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IOT SOLUTIONS DESIGNED FOR THE MEDICAL SECTOR

WHO ARE INVISIBLE SYSTEMS?

Invisible Systems is a proven, UK manufacturer of **LoRa** and **NB-IoT wireless devices**, with over 17 years of experience in delivering **leading IoT technology**.

We support the medical sector with **monitoring refrigerated temperatures, energy conditions** and **turn-key compliance systems in real-time.**

Our clients are provided with a secure software platform, **Real-Time Online**, which gathers data from your sensors and displays information within a personalised dashboard. In addition, the platform offers a comprehensive reporting suite and notification system.

As a team of 30 people, we work with the **NHS, WHO, Public Health England and Movianto** within the medical sector to provide accurate data and translate it into clear, actionable intelligence.

WHY CHOOSE IOT?

Online, Personalised Software - Our online monitoring software, Realtime Online is set-up to meet the specific needs of your organisation.

Proactive Alarms - Pro-active alerts ensure that your team can prevent the breach of critical levels, and so safeguard patient well-being.

Improved Patient Safety - By maintaining critical assets, you improve the potency and reliability of medications and vaccines.

Simple, Secure Set Up - Our medical grade sensors are easy to set up and do not require integration with your existing IT infrastructure.

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Lower Costs - Choosing wireless sensors and a cloud platform enables you to reduce your installation and maintenance costs.

Low Maintenance - Our sensors have been designed to have a battery life of up to 10 years, so you don't have to worry about changing them frequently.

REAL-TIME ONLINE

Clear, Actionable Data Delivered on Personalised Dashboards

Real-Time Online is Invisible Systems' **cloud-based software**, hosted in a **ISO27001** secure UK data centre and is accessible via a secure username and password from any internet connected devices/browsers therefore the system is available 24/7 regardless of site access.

Real-Time Online is set-up to **meet the specific needs of your organisation.** Whatever solution you choose to implement within your organisation, you'll be able to continuously monitor the conditions of the assets in **real-time** via our user-friendly dashboards.

🔔 ALERTS

Real-Time Online has the capability to set and adjust **high and low thresholds for each sensor**, which, when exceeded, creates and logs alarms. Not only is the **alarm alerted and logged within the system**, but specified users can be alerted via:

- **email,**
- **text**
- **or call** (autodialling alerts).

Alert settings are configurable and can be adjusted to compensate for any environmental changes within the building EG) day and night.

Taking and Logging Corrective Actions

In the event of an alarm, users can access the dashboard to acknowledge the alarm and describe what action, if any, has been taken.

All the corrective actions are stored and logged for traceability and audit trail.

The audit trail includes:

- Sensor Name
- Location
- Actual reading
- Status
- Action
- Username
- Time & Date

Reporting

Real-Time Online provides users with **comprehensive reporting capabilities** which can be automated or produced manually.

Users can select any live devices to view a report, filterable by date, period, or month, to view historic data. Comparative reports can also be generated to compare conditions across different timeframes.

The reports generated by Real-Time Online can be used to satisfy;
- **Care Quality Commission (CQC) audits**
- **MHRA compliance**
- **HACCP reporting**

IMPROVING PATIENT SAFETY

One of our most popular products within the medical sector are our **temperature monitoring devices**, specifically designed for use in **vaccine fridges.**

In order for medicines and vaccines to be effective, they must be stored within a specified temperature range. By ensuring this temperature threshold is not breached, IoT can enable you to provide the safest and most effective treatment to your patients.

Automated monitoring of critical assets means a reduction in manual monitoring. This ensures that staff will not be taken away from key clinical roles and the time taken to monitor fridge temperatures will be significantly reduced, providing more time for patient care.

⚙ SIMPLE, **SECURE** SET-UP

Data security has never been more important. For organisations within the medical sector, the requirement for the highest level of security is even more crucial.

With this in mind, we developed our solution so that there is **no requirement for integration with your existing infrastructure**. You do not need to upload any software onto existing site computers and no cabling, wiring or IT resource is needed for configuration.

Our solution is totally independent of your local IT system, due to the gateway having a 'roaming' cellular connection to the server via a secure, VPN connection.

All data is encrypted at source and only decrypted on the secure Realtime Online server. Configuration changes can be done **remotely at any time** and logged in the system for traceability following a user secure login.

"Invisible Systems solution is so easy to install, there is no need to interfere with other IT services. It was a non-invasive install and that was a primary factor in selecting it. I can log in from home, from holiday - it's very user friendly."
- Noel Gavin, Maynooth University.

