

# WPDRTS Keynote: Component-based Construction of Embedded Systems

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We present a framework for the component-based construction of embedded systems. The framework is based on a general semantic model, encompassing various models of computation for real-time systems. It is characterized by the combined use of models for behavior, interaction and dynamic priorities. Interaction models describe interactions between components by using connectors with synchronization types. Dynamic priorities are used to specify controllers and schedulers in particular.

We also present a methodology for model-based composition of real-time systems using this semantic model. The methodology enables correct-by-construction development for properties such as deadlock-freedom and progress, as well as incremental construction and associativity of composition operators. We present two implementations of the framework in system modeling and validation tools developed at Verimag:

- A partial implementation in the state exploration platform of the IF tool suite dedicated to the validation of asynchronous system modeling languages such as UML and SDL;
- A more recent full implementation in a platform for the execution of both synchronous and asynchronous components.

The methodology is illustrated by the use of these tools on case studies for real-time systems modeling and validation.