

# Industrial Interface Wireless Solutions

**Martin Sime**

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Martin Sime  
Industrial Interface Systems Ltd

# End-to-end Industrial IoT Solutions

## Sensors



Temperature  
Pressure  
Flow  
Inclination  
Humidity  
Force  
Position

Conversion of  
analogue or digital  
signals to wireless

## Sensor protocols

Short Range:  
*Bluetooth Low Energy*



Long Range:  
*IEEE 802.15.4 2.4 GHz (MiWi Pro)*



LoRa in development



## Gateways

Full Gateway with  
IoT modem



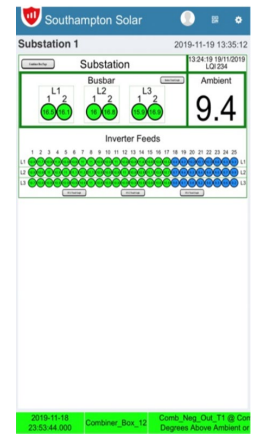
Modbus RTU or TCP/IP  
communications output  
over RS232/485  
or Ethernet



## Management Protocols



## Cloud (Back end)



On premises

*From Sensors to Knowledge Complete Solutions*

# Wireless Transmitters and Receivers



# Wireless Sensors



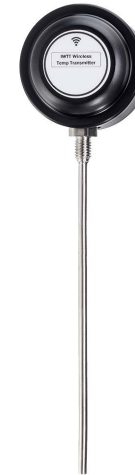
Pressure  
Temperature  
Strain Gauge/Load Cell  
4-20mA or Voltage Input  
Flow & Level switches  
AC Current Transformer  
Any standard 4-20mA transmitter  
Inclinometers  
OEM Custom Wireless sensors



Complete Cable replacement systems

# IWT Part Numbers Types

IWPT	Pressure Sensor Range
IWTT	Temperature Sensor Range
IWDigT	Switch input Sensor
IWmAT	mA input Sensor
IWVT	Voltage input Sensor
IWCTT	Current Transformer (DC mV) sensor
IWTRhT	Temperature & Relative Humidity
IWTxT	mA input with Transmitter Supply
IWLoadT	Load Cell input
IWTiltT	Biaxial Inclinator
IWPulsT	Pulse Input (Flow meter etc)



# IWU Config Transmitter Configuration and Monitoring Tool

IWUConfig

Connection | IWReceiver | IWTransmitter | IWReceiver-USB | IWReceiver-PORT | Industrial IoT Gateway

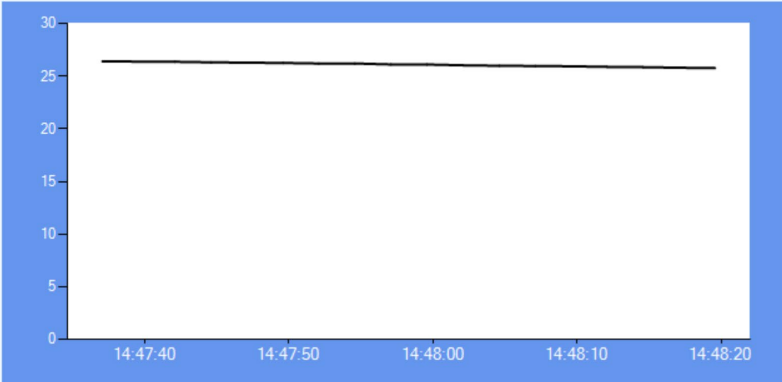
Read Device | Update Firmware | **Live Mode Off** | Clear All Data | Device Connected to COM3. Read Complete.

### Transmitter Data

25.78 °C (Live Temperature) | 22.58 % (Live %)

25.93 °C (Average Temperature (last 8))

-200 to 800°C PT100 (Range)



### Calibration Control

Zero Tare | Calibrate Zero Point | Calibrate Middle Point | Calibrate Full Scale point

### Channel Data

1 (Network (1,2,3,4)) | 10 seconds (Update Rate (5,6,7)) | 2 (Channel Number (8,9,10)) | 98814 (Transmissions)

ON (Power Save) | 2 (Extended Channel (8,9,10 on))

### Transmitter Dip Switch Settings:

Serial Number : IWTT-0820002 | RF Channel : 21 | Security : N/A

Firmware Version : 1.004 | Extended RF Channel : 21 | Security Key : Not Supported | Set Key

Dip switch settings : 000000001 | Extended PAN ID : 24591

# IWR-1 & IWR-5 Receivers



- 1 or 5 off Analogue Outputs
- 4-20mA or 1-5Vdc
- 1 off Relay alarm output – LED Indication
- DC Power Supply
- LED Indication of Received data
- Fail-safe mode if transmissions aren't received

# IWR-SET – PC Configuration Software for Wireless Receivers

The screenshot displays the IWR-SET PC configuration software interface. At the top, there are tabs for 'Connection', 'IWReceiver', 'IWTransmitter', 'IWReceiver-USB', 'IWReceiver-PORT', and 'Industrial IoT Gateway'. Below these are buttons for 'Read Device', 'Update Firmware', 'Live Mode Off' (highlighted in green), and 'Clear All Data'. A status message indicates 'Device Connected to COM3. Read Complete.' with a small graph icon.

