Thermal Vision

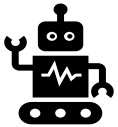
Human Based Monitoring

Solution Overview

May 2020

DELL Technologies

IoT Platform harnesses best-in-class performance of four key technologies:



ARTIFICIAL INTELLIGENCE

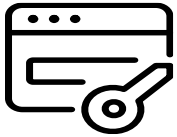
Leverages collected data to quickly analyze data

THERMAL IMAGING

Best in class thermographic cameras

MANAGED SERVICE

Managed service support and monitoring options



ENTERPRISE MANANGEMENT

Fleet management, enterprise interface with advance user privileges and IoT integrations.

Thermal Vision Overview

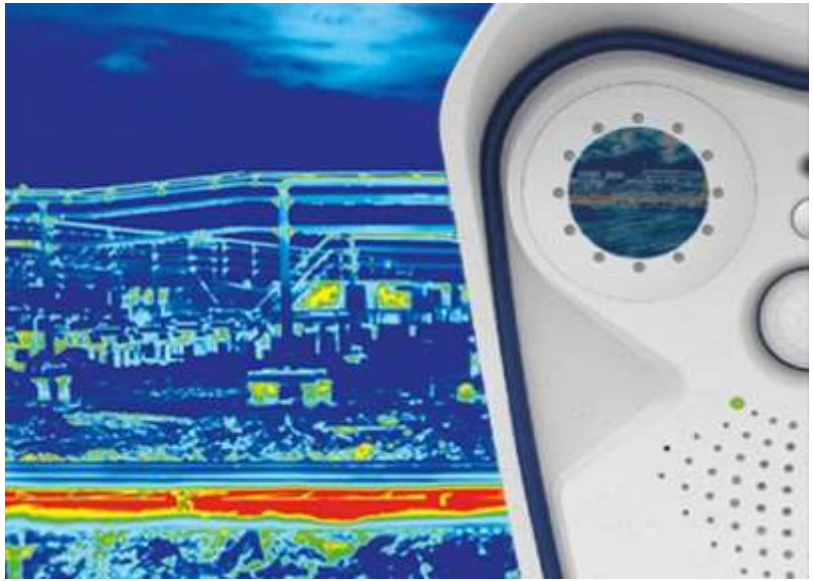
Utilizes thermal sensors to capture or detect thermal variance and compare against a known data set.

Many applications including:

- Identifying elevated body temperatures in point solutions or mass detection
- Mechanical conditions
- Combustion control

Thermal Vision combines thermal cameras, artificial intelligence to recognize slightest change in temperatures to create actionable outcomes.

