Video Surveillance System-Basics

presented by

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Acknowledgment:
Books:
Essential Guide to Video Processing by Al Bovik, Academic Press, 2009
Digital Video Surveillance and security by Anthony C Caputo, Elsevier Inc, 2010
Intelligent Surveillance Systems by Huihuan Qian, Xinyu Wu, Yangsheng Xu, Springer, 2011 and
Web sources

Surveillance: Everywhere!

Motivation

Security

- Huge threat on Human life pay attention

- Proliferation of camera sensors for security purposes.
  - **just as a forensic tool which lost its primary benefit.**
  - **Requirement is not only 24 hours monitoring.**
  - **Time is important.**
  - **Consistency in performance.**
- Need - smart surveillance
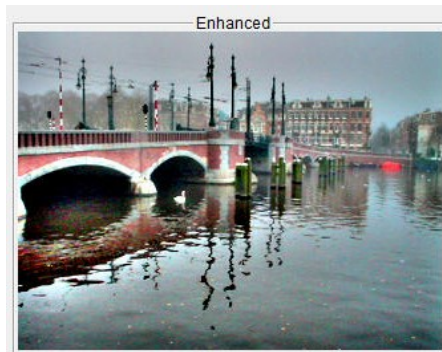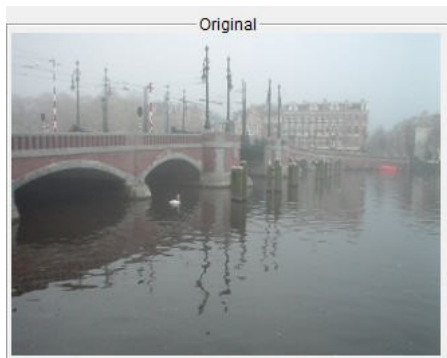
Computer Vision for Video Analytics

People Counting
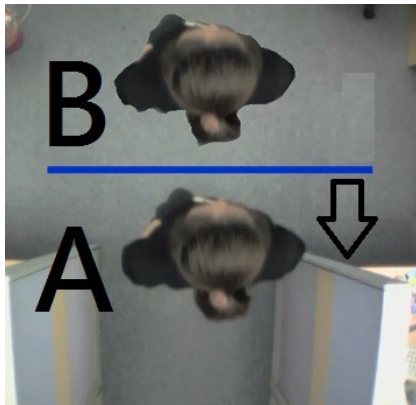
Panorama View

Defog

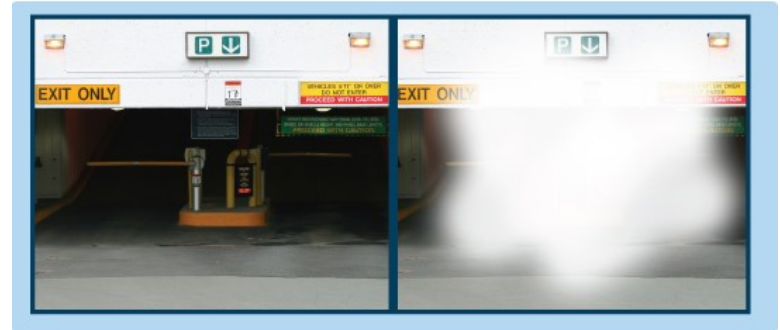## Stabilization

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Missing object detection   Scene change detection
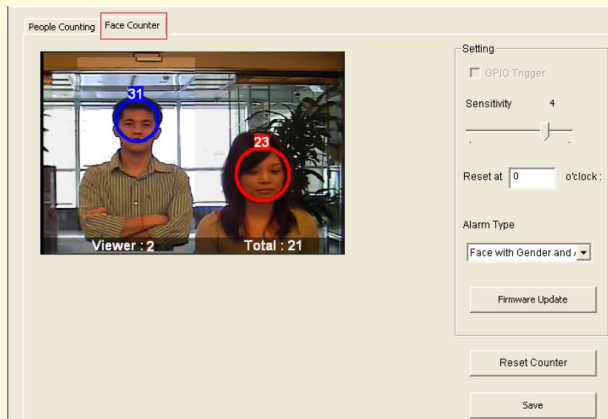

