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Tutorial

Surveillance Technologies
Beyond State-of-the-Art

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Dr. R. Reda, ICTmc
Topics:

* Advanced Surveillance Techniques
* Communication Technologies for Surveillance
* Processing Power driving Surveillance Business
* Multi-Sensor Surveillance Technologies
* Surveillance and Physical / Cyber Security
* Smart Home & Home Security
* Satellite Surveillance
The Big Controversy

Technology
Money
Security
Business World ?
Future ????????
### Big natural disasters

<table>
<thead>
<tr>
<th>Deaths</th>
<th>Date</th>
<th>Disaster</th>
<th>City</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>230.000</td>
<td>26.12.04</td>
<td>Indian Ocean Tsunami</td>
<td></td>
<td>Indonesia</td>
</tr>
<tr>
<td>222.000</td>
<td>12.01.10</td>
<td>Haiti Earthquake</td>
<td>Port-au-Prince</td>
<td>Haiti</td>
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<tr>
<td>79.000</td>
<td>08.10.05</td>
<td>Kashmir earthquake</td>
<td></td>
<td>Pakistan</td>
</tr>
<tr>
<td>15.000</td>
<td>June 2010</td>
<td>Russian heat wave</td>
<td></td>
<td>Russia</td>
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</tbody>
</table>
## List of non-natural catastrophies

<table>
<thead>
<tr>
<th>Deaths</th>
<th>Date</th>
<th>Catastrophy</th>
<th>City</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>2976</td>
<td>11.09.01</td>
<td>September 11, WTC</td>
<td>New York City</td>
<td>USA</td>
</tr>
<tr>
<td>796</td>
<td>14.08.07</td>
<td>Yasidi bombings</td>
<td>Qahtaniya</td>
<td>Iraq</td>
</tr>
<tr>
<td>334</td>
<td>01.09.04</td>
<td>Beslan School Hostage</td>
<td>Beslan</td>
<td>Russia</td>
</tr>
<tr>
<td>209</td>
<td>11.07.06</td>
<td>Mumbai train bombings</td>
<td>Mumbai</td>
<td>India</td>
</tr>
<tr>
<td>191</td>
<td>11.03.04</td>
<td>Madrid Bombings</td>
<td>Madrid</td>
<td>Spain</td>
</tr>
<tr>
<td>173</td>
<td>26.11.08</td>
<td>Mumbai attacks</td>
<td>Mumbai</td>
<td>India</td>
</tr>
<tr>
<td>110</td>
<td>10.10.08</td>
<td>Orakzai bombing</td>
<td>Orakzai agency</td>
<td>Pakistan</td>
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<tr>
<td>103</td>
<td>16.10.06</td>
<td>Digampathana bombing</td>
<td>Dambulla</td>
<td>Sri Lanka</td>
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<td>52</td>
<td>07.07.05</td>
<td>London bombings</td>
<td>London</td>
<td>UK</td>
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<tr>
<td>32</td>
<td>16.04.07</td>
<td>Virginia Tech massacre</td>
<td>Blacksburg</td>
<td>USA</td>
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<tr>
<td>17</td>
<td>26.04.02</td>
<td>Erfurt massacre</td>
<td>Erfurt</td>
<td>Germany</td>
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<tr>
<td>16</td>
<td>11.03.09</td>
<td>Winnenden school shooting</td>
<td>Winnenden</td>
<td>Germany</td>
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<tr>
<td>12</td>
<td>20.04.99</td>
<td>Columbine High School Masacre</td>
<td>Columbine</td>
<td>USA</td>
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</table>
## Bank Robberies

<table>
<thead>
<tr>
<th>Value</th>
<th>Date</th>
<th>Disaster</th>
<th>City</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>$65m</td>
<td>06.08.09</td>
<td>Graff Diamonds robbery 2</td>
<td>London</td>
<td>UK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Securitas depot cash robbery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$92.5m</td>
<td>21.02.06</td>
<td>Securitas depot cash robbery</td>
<td>Kent</td>
<td>UK</td>
</tr>
<tr>
<td>$41.5m</td>
<td>20.12.04</td>
<td>Northern Bank robbery</td>
<td>Belfast</td>
<td>Northern Ireland</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agricultural Bank of China</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$6.7m</td>
<td>16.03.06</td>
<td>Northern Bank robbery</td>
<td>Hebei</td>
<td>China</td>
</tr>
<tr>
<td>$94.3m</td>
<td>07.08.05</td>
<td>Banco Central burglary</td>
<td>Fortaleza</td>
<td>Brazil</td>
</tr>
<tr>
<td>$1.8m</td>
<td>30.12.07</td>
<td>Chelembra bank robbery</td>
<td>Kerala</td>
<td>India</td>
</tr>
</tbody>
</table>
# Art Crimes