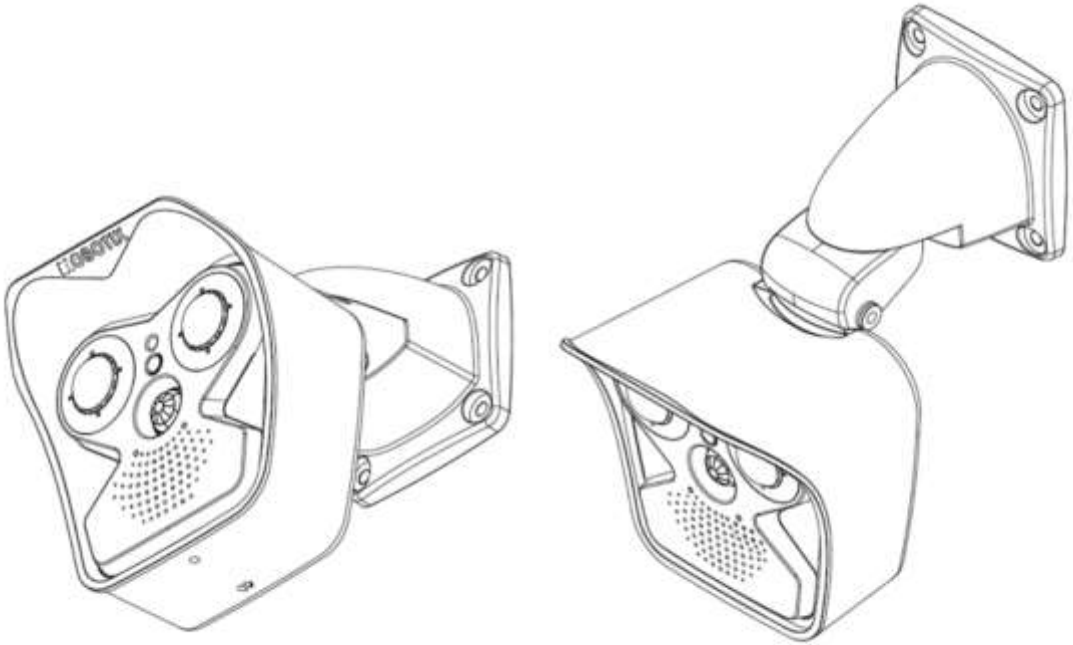
Thermal Vision Overview



- Detection of persons/objects Display of temperature differences from 0.1°C
- Alarm in case of exceeding or falling below defined temperature ranges
- Event Triggers (alarm, network message, activation of a switching output)
- Screening via special TR windows or the complete sensor image
- Temperature range from -40 to +550 °C
- Requires additional FDA approved body temperature screening tools

Not FDA Approved

MBX Physical Specs



Dimensions in mm

158 wide
210 high

Mounting Angle

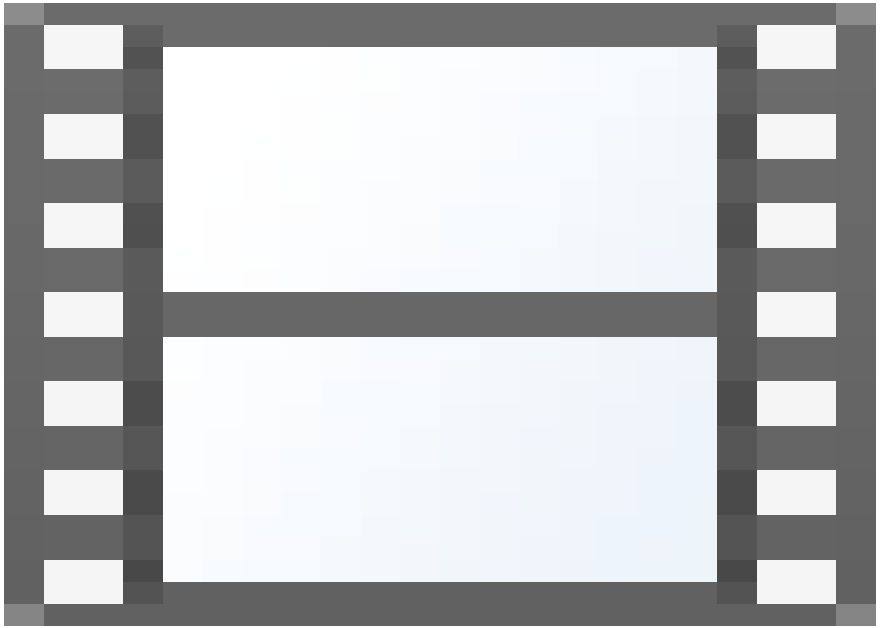
17^0 Up
90^0 Down
90^0 Horizontal

IntelliSite MBX hBM-X Screenshots

With Black Body Reference Temp

Pre-Recorded Demo

https://www.youtube.com/watch?v=-7Bu5xcBkUE&t=3s



Horizontal Use Cases

[1] When integrated into overall safety & security infrastructure

Advanced Capabilities

- AI-driven facial targeting software
- Align Thermal and RGB Camera Streams
- Isolate Faces for Thermal Evaluation
- Calibrate and Compare Temperatures
- Display and Store Detected Faces
- Social Distancing Analysis
- Mask Verification
- Contact Tracking [1]


