

CEN 4214 – Software-Hardware CoDesign

Live and DL sections – Fall 2019

Course Syllabus: Unified top-down system and software engineering approaches to integrate hardware and software of a state-of-the-art real-time embedded system.

Text book: System Design with SystemC, by Grotker, T., Liao, S., Martin, G., and Swan, S., Kluwer, 2002; Dr. Shankar's GitHub repository on SystemC: <https://github.com/shankar4/Functional-Model>

Reference: URL to System C/ Accellera User Group: <http://forums.accellera.org/> ; A SystemC Primer, 2nd edition, J. Bhasker, 2003; Installation Tutorial: <http://euinovation.blogspot.com/2016/02/systemc-development-of-eclipse-on-linux.html> . See Dr. Shankar's GitHub repository for changes to be made.

Pre-requisite: Junior or senior standing, microcontrollers, C/C++

Instructor: Ravi Shankar, Professor CEECS; (561) 297-3470, shankar@fau.edu; Office Hours: TBA

Course Time and Place: TBA

Course Description: SystemC is a system design and description language that is based on C++ and has been used extensively in chip design. One can use it to describe a system with its subsystems at different levels of abstraction, viz., behavioral to functional to RTL (register transfer level). This is useful when a subsystem has to be synthesized to hardware, while the remainder is either implemented with software and/or has already been synthesized to hardware. This subsystem is designed, modeled, and simulated as part of the larger system, with reference to context, and thus can be known a priori (pre-launch) to work with remainder of the system and that it will meet design specifications.

Grading: Five Assignments: 40 %; Mid-term exam – 30%; Final exam – 30%. A system design project in place of the final exam is allowed. Discuss with Dr. Shankar

Topics to cover:

1. Introduction - Ch. 1/Text
2. Fundamentals of SystemC – Ch. 2/ Text
3. Models of Computation – Ch. 3/ Text
4. Classical Hardware Modeling in SystemC – Ch. 4/ Text
5. Functional Modeling – Ch. 5 / Text
6. Channels and Channel Design – Ch. 6, 7 / Text
7. Concurrent System Design – Dr. Shankar's Papers
8. Transaction Level Modeling – Ch. 8/ Text
9. Communication Management with SystemC – Example of Biological Pathways. Ref papers.
10. Synthesizable subset of SystemC.