The main interface is divided into several sections:

- Channel 1:** A large gauge shows a temperature of 70.03 °C. Below it is a 'SETPOINT' button.
- Graph:** A line graph showing temperature over time from 15:52:00 to 15:57:00. The y-axis ranges from 0 to 80. Below the graph are three data boxes: '70.03 °C' (Scaled Value), '9' (Age (Sec)), and '255' (LQI).
- Device Parameters:** Shows '-200 to 800°C PT100' (Tx Type) and '70.03' (Input %).
- Channel Burnout Status:** Three status indicators: 'No Change' (grey), 'Low' (blue), and 'High' (grey).
- Channel Usage:** Three status indicators: 'Not Used' (grey), 'Auto' (blue), and 'Used' (blue).
- Channel Scaling:** Two input fields: '20mA' set to '100.00 °C' and '4mA' set to '0.00 °C'.
- Relay Configuration:** 'Relay Setpoint %' is '50.00' and 'Hysteresis %' is '2.00'. Below are four buttons: 'Above' (blue), 'Below' (grey), 'Low Battery' (grey), and 'Relay Not Used' (grey).
- Receiver 8 Way Switch Settings:** A bottom section with various settings:
  - Serial Number: IWR1-1016041
  - Firmware Version: 1.010
  - Dip Switch Settings: 0 0 1 1 0 0 1 1
  - Missed Transmission (5,6): 4
  - Network (1,2,3,4): 4
  - RF Channel (1,2,3,4): 24
  - Security: OFF
  - Security Key: Enter Security Key (Set Key)
  - Relay Action (7,8): Relay is configured by USB
  - Extended PAN Id: (empty)
  - Extended RF Channel: (empty)



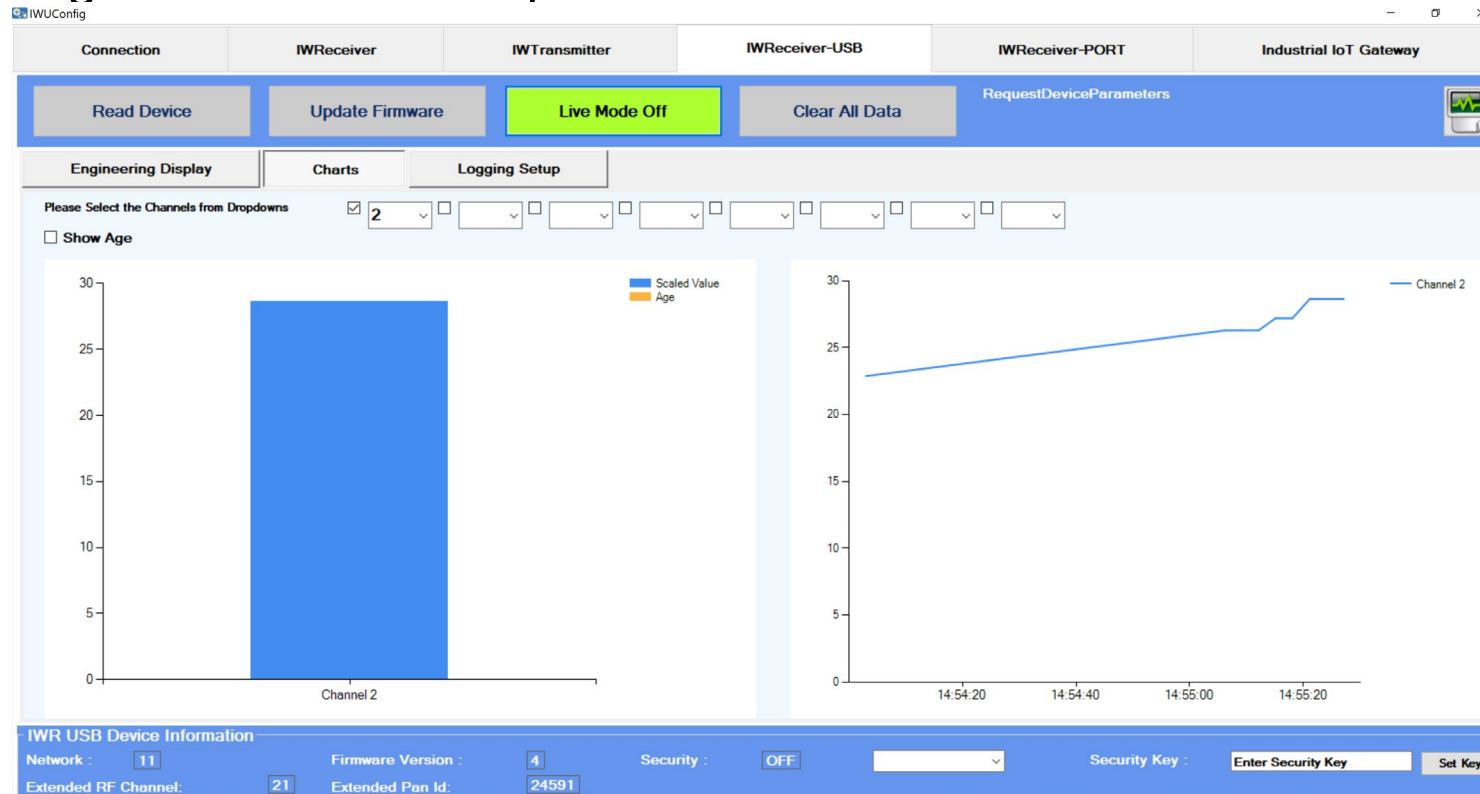
# IWR-USB Receiver – Ideal for Data Logging

