilization, handling of motion blur, and addressing environmental disturbances.

To summarize, the overall goal of most RDT&E programs in this field is to develop a system that can provide personal biometric recognition with high accuracy in 24/7 operations. In addition, the systems will need to support several operations:

- ❑ High volume low security identification, quickly scanning the area of interest.
- ❑ High security low volume identification in a smaller area.
- ❑ Authenticate an identity from a distance without slowing people down as they go about their business.
- ❑ Covertly capture biometrics and track through an infrastructure.
- ❑ Find a face/person in a crowd.

Figure 2 - CCTV Based Biometric People Screening Corridor

(**Source:** Millivision)

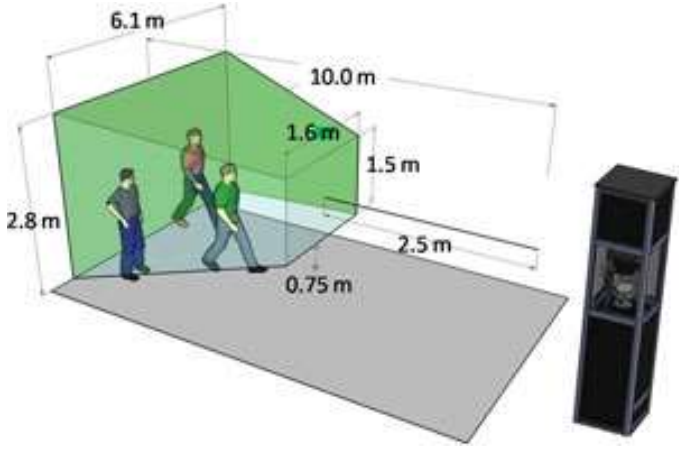
Recognition of individuals at a distance is a challenging problem that requires advancements in a variety of biometric technologies. Some researchers believe that iris recognition is the most promising technology for accurate recognition of an individual and in combination with other biometrics such as facial recognition and situational awareness, analytics of video scene images promises to deliver the highest performance standoff identification. The key is in multi-modal systems that definitively identify individuals within randomly moving crowds at variable distances. Retica Systems, Inc. (www.retica.com) has been awarded a sole source, RDT&E contract from the United States Army for its Iris Capture Authentication for Standoff Biometrics. The U.S. Army is developing standoff biometrics-based authentication methods to identify enemy threats for homeland defense.

1.3 Fused Standoff Video Surveillance and Biometrics

(**Source:** Retica Systems, Inc)

These types of systems fuse video surveillance and biometric I.D. to provide close range people screening.

Figure 3 - Field of View of a Fused Video Surveillance and Biometrics



Systems like the Eagle-Eyes by Retica coupled video surveillance algorithms with a biometric acquisition system. Eagle-Eyes is a long-range multi-biometric system that improves on existing iris acquisition approaches in terms of stand-off distance, capture volume and subject motion. It is capable of acquiring face and iris images from multiple subjects present within a scene. The system uses multiple cameras with hierarchically-ordered fields of views, a highly precise pan-tilt unit (PTU) and a long focal length zoom lens.

System specification includes:

- ❑ Day/night operation
- ❑ Screened population: Cooperative/non-cooperative operation
- ❑ Real-time iris & face capture
- ❑ Identify and track up to 40 subjects per minute

Table 1 - Retica Standoff Biometric; System Performance

Iris & Face Capture Working Distance:	2.5-10 meters
Iris & Face Capture FOV:	35° Horizontal, 20° Vertical
Estimated Capture Volume:	>95 m3
Iris Illumination:	Near Infrared LEDs, NIR Laser

The Dept. of Homeland Security, Science & Technology Directorate is funding a five-year program (2009-2013) to develop accurate, real-time capabilities relying on remote capture of multimodal biometrics to identify known terrorists and criminals at checkpoints. It will also produce a standoff biometrics capture capability with an operational distance of 30 feet. This project will improve accuracy, sample acquisition time and ease of use. By 2013, it is planned that the system prototype will undergo a preliminary demonstration and assessment.

1.3.1 Example: IOM PassPort™

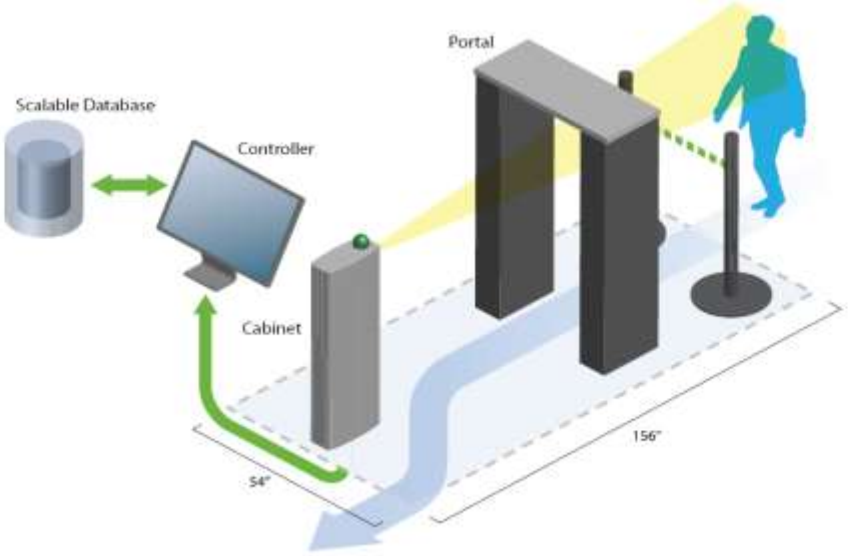
(**Source:** Sarnoff Corporation).

The IOM PassPort™ combines the security of iris recognition with a fast, convenient, high-throughput solution. It has a processing speed of 30 people per minute making it ideal for high-traffic locations such as airports, security checkpoints and other applications that require uncompromising identity verification for a large number of people.

Table 2 - Short Range Standoff Biometric Portal: IOM PassPort™ Performance

Standoff Distance	3 meters
Capture Volume	50 cm (W) x 50 cm (H) x 20 cm (D)
Iris Identification Speed	< 1 sec
Subject Motion	Longitudinal
Throughput	30 people per minute
Database Size	Scalable
Typical Application	High throughput access
Interface	Runs standalone or via Ethernet (10/100/1000 Mbps)
Additional Components (sold separately)	
Enrollment	Self or via multiple third party devices
Matching Algorithm	Multiple third party algorithms
Standoff Biometric	Requires no user training Limited subject interaction Unobtrusive and eye safe

Figure 4 - A Corridor CCTV & Biometric Portal Layout



More Information can be found at:

[Global Video Analytics, ISR & Intelligent Video Surveillance Market – 2015-2020]