

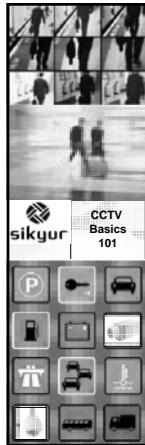
Closed Circuit Television (CCTV) Basic Course -101

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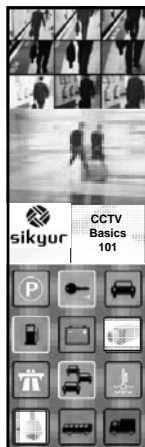
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Its not the technology that reduces crime

Its knowing how to use the technology that reduces crime!

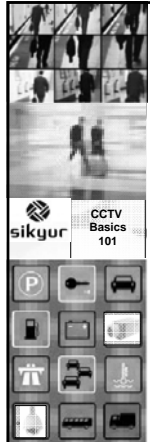
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Closed Circuit Television's (CCTV) Popular Climate

- CCTV is increasingly requested by:
 - law enforcement, security, management, schools, transportation
- Early research shows that CCTV can work if integrated with other systems however research is weak and limited
- Not all view the popularity of CCTV as good as CCTV is the frequent hostile target of inspection by privacy advocates

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Roles of Electronic Security

System Components	Purpose	Ibiv?
Deter	Discourage easy access Reinforce boundaries	Fences, walls Barriers, gates, locks Physical constraints
Detect	Provide early warning of unauthorized entry	Intrusion detection sensors
Delay	Impede easy access to key assets	Fences, barriers Audio visual alerts Delay devices
Assess	Delay intruder for assessment Provide positive confirmation of valid alarm	Direct visual identification CCTV, central control Lighting, sound
Respond	Take appropriate action	Communications Guards Safe places Police, etc.

Adapted from presentation by Martin L. Vitch, CPP, at the Physical Security Technology & Applications Conference, Minneapolis, MN, June 3-5, 1996.


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CCTV Basics 101

- What is CCTV?
- CCTV System Basics
 - Cameras
 - Lenses
 - Housings
 - Recorders (analog and digital)
 - Peripherals (multiplexers, matrix switchers, etc.)
 - Extended applications (browsers and remote surveillance)
 - Monitoring
- CCTV Application Technical Approaches
- CCTV Site Survey and Design Basics
- CCTV and the law
- CCTV futures – what's next?
- Where to find more information

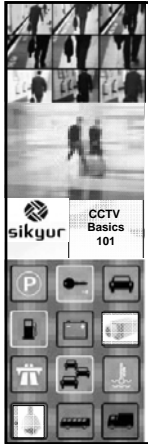
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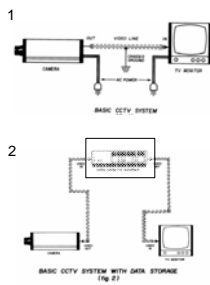
What is CCTV?

- CCTV was first used in the 1950s and has since become an essential element in any professional security system.
- Closed Circuit Television (CCTV) is a television system which operates on a 'closed loop' basis. Unlike broadcast television, which is available to anyone with a suitable receiver, CCTV pictures are only available to those directly connected to the loop.
- With today's network security, 'Network Video' is an expansion of CCTV beyond analog circuitry to data networks using a common interface such as TCP/IP.

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CCTV System Basics



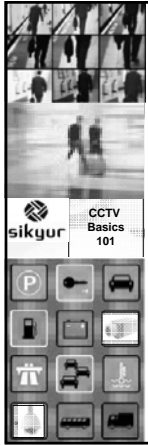
Technical Note -- In most installations, the loop is a physical link—a cable which carries the picture from the camera to the viewer. With very few exceptions, the pictures are transmitted as a composite video signal at 75ohms, 1 volt peak-to-peak, generally RG59 or RG6.

Where high resolution (>400TV lines) is required, some camera equipment offers a Y/C facility where the luminance signal (Y) and the chrominance (C) is divided.