Plugs into standard USB PC socket

Receives Data from up to 128 IWT Wireless Sensors

Packaged software allows all parameters to be displayed

Logs data to Excel compatible .csv file



# IWR-Port Receiver with Communications

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- Accepts inputs from up to 128 IWT wireless sensors
- RS232, RS485 or Ethernet Communication Ports
- All data available as Modbus registers
- Data includes: Latest valid reading received
  - Link Quality
  - Seconds since last reading
- Local display of Sensor values, LQI and Seconds since last receipt
- Can add Isoslice I/O units to combine wireless & wired inputs

# IWR-Port – Engineering Display

IWUConfig

Connection    IWRReceiver    IWTransmitter    IWRReceiver-USB    IWRReceiver-PORT    Industrial IoT Gateway

Read Device    Update Firmware    Live Mode    Clear All Data    Read Live Values 

Engineering Display    Charts    Logging Setup    Configuration

Chann	Serial Number	Device Type	Parameter	Scaled Value	Age	Timestamp	LQI	Type	Location	Span	Zero	Raw Values	Linked To	Burnout Timeout	Burnout Level	Update Rate	Transmissions
1	N/A	Isoslice	1	N/A	255	31-03-22 18:02:03	0	1 analogu...	local	100	0	FFF0	1.1	OFF	HI	N/A	N/A
2	709501	0 to 15 psi g	1	0.00	7	31-03-22 18:02:03	184	1 analogu...	remote	15	0	3856	2.1	OFF	HI	10 sec	1363968
3	721001	Digital	1	OFF	9	31-03-22 18:02:03	218	1 digital in	remote	100	0	0	3.1	OFF	HI	10 sec	1327104
4	721011	-200 to 800°C P...	1	6.63	1	31-03-22 18:02:03	85	1 analogu...	remote	800	-200	15808	4.1	OFF	HI	10 sec	1370112
5	721001	0 to 30 Aac	1	1.62	5	31-03-22 18:02:03	133	1 analogu...	remote	30	0	6980	5.1	OFF	HI	10 sec	1303552
6	721001	4 to 20 mA	1	3.26	2	31-03-22 18:02:03	174	1 analogu...	remote	20	4	1203	6.1	OFF	HI	10 sec	1310720
7	721001	4 to 20 mA sink	1	3.26	12	31-03-22 18:02:03	255	1 analogu...	remote	20	4	1203	7.1	OFF	HI	10 sec	397312
8	721011	4 to 20 mA sink	1	20.73	39	31-03-22 18:02:03	255	1 analogu...	remote	20	4	64299	8.1	OFF	HI	60 sec	253952

Device Information

Connection Details : Port: COM5 | Baudrate: 38400    Enter / Exit Security Mode    Security : N/A    Security Key : Not Supported    Set Key

# IWR-Port – Chart Display

IWUConfig

Connection: IWRReceiver | IWTransmitter | IWRReceiver-USB | IWRReceiver-PORT | Industrial IoT Gateway

Read Device | Update Firmware | **Live Mode Off** | Clear All Data | Read Live Values

Engineering Display | Charts | Logging Setup | Configuration

Please Select the Value from Dropdowns (ChannelNo.ParameterNo)  2.1  3.1  4.1  5.1  6.1  7.1  8.1

Show Age

Channel	Scaled Value
Ch2.Param1	8.5
Ch3.Param1	0
Ch4.Param1	29
Ch5.Param1	1.5
Ch6.Param1	3.5
Ch7.Param1	3.5
Ch8.Param1	21

Channel	Value
Ch2.Param1	~10
Ch3.Param1	~0
Ch4.Param1	~5 (spike to ~58)
Ch5.Param1	~2
Ch6.Param1	~2
Ch7.Param1	~2
Ch8.Param1	~20

Device Information

Connection Details : Port: COM5 | Baudrate: 38400

Enter / Exit Security Mode | Security : N/A | Security Key : Not Supported | Set Key

