Simplifying Infrastructure For Expanded Uses Of Computer Vision In Safety & Security

Nigel Steyn
EMEA Safety & Security | Industrial Edge | Computer Vision
Nigel.Steyn@Dell.com
We’re a technology leader with innovation at our core, fueled with sustained, aggressive investment in R&D and engineering, empowered by our seven Strategically Aligned Businesses (SAB’s) and our massive Partner Ecosystem.

- #1 virtualization, storage, servers, client
- 27,234 patents and applications
- $20B R&D investment in the last five fiscal years
- $4.5B annual future R&D investment
- $100M annual Dell Technologies Capital investment
- 85% software engineers on ISG engineering staff
- $100M annual future R&D investment
What our global team does

Safety and Security – Surveillance

Industrial Edge - IoT

Computer Vision – Data Analytics
Future growth of data and technologies

41.6 billion
IoT devices by 2025 – 75% growth over 2019¹

79.4 ZB
data from IoT cameras and other devices in 2025, up from 13.6 ZB in 2019¹

40.4%
CAGR in enterprise safety and security data driven by²:

Higher-resolution cameras
- Full HD 1920x1080 – 12.7GB/hour
- 4K 3840x2160 – 110GB/hour
- 5K 5120x2160 – 256GB/hour
- Full 8K 7680x4320 – 4.4TB/hour

Multitude of sensor data including audio and environment

16.2%
annual growth in surveillance cameras and drones¹

 Longer retention times

New use cases and devices

(1) IDC, Worldwide Global DataSphere IoT Device and Data Forecast, 2019–2023
(2) IHS Markit, Enterprise and IP Storage Used for Video Surveillance Report 2019
Making It Real
McDonalds
Store Vision of the Future
Challengers

- Lack of Thermal Checks
- Various manual temperature checks, to ensure compliance with local regulations and food safety standards.
- Manual reporting and data capturing
- Food spoilage and stock loss
- Appliance breakdowns
- Inefficient use of Energy, Gas & Water
- Lack of visibility on appliance performance.
Store of the future

DATA VISUALIZATION
DATA ACCUMULATION & ANALYSIS AI | ML
DATA AGGREGATION
DEVICE CONNECTIVITY – GATEWAY

VOLTAGE SENSOR
AMBIENT ROOM TEMPERATURE
AMBIENT ROOM TEMPERATURE
OCCUPANCY SENSOR
CURRENT SENSOR
TEMPERATURE MONITORING

TAKE AWAYS
## McDonalds Central Bureau

![Image of a dashboard showing equipment status and energy consumption](image)

<table>
<thead>
<tr>
<th>Equipment ID</th>
<th>Type - Cold Service</th>
<th>Section</th>
<th>Storage</th>
<th>Operations</th>
<th>Service</th>
<th>Daily Report</th>
<th>Devices Health</th>
<th>Alarms</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS 01</td>
<td>Bread Oven</td>
<td>Prep</td>
<td>187</td>
<td>min/24h</td>
<td></td>
<td>11</td>
<td>8.98 kWh</td>
<td>26 min/24h</td>
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<tr>
<td>HS 02</td>
<td>Roll Warmer</td>
<td>Service</td>
<td>32</td>
<td>min/24h</td>
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<td>0.9</td>
<td>0.54 kWh</td>
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<td>Chip Dump</td>
<td>Hot Section</td>
<td>32</td>
<td>min/24h</td>
<td></td>
<td>3</td>
<td>1.47 kWh</td>
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<tr>
<td>HS 04</td>
<td>Side Bain Marie Bath</td>
<td>Hot Section</td>
<td>179</td>
<td>min/24h</td>
<td></td>
<td>2</td>
<td>4.32 kWh</td>
<td></td>
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<td>HS 05</td>
<td>Rice Cooker</td>
<td>Cold Section</td>
<td>93</td>
<td>min/24h</td>
<td></td>
<td>0.6</td>
<td>0.34 kWh</td>
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<tr>
<td>HS 06</td>
<td>Chip Fryer</td>
<td>Hot Section</td>
<td>201</td>
<td>min/24h</td>
<td></td>
<td>5.5</td>
<td>9.07 kWh</td>
<td></td>
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<tr>
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<td>Fish Fryer</td>
<td>Hot Section</td>
<td>196</td>
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<td></td>
<td>5.5</td>
<td>11.67 kWh</td>
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<tr>
<td>HS 08</td>
<td>Calamari Fryer</td>
<td>Hot Section</td>
<td>n/a</td>
<td>min/24h</td>
<td></td>
<td>5.5</td>
<td>0 kWh</td>
<td></td>
</tr>
<tr>
<td>HS 09</td>
<td>Coffee Machine</td>
<td>Hot Section</td>
<td>179</td>
<td>min/24h</td>
<td></td>
<td>4.5</td>
<td>9.55 kWh</td>
<td></td>
</tr>
<tr>
<td>HS 10</td>
<td>Cup Warmers</td>
<td>Hot Section</td>
<td>0</td>
<td>min/24h</td>
<td></td>
<td>2</td>
<td>0 kWh</td>
<td></td>
</tr>
</tbody>
</table>

**Equipment IDs**
- **CS 01**: Cold Section Fridge
- **CS 02**: Sushi Fridge 1
- **CS 03**: Sushi Fridge 2
- **CS 04**: Upright Grill Fridge

**Energy Consumption**
- Bread Oven: 11 kW, 8.98 kWh
- Roll Warmer: 0.9 kW, 0.54 kWh
- Chip Dump: 3 kW, 1.47 kWh
- Side Bain Marie Bath: 2 kW, 4.32 kWh
- Rice Cooker: 0.6 kW, 0.34 kWh
- Chip Fryer: 5.5 kW, 9.07 kWh
- Fish Fryer: 5.5 kW, 11.67 kWh
- Calamari Fryer: n/a, 0 kWh
- Coffee Machine: 4.5 kW, 9.55 kWh
- Cup Warmers: 2 kW, 0 kWh
- Cold Section Fridge: 0.335 kW, 2.13 kWh
- Sushi Fridge 1: 0.33 kW, 2.15 kWh
- Sushi Fridge 2: 0.33 kW, 2.17 kWh
- Upright Grill Fridge: 0.375 kW, 4.09 kWh

**Temperature Alarms**
- **Cold Section Fridge 2's temperature is below 0°C**
  - Tuesday, 03 September 2019 at 10:09:33
- **Bread Oven Door**
  - Opened for longer than 5 minutes.
- **Kitchen Door**
  - Left open for more than 15 minutes, please investigate.
- **Bar Door**
  - Left open for more than 15 minutes, please investigate.
Summary & Next Steps

Working with Dell Technologies across many Verticals:

- Retail
- Manufacturing
- Transport
- Healthcare
- Utilities
- Smart Cities
- Agriculture
- Drone Technologies
- Oil & Gas...

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