INTERNET OF THINGS FOR SPECIAL CAR

Ing. **Dragoş Andrei POPA**[1], Dr. ing. **Mirela Maria CODESCU**[2], Dr. ing. **Dragoș POPA** [3]

[1] Universitatea „Politehnica“, București România,
[2]Institutul Național de Cercetare-Dezvoltare pentru Inginerie Electrică ICPE-CA-București, România,
[3] AGIR-SETEC, București, România

REZUMAT. Lucrarea va descrie aspecte privind alegerea, utilizarea şi comportamentul echipamentelor electrice, ca sisteme integrate în industria auto și/sau aeronautică. Se va face o scurta prezentare a echipamentelor electrice utilizate la construcția automobilelor, vor fi evaluaţi factorii de integrare în sistemul acestora, precum și elemente de Internet of things – IOT, efecte pozitive și măsuri pentru eliminarea sau diminuarea efectelor negative.

Cuvinte cheie: echipamente electrice, sisteme integrate, siguranță în utilizare.

ABSTRACT. The paper will describe aspects related to the choice, use and behaviour of electrical equipment like integrated systems in the automotive/aeronautical industry. A brief presentation of electrical equipment used on automotive industry will be made, about IOT integrated elements, their disturbing factors as well as measures to eliminate or mitigate adverse effects will be assessed.

Keywords: electrical equipment, IOT- integrated systems, safety.

1. INTRODUCTION

1.1. IoT basic elements for automotive and aeronautical industry

The definition of Internet of Things is „a proposed development of the internet in which everyday objects have network connectivity, allowing them to send and receive data". The Internet of Things is breaking fresh ground for car manufacturers by introducing entirely new layers to the traditional concept of a car. This upgrade — the connected, smart car — comes as a revolutionary way for us to drive and stay in touch with the world around at the same time.

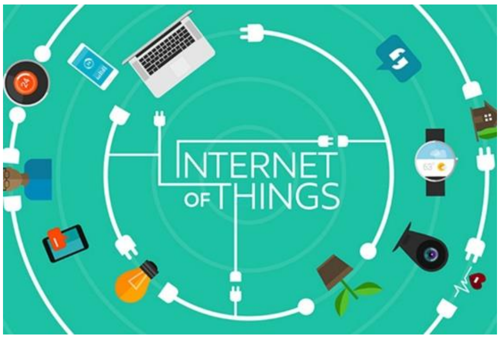

Fig.1. Internet Of Things.

Cars will remain a key component of our transportation mosaic with connected and electrified vehicles playing a critical role in helping this new world of mobility take off. Today most automotive companies and those in other industries are investing heavily to add a variety of mobility offerings to their portfolio.

Ecosystems are developed around the consumer's experience with how they want to utilize mobility options. Consumers have various preferences regarding the features and services they want to access. These are often based on their digital maturity and life-cycle expectations. Based on the desire for capabilities that enrich the vehicle experience. Based on connected services that enrich the personal experience of getting around. And based on a desire for new mobility models and alternative transportation modes. The value of IoT data is obviously not just collecting and having it, but turning it into valuable business insights that can drive real-time decisions, such as driving opera- tional planning, providing alerts and alarms using real-time data, providing descriptive analytics for reporting and modeling (what has happened in the past), providing predictive analytics (what will happen in the future) and even providing prescriptive analytics which help determine what should be done next. Analytics capabilities rely on a series of technologies, including leading analytics platforms, visualization tools, databases, data warehouses, data quality and extract, transform and load (ETL) systems, and other technology components.

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1.2 Smart airport iot elements

As air traffic grows, airports need to adapt to the requirements and to become more entrepreneurial and proactive to changing aviation dynamics.

Most of the airports, nowadays are considered „multi-nodal" transportation hubs for people, information and trade.

The goal of the smart airport is to make systems and processes digitally aware, interconnected, infused with intelligence and simple to access by everybody.