# IWR-Port – Logging Set-up Display

The screenshot displays the IWUConfig software interface. At the top, there is a navigation bar with tabs for Connection, IWRReceiver, IWTransmitter, IWRReceiver-USB, IWRReceiver-PORT, and Industrial IoT Gateway. Below this is a blue header bar containing buttons for Read Device, Update Firmware, Live Mode Off (highlighted in green), Clear All Data, and Read Live Values. A secondary navigation bar includes Engineering Display, Charts, Logging Setup (selected), and Configuration. The main content area is titled 'Data Logging' and features a text input field for the log file name and path, with a 'Set Log File Name and Path' button. It also includes a 'Channel List for Selection' on the left and a 'Channels Selected for Logging' list on the right, containing Channel 1 through Channel 8. Between these lists are buttons for 'Select All Channels', 'Select Channels >>', '<< Unselect Channels', and 'Unselect All Channels'. A 'Logging Frequency' section contains radio buttons for intervals: Every Second, Every 10 Second, Every 30 Second, Every Minute, Every 5 Minute, Every 10 Minute, Every 15 Minute, Every 30 Minute, and Every 60 Minute. 'Start Logging' and 'Stop Logging' buttons are positioned to the right. At the bottom, a 'Device Information' bar shows 'Connection Details: Port: COM5 | Baudrate: 38400', 'Enter / Exit Security Mode' buttons, 'Security: N/A', and 'Security Key: Not Supported' with a 'Set Key' button.

# IIoT Gateway



IIoT Gateway Features a wide range of inputs Including:

- Up to 128 IWT Wireless Sensors
- Analogue & Digital Inputs/Outputs
- RS232/485 or Ethernet Comms Ports
- I2C and SPI Interfaces
- In-built optional GPS and Display
- Battery or 12/24vdc Powered
- Sends secure MQTT messages to server
- has 4 off Relay Control/Alaram Outputs

The IoT Gateway Logs Data and periodically uploads it to Cloud-based Servers

# IIoT Gateway –general settings

IIoT Gateway –general settings

Connection | IWRReceiver | IWTransmitter | IWRReceiver-USB | IWRReceiver-PORT | Industrial IoT Gateway

Read Device | Update Firmware | Clear All Data | Device is connected

General | Security | Analog and Digital | Relays and Modbus | Modbus Registers

IoT Gateway ID : 1 | IoT Gateway Time : 31.03.2022 15:38:35 UTC

**Server Details**

MQTT Server IP URL : ec2-34-226-151-185  .compute-1.amazonaws.com  
MQTT Server Port : 8883 Use Long URL

Config Server IP URL : time.nist.gov    
Config Server Port : 13 Use Long URL

**SIM Data Connection Details**

Access Point Name : data.apn.name  
User ID :  
Password :  
Connection technology : 1. CAT-M1 then NB-IoT then 2G

**Timeouts and Delays**

Buffer Data Timeout (Seconds) : 10  
Reconnect to GSM network Delay (Minutes) : 5  
Data Storage Time per Channel (Seconds, 255 = OFF) : 10

Read Delay for Analog Input Values (Seconds, 0=OFF): 0  
Read Delay for Digital Input Values (Seconds, 0=OFF): 0  
Read Delay for Modbus Serial Data (Seconds, 0=OFF): 0  
Read Delay for Digital Output Values (Seconds, 0=OFF): 5

**Acknowledgements Status**

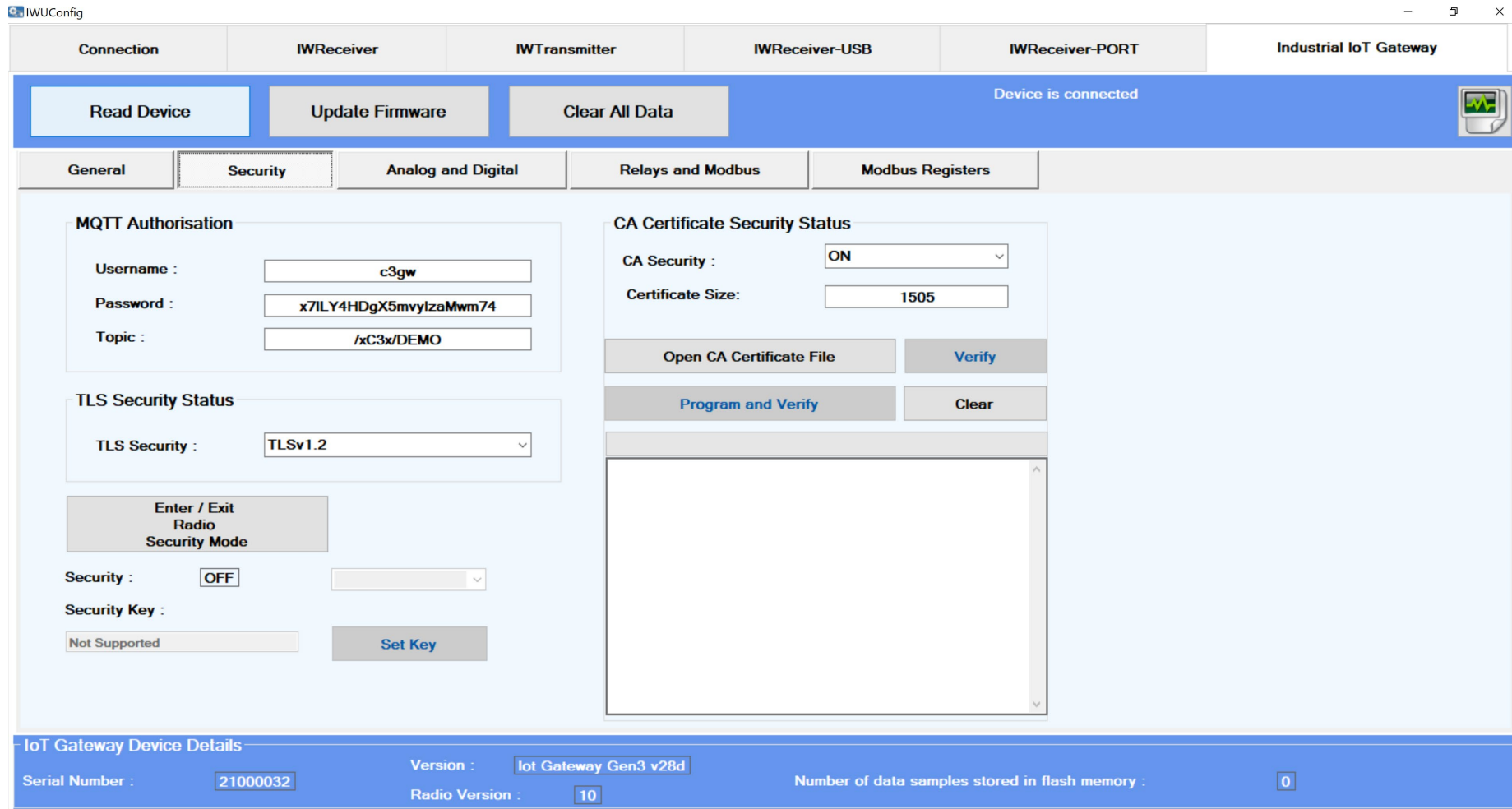
Option: Acks always on, modem always connected

