SMART border for cargo, passenger and transport - practical implementations and best practices

Jonathan Koh

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Nuctech - Introduction

Nuctech Company Limited, originated from Tsinghua University, is a Global Leading security inspection system manufacturer & solutions provider.

Founded in 1997
Staff: 5000+ personnel
Products: Exports to 160+ countries and regions
Original Inventions & Innovations

An Innovation Leader in X-Ray Scanner and Inspection

1st Mobile Inspection System

1st Re-locatable Cargo Vehicle Inspection System

1st Liquid Inspection System

Neutron/Dual-Energy X Ray Inspection System

1st Fast Scan System

1st Train Vehicle Inspection System

1st Dual Energy-Dual Angle Inspection System

3-rail Railway Container Inspection System
Comprehensive Product Range

We now have 30+ series and 200+ varieties of security products used in Customs, Civil Aviation, Railway, Urban Transit, Judiciary, and Big Events.
## Global Market Share

For Container / Vehicle Inspection Category, Nuctech currently holds the largest market share.

<table>
<thead>
<tr>
<th>Company Name</th>
<th>2016 Share</th>
<th>2017 Share</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuctech</td>
<td>41.2%</td>
<td>39.6%</td>
<td>-1.6%</td>
</tr>
<tr>
<td>Rapiscan Systems</td>
<td>27.1%</td>
<td>26.7%</td>
<td>-0.4%</td>
</tr>
<tr>
<td>Smiths Detection</td>
<td>14.8%</td>
<td>10.8%</td>
<td>-3.9%</td>
</tr>
<tr>
<td>L-3 Security and Detection Systems</td>
<td>1.7%</td>
<td>8.6%</td>
<td>6.9%</td>
</tr>
<tr>
<td>Astrophysics</td>
<td>3.7%</td>
<td>3.7%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Others</td>
<td>11.5%</td>
<td>10.6%</td>
<td>-0.9%</td>
</tr>
</tbody>
</table>

Source: IHS Research
Nuctech’s SMART CUSTOMS

Revenue Systems & Solutions
- Customs Mgt System (ViSight)
- Revenue & Tax (ViTax)
- E-Commerce

Facilitation
- National Single Window
- Port Community System
- Cargo Community System

Security
- Centralised Command (ViCentre)
- Cargo Tracking (ViTracking)
- Border Post Management (ViBorder)

Strategic Consulting
- Trade Facilitation Strategy
- Artificial Intelligence
- E-Commerce

Inspection Equipment & Devices
- CT / X-Ray Scanners
- Smart Gates
- E-Seals
- Robotics
Integrated SMART CUSTOMS

**Single Window**
- Clearance management
- Risk control
- Release management
- Inspection management
- Duty collection

**Customs Management System**
- Risk assessment
- Trade statistics
- Operational statistics
- Strategic decision-making
- Anti-smuggling assistance

**Automatic reconciliation of data & physical cargo**

**Big Data**

**Logistics Supervision Platform**
- Intelligent inspection equipment
- Intelligent inspection system
- IOT terminals
- Logistics monitoring system
- Logistics warehousing system
NUCTECH’s Smart Border Solutions
Border Solution

Facilitating People, Vehicles and Cargo
“One-stop” Border clearance

Cargo inspection + Access Control

Systems

Equipment

Site Facilities
## Functionalities of the Vi-Border Solution

<table>
<thead>
<tr>
<th>Information service construction</th>
<th>Infrastructure</th>
<th>Facility service construction</th>
<th>Consulting service construction</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Icon" /> Intelligent inspection and release</td>
<td><img src="image" alt="Icon" /> Site management</td>
<td><img src="image" alt="Icon" /> Monitoring and commanding center</td>
<td><img src="image" alt="Icon" /> Integrated service platform</td>
</tr>
</tbody>
</table>

**Consulting service construction**
- Business process construction
- Operation mode construction
- Data service construction

**Responsible authorities/platforms**
- Customs
- The Ministry of State Security
- The Ministry of Transport
- State Immigration Administration
- OGA
- Logistics companies
- Banks

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Arrival Registration

Arrival Info.  
Reg. Checkpoint  
X-ray Scanning Area  
Waiting Area  
Physical Inspection Area  
Self-service Release Checkpoint
X-ray Scanning Area

- Arrival Info.
- Reg. Checkpoint
- X-ray Scanning Area
- Waiting Area
- Physical Inspection Area
- Self-service Release Checkpoint
Cargo Clearance Process – Waiting Area


Complete relevant images review and comprehensive inspection

According to the information system, automatically send the release conclusion to LED screen

