Introduction to ISCAS & iTechs

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Outline

• Introduction to ISCAS
• Introduction to iTechs
  – People
  – Research
  – Culture
  – International Collaboration
Overview of ISCAS

- ISCAS, funded in 1985, is China’s national research institute focused on fundamental and applied research in both computer sciences and software technology development.
- Director: Prof. Mingshu Li (Since 2002)
- Total employee: 600+; Graduate Students and visitors: 600+
- Mission: research + technology/knowledge transfer + education

Main empirical research areas:
- Software Estimation and Measurement
- Software Process Modeling and Simulation
ISCAS Branch Offices (Domestic)

Beijing Head Office

Local Joint Labs
Beijing, Nanjing, Xi’an, Ningbo, Qingdao, etc.

Ha’ErBin Branch

Wuxi Branch

Chongqing Branch
Research Units at ISCAS

• Division for Basic Research
  – State Key Lab. For Computer Sciences
  – State Key Lab. For Information Security
  – Lab. For Parallel Computing

• Division for Advanced Technology
  – National R&D Center For Fundamental Software
  – National R&D Center For Information Security Common Technology
  – R&D Center For Software Engineering
  – R&D Center For Chinese Information Processing
  – Lab. For Internet Software Technology (iTechs)
  – Lab. For Human-Computer Interface Technology

• Division for Applications
  – State Key Lab. For Integrative Information System Technology
  – State Key R&D Center For Satellite Navigation Applications
Outline

• Introduction to ISCAS
• Introduction to iTechs
  – People
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  – International Collaboration
Overview of iTechs

- Director: Prof. Qing Wang
- Formally established in 1999
  - Funder and Director Emeritus: Prof. Mingshu Li
- Four research groups:
  - Requirement Management
  - Software Process Modeling
  - Empirical Software Engineering
  - Software Testing
- Main research product:
  - SoftPM: a toolkit based on TQM concept and embodies the major research results, CMM/CMMI/ISO9000 Compliant
  - Now a commercial product “QONE”, over 300 customers
- Co-sponsor international conferences
  - SPW2005, SPW/Prosim 2006, ICSP2007-2010
- URL
  - http://itechs.iscas.ac.cn
People

- Chief Scientist: Prof. Mingshu Li
- Director of the Lab: Prof. Qing Wang
- Faculty: 14
  - Prof.’s: 4
  - Associated Prof.’s: 5
  - Assistant Prof.’s: 6
- Grad students
  - Ph.D. students: 25
  - Master students: 32
- Post-Doc: 2
- Visiting Prof.’s:
  - Barry Boehm, Leon Osterweil, Lori Clark, Ross Jeffery, Yun Yang
Research Areas

Measurement, Evaluation and Knowledge Engineering

Requirement Engineering  SP Modeling and Simulation  Software Testing

Empirical Software Engineering

Software Tool and Tool Integration
Requirement Engineering

• Requirement Eliciting and Modeling
  – A tri-dimensional requirements model supporting coordination among stakeholders
  – Win-Win balance of success-critical stakeholders (SCSs).
    • Solution of requirement clashes for the same kind customers at different level
  – Win-win facilitation tool development

• Requirement Evolution and Management
  – Requirement evolution modeling and measuring
  – Requirements dependency establishment and maintenance
  – Requirement traceability establishment and maintenance
  – Requirement traceability through whole life-cycle
    • Relationship establishing between requirements and its implemented artifacts
Resource

- Group lead: Juan Li (Da Yang)
- Faculty Member: Yongji Wang, Hao Zhong
- Students
  - Ph. D.: Fei Dong, Lin Shi
  - MS.: Lingjun Kong, Jian Gao, Lei He, Hailong Wang, Peng Wan, Fuwei Sun, Qiang Cui, Tao Wen, Junjie Wang, Dexin Wang
- Major funding sources:
  - 973 Program (the National Basic Research Program)
    - Requirement evolvement modeling, Requirement engineering – Basic Research of software engineering for complex system, 2007-2011
  - NSFC
    - Research on multidimensional software requirements description and control method, 2006-2008
    - Research on requirements evolvement measurement method, 2009-2011
Publications (22)

1. Yin Li, Juan Li, Mingshu Li. Research on Dynamic Requirement Traceability Method and Traces Precision. Journal of Software, 2009
3. Lingjun Kong, Juan Li, Yin Li, Ye Yang, Qing Wang. A Requirement Traceability Refinement Method Based on Relevance Feedback. SEKE2009, 2009, Accepted
4. Lei He, Juan Li, Qing Wang, Ye Yang. Predicting Upgrade Project Defects based on Enhancement Requirements: An Empirical Study. ICSP2009, 2009, Accepted
5. Shuxian Xu, Juan Li, Lishan Hou. Design and implementation of multi-role requirement review system. Computer Engineering and Design, 2009
6. Ruimin Zhang, Da Yang, Juan Li. A WinWin theory based system for collaborative requirements negotiation. Computer Engineering and Design, 2009
8. Zhaowen Xiong, Juan Li, Qi Li. A Method for Requirements Prioritizing Based on Optimal Combination of Components. Computer Engineering and Design, 2009
17. Zhongsen Qin, Juan Li. The process of requirements change management and analysis of requirements management tools. Computer Engineering and Design, 2008, Accepted
18. Yuzhu Zhao, Juan Li. Fair Winwin: an approach for the fair win-win requirements negotiation. Computer Engineering and Design, 2008, Accepted
19. Juan Li, Nan Jiang, Mingshu Li, Qing Wang, Yanwu Yang. Tracking Projects through a Three-Dimensional Software Development Model, COMPSAC07, 2007
Software Process Modeling