**IoT Gateway Device Details**

Serial Number : 21000032 | Version : IoT Gateway Gen3 v28d | Number of data samples stored in flash memory : 0  
Radio Version : 10



# IIoT Gateway –security settings



**Connection** | IWReceiver | IWTransmitter | IWReceiver-USB | IWReceiver-PORT | **Industrial IoT Gateway**

Read Device | Update Firmware | Clear All Data | Device is connected

**General** | **Security** | Analog and Digital | Relays and Modbus | Modbus Registers

### MQTT Authorisation

Username :

Password :

Topic :

### TLS Security Status

TLS Security :

Security :

Security Key :

### CA Certificate Security Status

CA Security :

Certificate Size:

IoT Gateway Device Details

Serial Number :  | Version :  | Number of data samples stored in flash memory :

Radio Version :



# IIoT Gateway –Analog & Digital Inputs

The screenshot displays the IWUConfig web interface for an Industrial IoT Gateway. The interface is organized into several sections:

- Navigation Tabs:** Connection, IWReceiver, IWTransmitter, IWReceiver-USB, IWReceiver-PORT, and Industrial IoT Gateway.
- Action Buttons:** Read Device, Update Firmware, and Clear All Data. A status indicator shows "Device is connected".
- Configuration Tabs:** General, Security, Analog and Digital (selected), Relays and Modbus, and Modbus Registers.
- Analog Input Status:** Four dropdown menus for "Analog Input Types", all set to "0 - 20mA", labeled Input 1 through Input 4.
- Analog Input Data:** Two rows of data displays for "Analog Scaled Data" and "Analog Raw Data", each with four blue bars representing Input 1 through Input 4. A "Read Data" button is present.
- Digital Input Data:** Two rows of status displays for "Digital Input Data", labeled Input 1 through Input 8. The top row shows "OFF" for all inputs, and the bottom row shows "ON" for Input 5 and "OFF" for others. A "Read Data" button is present.
- IoT Gateway Device Details:** A footer section showing:
  - Serial Number: 21000032
  - Version: Iot Gateway Gen3 v28d
  - Radio Version: 10
  - Number of data samples stored in flash memory: 0

# IIoT Gateway –Relay Outputs & Modbus Registers

The screenshot displays the IWUConfig software interface for an Industrial IoT Gateway. The interface is divided into several sections:

- Connection:** IWReceiver, IWTransmitter, IWReceiver-USB, IWReceiver-PORT, Industrial IoT Gateway.
- Buttons:** Read Device, Update Firmware, Clear All Data. Status: Device is connected.
- Navigation Tabs:** General, Security, Analog and Digital, Relays and Modbus (selected), Modbus Registers.
- Relay Trip Function Configuration:**

	IWT Channel (0=OFF)	Trip Function	Failsafe	High Setpoint(%)	Low Setpoint(%)
Relay 1	1	In Band	<input checked="" type="checkbox"/> Failsafe ON	100.00	0.00
Relay 2	0	In Band	<input checked="" type="checkbox"/> Failsafe ON	100.00	0.00
Relay 3	0	In Band	<input checked="" type="checkbox"/> Failsafe ON	100.00	0.00
Relay 4	0	In Band	<input checked="" type="checkbox"/> Failsafe ON	100.00	0.00
- Modbus Read Function Configuration:**

