Avoid roadblocks toward a Web Highway
Automotive an Extra Sensory Powerhouse of Data

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Abstract

This position paper intends to present a vision and ideas from Ericsson in the area of "Automotive and Web". It describes a few real world scenarios where current solutions are insufficient to provide attractive and relevant service to users. Ericsson sees a great value in the proliferation of data and applications able to extend the utility of connected platforms for the good of society. The web toolbox and the addressable space of "auto-motivated" data offer a compelling and flexible environment to connect across the imaginable set of devices (having an integrated dashboard or mobile user interface). We also suggest a few areas for improvement considering safety, user experience and not the least taking advantage of the car and the automotive platform as the "extra sensory" powerhouse of data.

Introduction

Users tend to think about a car and automotive experience as a mobile "Movie Theater" on steroids. We get nice and comfy seats, lots of speakers, ample power. As a bonus we also manage to depart and arrive with a sense of accomplishment having transported ourselves from point A to B while we entertain ourselves in the process... What's wrong with this picture, you may ask yourself? This paper is an attempt to take a stab at some of the perceptions and shortcuts leading us in the wrong direction.

The [Web and Automotive] should be considered an opportunity and a game changer as it will allow us to experience the next wave of services that can leverage on the automotive data combined with the full breath of features available to web developers (HTTP, Web sockets, HTML5/CSS and rich media). Automotive data is already in abundance waiting to be liberated using the appropriate means to be exposed using protocols such as Zeroconf, HTTP Restful APIs and framework/platforms such as DLNA /UPnP, node.JS etc.). This new potential dimension of "reachability" between devices will need to be refined and mediated through state of the art solutions that can be augmented using Audio/Video, Bluetooth, IP bearers and dedicated hardware including sensors and information buses already in place.

Making the trip our goal

So here we are, together in one and the same confined space, might as well make the most out of it - play some game – work on that position paper for the next W3C workshop or simply consume an endless stream of media piped down our way with HTML5 media savvy browsers. Then again considering the fast pace of today's bustling society and the fact that we may instead take the opportunity to relax, reflect and de-stress from our daily chores. Obviously not all of us are craving to enter a "zen" like state as we plan to go on that next trip becoming automotive people.

To be honest as any parent to small children can attest to - that space could just as easily turn into a chamber of despair as our lovely kids without warning enter into the sudden state of boredom and need to expel that extra energy by annoying the rest of the family.

So what we are saying here is just the fact that everything is possible (to turn on and play) is not an excuse to do it without due consideration to the context of human needs, state of mind even the state of the car itself that may need our due attention. Automotive industry already understand factors affecting our attention and ability to focus on important actions taking us safely from A to B. Web can help to better integrate automotive experience with connected services. With the introduction of Web we will also get the added benefit of a framework able to render old data in new formats or bring in entirely new information (based on existing mined data). The "web enhanced" trip may now help us to prepare for what's coming up next e.g. a shopping excursion breaking news from roadside assistance service or simply a sudden need for diversion of the less "responsible" (younger) part of the family.

Personal Safety First

No harm in serving that content with blasting out 5.1 audio stream on the headrest screen and charge just about anything via USB slots dispersed all around us? Well of course that could only work if the average human would be a machine able to fully focus (concentrate) on the most important task at hand (and filter out all other distractions). We think there has to be considerations such as

1. Dedicated API's to monitor context of end-user (ideally event driven)

2. Discovery of the means (UI) how services can be presented (mDNS, DNS-SD)

3. Identify the role of a user (Driver / Passenger) think NFC, Bluetooth etc.

   Note driver is one role while services to passenger may be less of a threat to the safety of the car, but may still become a distraction if not considered by the platform (e.g. limit volume on behalf of driver).