Live Camera View
VIEW MODE
RGB Image
Thermal
CURRENT TIME
18:37:54 - Mon, 27 Apr 2020
DEEPVISION
AEROLINEAS ARGENTINAS
Concourse D,E,F,G,H
Concourse H, J
Women's Restroom
Concourse E,F,G
Concourse D
Men's Restroom
TEMPERATURE UNIT
Celcius
Fahrenheit
TEMPERATURE THRESHOLD
38.0 °C
Person
38.4 °C
TEMPERATURE ALERTS
18:26:07
Mon, 27 Apr 2020
38.4°C
18:32:41
Mon, 27 Apr 2020
39.1°C
36.8°C
36.3 °C
39.1 °C
36.1°C
-°C
-°C
37.1°C
38.4°C

IntelliSite

IntelliSite
deepvision
support@deepvisional.com

- Administration
- Camera listing
- Search
- Watchlist
- Analytics
- Alerts
- Logout

DEEPVISION

Notifications

Show dismissed notifications

ID: 85491455-be12-4731-af66-f90caa221c4c

Temperature: 38.4°C

Time: 18:27:12 - Mon, 27 Apr 2020

Temperature Verified

ID: 81cd9887-b280-4ae6-a8fc-cb8ff36f6b1c

Mark to Verify Temperature

Temperature: 39.1°C

Time: 18:32:41 - Mon, 27 Apr 2020

Temperature Not Verified

Thermal Vision Solution Overview

Solution Outline and Components

HARDWARE

- Thermal Camera
- Universal IoT Gateway (UIG®)
- Small Form Factor Workstation
- Touchscreen Display
- Cart

CONNECTIVITY

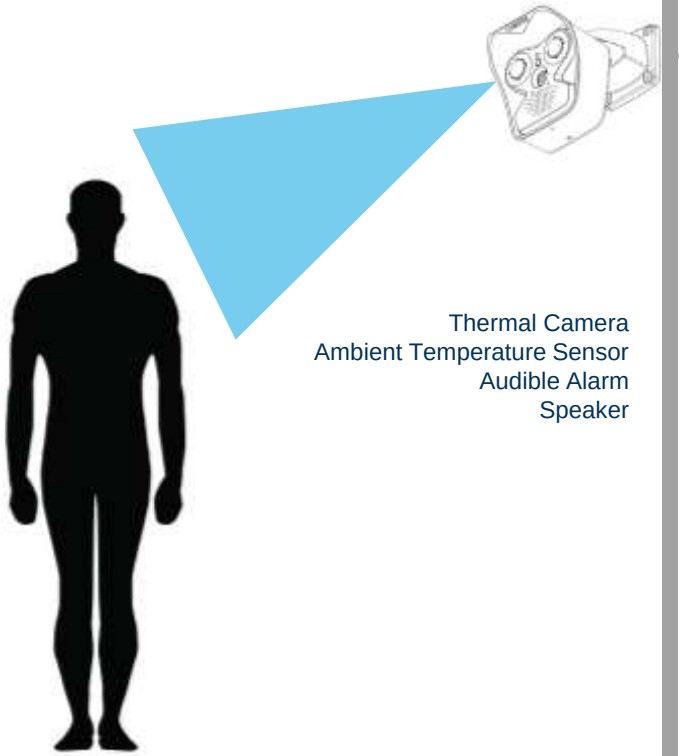
- 4G LTE / 5G Cradlepoint Router
- Wireless Service Plan (SIM card)
- Cloud-based Services

SOFTWARE

- Deep Vision AI Temperature Measurement Module
- IntelliSite IoT Platform
- IntelliSite Cloud Engine runs on any cloud or on-premise
- Easy Configuration and Deployment UI
- Alerts and Notification Panel
- Expandable AI-based software features on same platform