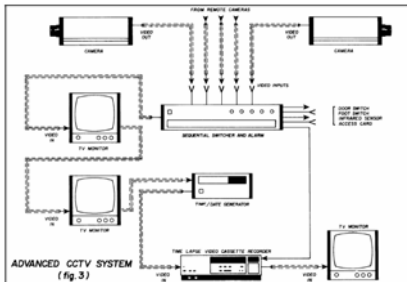
Over long distances, for example in Town Center systems or transportation systems, fiber optic transmission is popular. Where this option is too expensive, ISDN and DSL offers a cost-effective alternative for event-driven surveillance systems.

Courtesy: Panasonic Panasec, CCTV Theory

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CCTV System Basics

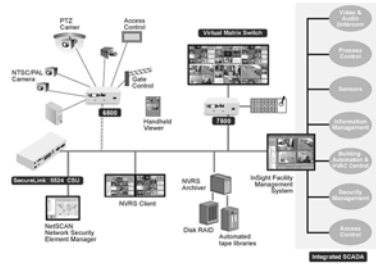


Courtesy: Panasonic Panasec, CCTV Theory

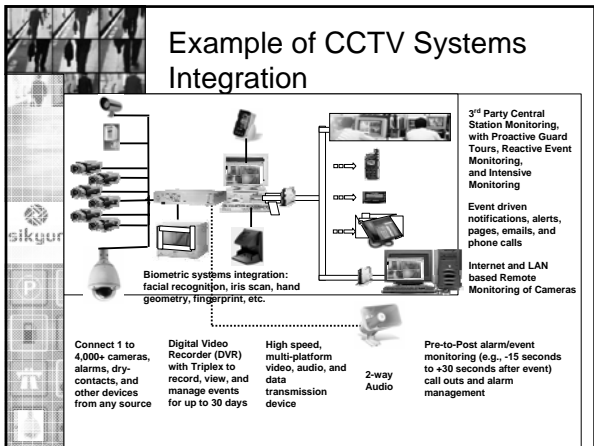
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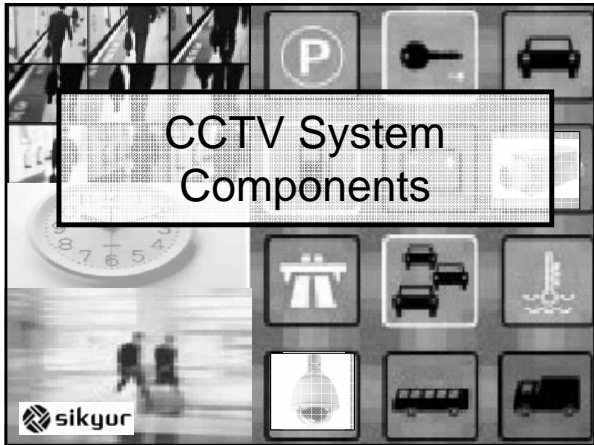


Network Video



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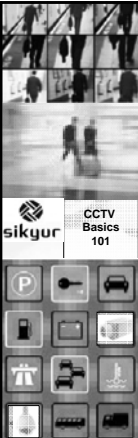
Camera selection – how do you decide?

Sample cut sheet of available cameras on the web

sikgur CCTV Basics 101

Acrobat Document

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CCTV Basics 101


Camera

- The camera is the 'eye' of a CCTV system and at its core lies CCD (charge coupled device) technology.
- The CCD is comprised of about 500,000 light sensitive cells called picture elements (pixels) which convert the light falling onto its surface into an electrical signal. The performance of the camera, and ultimately the surveillance system, is more dependent upon the quality of the CCD than any of the other camera components. Currently, the popular formats are:

■ Half-inch	High performance for high sensitivity and low noise
■ Third-inch	Most popular and ideal for a wide range of applications
■ Quarter-inch	A more recent development


Sony Guide to CCTV, Issue 3
Sony Corporation, UK

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Camera




Benefits of CCD Technology

■ Long Life	Produced with a design life of up to 10 years
■ Shock Resistant	Much more rugged than older tube technology
■ Size and Weight	Have enabled the miniaturisation of cameras
■ Spectral Response	Responsive in the near infra red area