Unattended object detection

Crowd detection

Intrusion Alarm

Face counting

Traffic Monitoring

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Assisted driving

Pedestrian and car detection
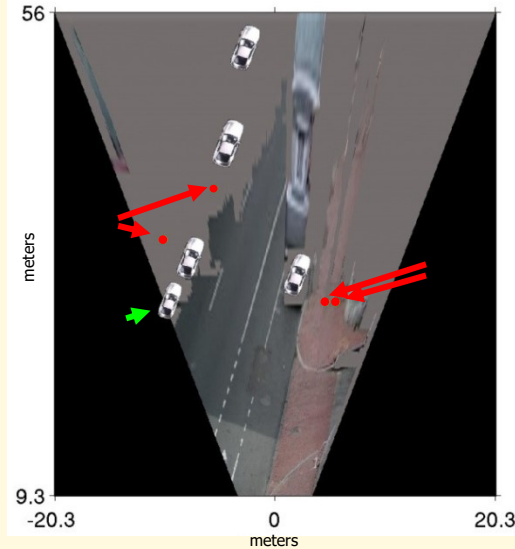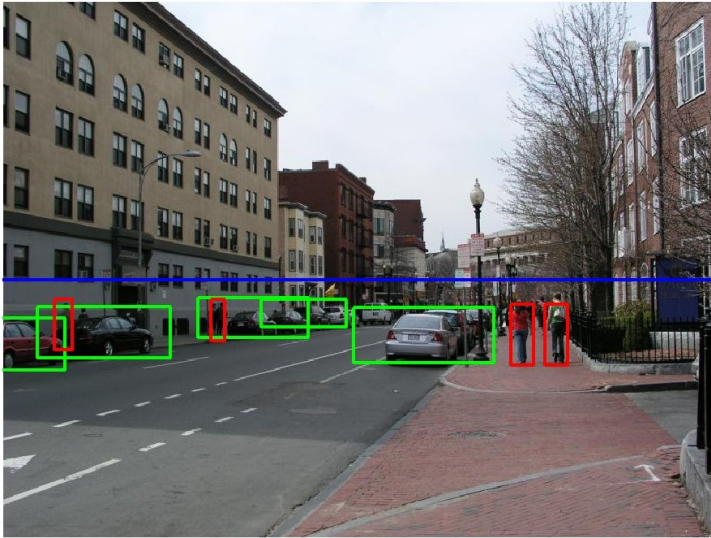
Lane detection
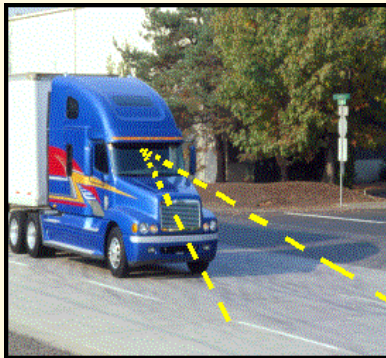
• Collision warning systems with adaptive cruise control,
• Lane departure warning systems,
• Rear object detection systems,

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Intelligent Video Surveillance 3/3
Typical problems