Predicting capacity demand, providing enhanced passenger travel experience, improving operational process efficiency, improving staff productivity and ensuring security and safety are just a few of the smart airport targets.

The main idea is to create an integrated system, unified and ready-to-use digital platform for the airports to become informed and intelligent.

Fig. 2. Airport Management Strategy.

As an example, passenger touchpoints will not be based on the same principle of the key information interchanges at check-in, security check or boarding.

Instead of this simple principle, it will be used a real-time and continuous connection to the passenger, that will permit the access of the information anytime and anywhere.

Those capabilities will enable all the airport stakeholders – airlines, security, operations, concessionaires and other service providers to engage the passenger with relevant information and offers. The direction of those conversations is to be more personalized, media-rich and valuable.

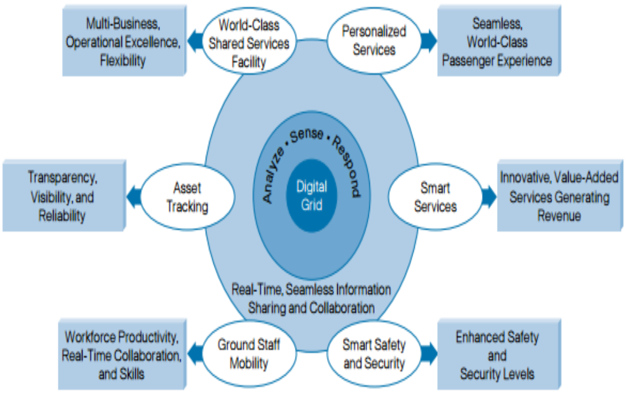

Fig. 3. Digital Grid for the Smart Airport.

2. SMART INTELLIGENT AIRCRAFT STRUCTURES (SARISTU)

About 3 billion people every year use air transport to realize their business and leisure needs, whereas about 5 trillion Euros worth of goods are transported by air. And these figures are on the rise: Annual passengers are expected to reach over 6 billion by 2 030, according to current projections.

Fig. 4. SARISTU.

As the number of flights increases, pollution and noise from air travel impose significant challenges on the industry. This is why airlines, aircraft manufacturers, and researchers are constantly searching for new ways to make their planes lighter, with increased aerodynamic performance, achieving at the same time greater fuel efficiency and thereby reduce the environmental footprint of air travel.

Coordinated by Airbus, the Smart Intelligent Aircraft Structures (SARISTU) project brought together 64 partners from 16 countries with a common goal: to demonstrate the feasibility of reducing aircraft weight and operational costs, as well as improving the flight profile-specific aerodynamic performance.

During the four years of project implementation (September 2011–August 2015), the synergy of leading entities participating in this ambitious venture has succeeded to achieve some major breakthroughs in a number of technological fields.

Firstly, developments with respect to conformal morphing (change of the shape of aerodynamic surfaces) validated not only a suitable skin material, but even the ability to integrate additional functionalities such as heating and environmental protection. Furthermore, the technical feasibility of trailing edge morphing and the ability to consider active winglet control were investigated.

Secondly, developments in the wide area of structural health monitoring covered analysis methods, physical system integration at part manufacturing level, the combination of different measurement and analysis techniques on single areas of the aircraft, and a screening program for fundamental approaches to passive damage indicating surfaces.

Thirdly, multi-functional structure developments highlighted the ability to upscale nanocomposite improvements from the basic resin all the way up to industrially relevant laminates of complex and large geometries, as well as opening development

3. IoT FOR AUTOMOTIVE INDUSTRY

Automotive (auto) companies are sitting on a treasure trove of data – data generated by their businesses, products and services, customers and other external sources. The potential uses of this data are tremendous – from greatly improving industry and company practices to personalizing consumers' in-vehicle experiences to creating new mobility options.