	Set 1	Set 2	Set 3	Set 4
Baud Rate	38400			
No of Registers (0=OFF)	0	0	0	0
Offset	0	0	0	0
Slave Address	11	11	11	11
Read Command	3	3	3	3
- IoT Gateway Device Details:**
  - Serial Number : 21000032
  - Version : lot Gateway Gen3 v28d
  - Radio Version : 10
  - Number of data samples stored in flash memory : 0

# IIoT Gateway –Modbus Registers

IIoT Gateway –Modbus Registers

Connection: IWRceiver | IWTranmitter | IWReceiver-USB | IWReceiver-PORT | Industrial IoT Gateway

Read Device | Update Firmware | Clear All Data | Device is connected

General | Security | Analog and Digital | Relays and Modbus | **Modbus Registers**

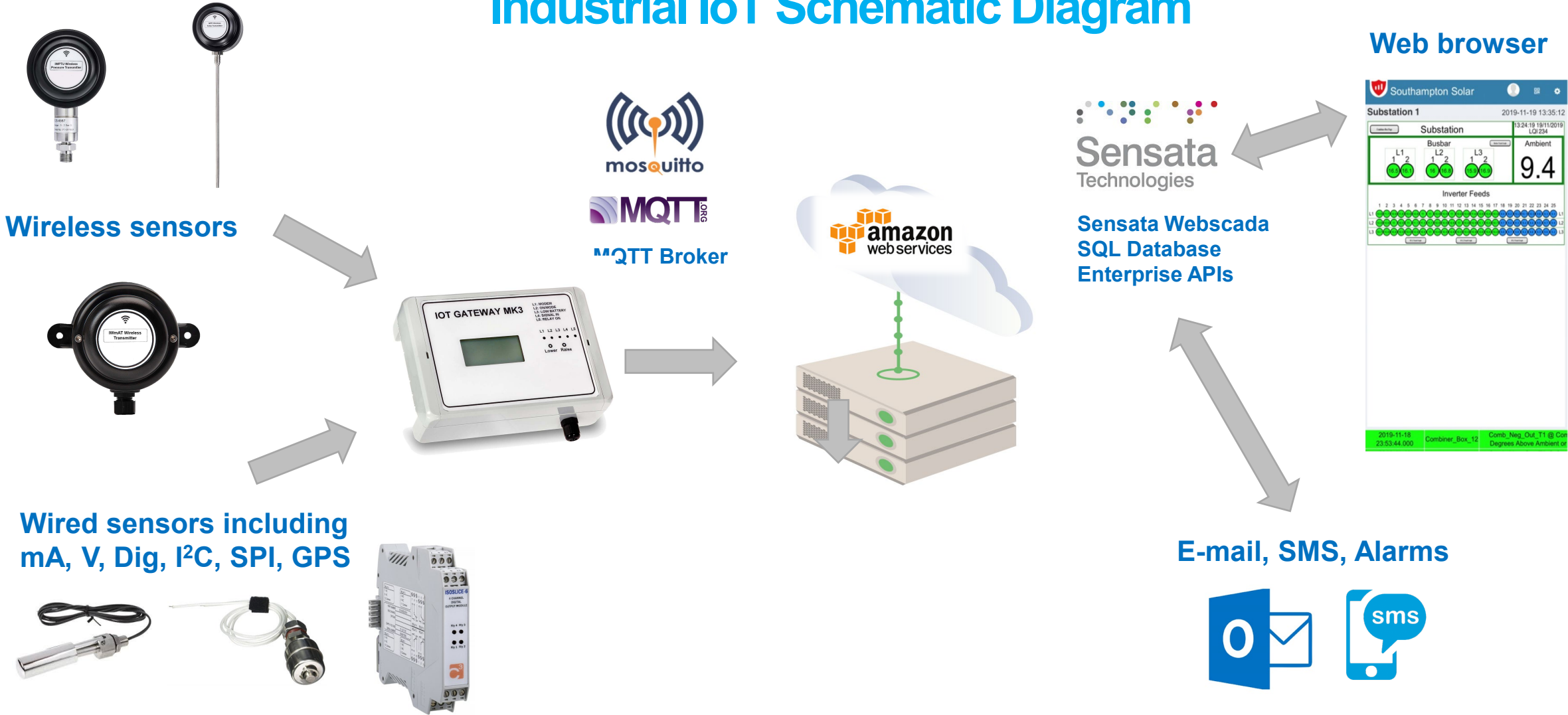
Set	ID	Offset	Register	Register Type	Scaling On/Off	Input Scaling Min	Input Scaling Max	Output Range Min	Output Range Max	Units
Set 1	1	0	40001	U16	ON	0	50	0	100	DegC
	2									
	3									
	4									
	5									
	6									
	7									
	8									
Set 2	9									
	10									
	11									
	12									
	13									
	14									
	15									
	16									
Set 3	17									
	18									
	19									
	20									
	21									
	22									
	23									

Program Modbus Settings

IoT Gateway Device Details

Serial Number : 21000032 | Version : IoT Gateway Gen3 v28d | Radio Version : 10 | Number of data samples stored in flash memory : 5

