ADLINK
Leading EDGE COMPUTING

Telematics Solution

IoT-Based Tire Monitoring System Increases Safety and Productivity

Industrial IoT Gateway sends alerts when a vehicle's tires are outside of normal tolerance levels.



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With its aging population, Japan faces a serious driver shortage in the logistics industry, making the need to improve transportation efficiency as important as ever. In this regard, Nihon Michelin Tire Co., Ltd. and SoftBank Corp developed the Michelin Tire Pressure Monitoring System (TPMS) for industries such as fleet management and construction. The system uses tire data to forecast potential problems in advance, helping drivers avoid accidents and unsafe driving situations. With automated tire monitoring, drivers can focus on their driving, and fleet operations managers can better handle vehicle maintenance, thus improving road safety and operations efficiency.

Objectives

- Reduce accidents: Prevent dangerous driving conditions caused by improperly inflated tires.
- Minimize vehicle downtime: Avoid time-consuming flat tires.

Solutions

- Michelin Tire Monitoring System: The system continuously monitors vehicle tire pressure and temperature and, if a problem arises, sends alerts to the fleet operations manager, the Michelin tire vendor, and the Michelin Rescue Network.
- ADLINK MXE-110i Industrial IoT Gateway: This vehicle mounted gateway collects data from sensors installed in tires and sends it to the Michelin Tire Monitoring System via the Softbank's mobile network.

Business Value

- Increased driver safety: The solution helps minimize accidents through proactive tire maintenance.
- Higher productivity: Early detection of tire issues helps minimize long, expensive, unscheduled vehicle downtime, thereby increasing vehicle and driver productivity.

Michelin's TPMS Cloud Service

The TPMS checks for under-inflated tires, which can cause tires to overheat, thereby increasing chances for tire damage and a blowout. The tire sensor sends pressure and temperature data to the ADLINK gateway, which then sends the data to the Softbank Cloud Service over the Softbank Mobile Network. When the air pressure or temperature of a tire exceeds its standard limits, the cloud service sends alerts containing vehicle number, location, and tire data to stakeholders: operations fleet managers, call centers, roadside assistance that can monitor tires via smartphones, tablets, and personal computers.

For the example shown in Figure 1, the fleet operations manager receives an alert and then sends a request for roadside assistance to either the Michelin tire vendor or to the Michelin Rescue network. Emergency roadside assistance is quickly dispatched to the location of the fleet vehicle to resolve the tire issue.

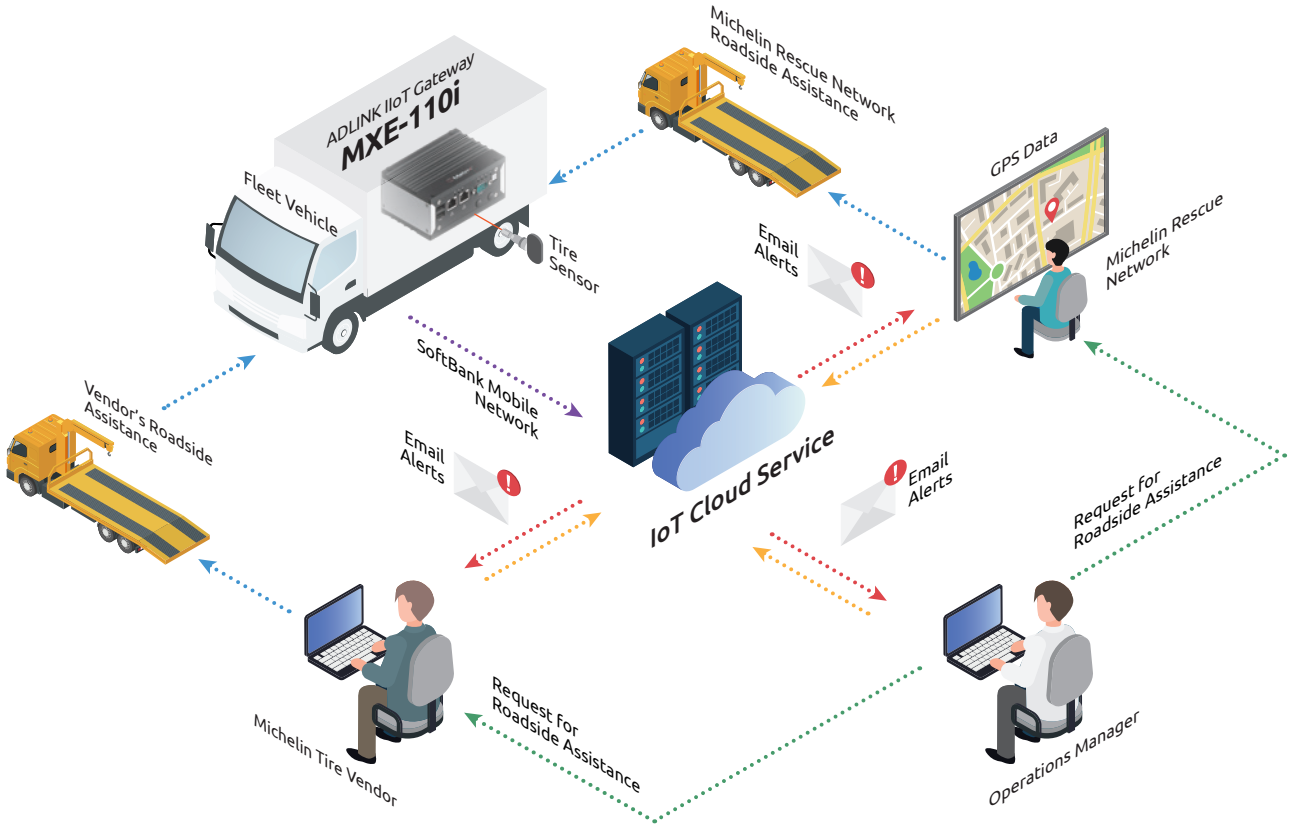


Figure 1. Michelin Tire Monitoring System Communication Flow.