DELL Technologies

Centralized Configuration



Thermal Camera
Ambient Temperature Sensor
Audible Alarm
Speaker

1-10 AI Cameras per server

Management Servers

Storage

SOFTWARE

- Deep Vision AI Temperature Measurement Module
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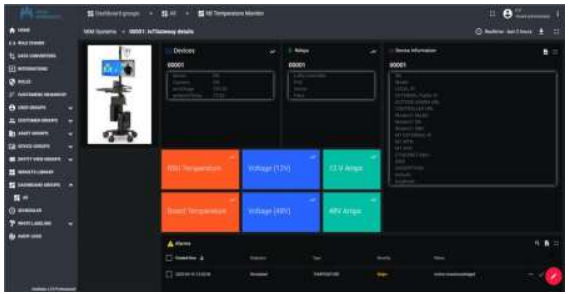
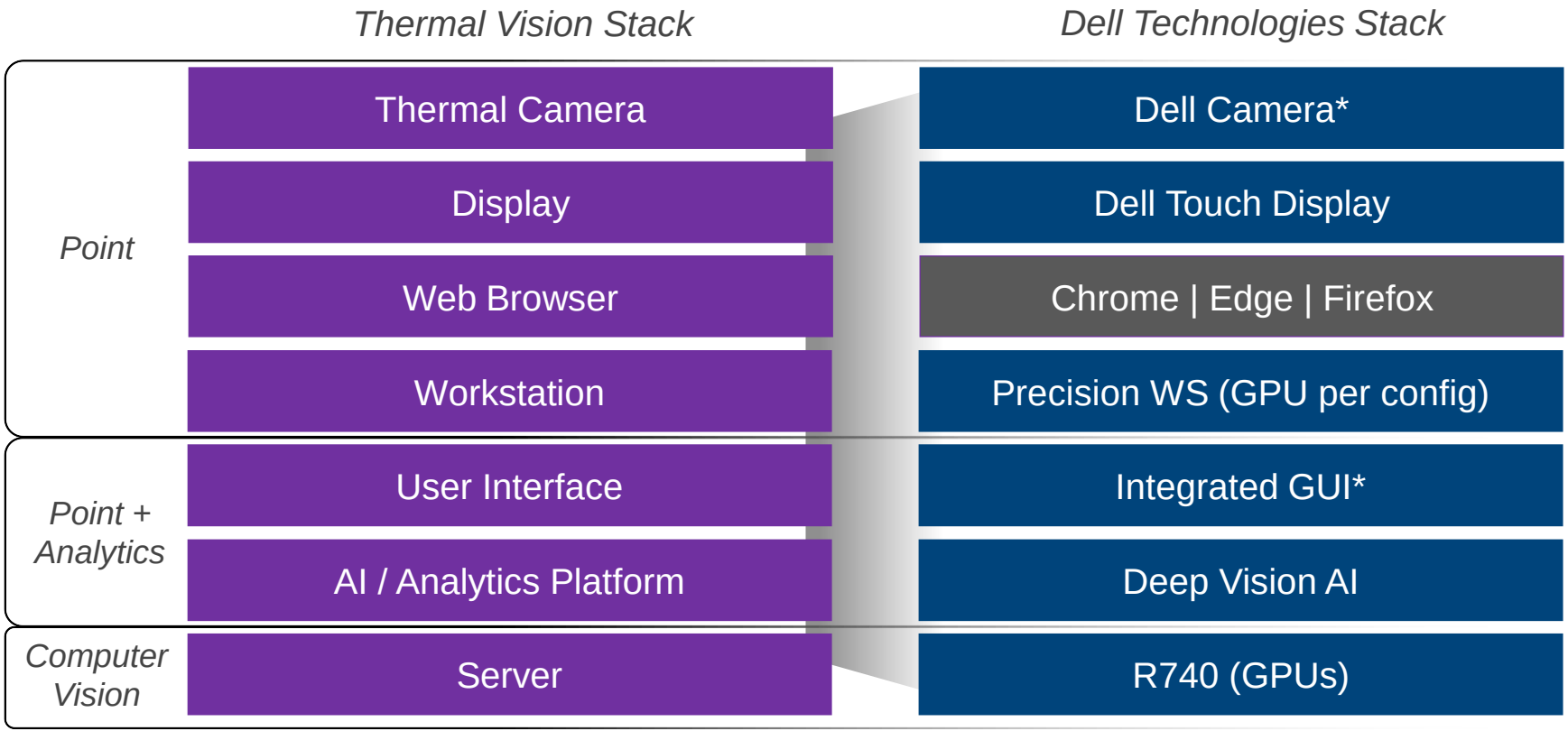