LED screen guides vehicles to the next step
Cargo Clearance Process – Physical Inspection Area
Self-Service Release Checkpoint

- Arrival Info.
- Reg. Checkpoint
- X-ray Scanning Area
- Waiting Area
- Physical Inspection Area
- Self-service Release Checkpoint
Main Equipment & Facilities

- Self-service Business Declaration Terminal
- Human Body Scanning Inspection Equipment
- Face Recognition and Smart Video Tracing
- Micro Measurement Human Body X-Ray Scanner
- Smart Luggage Inspection Equipment
- Mobile Terminal
- Special Inspection Toolkit
- Narcotics Detection Device
Smart Access

Main Functions:

- Passenger Declaration Inspection and Control
- Documents Read and Materials Obtaining
- Fingerprint Acquisition and Identification
- Face Acquisition and Recognition
- Inspector Monitoring & Patrol
- Abnormal Monitoring and Alarm
- Back-stage Management

Smart Access
Port Kolzhat of Kazakhstan

Port Kolzhat Land Border System was implemented in Oct 2018 with Pilot runs in early Apr 2019. Following benefits were realized:

**Improve Clearance Efficiency > 221%**
Before: Vehicles had to stop 10 times with clearance time of 90 mins.
After: Less stops for vehicles; clearance times within 28 mins.

**Automatic Collection Data**
Information - Vehicle dimensions, container No., Gross Axle Weight, X-ray Image, CCTV video and other information are automatically collected through integrated system.

**Visual Traffic Guidance**
Vehicles and passengers are automatically guided, for fast access.

**Intensify Business Query & Audit**
Each step is tracked and timed. Operation log can be audited and data can be mined and analyzed for further process improvements.
Cross Border / Transit

Customs A
- Scanning, Sealing
- Entry

Logistics Supervision Center

Check Station
- Statistics
- Scanning
- On-road Supervision
- Report Management
- Dispatching Management
- Inventory Management
- Intelligent Alerts
- Process Management
- Risk Analysis

Illegal Opening
- Low Battery
- Overtime Stay
- Lock Rod Broken

Check Point
- Sealing Area
- Registration Area

Scanning Area
- Positioning
- Temperature/Humidity
- Real-time Transmit
- WiFi Transmit

Exit

Customs B
- Scanning, Reconciliation, Unsealing
Transit Tracking Platform

Transit Logistics Tracking & Monitoring

- In-transit monitoring
- Smart Security Lock
- Intelligent image and document comparison
- Customs issues release notice

Cargo arrival ➔ E-Lock ➔ In transit ➔ Inspection & Sorting ➔ Cargo Storage ➔ Delivery
Way Forward

• Smart Borders is only part of the Border & Cargo Security Transport Chain

• A holistic approach is required – Integrated Solutions / Infrastructure and Business Model are critical for comprehensive smart border / cargo transit management

• Leveraging on new technologies are the way forward –
  • IoT Device / Cloud
  • Artificial Intelligence
  • Blockchain & Smart Contracts
Challenge

• No classification by vehicles type and model
• No classification by cargo type
• No classification by sized items type
• No classification by sized items location

Library sorted by vehicles type and model

- # Hatchback # VW Golf
- # Minivan # VW Transporter
- # SUV # MB ML

Library sorted by cargo type (HS codes)

- # Potato chips HS 1105
- # Apples HS 0808

Library sorted by sized items type and location

- # Drugs # Truck # Floor
- # Tabaco # SUV # Tank
Nuctech’s Artificial Intelligence Platform

is an NUCTECH’s Artificial Intelligent Platform. It is designed to reduce interpreter burden and speed up the whole analysis process.
For abnormal detection, wiSpot can detect inconsistent vein and find the items hidden in the container, or identify whether the container is empty as it is declared.
For certain contrabands detection, wiClue can automatically locate some certain contrabands. e.g. cigarettes, bottled liquor, high atomic number material and illegal weapons.
Where manifest data are provided, wiLable can help the operators to check whether cargo in containers matches with the information in customs declaration.
Reference for Images without Manifest

The scanned image or manifest data of similar cargos can be retrieved from a database for quick reference.

<table>
<thead>
<tr>
<th>Manifest</th>
<th>Refrigerator</th>
<th>Refrigerator</th>
<th>Refrigerator</th>
<th>Refrigerator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Similarity</td>
<td>96%</td>
<td>94%</td>
<td>87%</td>
<td>82%</td>
</tr>
</tbody>
</table>
wiScan+ Customization

Can be customized for specific requirements.

We need:
- Scanning Image
- Manifest Information
- Inspection Conclusion

We do:
- Data Mining
- Deep Learning
- Follow-up Training
Thank You