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Robust and Versatile ADLINK Gateway

The rugged, fanless construction of ADLINK MXE-110i industrial IoT gateway is designed to handle the harsh environments under which commercial vehicles operate, including high levels of vibration, impact, dust, electromagnetic interference (EMI), and temperature extremes (e.g., -20°C to 70°C). The gateway is also low power and compact – essential features for integration into trucks and other vehicles, in which power and space are constrained.

For this IoT tire application, the gateway performs data acquisition and remote monitoring; connects to Michelin's TPMS sensors through RS-232; and communicates over the Internet across SoftBank's 3G/4G cellular network. It is well-suited for a wide variety of industrial IoT (IIoT) applications, like smart city, facility management, and industrial automation, and supports many I/O interfaces: 2x 10/100 MbE, 2x COM, 2x USB 2.0 host, 2x mini PCIe slots, and a micro-SIM socket for wireless connection, like Wi-Fi, Bluetooth, LoRa, and 3G/4G/LTE.

Telematics Use Cases

ADLINK's MXE-110i can further help implement predictive maintenance services and usage-based insurance programs. With the ability to support GPS tracking and OBD II (on-board diagnostics) over a CAN bus interface, the MXE-110i can collect vehicle telematics data such as engine temperature, vehicle speed, and gas mileage, and alert operations managers and drivers when repairs and maintenance are necessary. The vehicle telematics data also provides insights into drivers' behavior, allowing insurance companies to better assess risk and calculate insurance premiums for individual drivers (Figure 2).

Benefits of the Tire Monitoring Service

Michelin and SoftBank have begun to offer the "Michelin Tire Pressure Monitoring System (TPMS) Cloud Service" in Japan. With this remote tire control system, based on ADLINK's MXE-110i industrial IoT gateway, Michelin aims to help minimize vehicle downtime and improve efficiency in the logistics industry. The tire information can also be used to prevent low gas mileage, and excessive wear and tear on the traction system and tread, all caused by improperly inflated tires.

The flexibility and versatility of the system allows it to handle all classes of mobile assets and vehicles, including camper vans, light trucks, heavy vehicles, trailers, and buses. SoftBank anticipates similar IoT-enabled solutions to emerge, like ride sharing and autonomous vehicles.

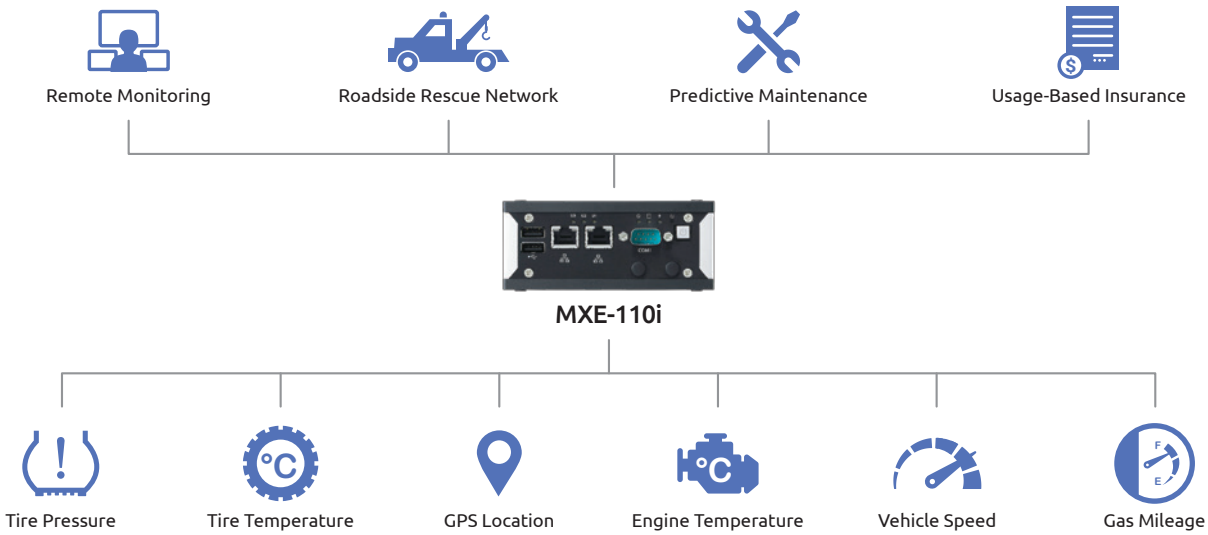


Figure 2. ADLINK's MXE-110i can interface with a myriad of sensors to gather data required for safety and operational improvement.

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