

SystemC AMS Day 2011

Industry Adoption of the SystemC AMS Standard

BLOCK 2: SYSTEMC AMS FOR AUTOMOTIVE AND SENSORS SEMICONDUCTOR INDUSTRY

SystemC AMS Model of a CMOS Video Sensor

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An image acquisition system is a complex mixed-signal system composed by an image sensor combined with an image signal processor (ISP) and a central processing unit (CPU). A SystemC-AMS/SystemC-TLM virtual prototype of the image acquisition system has been developed. The analogue and mixed-signal (AMS) part of the sensor has been modelled using the timed data flow (TDF) model of computation (MoC) of SystemC AMS. The model takes into account a linear discharge of the photodiodes, the Bayer Filter light adsorption effect, hot pixels effect and the controllable integration time.

The SystemC AMS model of the video sensor is integrated in a SystemC TLM 2.0 platform by wrapping it in a SystemC TLM module that sends the video stream and receives the control parameters. Simulations have been performed with a speed of 8 sec per simulated frame for a 2megapixels image, more than 800 times faster than the previously developed VHDL-AMS model of the sensor. Resuming, virtual prototyping of such a complex system shrinks time-to-market by anticipating many phases of the design-to-market flow, here the focus is on the validation of the embedded software. Future works will enrich the SystemC AMS model of the sensor with other non-idealities such as the dark signal non-uniformity (DSNU) and the photo response non-uniformity (PRNU).