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Sony Corporation, UK


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Camera Resolution

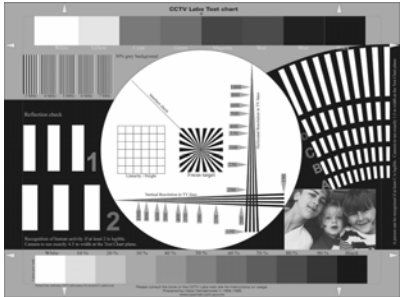
- The higher the resolution the sharper the picture. The best resolution available at present for CCD cameras is approaching 750 horizontal lines (TV lines) (3-CCD) and 500 vertical lines.
- Resolution is not necessarily the key decision point. Low resolution CCTV, which is usually lower cost, is often perfectly adequate and the final choice depends on the combination of camera features and build quality together with site conditions and available funds.
- As a general rule, a high resolution is preferable in low light levels and when identification of points of fine detail are required.



Sony Guide to CCTV, Issue 3
Sony Corporation, UK

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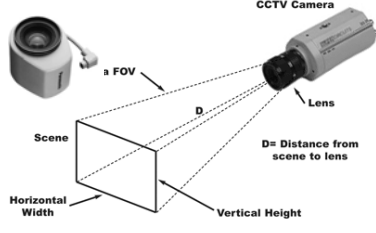
Camera Quality



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Lenses

■ Demonstration of a Manual and Electronic Lens Calculator



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Lenses – Focal Range (F)

■ The lower the 'F' number of the lens used the better the result. For example:

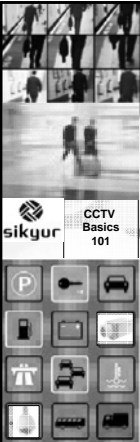
- Camera one quotes 0.8 lux full video with an F1.0 lens
- Camera two quotes 0.8 lux full video with an F1.2 lens

■ Camera two is the more sensitive camera as it quotes 1 lux with a slower F1.2 lens.

■ With the faster F1.0 lens, it would probably give a full video signal at only 0.6lux.




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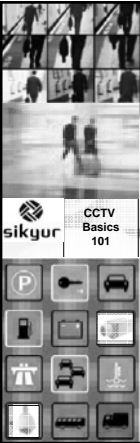


Housings


- Housings come in many styles and types:
 - Fixed
 - PTZ
 - Unitized
 - Pressurized
 - Vandal resistant
 - Bullet resistant
 - Concealed



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Recorders (analog and digital)




- Analog video is to Digital Video what the horse and buggy is to the modern automobile. Both will get you to your destination. But the time taken to get there often determines whether you will take the trip at all. Here are some key differences between the recording technologies:
 - Multi-tasking
 - Speed of Information Retrieval
 - User Interaction
 - Signal Degradation
 - Smart Monitoring
- The greater challenge is deciding which of the 450+ Digital Video Recorders (DVRs) to standardize on.

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There are over 450 DVR manufacturers and nearly as many transmission device providers ...

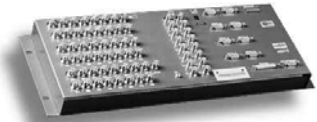


There is no "one-size-fits-all" solution.


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Peripherals (multiplexers, matrix switchers, etc.)




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Switching systems

- Principle and features of different types of switchers
- Multiplexers, quads, & matrix switchers
- **Monitors**
- Different types and important features of monitors
- Adjustments, precautions and trouble shooting

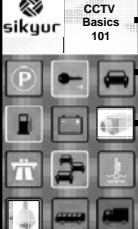
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Transmission Systems


- Video transmission including coaxial cable, Fiber Optics.
- Telephone networks
- Different methods for transmission of control signal
- Power transmission systems
- Adjustments, precautions and trouble shooting

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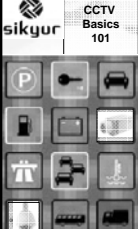
What is the value of remote monitoring?