<table>
<thead>
<tr>
<th>Value</th>
<th>Date</th>
<th>Disaster</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>$123m</td>
<td>20.05.10</td>
<td>Pablo Picasso painting stolen</td>
<td>Paris</td>
</tr>
<tr>
<td>$163m</td>
<td>11.02.08</td>
<td>Monet, Degas, Van Gogh, Cezanne stolen</td>
<td>Zurich</td>
</tr>
<tr>
<td>$55m</td>
<td>20.12.07</td>
<td>Picasso, Portinari stolen</td>
<td>São Paulo</td>
</tr>
<tr>
<td>$47m</td>
<td>21.01.06</td>
<td>Saliera stolen</td>
<td>Vienna</td>
</tr>
<tr>
<td>$612</td>
<td>12.06.08</td>
<td>Picasso et al stolen</td>
<td>São Paulo</td>
</tr>
<tr>
<td>$133m</td>
<td>27.08.03</td>
<td>Da Vinci Painting stolen</td>
<td>Drumlannig Castle</td>
</tr>
</tbody>
</table>
Do we have SECURITY?
Tools Available to Achieve Site Security

- Encryption
- Firewalls
- Security Tools
- Network Security Protocols
- Access Controls
- Virtual Private Networks
- Authentication
- Tunneling
- Proxy/Agent Systems
- Intrusion Detection

Security Management
NASA – www.nasa.gov
Microsoft - www.microsoft.com
Sony Music www.sonymusic.com
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Security Management
Balance: A and C
SECURITY

The

R & D Trends
Information may take different physical forms...

... mechanical,

... or electronic,

... or bio-molecular,

... or quantum, etc.

There is no information without a physical carrier, and no computation without a physical process.

The laws of physics dictate what computations can
A classical bit is, at every point in time:
- either in state 1:
- or in state 0:

State of a classical bit: $b \in \{0,1\}$

A quantum bit (« qubit ») is, at every point in time:
- either in basis state $|1\rangle$:
- or in basis state $|0\rangle$:
- or in a superposition state, i.e. at the same time $|1\rangle$ and $|0\rangle$:

State of a qubit:
$|\psi\rangle \in E$

where $E$ is a 2-dimensional vector space
What Does it Mean- “Security”?

- Communications security
- Network security
- Information Security
- ???
- ?????
- ??????

Society Security
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GPU Block

128 Thread Processors execute kernel threads
Up to 12,288 parallel threads active
Per-block shared memory (PBSM) accelerates processing
Streaming Multiprocessor (SM)

- Processing elements
  - 8 scalar thread processors (SP)
  - 32 GFLOPS peak at 1.35 GHz
  - 8192 32-bit registers (32KB)
    - ½ MB total register file space!
  - usual ops: float, int, branch, ...

- Hardware multithreading
  - up to 8 blocks resident at once
  - up to 768 active threads in total

- 16KB on-chip memory
  - low latency storage
  - shared amongst threads of a block
  - supports thread communication
GPU Computing Example Markets

- Computational Geoscience
- Computational Chemistry
- Computational Medicine
- Computational Modeling
- Computational Science
- Computational Biology
- Computational Finance
- Image Processing
GPU Applications Examples:

- 3D image analysis
- Adaptive radiation therapy
- Acoustics
- Astronomy
- Audio
- Automobile vision
- Bioinformatics
- Biological simulation
- Broadcast
- Cellular automata
- Computational Fluid Dynamics
- Computer Vision
- Cryptography
- CT reconstruction
- Data Mining
- Digital cinema/projections
- Electromagnetic simulation
- Equity training
- Film
- Financial - lots of areas
- Languages
- GIS
- Holographics cinema
- Imaging (lots)
- Mathematics research
- Military (lots)
- Mine planning
- Molecular dynamics
- MRI reconstruction
- Multispectral imaging
- nbody
- Network processing
- Neural network
- Oceanographic research
- Optical inspection
- Particle physics
- Protein folding
- Quantum chemistry
- Ray tracing
- Radar
- Reservoir simulation
- Robotic vision/Al
- Robotic surgery
- Satellite data analysis
- Seismic imaging
- Surgery simulation
- Surveillance
- Ultrasound
- Video conferencing
- Telescope
- Video
- Visualization
- Wireless
- X-ray
ICT - Emerging & Future Technologies

FI The Big Picture

Future Universal Network FUN

Wireless Standards
- 3G
- MBWA
- WAN
- 4G
- LAN
- 5G
- 6G

Wireless Technologies
- MY
- HPC
- CPU
- GPU

Nodes
- DSL
- CATV
- TP
- QP

Fixed Technologies
- IN
- NGN
- IMS
- IPV6

Convergence
- IP
- ALL-IP

Core Network

2005

2020

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Wireless Standards

MBWA
- WCDMA
- GPRS
- EDGE

WAN
- WiMAX

MAN
- Wi-Fi

LAN
- RFID/TAG
- UWB
- Bluetooth
Thank you, Steve Sutor

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