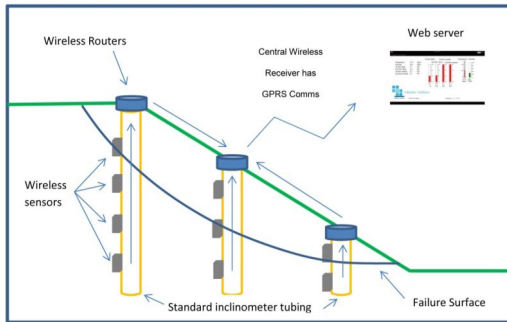
# Industrial IoT Schematic Diagram



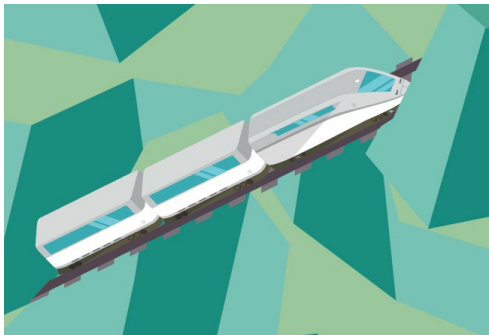
***Our Wireless Sensors Enable a Clean and Connected Environment***

# How our Sensors Contribute to a Smart World

**Monitoring High resistance Joints on Solar Farms**



**Slope Monitoring on Rail and Highway Embankments**



**Motor & key equipment monitoring at UK Car Assembly Plant**



**Real time data  
Email & SMS alarms**

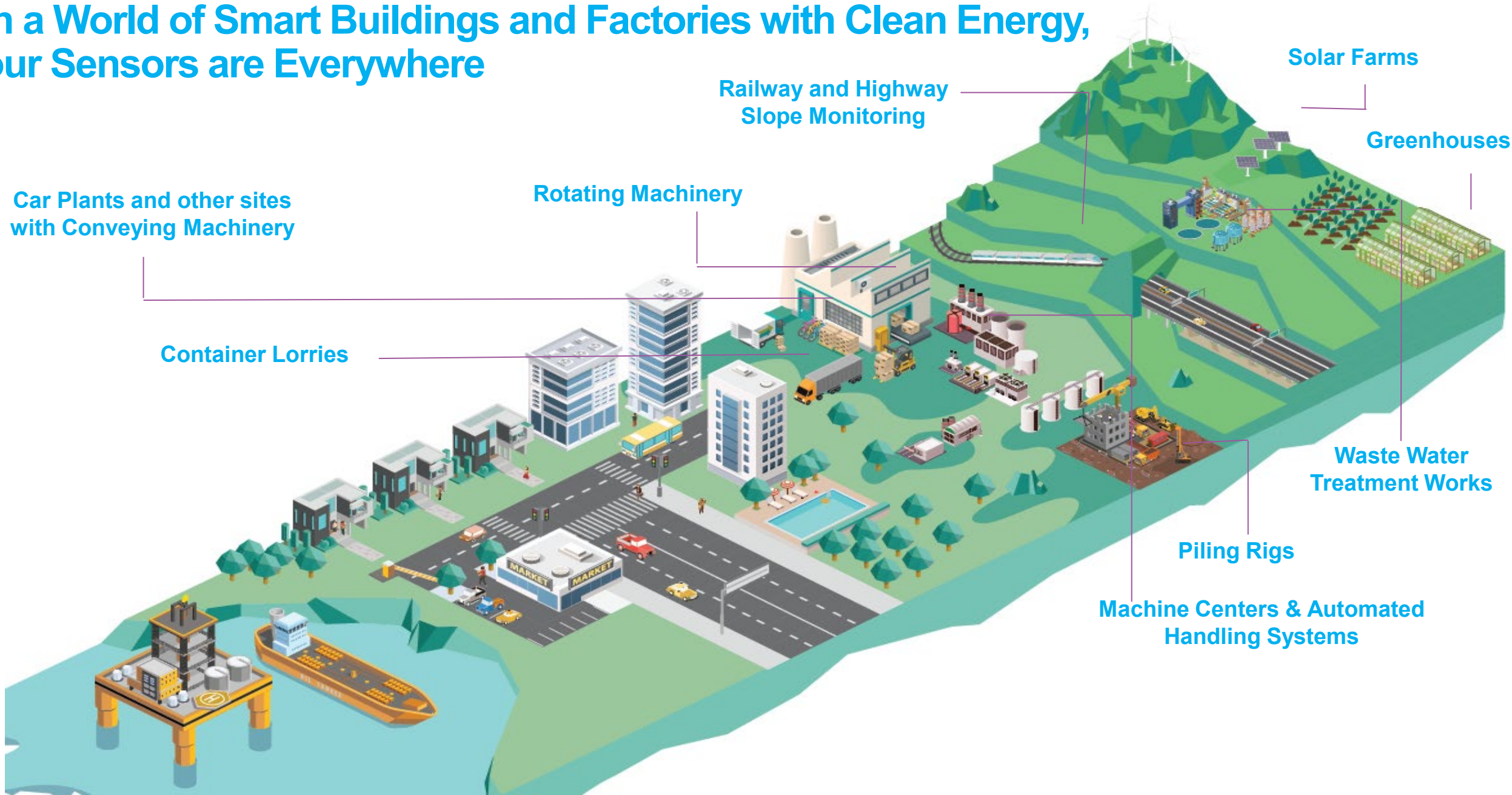


**Fixture Monitoring System for Major Aerospace Company**

**Wireless Sensors for a Smart Monitoring of your Application**



# In a World of Smart Buildings and Factories with Clean Energy, our Sensors are Everywhere



## Other example completed applications

Application	Description	End User	Project Status
Irrigation Rig monitoring	Monitors the current taken by motors driving large scale irrigation rigs. Used to check for overloaded motors, sometimes due to flat tyres on the wheels fitted to them	Heartland, USA	Trial system
Railway Embankment Monitoring	Using buried MEMs inclinometers to monitor movement in embankments	Network Rail	2 x Trial Sites
Monitoring of Fixtures in CNC Machines	Using wireless transmitters embedded into fixtures to monitor hydraulic clamping pressure and alarm if changes are detected	Rolls Royce Aerospace	Completed, on-going orders
Solar Farm High Terminal Monitoring	Uses digital temperature ICs to check for high resistance joints in solar farm DC combiner boxes and substations	Mycena	Trial Site
Motor Condition Monitoring	Monitoring of 500+ production motors for HRJs, phase imbalance and increased load conditions	Jaguar LandRover	
Load Weighing on Log Loader	Uses Pressure to weight the quantity of logs loaded onto low loader	LateHose	On-going sales
Rotating Oven Temperature Measurement	Uses wireless thermocouple transmitters to replace inherently unreliable slip rings	Premier Foods	On-going sales
Wireless Vibration monitoring	Monitors raw vibration data from industrial accelerometers in Iron Ore and Coal mines in Western Australia	BHP Billiton, Rio Tinto, FMG etc.	On-going sales
Sludge Depth Monitoring at WTW	Sends the Sludge Depth signal wireless to receiver to eliminate the requirement for slip rings	South West Water +	Complete
Tamper monitoring of Sculptures	System monitors sculptures for movement & vibration to send an SMS alarm if a sculpture is being attacked or stolen	Pangolin	Complete
Concrete Pressure Monitoring on Piling Rigs	Monitors the pressure of the concrete at swan neck at the top of the piling rig to detect when the concrete is backing up	ND Tech	On-going sales
Water Pressure Monitoring	Monitoring of under-body and over-body spray water pressure	Jaguar LandRover	Complete