- Cost of security guard uniform: \$48
- Cost of a security console: \$20,000
- Cost of CCTV Surveillance System: \$150,000
- Cost of 24-7 Manned On-Site Monitoring: \$600,000
- Cost of the Newspaper defeating monitoring system: \$.50
- Value of Watching the Watchers -- Priceless

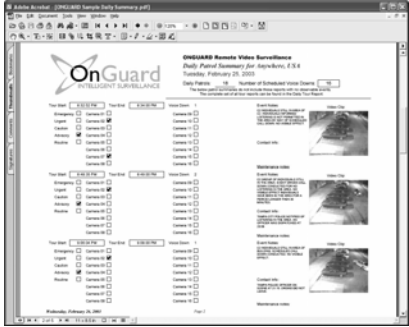


High crime opportunity profile site with on-site contract security (guards), local video monitoring, and 3rd party remote video monitoring (SPARTA). Situation, SPARTA Security Operation Center (SOC) watch officers detect on-site contract guard performing personal activities during working time. SPARTA sends incident report and notification procedure to property manager and security company; no further problems of similar nature observed at this site. There is value in watching the watchers.

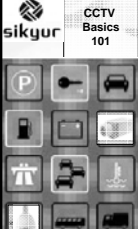
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Remote Monitoring Reporting





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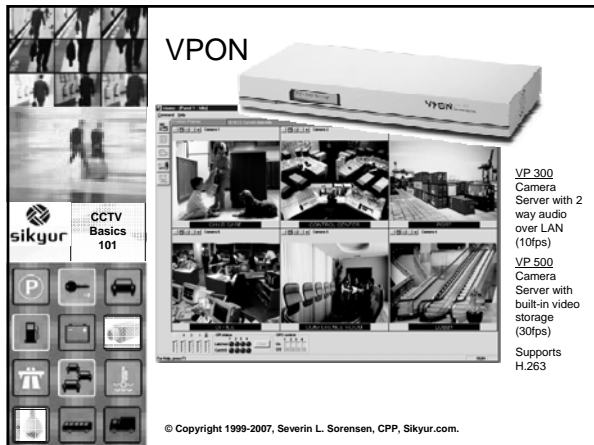
Video Monitoring Types

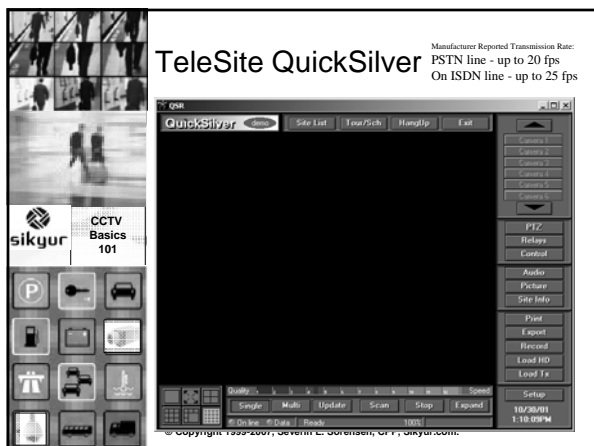
- Scheduled / Proactive patrols and hotspot monitoring
 - Scheduled tours
 - Maintenance checks
 - Opening and Closings
 - Investigations
- Event oriented / "Dark Screen" monitoring
 - Alarm (emergency) response
 - Event (non-emergency)
 - Maintenance and system condition monitoring
- Intelligent surveillance and automated monitoring
 - Automated activity, behavior, and object tracking by computer
 - Recognized events, trouble, malfunctions, are redirected to "manned" monitoring center
 - Automated web based reports




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Motion Media






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Axis Communications




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Other IP Transmission Devices

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Traditional central station monitoring services have been added to several systems (e.g., cVideo)

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Integral Technologies RemoteView

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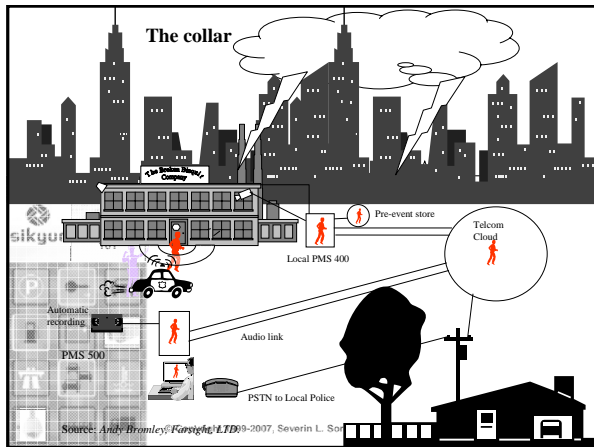
Integral Technologies OASIS

- Oasis is a software package which integrates numerous security systems, including CCTV, access control, alarms, intercoms, pagers and others into a common graphical user interface. No other software package supports the variety of products -- more than 75 systems from 30 manufacturers.

