Over-the-Air Automotive Software and Data Management With Edge Data Processing

Increasing Dependency and Complexity

Connected vehicles are increasingly dependent on software, electronic control units (ECUs), sensors, microprocessors, and data analytics to power advanced driver assistance systems, vehicle-to-everything integrations, autonomous systems, and expanding services and monetization models. Combined with the rising intricacy and complexity of executing software update and data management campaigns for millions of vehicles simultaneously, automakers need a secure and highly scalable over-the-air (OTA) solution with dyamically upgradable data analytics and the flexibility to balance cloud and in-vehicle data processing.

Software, Data, and Analytics Management for Connected and Autonomous Vehicles

Combining Airbiquity's OTAmatic™ OTA software update, data management, and upgradeable edge analytics features with Teraki's pre-processing data analytics capabilities provides automakers with an efficient and accurate solution for managing connected vehicles. Working in tandem, Airbiquity and Teraki technology gives automakers the flexibility to conduct data analytics on-board the vehicle or in the cloud, and supports a wide range of future use cases to increase vehicle performance and safety - as well as consumer satisfaction with connected vehicles, autonomous vehicles, and new mobility services.
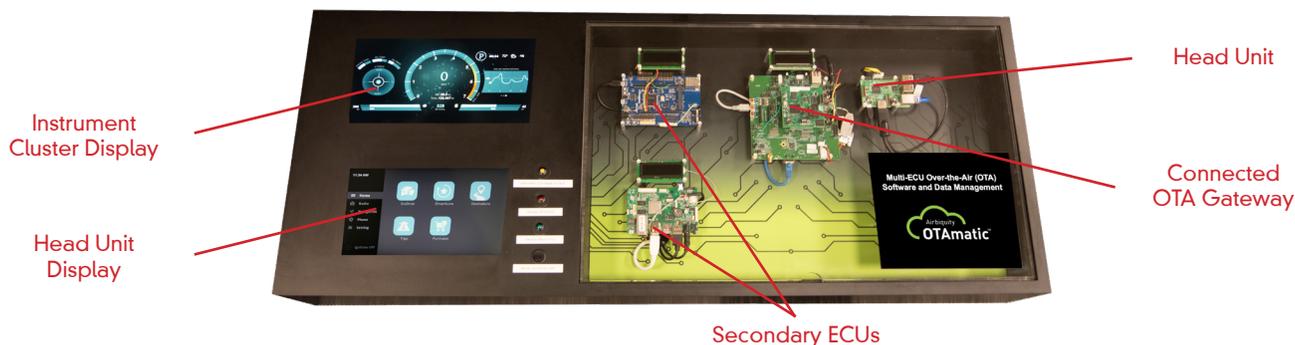
OTA Software and Data Management

OTAmatic securely and efficiently orchestrates and automates connected vehicle software update and data management campaigns from the cloud. OTAmatic provides a sophisticated back-end service delivery management capability with highly refined vehicle and device targeting, multiple and parallel software updates, discrete policy and privacy controls, customizable consumer communications, and solution deployment flexibility. OTAmatic also features an edge analytics framework supporting upgradable data analytics modules and enhanced multi-layer cybersecurity protection via integration of the compromise-resilient Uptane Security Framework.
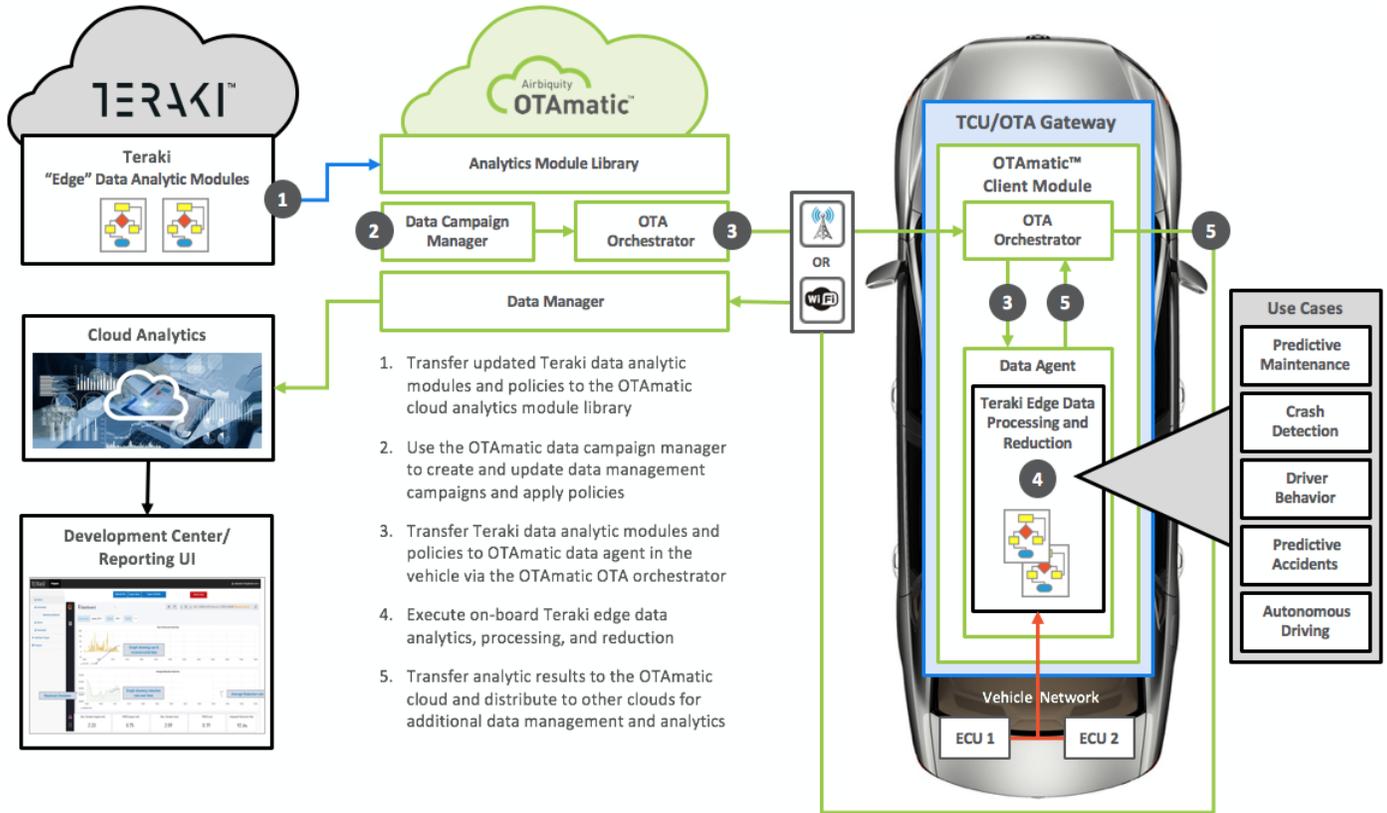
Accurate and Efficient Edge Data Processing

