DENSO enables vehicle manufacturers to accelerate and more accurately design in-vehicle networks.

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DENSO adopts VisualSim Architect to improve in-vehicle network design.

Santa Clara, CA April 12, 2023- Mirabilis Design announced today that DENSO, a leading mobility supplier, has deployed VisualSim Architect from Mirabilis Design for efficient network development, from in-vehicle network architecture to communication processing of ECUs such as gateways.

DENSO was building a network modeling team and required a simulation platform that provided system modeling IP for hardware electronics, software, networks, schedulers, and more. After trying out multiple simulators, DENSO found VisualSim to be among the easiest to use, providing all the required system modeling IP and the ability to deploy within a short period of time.

"The delay time and packet loss of communication packets are affected not only by the scheduling algorithm, but also by the hardware configuration such as the bus and memory, and the processing load of the communication processing software. Visual Sim has three modeling IPs: network, hardware, and software. This allows us to deploy accurate simulations quickly."

-- Said Hiroshi Yamaguchi, Project Assistant Manager in the In-Vehicle Network R&D Department of Semiconductor-Originated Key Technologies R&D Division in DENSO.

To learn more about this adoption and how it impacts in-vehicle network design, DENSO and Mirabilis Design are jointly hosting a Webinar in Japanese and English on May 24, 2023. To register, please visit https://www.mirabilisdesign.com/registration-form/.

Partnership:

DENSO worked with the Mirabilis Design modeling team to create models of the network and communication processing software models for CAN and Ethernet protocols, hardware models for SOC and DDR and models for verifying network architecture using Gateway ECUs and Ethernet Switches. Communication delay time and packet loss are important for network architecture development. In order to keep communication latency and packet loss below acceptable levels, the developer not only

needs to understand his network protocol, but also the scheduling algorithm, CPU processing time, system-on-chip and memory throughput, and transfer time between buses.

VisualSim Technology:

VisualSim simulation technology provides a platform that promotes the efficiency of network development in the early stages of development. This allows ECU suppliers to understand the performance and functional advantages and disadvantages of gateways and switches through ECU-level simulation. They are also able to build network topology models and simulate network architectures for various use cases. By using such simulations, product issues can be discovered early in the early stages of network development. For example, developers can reduce the number of tests in actual device evaluation by discovering the amount of input frames, scheduling algorithm, number of CPUs, and number of memories that satisfy the allowable communication delay time through simulation.

Prior Product Design Flow:

Prior to using VisualSim, this process was very ad hoc. Based on the data sheets of newly adopted parts and the actual measurement results of existing products, designers derive design values using a spreadsheet, then create POCs and evaluate actual equipment repeatedly to proceed with development. However, with the recent increase in communication speeds, it is necessary to use advanced scheduling functions and parallel processing, and the increased complexity makes it difficult to accurately derive design values through numerical calculations using spreadsheets.

About VisualSim Automotive

VisualSim Automotive is the first vehicle system modeling environment that studies the dynamic behavior of the use-cases across the network, hardware, and software. The system-level IP, system debugger, analysis tools, and executable generators have transformed the way of the future for networks, ECU, and software.

About DENSO Corporation

DENSO is a $45.1 billion global mobility supplier that develops advanced technology and components for nearly every vehicle make and model on the road today. With manufacturing at its core, DENSO invests in its 200 facilities to produce thermal, powertrain, mobility, electrification, & electronic systems, to create jobs that directly change how the world moves. The company's 168,000+ employees are paving

the way to a mobility future that improves lives, eliminates traffic accidents, and preserves the environment. Globally headquartered in Kariya, Japan, DENSO spent 9.0 percent of its global consolidated sales on research and development in the fiscal year ending March 31, 2022. For more information about global DENSO, visit https://www.DENSO.com/global"

About Mirabilis Design Inc.

Mirabilis Design is a Silicon Valley software company, providing software and training solutions to identify and eliminate risk in the product specification, accurately predicting the human and time resources required to develop the product, and improve communication between diverse engineering teams. VisualSim Architect combines Intellectual Property, system-level modeling, simulation, environment analysis and application templates to significantly improve model construction, simulation, analysis and RTL verification. The environment enables designers to rapidly converge to a design which meets a diverse set of interdependent time and power requirements. It is used very early in the design process in parallel with (and as an aid to) the written specification and before an implementation (for example, RTL, software code, or schematic) of the product .

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