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Boeing Autometric VSOC / NICE

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Central Station Monitoring

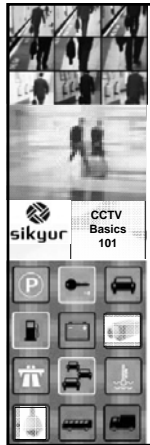
Sample of Central Monitoring Station, Farsight, LTD.

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Technical Approach to CCTV Specification


Lessons Learned



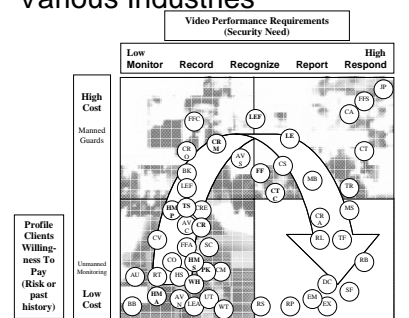
CCTV Application Technical Approach Pointers

- Examine use of CCTV within your industry
- Examine your need to identify activity, behavior, individuals, etc.
- Examine your BUDGET – often the starting point
- Examine your situational and requirements
- Examine barriers, obstacles, and environmental constraints to implementation


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Examine CCTV Use In Various Industries



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Define CCTV System Requirements




Monitor Detect Recognise Identify Other (specify)

Obtaining more detail in an image is achieved at the cost of each camera covering a smaller area. As higher performance is therefore more expensive and difficult to achieve it should be specified only when necessary.

CCTV Operational Requirements Manual
UK Home Office, Development and Practice Report 7, 2003.

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Conduct a CCTV Site Survey and Don't Forget the Basics

- Do you really need CCTV?
- Set out your problem
- Set out possible solutions
- List pros and cons for each possible solution
- So, OK, you have decided you need a CCTV system
- Set down a list of objectives for the system
- Who will design the basic system layout?
- The types of specification
- Operational and equipment specifications

Microsoft Word Document

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Consider seven identified key aspects of successful CCTV implementation

- ┆ Specification and the pre-bidding process
- ┆ Project management
- ┆ Building a project team
- ┆ Engagement of stakeholders
- ┆ Third parties
- ┆ Identification of costs and resources
- ┆ Design and technology

National evaluation of CCTV safety, floodlighting, signage, implementation - effective practice guide
UK Home Office, Development and Practice Report 7, 2003.

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Reasonable CCTV strategies needs to be . . .

- Appropriate
- Sustainable
- Cost effective
- Adaptable
- Compensate for vulnerability to defeat
- Simple interactivity Evaluate and improve methods and technologies
- Always On (24x7)
- Redundant backup systems
- Secure
- Reliable
- Efficient
- Robust tools with open data accessibility.
- Scalable system architecture
- State-of-the-art security technologies

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CCTV futures – what's next?



3 mega pixel Camera



360 (6 fused image) Camera




Extreme weather, wireless PTZ



Hybrid Hi-Res/IR Camera

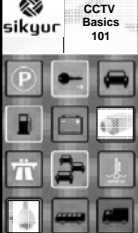
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CCTV futures – what's next?

- Fusion Cameras (high-resolution and thermal)
- Intelligent Cameras with embedded software
- Enhanced CMOS cameras with higher color rendition and low-light capacity
- 360 mirror cameras with intelligent software
- Smaller, lighter, wireless cameras

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Futures: Biometric - Iris

- Iris-based biometric devices analyze the features found in the colored ring of tissue that surrounds the pupil.
- Iris scanning, is less intrusive than retinal eye-related biometrics and uses a fairly conventional camera element and requires no close contact between the user and the reader.
- In addition, Iris scanning has the potential for higher than average template-matching performance. Iris biometrics work with glasses in place and is one of the few devices that can work well in identification mode.