• OEC-SPM
  – OE (Organization Entities): a set of human resource with similar skill, knowledge and capability, called process agent
  – Modeling software process Based on Organization Entities Capability - OEC

• Resource allocating and modeling
  – Describing resource to enable allocating
  – Allocate resource under project constraints
  – Enable the best usability and efficiency of resource

• Process simulation
  – Requirement change impact
  – Human resource turn over
  – Optimizing project plan

• Process definition and model check
  – Triso-ML: process modeling language
  – Trustworthy process components defining, combining, evolving and verifying
Resource

• Group lead: Junchao Xiao
• Faculty Member: Yongji Wang, Qiusong Yang, Feng Yuan, Jian Zhai
• Students
  – Ph. D.: Lizi Xie, Bei Zhang
  – MS.: Nanhai Zhong, Hao Chen, Feng Su, Anqi Wu, Wancheng Hulei, Hui Huang, Jie Chen, Xin Dong, Jialiang Dong
• Major funding sources:
  – NSFC
    • Research on trustworthy software process management and risk control models and methods. 2008-2010, 90718042
    • Research on software process modeling method based on organizational entity capability, 2005-2008
  – 863 Program (the Hi-Tech R&D Plan of China)
    • Production line supporting trusted software process management, 2008-2010
    • Research on software process modeling and simulation method supporting software production scheduling, 2007-2008
    • Dynamic evolvement technology of the model-driven software system, 2008-2009
    • Service-oriented dynamic software architecture and its support environment, 2006-2008
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<th>Title</th>
<th>Conference/Journal</th>
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<tr>
<td>1</td>
<td>Lizi Xie, Qing Wang, Junchao Xiao, Yongji Wang, Ye Yang. PP-HAS: A Task Priority Based Preemptive Human Resource Scheduling Method</td>
<td>SEKE2009, 2009 Accepted</td>
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<td>2</td>
<td>Jian Zhai, Qiusong Yang, Feng Shu, Junchao Xiao, Qing Wang, Mingshu Li. Stochastic Process Algebra Based Software Process Simulation Modeling</td>
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<td>Qiusong Yang, Mingshu Li. Heuristic Symbolic Verification of Safety Properties for Parameterized Systems</td>
<td>Journal of Software, 2008 Accepted</td>
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<td>Accepted</td>
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<td>6</td>
<td>Mingshu Li, Qiusong Yang, Jian Zhai. A Systematic Review of Software Process Modeling and Analysis</td>
<td>Journal of Software, 2008 Accepted</td>
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<td>Dapeng Liu, Qing Wang, Mingshu Li, Huaizhang Li, Junchao Xiao. RVSim: A Simulation Approach to Predict the Impact of Requirements Volatility on Software Project Plans</td>
<td>ICSP2008, 2008</td>
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<td>Jian Zhai, Qiusong Yang, Junchao Xiao, Ye Yang, Mingshu Li, Qing Wang. Automated Process Quality Assurance for Distributed Software Development</td>
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<td>14</td>
<td>Jun Guo, Feng Yuan, Li Ruan. PSP Enactment Method Based On Extended SPEM</td>
<td>Application Research of computers, 2008</td>
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<td>Lu Meng, Feng Yuan, Guowei Yang, Jun Guo</td>
<td>Study of a Semistructured Data-based Project Backup Method</td>
<td>Computer Engineering and Design</td>
<td>2008</td>
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<td>18.</td>
<td>Feng Yuan, Mingshu Li</td>
<td>MDA-Based model management method and its application for TRISO-model</td>
<td>Journal of Software</td>
<td>2007</td>
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<td>23.</td>
<td>Qiusong Yang, Mingshu Li, Qing Wang, Guowei Yuan, Jinhui Zhou</td>
<td>An algebraic approach for the management of inconsistencies in software processes</td>
<td>ICSP2007</td>
<td>2007</td>
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<td>24.</td>
<td>Lei Zhang, Qing Wang, Junchao Xiao, Li Ruan, Lizi Xie, Mingshu Li</td>
<td>A Tool to Create Process-Agents for OEC-SPM from Historical Project Data</td>
<td>ICSP2007</td>
<td>2007</td>
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Empirical Software Engineering

• Estimation
  – Phase-wise effort estimation
  – Estimation for reuse-based development
  – Survey on cost estimation practice in Chinese software industry
  – Government contract pricing model: COGOMO
  – Empirical studies on defect and testing effort management

