Multi-Paradigm Modeling
- From Functional Model to Implementation

CAMPaM Workshop, Bellairs

Haibo Zeng
McGill University

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About Myself

- PhD, University of California at Berkeley, 2008

- Working Experiences
  - August 2008 – October 2011
    • Senior Researcher, General Motors R&D
  - November 2011 – Present
    • Assistant Professor, McGill University
My Research Focus w.r.t. MPM

- The four tenets on the right are fundamental to model-based design.

- Of course, you must select modeling languages that allow to do things in the most natural and easy way…

- It is also essential for:
  - testing
  - verification
  - simulation
  - validation
  - automatic deployment and code generation

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Figure 1 – Elements of model-based design

by Ali Behboodian, DSP Magazine
My Research Contributions and Plans

- **Synchronous Reactive modeling (Simulink)**
- **Synchronous Finite State Machine (Stateflow)**

**Synthesis and optimization of implementation** that is **correct-by-design and efficient w.r.t.**
- Preserving the behavior in functional model
- Real-time requirement
- Control algorithm performance
- Reliability, safety, security, energy
Related Recent Publications

- **Stateflow on Single-Processor Platforms**

- **Simulink/AUTOSAR on Single-Processor Platforms**

- **Simulink/AUTOSAR on Multi-core Platforms**
Related Recent Publications

- Simulink/AUTOSAR on Distributed Systems Platforms

- Deployment Space Exploration and Optimization
Potential Topics / Expected Results

- Modeling Deployment
  - How to choose the modeling languages for
    - Architecture Platforms Description
    - Design Constraint Description
    - Cost Description
    - Mapping/Deployment Description
Potential Topics / Expected Results

Model Transformation

- Whether/how transformation-based modeling infrastructure can support deployment space exploration
  - refine the pure functional models to deployed ones
  - produce models at the same level of abstraction
    - to evaluating the feasibility and/or fitness of a deployment candidate.
  - backtrack from a refined deployment candidate to a coarser level one

- How to support the plugging of legacy algorithms
  - deployment candidate generation
  - selection of optimal deployment candidates
Criteria for Success

- Nice tourism at Barbados!!

- Discuss and understand better on possibility of transformation-based deployment space exploration
thank you!

haibo.zeng@mcgill.ca