AUSTRIAN INSTITUTE OF TECHNOLOGY
TOMORROW TODAY

E/E NETWORK DESIGN
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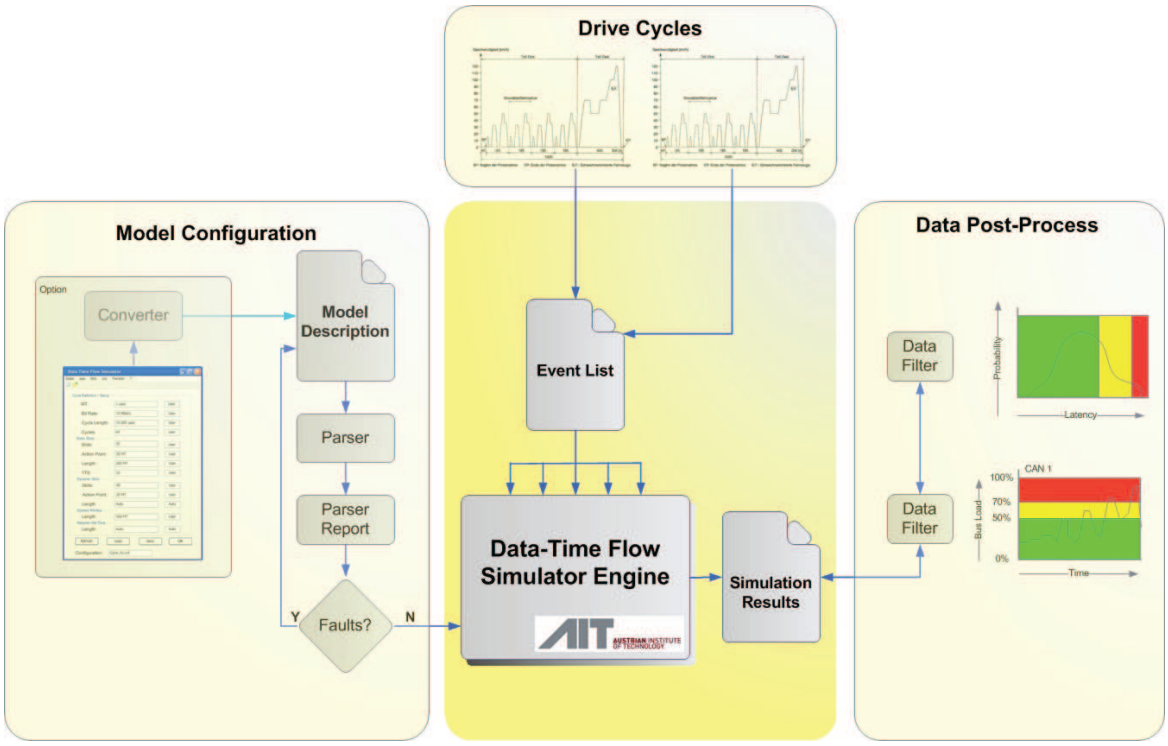
PROBLEM DESCRIPTION

The development of communication network architectures for vehicles or industrial control systems represents a huge effort for the development team, because of its continuously increasing complexity. Different network protocols, varying network transfer speeds, diverse physical transportation layers and the best-suited network topology must be chosen intelligently in order to fulfill the specified requirements, with focus on reliability and safe operation. It will be difficult to reach this goal using only tables and paper. Where are the bottlenecks when a large volume of data is transferred on the network? Where are higher data rates necessary? Where are lower data rates sufficient? How can the peak data loads be detected and documented? What are the bandwidth reserves for future network extensions?

BENEFITS AND APPLICATIONS

- Enables the modeling of communication network architectures in varying states of complexity to assess the design during all phases of the design process.
- Extend existing development tools with a Data Time Flow simulation.
- The DTF Simulator Engine is a complete software module with interfaces for model data input and simulation result output.
- Provides a design validation in an early phase of the design process
- The ongoing more precisely defined model accompanies the design during the entire design process.
- Changes applied later to the communication network architecture can first be simulated to show the impacts of the changes.



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METHOD

These questions were resolved by AIT in various research projects and new design approaches were developed. With the Data Time Flow (DTF) Simulator Engine, an innovative technology is now available that helps to keep track of the complex E/E network topologies during the development process and aids with systematic performance analysis to fulfill the given design requirements.

The key question is how the different message and timing dependencies influence each other. Only with this information a successful design and optimal dimensioning for the given application will be possible. For this reason, modelling and load simulations will be the most successful way to find satisfying results, especially in a very early phase in the design process, where changes are less time-consuming and less cost-intensive than in a later design phase.

The DTF Simulator Engine provides a powerful design tool that allows fast and simple modeling of the overall communication network architecture including the communication nodes.

As the name DTF implies, the flow of data over the time will be simulated and reported. The simulation results show through meaningful data representation the load conditions of the communication networks and the resulting latency times for each step in time.

The main advantage of the DTF simulator is that this simulator uses complete driving cycles, in which the significant load conditions are detected, contrary to single cycle simulation, in which the general view of the system properties will never be visible.

The DTF Simulator Engine is a software module that can be integrated with existing development tools to extend the functionality with a comprehensive simulation environment.

TECHNOLOGY INFORMATION

The DTF Simulator Engine was developed in course of research projects in cooperation with well-known European car makers and is used in the modeling and simulation of prototype designs of next generation vehicles (full electric vehicle) and high safety critically applications (x-by-wire).

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