INDIUM

Redefining the Ride: How Indium Transformed the Client's Connected-car IoT Devices with Big Data Infrastructure

SUCCESS STORY

Client Overview

The client is a subsidiary of a leading Tier-1 automotive parts supplier with operations in Asia, Europe, and North America. Established to enhance value through connected car and telematics solutions, the client maintains manufacturing facilities in Asia and Europe and international offices strategically located in North America, Europe, China, and Japan.

Breaking Down Client Requirements: The Demand for AI-Driven Vehicle Intelligence

The project aimed to achieve two primary objectives:

1

Establishing a Big Data Infrastructure for Real-Time Event Processing

The client required the development of a robust big data system capable of handling real-time events generated by connected-car IoT devices. This infrastructure needed to support immediate processing and response to events such as impact alerts, tow alerts, and driving violation alerts, ensuring timely and actionable insights for users.

2

Developing Advanced Analytics and Machine Learning Algorithms

Beyond real-time event handling, the client sought to enhance user experience through advanced analytics and machine learning models. These tools were to provide car owners with capabilities to:

- **Trip Optimization:** Analyze historical trip data across multiple drivers to recommend efficient routes and driving practices.
- **Driver Behavior Monitoring:** Assess and monitor the driving habits of the drivers, promoting safer driving behaviors.
- **Vehicle Health Assessment:** Offer real-time diagnostics and predictive maintenance alerts to ensure optimal vehicle performance and longevity.

Faced with the challenges of managing real-time IoT data and enhancing user experience, the client sought a reliable partner to build a robust solution. With a clear vision, they aimed to tackle these hurdles through advanced big data infrastructure and AI-driven analytics.

Blueprint for Success: Indium's Methodical Approach to Building a High-Performance Connected Car Ecosystem

The Indium team identified the need for a horizontally scalable, low-latency infrastructure that could seamlessly handle both real-time IoT event processing and batch analytics. Understanding the critical nature of event-driven decision-making, trip optimization, and driver behaviour analysis, Indium devised a multi-layered architecture that could process, store, and analyze data efficiently, ensuring seamless insights for end users.

Architecting Scalability & Speed

Designed a horizontally **scalable, low-latency architecture** to handle both real-time event processing and batch analytics, ensuring uninterrupted performance.

Intelligent Event Processing with Stream Grouping

Balanced **tuple processing across the Storm topology** using precise stream grouping, ensuring that data from the same car was always processed by the same Storm bolt for consistency.

A Lambda-Driven Big Data Infrastructure

Implemented **a Big Data framework inspired by the Lambda architecture,** seamlessly integrating batch (historical analysis) and speed (real-time processing) layers for optimal efficiency.

AI-Powered Driver & Trip Optimization

Developed a **custom AI algorithm** to calculate driver scores and optimize trips based on historical trip data, enhancing driving efficiency and safety.

Streaming IoT Data with Kafka & MongoDB

Enabled the car owner's **mobile app to store IoT sensor data in MongoDB** while leveraging Kafka to stream this data for real-time processing.

Real-Time & Predictive Analytics with Spark & HBase

Synchronized data in HBase for near real-time **Trip & Driver Score Analytics** using **Spark MLlib,** ensuring continuous monitoring and actionable insights.

High-Velocity Event Processing with Storm

Implemented **Storm for real-time event processing,** seamlessly integrating with the analytics pipeline to power instant decision-making.

Closing the Data Loop for a Smarter Experience

The output of **Trip & Driver Score Analytics was fed back into MongoDB,** ensuring a unified, data-rich experience for car owners.

This end-to-end architecture empowered the client with a robust, AI-powered, real-time connected-car ecosystem, transforming data into actionable intelligence for smarter and safer driving experiences.

The Road to Impact:
The Business Value of Innovation and Data-Driven Decisions

Real-time insights, smarter decisions, safer roads—Indium's data-driven approach transformed raw IoT data into actionable intelligence, delivering tangible business benefits.

▶ **20% Safer Roads with Smart Driving Insights:** Trip & Driver Score Analytics helped reduce risky driving behaviors, leading to improvement in overall driving safety.

▶ **Predictive Maintenance for Peak Vehicle Health:** IoT sensor data from trips and vehicle components optimized maintenance schedules, reducing unexpected breakdowns and improving servicing efficiency.

▶ **Reinvented & Rebranded: A Smarter Product for the Market:** The solution was rebranded as an IoT-powered safety & convenience device, transforming real-time analytics into a commercially successful offering.

About Indium

Indium is an AI-driven digital engineering company that helps enterprises build, scale, and innovate with cutting-edge technology. We specialize in custom solutions, ensuring every engagement is tailored to business needs with a relentless customer-first approach. Our expertise spans Generative AI, Product Engineering, Intelligent Automation, Data & AI, Quality Engineering, and Gaming, delivering high-impact solutions that drive real business impact.

With 5,000+ associates globally, we partner with Fortune 500, Global 2000, and leading technology firms across Financial Services, Healthcare, Manufacturing, Retail, and Technology—driving impact in North America, India, the UK, Singapore, Australia, and Japan to keep businesses ahead in an AI-first world.

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