Dell Technologies Components



IntelliSite MBX hBM-X Enteprise vs Lite vs Centralized

Lite

- Thermographic Camera
- Mobile Cart
- Edge Computing
- UPS

Enterprise

- Thermographic Camera
- Mobile Cart
- Edge Computing
- UPS
- LTE for remote management and asset tracking
- Enterprise Management

(Cloud or on Premises)

- Fleet Management
- Integrated AI

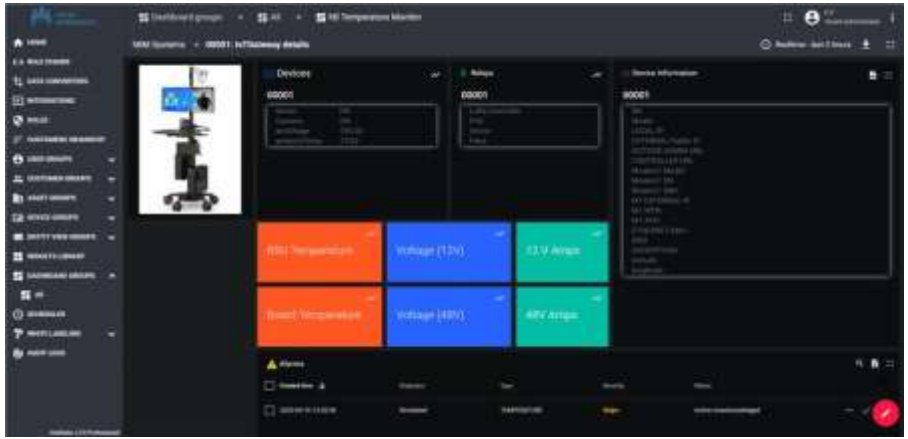
Centralized

- Thermographic Camera
- Datacenter Computing
- Storage (as needed)
- Enterprise Management

(Cloud or on Premises)

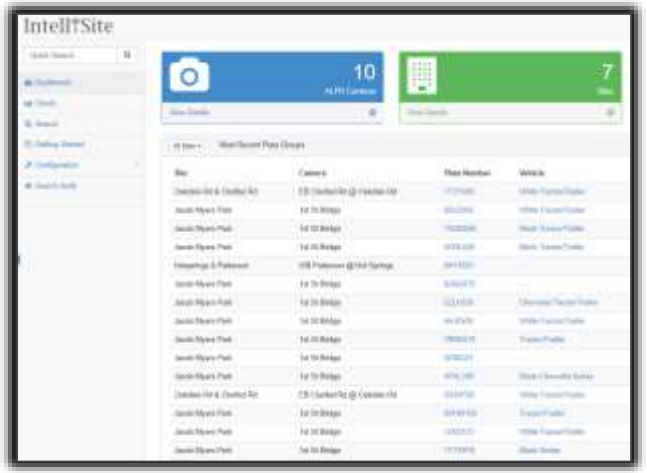
- Fleet Management
- Integrated AI

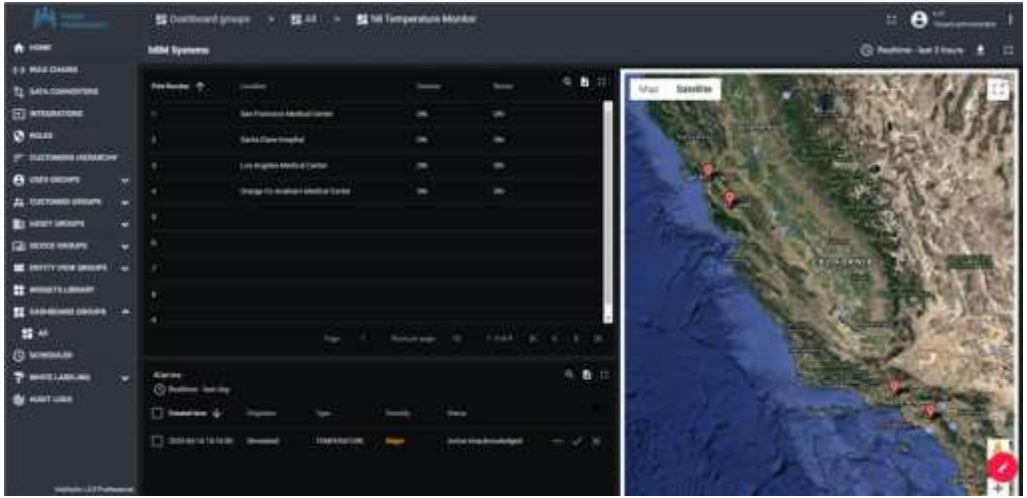
IntelliSite Cloud Engine for Enterprise Management