But that potential often remains untapped because the tools to extract the insights residing within the data are either underutilized or unavailable. Cognitive computing can help unleash these insights – and auto executives are beginning to take heed.

ntelligent concierge-style services

A European automaker in North America offers „intelligent" concierge-style services through a smartphone app that is integrated into its vehicles. In-vehicle services are personalized for the owner who can use them while in the vehicle or away from it. Route-time estimations, fueling, charging and finding parking spots, and coordination with other lifestyle events are just some of the features. The service continuously learns based on actions and preferences of the user. The experience configures to other like-model vehicles to allow for a consistent brand experience when car sharing.

A Japanese automaker is driving brand awareness and engagement for one of its models. The company is engaging and educating consumers using pop-up ads in a weather app. Instead of passively experiencing a brand's message, consumers actively engage with the ad to learn more about the vehicle on their terms. Users can get direct answers to their text and voice queries, and can be transferred to a local dealership. Machine learning provides deeper insights into the types of questions consumers ask.

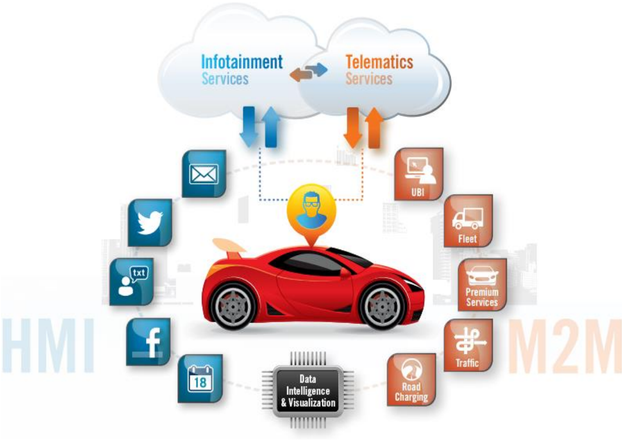

Fig. 5. Various On-Board Services.

A major on-demand ride-sharing provider is experimenting with alternative ways to calculate fares based on regional preferences. One option is to create a system that charges what customers are „willing to pay," based on factors like whether the customer is traveling to a wealthy suburb or past fares the customer has paid for similar trips. The company calculates fares using a „route-based pricing" strategy that involves a complex set of algorithms and takes into account the customer's spending habits. To understand route patterns and spending habits, the company incorporates artificial intelligence and machine learning. It also applies the data it collects from customers to make educated guesses about price sensitivity.

The automotive IoT transition is evolving across four major phases. Connectivity and sensors progressively enable passive monitoring, interaction, ambient awareness, and automation.

Passive monitoring essentially consists of traditional telematics capabilities, such as emergency calling, roadside assistance, stolen vehicle tracking, and remote diagnostics, all of which are only activated after an event like a collision or a breakdown has happened. As such, they are reactive and passive in nature.

The second phase has added an interaction component. It allows the remote control of a vehicle through a smartphone and adds infotainment inside the vehicle, mostly through smartphone integration.

The transition to phase 3 will allow vehicles to be aware of what is happening in the immediate vicinity through Advanced Driver Assistance Systems (ADAS) sensors or even through vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I). Phase 3 will have a major impact on safety, but will also result in big data collected by vehicle sensors to be shared on a wider scale, resulting in new services, such as micro-weather information.

The fourth phase introduces automation by making vehicles independent through autonomous and driverless cars. This will have a disruptive impact on transportation in terms of declining vehicle ownership in favor of car sharing (e.g., Car as a Service (CaaS)).

Fig. 6. Examples of Internet of Things Features.

3.1. Vehicle-to-person and healthcare

In-vehicle healthcare monitoring is explored either via wearables like Nissan's Nismo smart watch or via embedded healthcare sensors as demonstrated by Ford. Biometric parameters and conditions monitored typically include heart rate, blood glucose levels, blood pressure, asthma, and allergies. Pedestrian detection is a special case of vehicle-to-person (V2P), whereby connected cars communicate with pedestrians to avoid casualties. Qualcomm recently announced a Wi-Fi chipset solution supporting DRSC, which could be used for this very purpose.