• Measurement
  – Empirical studies on process audit data
  – Preliminary studies on SP trustworthy attributes and evidence modeling
  – Industrial studies of CMMI higher level SP management

• Knowledge Engineering
  – Mining knowledge from organization project repository or public software repository

• Experience repository
  – Aim: a collaborative experience-top for empirical software engineering researchers and users
  – Leveraging on semantic web technologies
Resource

• Group lead: Ye Yang
• Faculty Member: Fengdi Shu, Da Yang, Wen Zhang
• Students
  – Post-Doc: Benhai Yu, Yanbin Liu
  – Ph. D.: Chenyong Hu, Jing Du, Shujian Wu, Haitao Wang, Jie Hu, Jia Chen, Dandan Wang, Zhimin He
  – MS.: Xinguang Chen, Haopeng Zhang, Yan Ku, Hao Jia, Xiaoyun Li, Zhongpeng Lin, Kewen Wu, Lang Xie, Wenpei Liu, Yueming Sun, Lihua Cao
  – Visiting student: Greg Gay (WVU), Ali Malik (USC)

• Major funding sources:
  – NSFC
    • Research on trustworthy software process management and risk control models and methods. 2008-2010, 90718042
    • Research on software cost estimation methods for reuse-based development. 2009-2011
    • Research on highly trusted network system measurement, evaluation, and optimizing the key technologies and software implementation.
  – 863 Program
    • Production line supporting trusted software process management, 2008-2010
    • Comprehensive quantitative assessment system and model supporting CMMI high maturity level, 2007-2008
  – CAS
    • Software development and process service management, improvement and evaluation method, 2007-2010
2. Shujian Wu, Mingshu Li, Ye Yang. A Dynamic Model to Handle Defect-Oriented Processes. SSMSSD09, 2009, Accepted


17. Tom, Mei He, Ye Yang, Qing Wang, Mingshu Li. An Analysis to Understand Software Trustworthiness. Trustcom’08, 2008


Publications(40) – cont.

32. Sheng Zhang, Yongji Wang, Feng Yuan, Li Ruan. Mining Software Repositories to Understand the Performance of Individual Developers. COMPSAC07, 2007
35. Da Yang, Barry Boehm, Ye Yang, Qing Wang, Mingshu Li. Coping with the Cone of Uncertainty: An Empirical Study of the SAIV Process Model. ICSP2007, 2007
Software Testing

• Software Testing
  – Fundamental software testing
  – Test case generation
  – Test process management
  – Improve process based the quality data

• Defect analysis and predicting
  – Based on defect data through whole life-cycle
  – Defect predicting model

• Software quality evaluation
  – Refer ISO9126&14598
  – Measure and evaluate the quality
    • Meet customer requirements
    • Satisfy the quality goal
  – Trustworthy Software evaluation
Resource

• Group lead: Yunzhi Xue
• Faculty member: Chen Zhao, Qiuming Tao, Xiaoyong Huai
• Students
  – Ph. D.  : Juncheng Chen
  – MS.    : Chao Wang, Wei Wu
• Funds in China
  – NSFC
    • Research on trustworthy software process management and risk control models and methods. 2008-2010, 90718042
  – 863 Program
    • Production line supporting trusted software process management, 2008-2010
Publications(25)

2. Chen Zhao, Yunzhi Xue, Qiuming Tao, Liang Guo, Zhaozhi Wang. Automated Test Program Generation for an Industrial Optimizing Compiler. ICSP2009, 2009, Accepted
5. Qiuming Tao, Chen Zhao, Liang Guo. Proving Soundness of Three Widely-Used Program Transformations in Optimizing Compilation Based on Temporal Logic. Journal of Software, 2008, Accepted
7. Yunzhi Xue, Chen Zhao. Automated Phase-Ordering of Loop Optimizations Based on Polyhedron Model. HPCC '08, 2008


iTechs Culture
International Collaboration

• 3 Joint SE Research Labs
  – Univ. of Southern California
  – Univ. of Massachusetts
  – HK PolyU

• Collaboration research plan
  – NICTA, Australia
  – NAIST, Japan
  – Lero, Ireland

• Co-sponsor international conferences
  – SPW2005,
  – Co-located with ICSE: SPW/Prosim 2006, ICSP2007-2010

• Professor mutual visiting program
• Ph.D. student exchange program
ISCAS/USC/UMass Joint SE Research Lab

• History
  – Begin from 2004
  – Formal signature at 2006
Summary

- iTechs is a young, dynamic, and energetic research lab in the field of SE
- Main empirical research areas:
  - Software Estimation and Measurement
  - Software Process Modeling and Simulation
  - Requirement Management
  - Software Testing
- Open for international collaboration:
  - Exchange of information and academic publications
  - Conducting joint experiments
  - Submit joint research proposals and establish joint projects
  - Exchange of staff members and research students
- Look forward to exploring collaboration opportunities with SWELL!
Thank You!

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