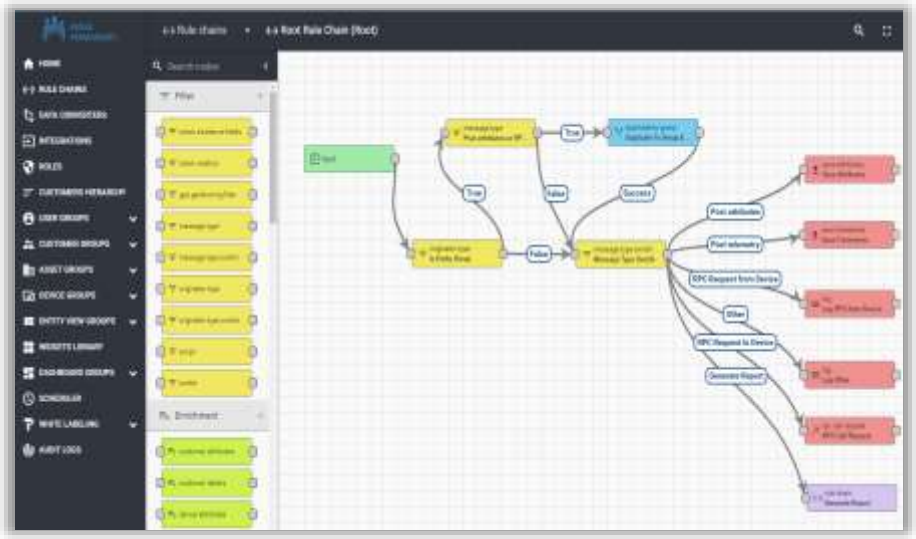
- Provision devices, assets and subscribers (i.e. consumers of the data, doctors, engineering staff, etc) and define relations between them.
- Collect and visualize data from devices and assets in the field.
- Analyze incoming telemetry and trigger alarms with complex event processing.
- Control your devices using remote procedure calls (RPC).
- Build work-flows based on device life-cycle event, REST API event, RPC request, etc
- Design dynamic and responsive dashboards and present device or asset telemetry and insights to your customers
- Enable use-case specific features using customizable rule chains.
- Push device data to external 3rd party systems.

Highly User-Customizable Web Interface





IntelliSite Cloud Engine: Rules Engine



- Data validation and modification for incoming telemetry or attributes before saving to the database.
- Copy telemetry or attributes from devices to related assets so you can aggregate telemetry. For example, data from multiple devices can be aggregated in related Asset.
- Create/Update/Clear alarms based on defined conditions.
- Trigger actions based on device life-cycle events. For example, create alerts if Device is Online/Offline.
- Load additional data required for processing. For example, load temperature threshold value for a device that is defined in Device's Customer or Tenant attribute.
- Trigger REST API calls to external systems.
- Send emails when complex event occurs and use attributes of other entities inside Email Template.
- User preferences are considered during event processing.
- Make RPC calls based on defined condition.
- Integrate with external pipelines like Kafka, Spark, AWS services, etc.

