

Project Note

Algorithmic Signal Analysis in a Medical Measuring Device

A Medical Measuring Device records continuously physiological processes and displays the trend of the measured values. So the development cycle is substantially shortened.

Task

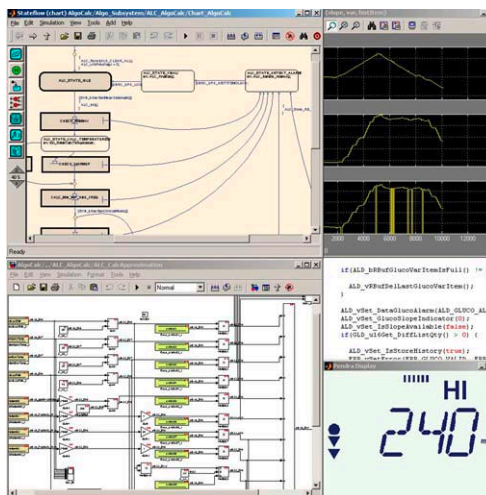
The task here entails a complex medical device which utilizes impedance spectroscopy to continuously record physiological processes and display the trend of the measured values. A microcontroller with limited resources handles the sensor control as well as the storage and analysis of the measured values. The algorithm, a central element in the development of this device, is to be continually further developed in iterative programming steps. The existing code is manually implemented and highly labour-intensive. Furthermore, the algorithm cannot be verified until it is implemented on the microcontroller.

Implementation

The new solution enabled complete simulation of the numeric features of the algorithm and automatic code generation from the simulation model. The Zühlke team set up the corresponding simulation platform in close cooperation with the customer.

The following peripheral conditions had to be kept in mind:

- The generated code had to deal efficiently with the limited resources of the microcontroller.
- Numeric effects such as counter overflow, resolution loss, and quantization noise of the fixed-point arithmetic were to be rendered visible and measurable.
- The simulation model had to cover the complete sequence control system and error handling.
- The automatically generated code had to be readily implementable in the existing firmware framework.



Technical Data

Programming language: C

Simulation platforms:
 Matlab
 Simulink
 Stateflow
 Fixed-Point-Blockset
 RealTimeWorkshop

Customer benefits

- Automatic code generation from the simulation model
- Substantial shortening of the development cycle
- Hardware signal recording accurate to the nearest bit in accordance with the simulation results
- Straightforward representation of programming expertise thanks to graphical code modelling

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