IBM Watson IoT for Automotive Connected Vehicle



Serge Bonnaud - <u>serge.bonnaud@fr.ibm.com</u> - + 33 6 14 21 01 57 Executive Architect, Industry Solution Team, IBM Europe

https://www.linkedin.com/in/serge-bonnaud-97b1527/

18th of October, Versailles, 2018



Our Connected Vehicle solution focuses on Four Domains for the Connected and Cognitive Vehicle



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IBM Watson IoT for Automotive Connected Car Platform





- Made for the development and operation of world leading Connected Car Services
- A secured, highly configurable & scalable cloudbased solution
- Enables real-time tracking, support & analysis of millions of vehicles & drivers, in the context of their environment
- Provides embedded complex analysis
- Open to enterprise legacy systems & 3rd-party platforms & solutions
- Platform for Watson Cognitive solutions
- Delivered as a SaaS offering



Vehicle Real-Time Digital Twin





- Features
 - Vehicle Driving, Diag & Incident History
 - Vehicle Health / Prognostics
 - Failure Prediction & Alerts
 - Vehicle Usage context (weather, road type)
 - Trigger Additional Data Collection
 - Location & Environment Awareness (Vehicle History)
- Enabled Use Cases
 - Advanced Driver Assistant Systems
 - Predictive Maintenance and Quality
 - Dynamic Service Scheduling
 - Vehicle Record and Warranty Management
 - Remote Vehicle Status and Control
 - Vehicle Lifecycle Management
 - Geo-Fencing & Stolen Vehicle Tracking



Dynamic Layered Map System



- Features
 - Event Management, Event Pattern Analysis
 - Traffic Pattern Analysis
 - 3rd Party Integration (e.g. weather, traffic lights, public events, roadworks, Pol)
 - HD Map integration / HAD ready
- Enabled Use Cases
 - Crowdsourced Traffic Information
 - Dynamic Traffic Prediction
 - Environmental Awareness (Air Pollution...)
 - Beyond sight information / warnings / optimize stops & fuel saving
 - Multimodal Navigation & Transportation
 - EV Charging Management
 - Road Condition Warning
 - Driving optimized with Infrastructure / Green Wave Assistance
 - Parking Finder
 - Etc.

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Driver/Persona Real-Time Digital Twin – Designed for Autonomous Vehicles





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- Features
 - Driving behavior (acceleration, turning, idling, ...)
 - Driving context (speed pattern, weather,)
 - Origin & destination and trajectory patterns
 - Personal driver information and record
 - Natively supports wearable & driver sensor data
- Enabled Use Cases
 - Personalized Navigation
 - Cognitive Personalization
 - Driver Health Monitoring
 - Location-based Couponing and Advertisement
 - Driver Behavior Analysis (for Fleets)
 - PAYD Insurance
 - Usage-based Tolls
 - Car-Sharing and Ride-Sharing
 - Feedback to engineering
 - Etc.



Vehicle Probe Data enable a variety of value generating use cases



Connected Car Use Cases



Example – Use Case Recipe for *!Black Ice Ahead!*





Open for Next Generation Apps & Services





IBM Watson IoT for Automotive



Examples & References





Honda Makes Real-Time Racing Decisions for Formula One Power Unit Operations with IBM Watson IoT Technology Data monitored & analyzed in real-time from 160+ sensors in Formula One (F1) cars.

Results in streamlined performance, improved fuel efficiency, drivers & crew real-time decisions to adjust strategy, speed and pit stops.

"The power of data and real-time analytics is a critical factor in winning races" – Chief Eng. & Mgr.

Ford's Smart Mobility Platform uses Watson IoT Platform to help consumers have better travel experiences.

Combines subway, traffic & weather data to advise on most efficient method of transportation.

Uses City Parking data with time and location-based parking patterns to provide insights into available parking spots.

Dynamic rerouting of shuttle busses when malfunction detected.



Alpine and IBM develop Next-Generation in-vehicle systems that utilize Cognitive Watson IoT for Automotive as a fundamental technology Will combine driver behavior and map, traffic, city, weather dynamic information to guide for route.

May propose stopover after studying social information and preferences.

Various sensors in the car to connect seamlessly to the lifestyle of the driver and passengers.



With the Bluedrive solution IBM is helping drivers in China to avoid air-pollution whilst driving





When connecting their in-vehicle air quality sensor to the IBM platform, drivers receive a warning when they enter a highly polluted area.





us to calculate and compare driver scores, give cost saving recommendations and identify maintenance needs.

console so the driver or the emergency can

be called.