IntelliSite Asset Management IoT Sensors

Open / Close Sensor  Wireless sensor monitors Open/Close status of doors, windows, cabinets, etc.	**Infrared Motion Sensor**  Wireless motion sensor uses infrared sensing to accurately detect movements made by people/animals within 20ft range	**Dry Contact Sensor**  Wireless dry contact sensor detects contact between two wired contact points
Accelerometer Sensor  Wireless advanced vibration sensor uses an accelerometer to measure vibration and frequency on 3-axis (3D sensing)	**Activity Detection Sensor**  Wireless activity detection sensor detects sudden movement or vibration	**Magnet Detection Sensor**  Wireless magnet detection sensor detects the presence of a magnetic source. Measures movement and placement
Asset Tag Sensor  Wireless asset tag sensor outputs an RF signal at a set time interval to advertise the present of the attached object to be monitored	**Vehicle Detect-Counter Sensor**  Wireless vehicle detect/counter sensor detects the presence of a vehicle or count oncoming traffic utilizing a 9ft pneumatic tube	**Button Press Sensor**  Wireless touch activated sensor allows notification signal to be sent when immediate contact is important

IntelliSite Asset Management IoT Sensors

Ultrasonic Sensor  Wireless ultrasonic sensor measures distances between the sensor and objects in its path, such as solids, liquids, grain, etc.	**Flex Sensor**  Wireless flex sensor uses a flexible, stress sensitive ribbon to accurately measure the amount of bend (force) applied to the ribbon	**Flex Sensor**  Wireless pulse counter sensor can be integrated with a dry contact or mechanical switch to count the number of actuations
Propane Tank Monitor Sensor Wireless propane tank sensor monitors the level of propane tank by plugging in the R3D® (Remote Ready) into a pre-installed gauge	**Thermostat Control**  Wireless thermostat is designed for remote configurations with no manual adjustments button. Includes an IR (Presence) sensor	**Relay Control**  Wireless relay control allows a user to control two separate power relays (motors, pumps, electrical devices)
Local Alarm Notification  Wireless local alarm device receives critical notifications and sensor readings (audio alarm)		

IntelliSite Environmental IoT Sensors

Temperature Sensor  Monitors ambient temperature via accurate thermistor	**Thermocouple Sensor**  monitors temperature using a thermocouple. Supports very low & high temperature ranges	**Humidity Sensor**  Wireless Humidity sensor to monitor relative humidity of the air within a room or enclosure
Water Rope Sensor  Water Rope sensor detects liquid anywhere along the length of the detection rope	**Water Detect Sensor**  alerts when water is detected, preventing potential damage to property	**Carbon Monoxide (CO) Sensor**  Wireless Carbon Monoxide (CO) sensor to prevent gas poisoning
Light Meter Sensor  Wireless light sensor measures light in "lux" (luminescence / unit area) from 0 to 83,000 lux	**Tank Pressure Sensor**  Wireless pressure meter sensor monitors pressurized gas, liquid or vapor supply line	**Light Detection Sensor**  Wireless light detection sensor used to detect whether light is present or not. Calibrated to desired threshold

IntelliSite Environmental IoT Sensors

Differential Air Pressure Sensor  Wireless differential pressure sensor measures pressure difference between two input ports	**Air Quality (PM) Sensor**  Wireless air quality sensor (PM 2.5 um) measures PM1, PM2.5 & PM10 concentrations in the air	**Carbon Dioxide (CO2) Sensor**  Wireless carbon monoxide sensor monitors the level of carbon dioxide in the surrounding air
Air Velocity Sensor  air speed sensor measures air pressure between two input ports, determines speed	**Hydrogen Sulfide (H2S) Sensor**  Wireless hydrogen sulfide sensor to measure the gas level in the air	**Seat Occupancy Sensor**  Wireless seat occupancy sensor measures when (force) is applied, thus detecting seat occupancy
Grains per Pound Sensor  Wireless grains per pound sensor measures the mass in grains of H2O in otherwise dry air (weight of water in air)	**Compass Sensor**  Wireless compass sensor uses a highly sensitive 3 axis digital compass to return the orientation of the device	**Liquid Level Sensor**  Wireless liquid level sensor uses a sensitive ribbon to measure the level of liquid in a container

