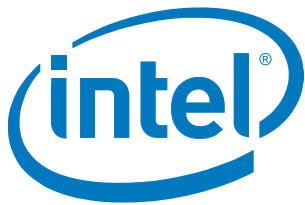




Mp3Car Partners with Technology and Auto Companies to Support Ground-Breaking Mobile Computing Demonstrations

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Immersed in the rapidly-evolving world of mobile computing, Mp3Car knows how to combine the amazing with the feasible to build exciting and substantive demos.

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It isn't easy to capture novel technology concepts and put them on stage while they're still fresh, but mp3Car has been doing just that for several years – providing the vision, expertise and sweat to build exciting and fully-functioning demos and prototypes.

Based on a philosophy of customer intimacy and a high level of comfort with innovation and creativity, mp3Car is able to respond quickly to the requirements – and the intent – of their clients. Mp3Car's immersion in the quickly-evolving world of mobile computing allows them to work at the intersection of the incredible and the feasible in mobile technology.

In these high-profile examples, mp3Car partnered with several different customers (Intel and Volkswagen; Toyota; and BMW) to design stage or showroom demos. Each project was executed with little lead time, and performed as expected during demonstration.

Client Challenges and Needs: Rapid Development of Cutting-Edge Technology for Tradeshow Demos and Prototypes

Beginning in 2005, mp3Car has partnered – and co-branded – with a variety of high profile companies in the demonstration of novel and innovative concepts for in-automobile ultra-mobile computing. Sought after for their broad expertise in the development, utilization and deployment of cutting edge mobile technology, mp3Car played a key role in many distinct projects. Three are discussed here: Intel's CEO Keynote Address (in partnership with Volkswagen) at the 2005 Intel Developer Forum; a Toyota Hybrid Demo vehicle for the 2005 Consumer Electronics Show; and a BMW demo vehicle for the Salon Auto Show in Geneva in 2007.

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While all of these projects had unique requirements, timelines and finished products, there was also a high degree of similarity in the underlying effort to design complex computer systems for deployment in passenger vehicles. This fundamental requirement presented several shared technical challenges (such as ignition-controlled power on/off, safe operation on unregulated power, and space constraints in mounting and cooling the hardware), and suggested a similar strategic approach for all three engagements.

To ensure success in envisioning and showcasing a novel technology demonstration, mp3Car typically employs multiple steps in a focused development framework. This paper will illustrate that approach with a close examination of the Intel CEO Keynote Address project; and the Results section will outline shared results for all three projects, as well as specific characteristics of each of the finished demonstration products.

In 2005, Intel set out to define and demonstrate the future of ultra-mobile computing. Fresh from the development of the latest and greatest in miniaturized, low-power components (code named "Stealy"), Intel wanted to prove the concept of truly mobile connectivity. In partnership with Volkswagen, they began to develop the idea of an in-car computer system that could revolutionize car infotainment, while also providing access to all of the benefits of the internet. All of the conceptual pieces were there, but the challenges of ignition-controlled, unregulated power along with seamless wireless connectivity and limited-space installation had yet to be addressed. With only a few months before the Intel Developer Forum (IDF), Intel and VW required expert assistance in the technical and assembly processes that would turn this vision into a demonstrable reality.

Solution and Approach: Customer Intimacy, Creativity and Innovation

These challenges presented an exciting opportunity for mp3car, whose broad professional background in custom automotive computing and infotainment (along with the combined experiences of the forum community) came as a unique qualification for the project. Project tasks fell into three broad groups of activities: Requirements Gathering, Brainstorming/Prototyping, and Execution.

Requirements Gathering: Experimenting with a best-of-breed mesh of consumer and industrial components – along with Intel's own cutting-edge materials – mp3car began developing the requirements and specifications for building out the automobile hardware, and architecting the broader solution. In order to facilitate the vision of multi-cast entertainment (discrete audio and visual streams for three consoles in the vehicle) alongside real-time internet connectivity, mp3Car chose to use a network of four small computers (one for each console, and an onboard backup unit). They also developed in-car docking station specifications for the flip-screen Ultra-Mobile PC (UMPC) that would provide a mobile link to the vehicle and its network.

