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TECH OFFER

AI & IoT Logistics Intelligence Solution

KEY INFORMATION

TECHNOLOGY CATEGORY:
Logistics - Transportation
Logistics - Value-Added Services
Infocomm - Artificial Intelligence
Infocomm - Internet of Things
Foods - Quality & Safety

TECHNOLOGY READINESS LEVEL (TRL): **TRL8**
COUNTRY: **SOUTH KOREA**
ID NUMBER: **TO175396**

OVERVIEW

This IoT and AI-driven solution directly addresses critical logistics challenges, including product spoilage, quality degradation, and compliance failures, particularly in cold-chain and high-value supply chain environments. Given that product spoilage alone costs companies 3–7% of their annual revenue, the technology's core value lies in its ability to transform logistics management from a reactive process into a proactive and intelligent operation.

The solution's robust platform is built on three key technological pillars:

- An IoT sensor device for real-time data collection.
- An AI-driven predictive model for deep analysis.

- An integrated data management platform that unifies insights.

This system leverages domain-specific data management to handle complex knowledge, ensures quick and accurate forecasts through advanced modeling, and dynamically adjusts risk thresholds in real time using AI-based risk management.

By integrating these elements, the technology provides comprehensive visibility and enables timely intervention, preventing minor issues from escalating into major disruptions. Ultimately, this solution is ideally suited for sectors such as biopharmaceuticals, fresh food, and high-value asset transportation, where its accuracy and speed can significantly reduce operational losses.

TECHNOLOGY FEATURES & SPECIFICATIONS

This solution integrates a suite of advanced hardware and software components to deliver comprehensive supply chain visibility. The technology consists of IoT-enabled multi-sensor devices that capture critical data on temperature (–30°C to +70°C), humidity (20–90% RH), shock (±16 g), light, and location (GPS). These devices feature onboard Edge AI for intelligent data filtering, a robust battery life of up to 90 days, and versatile connectivity options including LTE-M, NB-IoT, and BLE. An operating app enables users to upload and manage data from the sensor devices, and a gateway can be connected for more effective condition monitoring.

The data is processed by a powerful cloud-based SaaS platform powered by machine learning models. This platform delivers predictive analytics on transport routes and environmental variables, and offers a user-friendly interface with real-time dashboards, automated alerts, and customizable reports. The system supports seamless API integration with existing enterprise systems such as ERP and WMS, while ensuring compliance with standards including HACCP (Hazard Analysis and Critical Control Points) and GDP (Good Distribution Practice).

This technology provides a scalable, compliance-ready visibility solution that transforms logistics management from reactive to proactive.

POTENTIAL APPLICATIONS

This technology can be deployed in biopharmaceutical cold-chain logistics, food cold-chain, fresh produce supply, electronics, and warehouse operations, where quality and compliance are critical. The technology also underpins marketable products such as IoT multi-sensor trackers, SaaS monitoring platforms, compliance reporting tools, and risk analytics services, enabling end-to-end supply chain visibility and resilience.

Ideal Collaboration Partners include:

- **Pharmaceutical and Biopharma Companies** – Vaccine and drug cold chain transport.
- **Cold Chain Logistics Providers** – Shipping lines, freight forwarders, 3PLs.
- **Warehouse Operators** – Cold storage and bonded warehouses handling items and goods requiring sensitive care.
- **Adjacency Partners** – Transport container manufacturers, IT integrators, and digital supply chain platforms.
- **Institutes of Higher Learning (IHLs) and Research Centres** – Compliance validation and applied R&D
- **Strategic Consulting Firms** – partners with deep insight into vertical industry trends and regulatory frameworks, enabling joint PoCs and BETA trials with leading service providers in the market.

MARKET TRENDS & OPPORTUNITIES

The Singapore cold chain market was valued at USD 5.09 billion in 2024 and is forecast to grow at a CAGR of 23.2%, reaching around USD 32.45 billion by 2033. (source: Grandviewresearch.com) This AIoT solution is uniquely positioned to capitalize on this significant market growth by transforming traditional cold chain monitoring into an intelligent, data-driven system.

While many competitors offer basic sensor-based tracking, this platform utilizes advanced AI and Machine Learning models to process vast amounts of multi-sensor data in real time. This allows the system to analyse historical patterns and external variables to generate highly accurate predictive risk alerts, enabling proactive issue resolution before product loss or compliance failures occur.

This intelligent approach, combined with unified device-platform delivery, customizable reporting, and seamless API integration, provides a comprehensive solution that far surpasses the capabilities of traditional sensor-only solutions.

UNIQUE VALUE PROPOSITION

The technology provides a significant improvement over the current state of the art by leveraging an intelligent AIoT platform. It features:

- Multi-sensor precision devices that capture temperature, humidity, shock, light, and location data in real time. These smart devices utilise Edge AI for efficient on-device data processing, which then feeds into a cloud platform.
- The cloud platform goes beyond simple monitoring, alerts, and reporting, it employs advanced machine learning models to transform raw sensor data into actionable insights and proactive risk predictions.
- Users gain a unique competitive advantage through customised alerts and reports aligned with their standard operating procedures (SOPs).

This solution has proven reliability with major enterprises in South-Korea and offers flexible adoption through single-use or multi-use devices with API integration, making it a scalable and highly intelligent solution for modern logistics.