IntelliSite Power Management IoT Sensors

Voltage Meter Sensor (0-5 VDC)  Wireless voltage meter sensor measures the voltage off another device, battery or sensor up to 5 VDC (*Direct Current)	**Voltage Meter Sensor (0-10 VDC)**  Wireless voltage meter sensor measures the voltage off another device, battery or sensor up to 10 VDC (*Direct Current)	**Voltage Meter Sensor (0-50 VDC)**  Wireless voltage meter sensor measures the voltage off another device, battery or sensor up to 50 VDC (*Direct Current)
Voltage Meter Sensor (0-200 VDC)  Wireless voltage meter sensor measures the voltage off another device, battery or sensor up to 200 VDC (*Direct Current)	**Voltage Meter Sensor (0-500 VAC)**  Wireless voltage meter sensor measures the voltage off another device, battery or sensor up to 500 ADC (*Alternate Current)	**Voltage Detection Sensor (0-200 VDC)**  Wireless voltage detection sensor reports presence or absence of electricity, intended for DC source (i.e. batteries) up to 200 VDC
Voltage Detection Sensor (24-500 VAC)  Wireless voltage detection sensor reports presence or absence of electricity, intended for AC sources from 24 to 500 VAC)	**Resistance Sensor**  Wireless sensor outputs the current resistance across a load such as soil moisture probe or contact/continuity switch	**0-20mA Current Meter Sensor**  Wireless (0-20mA) current meter sensor monitors current off another device or sensor, up to 20mA (DC)
AC Current Meter Sensor  Wireless AC current sensor measures the RMS current of an Alternating Current (AC) system using a (CT) current transformer that wraps around the electric wire	**3-Phase Current Meter (150 Amp)**  Wireless 3-phase current meter (150Amp) reports RMS current of an alternating current (AC) system using 3 (CT) current transformers that wrap around the electric wires	**3-Phase Current Meter (500 Amp)**  Wireless 3-phase current meter (500Amp) reports RMS current of an alternating current (AC) system using 3 (CT) current transformers that wrap around the electric wires


DELL Technologies

Detailed Specifications MBX Thermographic Camera

Thermal image sensor	Uncooled microbolometer with 336 x 252 pixes, IR range 7,5 to 13,5 µm	
Sensitivity NETD (thermal resolution)	Typ. 50 mK, < 79 mK (50 mK is equal to temperature changes of 0,05°C)	
Thermal image representation	False colors or black and white	
Temperature measuring range (adjustable)	High Sensitivity: -40 to 160°C/-40 t0 320°F – Low Sensitivity: -40 to 550°C/-40 to 1022°F	
Temperature measuring method (via camera)	In the center of the image (2x2 pixels)	Complete image areas (customizable temperature measuremnt windows)
Max. accuracy of temperature measurement	+/– 20°C	+/– 10°C

Detailed Specifications MBX Thermographic Camera

Microprocessor	i.MX 6 Dual Core incl. GPU (1 GB RAM, 512 MB Flash)
H.264 Hardware-Codec	Yes, bandwidth limitation available; output image format up to QXGA
Protection class	IP66 and IK06; with second 6MP sensor module: IK04 with B036 to B237, IK06 with B016
Intended use	Not for use in hazardous areas (Ex area); no mounting behind glass windows
Ambient temperature (range, incl. storage)	-40 to 60°C/-40 to 140°F (cold boot from -30°C/-22°F)
Internal DVR, ex works	4 GB (microSD)
Microphone/speaker	Yes/Yes
16bit/16kHz HD wideband audio (Opus codec)	Yes (live and audio messages)
Passive infrared sensor (PIR)	Yes
Temperature sensor	Yes
Shock detector (tamper detection)	Yes
Power consumption (typically at 20°C/68°F)	9 W (10 W possible over the short term)
PoE class (IEEE 802.3af)	Class 2 or 3 (variable), factory setting: class 3 (required for thermal operation)
Interfaces Ethernet 100BaseT/MxBus/USB	Yes (MxRJ45)/No/Yes
Interface RS232	With accessory (MX-232-IO-Box)
Mounting options	Wall, pole or ceiling (wall and ceiling mount included)