A Human Bar Code

Computers are being programmed to identify people that need take the shape of passwords, PINs and keys. The iris is the colored ring of tissue that surrounds the pupil of the eye. It is the most permanent physical feature on the human body and is difficult to exchange throughout life.

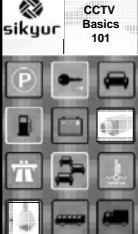
1. Scan
The user is positioned in front of the camera and the iris is scanned.

2. Iris captured
The iris is captured as a digital image of the eye. The image is then processed and converted into a template.

3. Template storage
The captured image is analyzed and the unique features are stored in a database.

4. Compare with database
The captured image is compared against the database and a match is determined.

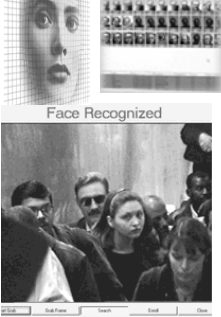
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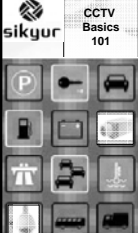
Futures – Biometric - Face

- Popular face recognition solutions (e.g., Visionics and Viisage) analyze facial characteristics with geometric point algorithms. It requires a digital camera to develop a facial image of the user for authentication and compares the image to a database.
- Real-time reliability of systems not much beyond 70% accuracy in real-world settings during last US gov. tests.

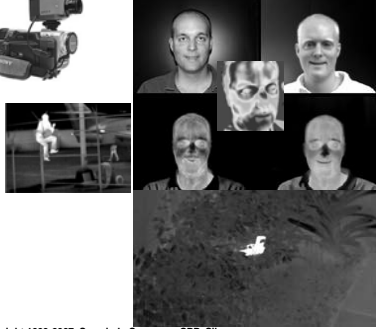
Face Recognized



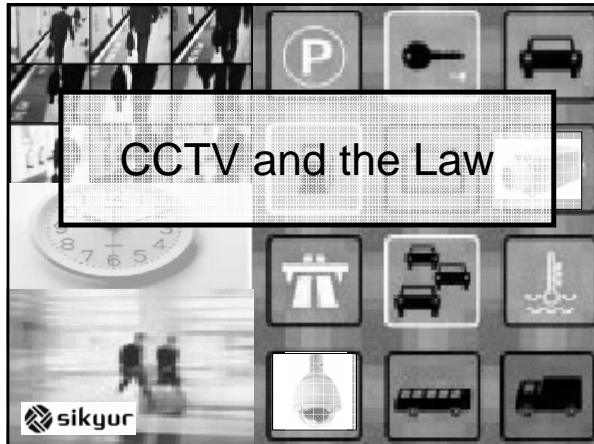
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Futures – Biometric - Thermal



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A graphic with a grid of icons similar to the first one. A central text box contains the title "CCTV and the law (a forecast)". Below the title is a bulleted list of six items. The Sikyur logo and "CCTV Basics 101" are on the left. A copyright notice is at the bottom.

CCTV and the law (a forecast)

- Video cameras may be used in public spaces, and proprietary places by the owner
- Using audio with video is growing in popularity and can be performed by monitoring companies, however check local laws for notice requirements and other regulations
- Privacy law will continue to play an important part of security
- Privacy advocates are expected to become more aggressive in their methods and tactics
- Within the alarm industry, video verification will increase in importance
- Industry driven, or government mandated certification and/or standardization of video monitoring is likely to occur.

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More information on CCTV

- CCTV Labs <http://focus.cctvlabs.com/>
- Security <http://www.secmag.com>
- Security Management <http://www.securitymanagement.com>
- Security Distributing & Marketing (SD&M) <http://www.sdmmag.com>
- Access Control <http://www.securitysolutions.com>
- Security Sales & Integration Magazine <http://www.securitysales.com>
- Security Technology & Design (ST&D) <http://www.st-and-d.com>
- Security Dealer <http://www.secdealer.com>
- Security Systems News <http://www.securitysystemsnews.com>
- Security Products <http://www.secproonline.com>
- Loss Prevention <http://www.losspreventionmagazine.com>

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Where to find more information on CCTV specification, integration, and monitoring



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