Brainstorming / Prototyping: All of these machines needed to communicate constantly with each other, and mp3Car ultimately settled on UPnP as the protocol. Mp3car also provided and installed hardware that managed power regulation and on/off control for all of the on-vehicle machines, and provided material and design support to the engineers who were responsible for fabricating the custom vehicle mounting assemblies. Mp3Car went through several prototypes in the development of a glove-box charging/docking station for the UMPC. As the overall solution architect, mp3car also managed the software development effort that provided underlying communication and front-end user interface functionality to the vehicle consoles and the UMPC.

Execution: Functioning as the central figure in this product design, development and fabrication process, mp3car coordinated the efforts of 15 dedicated resources from three different companies, taking the project from the drawing board to an approved prototype, and only six weeks later to the stage at Intel's Developer Forum keynote address.

In the real world – and particularly in a project with such a short timeline – these tasks are often executed simultaneously, and the ability to steer through them to reach the underlying project goal is crucial. Mp3Car's innovative philosophy and high level of comfort in creative and open-ended environments allowed them to guide this project to a successful conclusion.

Results: Demos that get the Right Kind of Attention

All three of these projects culminated in working demonstration automobiles. For the sponsor companies, these demo vehicles provided several basic benefits: 1) they acted as platforms for the articulation of concepts or visions for new and innovative technologies; 2) they garnered substantial attention and useful feedback from both media and consumer communities; and 3) their demonstration – and the responses they received – functioned as free market research. Each project also had more specific results.



Intel CEO Keynote Project: The finished product, demonstrated in a VW Passat, was a series of firsts in mobile/automotive computing. It was the first mobile demonstration for WiMAX and the first in-car point-of-interest search (using Microsoft's Points of Interest and leveraging exposed APIs for Microsoft Live Local Search); it provided real-time traffic information and internet radio (from Yahoo); it gave users access to interactive GPS capabilities, along with Microsoft's Virtual Earth satellite imagery; and data (including audio or video files) stored on any of the networked machines was available across the network. The user interface incorporated touchscreen functionality and gestures, allowing users at any of the three in-vehicle consoles to conveniently and independently access and enjoy all of the available features. When the car rolled out onto the stage in San Francisco, mp3car's joint mission with Intel and VW – to capture the future of mobile computing – was a success.



Toyota Hybrid Demo Project: For this project, mp3Car helped create a multi-purpose, driving demonstration vehicle. PC components remained accessible, enabling customization of the demo experience for a given audience. Beyond being equipped for in-booth or on-stage use, the vehicle was fully functional on-road as well, so that users could sit in the seats and access the technology in a real mobile environment. This vehicle saw heavy duty, including: the Intel Booth at the 2005 Consumer Electronics Show; Show car for Detroit Executives at Car briefing seminar in 2006; Show car at Telematics Detroit in 2006; Private exhibition for Disney and ABC executives in 2006; Show car at DEMO Conference in 2006. It was even featured on Discovery Channel's Future Car in 2007.



BMW Salon Auto Show Project: This innovative concept, enabled by mp3Car, was featured front and center in the Intel booth at the Salon Auto Show in 2007. This show provides international exposure for multiple vendors, and the technology on display for this project was the first demonstration of in-car music purchasing capabilities. Featuring a collaborative effort between Gracenote and Intel, the system was able to fingerprint the music playing on the stereo and then identify it for immediate purchase and download. In the process, it also became the first successful demonstration of in-car internet mashups.

In each of these cases, mp3Car provided crucial skills in a proven development framework – from requirements gathering to prototyping to final execution. It is this framework, along with mp3Car's unique technical background and resource pool, that lies behind the smooth exterior of these prominent demonstration projects.