Teraki's embedded, data pre-processing software enables applications to run efficiently on existing hardware and with the highest accuracy. Users can process, store, and send 10X more data compared with other technologies. Teraki's deterministic technology enables safety critical applications with the lowest inference times and allows both edge and cloud algorithms to achieve the highest accuracy rates. Teraki enables connected car and autonomous use cases such as predictive maintenance, crash detection, driver behavior, and predictive accident alerts. Teraki technology works for all telematics, video, and 3D sensors.

Airbiquity-Teraki OTA Software and Data Management with Edge Data Processing

Airbiquity-Teraki OTA Software and Data Management with Edge Data Processing
— Functional View —

Teraki "Edge" Data Analytic Modules

Analytics Module Library

Data Campaign Manager

OTA Orchestrator

Data Manager

Cloud Analytics

Development Center/ Reporting UI

TCU/OTA Gateway
OTAmatic™ Client Module
OTA Orchestrator
Data Agent
Teraki Edge Data Processing and Reduction
Vehicle Network
ECU 1   ECU 2

Use Cases
- Predictive Maintenance
- Crash Detection
- Driver Behavior
- Predictive Accidents
- Autonomous Driving

1. Transfer updated Teraki data analytic modules and policies to the OTAmatic cloud analytics module library

2. Use the OTAmatic data campaign manager to create and update data management campaigns and apply policies

3. Transfer Teraki data analytic modules and policies to OTAmatic data agent in the vehicle via the OTAmatic OTA orchestrator

4. Execute on-board Teraki edge data analytics, processing, and reduction

5. Transfer analytic results to the OTAmatic cloud and distribute to other clouds for additional data management and analytics

- Single and Multi-ECU Software Updates
  - Unified Diagnostic Services (UDS) Updates for Secondary and Legacy ECUs
- Multiple and Parallel Software Updates
  - Firmware, System, Application, and HMI
- Advanced OTA Software Update Orchestration
  - Pre-Conditions, Priorities, and Dependencies
  - Fault and Error Detection, Recovery and Rollback
- Dynamic and Flexible Data Management Framework
  - Definable Collection: Frequency, Triggers, Logs, DTCs
  - Multiple Bus Support: CAN, Ethernet, MOST, FlexRay
  - Upgradeable In-Vehicle Edge Analytics
  - Data Transfer from Car to Cloud to Analytic Resources
- Back-End Service Management Portal
  - Step-by-Step Campaign Configuration Process
- Campaign Specific Consumer Notifications
  - In-Vehicle Displays and Smartphone Application HMI

- Teraki Edge Data Processing
  - Reduces Mobile Data Consumption up to 50X
  - Applicable to All Sensor Data: Telematics, Images, 3D
  - Higher Algorithm Accuracy Rate via Pre-Processing
  - Low CPU and RAM Usage for Constrained Compute Environments
  - In-Vehicle (ECU-ECU, ECU-TCU) and Car-to-Cloud (TCU-Cloud) Usage
  - Operates in Real-Time with [Safety Related] Edge Algorithms and Neural Networks (NN)
- Multiple Bus Support: CAN, Ethernet, MOST, FlexRay
- Defense In-Depth Security Approach
  - Compromise-Resilient Uptane Software Security System
  - Standards-Based Confidentiality, Integrity, Authenticity
- Comprehensive Campaign Reporting
  - Collective and Individual Campaign Results
  - Analytics Module Performance Metrics

For Additional Information

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