Advanced Tool Integration for Embedded Systems Assurance (HASTEN)

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Personnel

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• Graduate students: Alwyn Goodloe, Yerang Hur, Michael McDougall, Wonhong Nam, Usa Sammapun, Zonghua Gu, Sharath Kodase, Yi Meng

• Tech Staff: David Arney

• Postdoctoral fellows: Tugkan Batu, Hyung-Seok Hong, Madhu Parthasarathy, Li Tan
Embedded Systems

• **Difficulties**
  - Increasing complexity
  - Decentralized
  - Safety critical
  - Resource constrained

• **Properties of embedded systems**
  - Adherence to safety-critical properties
  - Meeting timing constraints
  - Satisfaction of resource constraints
  - Supporting fault tolerance
  - Domain specific requirements

• **Development of reliable and robust embedded software**
Goals of the HASTEN Project

• High Assurance Systems Tools and ENvironments (HASTEN)
• Develop techniques and tools for “end-to-end” software engineering of embedded systems
  - Requirements capture
  - Specification, analysis, simulation
  - Implementation generation and validation: code generation, testing
  - Deployed system monitoring, checking, and steering
• Integrated use of tools
  - Vertical integration (reuse models)
  - Horizontal integration (layered modeling and analysis)
• Case studies
  - automotive controllers, mobile robots, medical devices, real-time Java, embedded Linux
Poster Session

- Translating informal requirements to formal models: two case studies, Dave Arney, UPenn
- The Linux Kernel Verification Project (LV), Bob Cook, Georgia Southern University
- OpEm: Open APIs for Embedded Systems, Alwyn Goodloe, UPenn
- Requirements Management System, Elsa L. Gunter, NJIT
- End-to-end design and analysis of embedded real-time systems, Zonghua Gu and Kang G. Shin, University of Michigan
- Specification-based test generation for hybrid systems using CHARON, Hyoung-Seok Hong, UPenn
- Counter-example guided predicate abstraction of hybrid systems, Franjo Ivancic, UPenn
- Model-based code generation for hybrid systems, Jesung Kim, UPenn
- BDD-based and SAT-based approaches to solving games, P. Madhusudan and Wonhong Nam, UPenn
- Run-time Monitoring, Checking, and Steering, Usa Sammapun, UPenn
- Property-based test generation, Li Tan, UPenn
Talks

• Sampath Kannan, Mining for Patterns and Anomalies in Data Streams (25 mins)

• Kang Shin, End-to-end design of embedded real-time systems (20 mins)

• Elsa Gunter, Challenges of LTL Specification of CARA (20 mins)

• Insup Lee, Test Generation from Specifications (15 mins)