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💵 LOWER YOUR COSTS

A reduction in costs can be realised in numerous different ways following the implementation of IoT solutions in a medical setting, such as:

- A **reduction in the loss of costly medical supplies**
- No requirement to purchase replacement supplies
- Reduced manual checks by staff, meaning that **fewer paid hours** are spent on a task which can be entirely automated
- A reduction in unnecessary journeys to check on critical assets manually
- Reduced energy costs

Example Savings - An Existing Invisible Systems Client

- **Routine Staff monitoring of fridges**: 5 minutes per 14 sites 5 days a week at £16/hour on costed = 5 / 60 x 14 x 5 x 52 x 16 x 1.3 = **£6,309**

- **Fridge investigations** across 14 sites in year: 2 hours of nurse time investigation and review occurring once a year in 14 sites at £16/hour on costed = 2 x 14 x 16 x 1.3 = **£582**

- **Destruction of fridge contents** due to (1) faulty fridges (2) ineffective management of cold chain storage procedures: Total value of fridge contents destroyed at 2 surgery sites in 12-month period = 2 x £2600 = **£5200**

Total predicted financial annual savings from project: £12,091

A **LOW MAINTENANCE** SOLUTION

Invisible Systems sensors have been deliberately designed to have a long battery life, in some cases of up to 10 years. This means that you do not have to worry about continually changing batteries.

We provide our clients with a comprehensive support and maintenance package where required. Our expert team are also available to answer any questions you may have throughout your contract with us.

Within the support and maintenance package you can expect:

- System training – inclusive of configuration changes and the use of reporting tools
- Regular updates
- 24/7, 365-day monitoring
- 99.997% Uptime reliability
- Access to the support team within office hours

HOW DO OUR **SOLUTIONS** WORK?

Our Internet of Things systems work slightly differently depending on whether a LoRa/LoRaWAN or NB-IoT solution is used. Our IoT experts will assess your requirements to help you select the best solution for your organisation.

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LoRa and LoRaWAN

When using LoRa or LoRaWAN, your system will be made up of sensors and an internet gateway.

The Invisible Systems LoRa/internet gateway receives RF messages from the sensors and your data is then sent from the gateway to Real-Time Online, our cloud-based reporting software via a 2G/3G cellular modem.

A Battery Backup Gateway

The Invisible Systems gateway has battery backup for **continuous monitoring in the event of a power failure** and has capability to receive messages from over **200 wireless sensors from up to 15km away.**

Messages are stored in the gateway and uploaded to the server every 5 minutes. Each message is timestamped and acknowledged by the server. Up to 3 months' worth of sensor readings can be stored within the gateway to provide back-up should there be any reason it cannot communicate with off-site servers.

NB-IoT

In the case of NB-IoT, a similar process takes place, but no gateway is required. Instead, the data is uploaded directly from the sensor to the server.

Edge Intelligence

Invisible Systems Internet of Things solution also incorporates Edge Intelligence. Edge Intelligence is an alert scheme which alerts predefined team members within your organisation to any breach of thresholds via SMS or Text-Speech, or email.

This use of Edge Intelligence ensures instantaneous alerts and ensures the effectiveness of IoT within medical organisations.

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VACCINE FRIDGE MONITORING FOR LIVERPOOL PRIMARY CARE NETWORK

## REDUCING THE RISK OF LOST VACCINES

PROJECT SNAPSHOT

As Liverpool Primary Care Network (PCN) play their crucial role in vaccinating the UK public against COVID-19, it became clear that they required a system which would help them better monitor the conditions in which the vaccinations were stored.

Having previously experienced inaccuracies in the recording of fridge temperatures, there were numerous potential risks such as losing vaccine supply, incurring unnecessary waste and potential financial loss.

To avoid these risks, Liverpool PCN chose to implement an Internet of Things, remote temperature monitoring system. The team selected Invisible Systems ISL124B device, capable of accurately recording fridge temperatures and providing data in real-time.
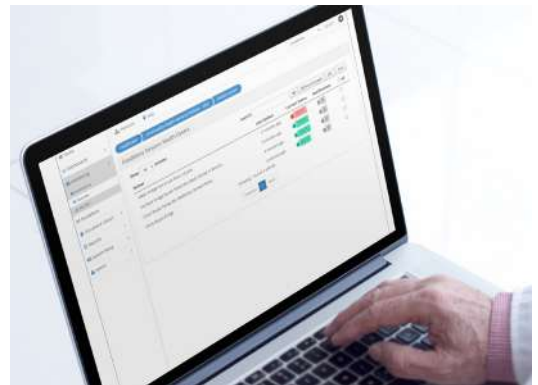
PROJECT OBJECTIVES

IMPROVE PATIENT SAFETY

ENSURE COMPLIANCE

STREAMLINE MONITORING

MONITOR REMOTELY

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PROJECT OUTCOMES

With the reliable, remote temperature monitoring system in place, Liverpool Primary Care Network now have complete assurance that their supply of vaccines is stored safely.

The team are able to continuously monitor the temperature of their fridges and receive instant alerts if temperatures are to fall out of their predefined range, so that preventative action could be taken.

"*During our COVID clinic this system was most valuable.*

It allowed continuous temperature monitoring of our vaccine fridge and had the addition of email alerts if temperature was out of range so it could be actioned immediately. The facility that this could be a call or text out of hours and at weekends to key holders is an amazingly good use of technology and hugely welcome.

When this system monitors all fridges in our PCN practices it will free up time and reduce errors where fridge resets have not been done correctly.

The assurance that comes with continuous monitoring will ensure that no vaccines are wasted, should a temperature outage occur."

 - **Una Harding, PCN Pharmacist, Aintree Primary Care Network**

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