Metro station surveillance

Surveillance inside trains

Building access control

Airport monitoring

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INRIA

Typical CCTV Topology

Closed Circuit Television (CCTV)
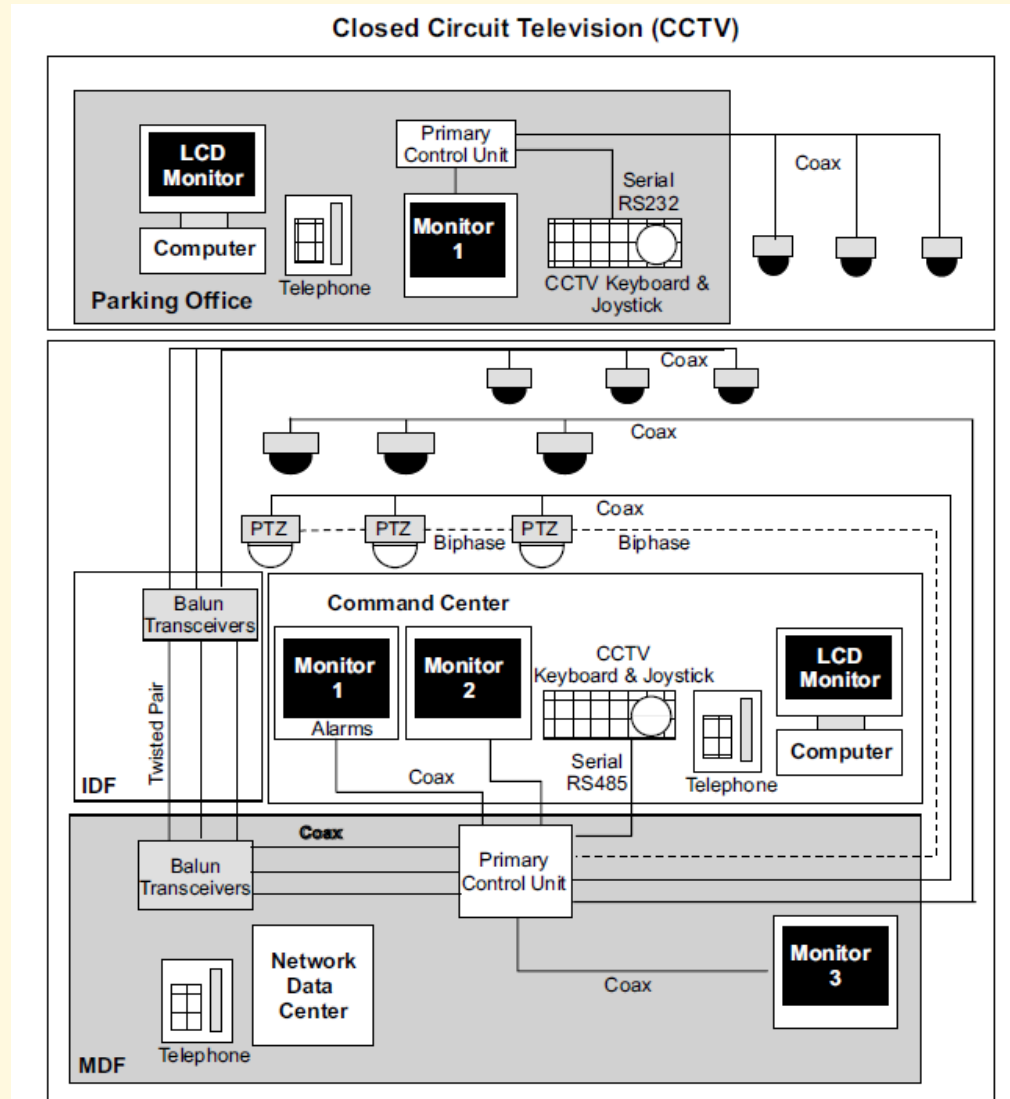
What is to be known before to design a architecture for a surveillance application
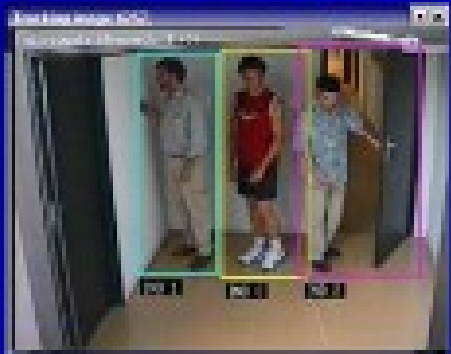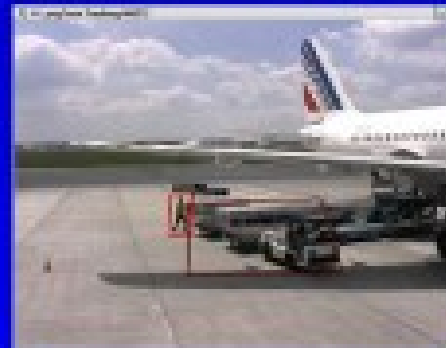
- ✓ Site Survey (Includes how cameras can be protected from weather)
- ✓ Topolgy
- ✓ Analog vs Digital
- ✓ Number of Cameras
- ✓ Type of Cameras
- ✓ CCD vs CMOS Sensors
- ✓ Lens Specification
- ✓ Surge Protector
- ✓ Co-axial cable
- ✓ Media Converter
- ✓ Digital Video Encoders
- ✓ Switch
- ✓ Storage (DVR vs NVR)
- ✓ Server
- ✓ Networking (Wired/Wireless)
- ✓ VMS
- ✓ Cost

❖ Make sure that whatever hardware you choose is fully compatible with the software.