Office Temperature & RH Monitoring	Monitors the temperature and RH in commercial offices during HVAC installation acceptance period		Complete
Fire Temperature Monitoring	1-2m long wireless thermocouple transmitters used to monitor the internal temperature of buildings used during fire testing	PICS, Belgium	Complete

## Other example completed applications

<b>Wine Fermenting Temperature monitoring</b>	Used to measure the temperature of wine in fermenting vats in wineries in Australia	Precision Electrical	Complete
<b>Well head pressure monitoring system</b>	Used by Weatherford plc to measure well head pressure levels	Weatherford	On-going sales
<b>Excavation Monitoring</b>	Monitors the level and force on struts supporting large scale excavations	Mabey Hire	Complete
<b>Borehole Water Usage in Quarry</b>	Transmits water meter pulses wirelessly across a quarry to a central location	Hansen Quarry	Complete
<b>Temperature measurement in Grain Silos</b>	Long temperature probes inserted into grain silos to check for rises in temperature which may indicate that fermentation is commencing		Complete
<b>Level measurement in Grain Silos</b>	Bottom mounted level sensors wired to antennas at the top of each silo. Wireless network was effectively in the air above the silos which overcame the problem of getting a wireless signal around lots of metal silos in a small area.	Process Instrument Sales	Complete
<b>Cement Mixer Weight monitor</b>	Wireless pressure sensors mounted to the hydraulic drive circuit on cement mixers. The hydraulic pressure was used to indicate how much force was needed to rotate the drum on the vehicle, this in turn indicated how full the mixer was. Used in central filling station	European Cement	Complete
<b>Signal transfer across reservoir</b>	IWT-128 used as a cable replacement system to transfer analogue and digital signals across reservoirs	Scottish Water +	Complete
<b>Wireless pH signal transfer</b>	Picked up the output from a pH meter and wirelessly transferred this to a central dosing control system	Clippertech	Complete
<b>Wireless Borehole Level monitoring</b>	Monitored water levels in multiple boreholes so that the central controller could decide which to pump water out of	St Philips, Bahamas vis Grundfos	Complete
<b>Overhead trolley wear monitoring</b>	Monitors the force on motor drive stations using load cells embedded into trolley blocks. If the force reduces the rack drive starts to slip and the line may stop	Jaguar LandRover	Complete
<b>Wireless Tailgate opening system</b>	Automatically opens the tailgate on vehicles on the production line when operators require access to the rear of the vehicles	Jaguar LandRover	Complete



**Thank you for listening, any  
questions?**

**Martin Sime**  
**[martin@industrialinterface.co.uk](mailto:martin@industrialinterface.co.uk)**