Runtime Verification and Active Monitoring

Software Active Monitoring
Improve the runtime verification technique to predict non-conformance (prediction), and prevent the system from reaching the real violation (prevention).

Feedback Loop of Active Monitoring

![Diagram of Feedback Loop of Active Monitoring]

Implementation Framework of Active Monitoring

![Diagram of Implementation Framework of Active Monitoring]

Property Oriented Testing

Background
- Model-based testing of reactive systems
- Traditional testing is not targeted but “comprehensive”
- It is desired to focus testing efforts on system behaviors of utmost interests
- Save testing budget and time

Principle of the Method

\[ M: \text{specification model} \quad \models \quad P: \text{property to be tested} \]

- Behaviors of \( P \): \( @B \rightarrow (e \rightarrow X(@C)) \)
- Behaviors of \( P \) when the premise is true (behaviors to be tested)

\[ S(\pi): \text{steering action based on } \pi \]

Test Sequence Generation

Trustworthiness of Embedded Control Software

Some of Our Main Interests in Future

I: Analysis and Verification of Cyber Physical Software
Cyber-Physical System features the tight combination and coordination between computational and physical elements. Analysis and verification of CPS software will face some grand challenges which are also interesting.

II: Verification-Driven Embedded OS Development
Integrating formal methods and tools, which include model checking, static analysis and theorem proving, to develop trustworthy microkernel based embedded operating system which will be use in critical areas.