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Analog Camera

IP Camera

Video Formats: CIF, QCIF
Resolution: MP:HD
Interlaced Vs. Progressive

IP Camera Cabling:

Analog Camera Cabling
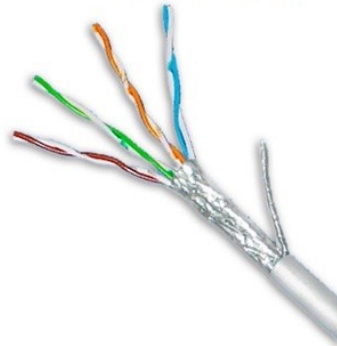
Twisted Pair Network Cable

Coaxial Cable

RJ45 terminated cables

BNC terminated cables

Fixed Camera   PTZ Camera   Moving Camera

Fixed Camera Mount

Moving Camera Mount

PTZ Camera Mount

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Indoor/Dome Camera (Retail Surveillance)

Bullet Camera

Outdoor Camera (Parking Lot) (PETS)

Box Camera

Day/Night Camera

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Analog vs Digital Video

F-Stop : The *f-stop* is the method of measurement for the iris opening of the lens aperture.

Lenses are labeled with their widest f-stop, which is the largest iris aperture of which the lens is capable

Shutter speed : Shutter speed also controls how well the camera captures movement. Faster shutter speeds are able to capture movement clearly, whereas slower shutter speeds allow for more light but sacrifice clarity of moving objects

Focus- Manual vs Auto

Lens: Zoom vs Fixed
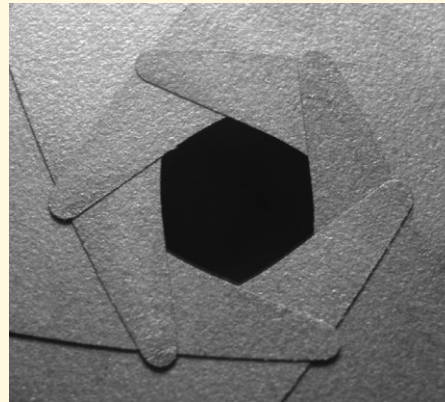
Lens: Plastic Vs Glass

Plastic

Glass

Vandal Resistant

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CMOS vs CCD Sensors

CMOS Security Camera
Strengths
- High resolution
- Excellent color
- Fast frame rate
- Low power consumption
- Cost-effective

Weeknesses:
- High noise
- Moderate sensitivity

CCD Security Camera
Strengths:
- Good performance in low-light conditions
- Good WDR
- Less susceptible to vibration effect
- Low noise
- High sensitivity
- High definition

Weaknesses:
- High power consumption
- Slow frame rate
- Expensive

Use CMOS security cameras in covert environments.
Compact size.

You can opt to security cameras with CCD image sensors when you want to install your security cameras in dark environments

CMOS and CCD sensors are typically measured in either millimeters or inches.
The majority of security cameras use anywhere from a ¼- to a 2/3-inch sensor

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Power Over Ethernet

- •NVR systems utilizing power-over-ethernet (POE) technology. Only require Ethernet cable to connect camera and recorder.
- •The Ethernet cable clicks into the back of the NVR and IP camera. This cable provides both power and video transmission.

Networking: Wired vs Wireless

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NVR vs DVR

Bandwidth and hard drive space are crucial components in determining the level of digital video quality required.

Megapixel cameras provide more detail in the archived footage to provide added value at the cost of more bandwidth and storage requirements.

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NVR	DVR
A network video recorder is considered a complete Internet Protocol camera recording system and is mostly used in Internet Protocol video surveillance systems	A digital video recorder (DVR) is a consumer electronics device designed for recording video in a digital format within a mass storage device such as USB flash drive, hard disk drive or any other storage device
A network video recorder does not use any dedicated hardware for video capture but makes use of special software on a dedicated device.	It is mostly used in analog surveillance/security systems.
It can record as well as access recorded images and live views.	
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