Driver Profiling with Context Map



Context based Query & Alerting for Navigation





- Context Map Searching:
 - Real time alert in sharp turn area (context of Road network) with heavy rain (context of weather) to vehicle running over 80km/h (context of speed pattern)
 - Real time alert in freeway entrance (context of Road network) area with fog/snow (context of weather) and dark light (context of vehicle lighting)
 - Real time notify hail messages to all vehicles on the road links inside hail region







Cognitive Examples



Cognitive features along the drive are providing a true cognitive experience - integrating various 3rd parties



Local Motors Debuts "Olli", the first self-driving vehicle to tap the power of IBM Watson

Watson lo

Olli is the first vehicle to utilize the cloud-based cognitive computing capability to analyze and learn from high volumes of transportation data, produced by more than 30 sensors embedded throughout the vehicle. The platform leverages four Watson developer APIs -- Speech to Text, Natural Language Classifier, Entity Extraction and Text to Speech -- to enable seamless interactions between the vehicle and passengers.



Every driver desires intelligent, proactive and relevant route guidance



Cognitive Route Guidance

Learn, predict and suggest intelligent routes based on historic and real-time driving behavior that considers traffic, weather, and social events associated with the route predicted.

Features

- Use cognitive learning to discover the drivers frequent route patterns (origin, destination, and trajectories with time attributes) based on accumulated historical trips
- Create/update driver's profile based on accumulated trips and learned behaviors
- Use real-time analytics to predict and suggest the next trip to the driver and advise driver appropriately
- Pull value-added information associated with the location and route predicted and push alerts to the driver, such as weather hazards (hail, thunder storm, icy conditions, flooding from TWC) as well as real-time or predictive traffic information from 3rd party data provider
- Simulate fleet of vehicles to identify patterns amongst a cohort of cloud-connected vehicles
- Text to speech, speech to text alerts

Possible enhancements

- Integration with mobile calendar to predict route dynamically
- Notify driver events related with his route from social media analysis, e.g., tweeter feeds on sports, social events, accidents
- Optimize route plan based on trip duration, time of the day, day of the week based traffic information
- Advise driving decisions based on real-time and predictive information, e.g., leave early today because of traffic congestion (while you are en route), you will not make it to your appointment
- Natural language dialogue/interaction while driver is driving

<u>Demo</u> : Notify weather hazard associated with the route prediction to the drivers





Intelligent self-enabling vehicles provide greater personalized experience through their ability to "take care" of their occupants



Cognitive Personalization Learn and recommend cabin climate control and infotainment system settings based on the driver's historical behavior paired with environmental and demographic contexts such as traffic, location, weather and driver's social profile

Features

- Use cognitive learning to understand driver's preferences for the climate control system and IVI system (e.g. radio channel and volume) associated with context (time of day, day of week, weather, traffic)
- Discover in-vehicle climate (temperature, humidity, air quality, etc.) condition correlation patterns with climate control actions, traffic, weather and road network situation
- Drive intelligent control of climate system to deliver personalized in-vehicle climate dynamically considering contextual information streams
- Integrate IBM Research BlueDrive solution for intelligent in-vehicle air quality control for closed-loop actions
- Simulate fleet of vehicles and driver profiles to identify patterns amongst a cohort of cloud-connected vehicles
- Text to speech, speech to text alerts

Possible Enhancements

- Pre-condition vehicle before the driver starts the trip based on learnings from historic behavior considering
 personal profile, weather information
- Integrate with mobile calendar and destination POI understanding (learn behavior that Saturday is soccer day, and the music needs to be different vs. driving home Thursday night after busy day requires different music)
- Natural language dialogue/interaction

<u>Demo</u>: Notify driver to change climate settings based on air quality, and traffic observations



CES 2017 - Panasonic Automotive and IBM partner to develop cognitive vehicle infotainment system with Watson

- Panasonic Automotive today announced the introduction of the Panasonic Cognitive Infotainment platform designed to provide OEMs and fleet providers a set of cognitive vehicle solutions combining Panasonic's market leading infotainment expertise with IBM's Watson and cloud technologies
- The platform leverages Watson cognitive capabilities, including deep natural language processing and understanding, to answer questions and provide recommendations as well as directions while en route
- The platform also introduces e-commerce capabilities for convenient in-vehicle purchases to make the most of a driver's time, as well as possible future cognitive driving solutions that monitor the vehicle condition for safer driving
- This new platform is designed in collaboration with both Panasonic, responsible for more efficient strategic retail business systems, and IBM, leveraging the company's cognitive technology via its Watson APIs





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Link

Thank you!