Web Exempt the Browser

Web can help us to realize a vision how to best enable information to be used if it can be named (URI/URLs) and retrieved (HTTP) and expressed (HTML). This is an abstract model (still need to be connected into the automotive platform) that helps us reach the sources or generators of data. In order to make that data accessible we also need the tools (API's and data formats) that are able to connect with the car automation system. A connected web end point would then be able to server the data to a web client (or user agent). It should be noted that the user agent is not limited to a desktop browser but could be any entity (dashboard UI included) able to interact with the automotive user.

WEB - Not just happen to serve as a catchy recursive acronym but an important and realistic idea as we are moving into an automotive and networked society having needs beyond what can be accomplished by a "docked" desktop browser. Today we tend to expect more and more out of the web beyond idly perusing of information. Eventually the ultimate experience may well be the one;

1. *That serve the user* but is not intrusive

2. That *acts on our behalf* as we expect and

3. *Transport us safely* to our destination

The car an extra sensory powerhouse

When it comes to a traditional web browsers these platforms are typically "indifferent" (except for positioning enabled browsers) about the whereabouts or context of the end-user. Context in this case is any knowledge that may help us to enhance and adapt the experience of the web to benefit the end-user. Example of context that seem attractive to expose to application developers may include;

1. Temperature inside, outside car and at destination

2. Accelerometers (navigation or synthetic horizon to aid sensitive users).

3. Car data to indicate need for maintenance, tire pressure, fluid levels

4. Sound pressure (or noise level) to enhance media experience

5. External connectivity ("proxied" through car system) GPS, Cellular Radio

We also tend to simplify Web as a combination of a network server and a client browser almost always working in one direction. In reality almost all of today's "smart" devices are powerful enough to work as "peers" able to interact with other devices nearby, in the car or even at the roadside. The car as a new compelling hub for dissemination of vital information is not yet being pursued as we do not have the means in place to share the data to applications.

The various sensors and features that may be invoked could be put to use if we also activate mechanism to identify and discover capabilities given to us as we immerse ourselves into the automotive experience

(prior to a trip, during a trip or even in a maintenance or remote scenario not necessarily being inside the car).

New solutions are being considered by various industry forums such as the W3C local discovery activities, automotive industry forum and wireless industry such as Bluetooth SIG (local connectivity and SMART sensors) and 3GPP (Telecom M2M work) to mention a few. Sensor data may come from any part /device and may reflect any kind of sensory input therefore the solutions being pursued should also be generic enough to allow for new sensors to be quickly deployed and brought to the market to further enhance applications (e.g. road train status update and social triggers "check in to truck stop").

State of the Art

What are the building blocks that we expect to benefit an adaptation for [Web and Automotive];

1. HTTP(S) and Web sockets (assuming we are not designing the in-car data system CAN bus etc).

2. HTML5, CSS with a healthy dose of responsive design principles

3. HTTP RESTFul API's and efficient and popular data formats such as JSON, XML

4. Web Server (Apache (MySQL, PHP), Node.JS, with database and scripting framework)

5. Physical media adaptations IP and Local Connectivity (Bluetooth, NFC)

6. Capability and Service Discovery (Zero Conf; mDNS, DNS-SD, Web Intent)

7. Model and framework to safely disseminate sensor data (Policy, Registration, Authentication).

Conclusion

W3C together with automotive industry stakeholders should feel the responsibility to develop the reference architecture that may help us to liberate automotive data /sensors and share that information with devices (car system, screens, mobiles, PDAs, ITS systems etc.). Automotive data and services should be possible to expose in a safe and predictable way ideally separating technical issues (sensors and actuators) from business logic (as separate layers of concerns). W3C has a long standing tradition to avoid constraining the web stack with the actual business policy the later part is better suited to be dealt with in the appropriate industry forum having the automotive end-user well-being as highest priority.

References

W3C workshop on Web and Automotive

http://www.w3.org/2012/08/web-and-automotive/

W3C wiki pages on Web and Automotive

http://www.w3.org/wiki/Web_and_Automotive