3.2. Vehicle-to-infrastructure

V2I services allow vehicles to communicate with connected road infrastructure, such as traffic signs, digital signs, light poles, and parking spaces, for a wide range of applications, including traffic signal violation warnings, bus priority signal control, adaptive lighting, green-light optimum speed advisory (GLOSA), and bridge and parking structure height warning, many of which are critical for smart cities deployments. While IEEE 802.11p-based connectivity has been touted as the standard of choice for V2I (as part of the DSRC standard), other technologies will also play a role, such as Bluetooth low energy for parking sensors or as roadside traffic probes, low latency 4G LTE cellular, RFID, and radar and machine vision systems. While most regulatory and commercial efforts currently focus on V2V (U.S. mandate and CC-C2C consortium in Europe), these initiatives will be extended to V2I.

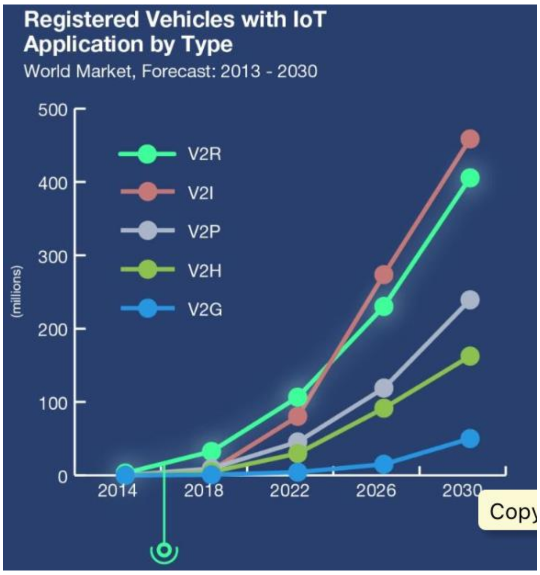

Fig. 7. Registered Vehicles with IoT Application by Type.

3. CONCLUSIONS

1. Car manufacturers are starting to explore solutions in the emerging smart car IoT application space by partnering with various vendors .

2. In order to fully unlock the automotive IoT potential, it will be critical to address a wide range of barriers, including security, safety, regulation, lack of cross-industry standards, widely varying industry dynamics and lifecycles, and limited initial addressable market sizes.

4. While the automotive industry is already struggling to match its own design and product cycles with those of the mobile and consumer electronics industries, which are typically an order of magnitude shorter, an IoT environment with multiple industries and verticals interacting exacerbates this issue.

5. For most smart car IoT applications, the addressable market is the intersection between the subsets of connected vehicles on one hand and a particular connected industry vertical on the other hand. For a smart car IoT application to be available, the double condition of the car being connected and, for example, the home being equipped with a home automation system is required.

6. Open connected platforms and in-vehicle smartphone application integration are strong drivers

and unifying technologies for deploying cross-segment IoT applications by a developer ecosystem, which is just starting to realize the innovation and value creation opportunities that lie hidden at the boundaries between the IoT segments and the monetization possibilities offered by cross-industry synergies.

7. Smart aircrafts will offer similar services as the smart vehicle, this starts with the personalization of the flight experience and being connected all the time to all the media services.

8. Tomorrow's airport will be a complex environment passenger-centred, being based on collaboration and innovation. This means critical roles will emerge around deep customer engagement, complexity management, partnership working and innovation delivery.

9. People tend to be technology dependents and assuring the costumers that they have access to all the new and raising technologies in their plane and in their cars it will be an important point in the monetization.

10. Ultimately, the success of the IoT will, to a large degree, depend on bringing all isolated connected ecosystems together into a seamless universal framework, in turn, providing essentially unlimited scope and scale.

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