

# **The First International Workshop on Software Cybernetics**

in conjunction with

## **COMPSAC 2004**

September 28-30, 2004, Hong Kong

<http://rachel.utdallas.edu/compsac>

### 1. Motivation

This workshop is motivated by a strong perceived need for formalization in the area of software development process. Approaches such as model checking and formal verification have made notable advances over the past few decades. They have brought rigor and formality to various activities, aimed at quality software development, involved in software development. However, the area of software process has very little to offer in terms of formality and mathematical rigor of the kind offered by approaches such as model checking.

This workshop will serve as a platform for like-minded researchers to get together to (a) define/understand the emerging field of software cybernetics, (a) expose the on-going work in the area of software cybernetics and the background on which it rests and borrows from, and (c) chart out a direction for future theoretical and experimental research in this area.

### 2. Scope of the Workshop

#### **The objectives of this workshop are**

- To bring various seemingly unrelated topics together for the first time and make a timely and essential contribution to the emerging area of software cybernetics.
- To formulate the fundamental principles of the new area, review the state-of-the-art, improve existing topics, and identify new research and application topics.
- To assist researchers and practitioners in this new area to know each other, promote cooperation and collaboration among them, and bring more people to join the exciting area.

#### **Topics of interest include, but are not limited to, the following**

- Feedback mechanisms in software processes and systems
- Adaptive software
- Software architecture for on-line learning
- Control of software rejuvenation
- Adaptive rejuvenation
- Feedback based approaches for fault-tolerant computing
- Application of supervisory control to software safety controller
- Control theory based software synthesis
- Feedback control of the software test process

- Adaptive testing
- Software evolution and feedback control
- Active policies for software security
- Software architectures for control systems

## Background

Most software development follows ad hoc approaches and depends heavily on software development personnel and company resources. Feedback mechanisms, ubiquitous in software processes and systems, have not been formalized, quantified, or optimized. Since feedback and optimization are two central themes in control and decision theories, a natural question to ask is: “What roles can feedback control based approaches play in the reinforcing the current trends of software engineering?”

Furthermore, the widespread deployment of computers and embedded software in control systems sets a challenge to existing control theories that do not account for the special characteristics of software. In order to achieve satisfactory Internet-based control of processes or, for example, the future intelligent home, the evolutionary feature of software should be considered in synthesizing Internet-based control policies. An important example of such a synthesis is the improvement of the reliability of fly-by-wire systems in modern airplanes whose underlying control laws should be robust to certain classes of software faults. It seems reasonable to consider software problems in the light of control theoretic formulation.

Software cybernetics is an emerging area that explores the interplay between software and control. It unifies and expands various research topics under different umbrellas such as adaptive software, adaptive rejuvenation, active security enhancement, and the supervisory control approaches to software synthesis. It is also rich in research topics such as feedback control of the software test process and adaptive testing. In general, software cybernetics addresses

- How to formalize and quantify feedback mechanisms in software processes and systems;
- How to adapt control theory principles to software processes and systems;
- How to apply the principles of software theories and engineering to control systems and processes; and
- How to integrate the theories of software engineering and control engineering.

## 3. Important Dates

- Paper submissions due: **March 22, 2004 (extended)**
- Notification of acceptance: **May 20, 2004**
- Camera-ready Due: **June 30, 2004**

## 4. Submission

Papers must be submitted electronically at <http://rachel.utdallas.edu/compsac/submit.html>. Please read and follow the instructions listed on that page. The format of submitted papers must follow the IEEE conference proceedings guidelines which are available at

<http://computer.org/author/psguide.htm>. Accepted papers will be included in a separate proceedings. Each paper is expected to be no more than four pages. One of the authors of each accepted paper must present the paper at the workshop and have regular registration uniquely identified with the paper, which will cover the following: the admission to all the technical sessions and a copy of the proceedings of COMPSAC 2004 and its workshops, the welcome reception and conference banquet.

## 5. Workshop Organizers

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### Program Committee

- Joao Cangussu, University of Texas at Dallas, USA
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- Sudipto Ghosh, Colorado State University, USA
- Manny Lehman, Imperial College of Science, Technology, and Medicine, UK
- Bharat Madan, Duke University, USA

## 6. General Inquiries

For updated information, please refer to <http://rachel.utdallas.edu/compsac> or contact any one of the program chair or co-chair listed above.