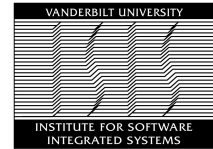


# TFPG: Timed Failure Propagation Graph A Tool for Robust Diagnosis of Reactive Systems<sup>1</sup> Summary of Features

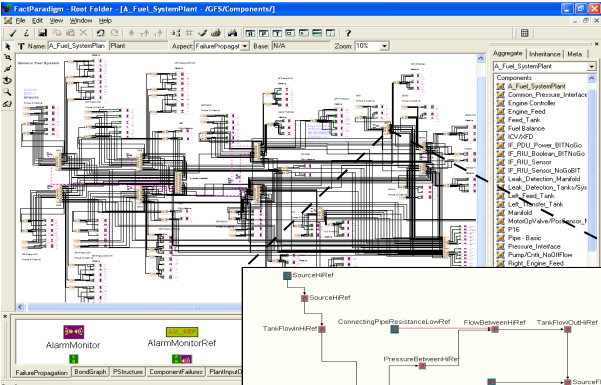


The TFGP is a model-based robust diagnosis tool for a general class of reactive systems. The underlying diagnosis system delivers online assessment of the overall system state based on continuous observation of the sensors signals. The tool integrates several techniques to help identify and isolate failure sources and distinguish between correct and false sensor signals. The tool is using an efficient, incremental, model-based diagnosis approach that can handle complex distributed and hierarchical systems with large number of sensors.

The TFGP model represents temporal progressions of effects that are caused by failure modes. This simple and intuitive model can represent a wide class of engineering systems and applications. The diagnosis approach implements a set of efficient heuristics that can adapt to limited computational resources like, for instance, memory restrictions in embedded systems. The reasoning algorithm can handle multiple faults and sensor failures, and degrades gracefully as the number of failures increases.

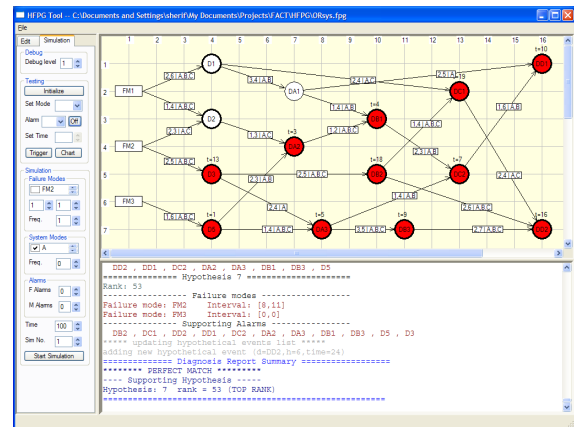
Visual modeling environment for creating final TFGP model and the platform

## Component-Based Hierarchical GME Model



Propagation attributes:  
Time delay  
Operation mode

TFPG model for a system component



Prototype tool for model analysis and diagnosis

The TFGP tool suite has the following components:

- A modeling tool that allows creating, editing, and maintaining time failure propagation graph models. This tool is based on GME; an independently maintained and supported tool from ISIS.
- Run-time support code that implements the algorithms that perform fault identification in conjunction with the code generated from the models.

The figure above depicts various aspects of the TFGP diagnosis tool suite.

In the **design-time** environment the modeler creates plant models in the form of timed failure propagation graphs (TFPG). The models also contain information about sensor allocations and the corresponding causal/temporal relations between sensor signals. Additionally, the designer can specify different forms of failure propagations depending on the operational mode of the system. In the **run-time environment** *embedded models* are used to configure the various generic software components: the plant interface (that connects to sensors and monitors on the plant), the failure propagation model, and the qualitative diagnoser.

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