Short presentation of the Software Engineering area

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MISSION

M1. to develop novel methods, techniques, and tools that advance the way in which software is designed, synthetized and assessed;

M2. to ensure that our research results have a lasting impact in software development practice;

M3. to offer students an education that prepares them to take a leading role in complex software development projects;

M4. to contribute to improve the competitiveness of the industry

Values: Pragmatic, industry-oriented, high-quality, cost-effective
software engineering

PEOPLE

PhD
Members

Ademar Aguiar
Ana Paiva
João Faria
Hugo Ferreira
Nuno Flores
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PhD
Students

Alexandre Perez
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Isabel Margarido
Jorge Garcia
Luís Cruz
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Rodrigo Moreira
Tiago Boldt
software engineering

SUBAREAS

Software Design and Construction
- Model-Driven Software Engineering
- Software Architecture and Design

Software Testing and Analysis
- Software Test Automation
- Automatic Fault Localization and Debugging

Software Processes Engineering and Knowledge Management
- Software Process Improvement
- Software Knowledge Management

Software Quality
SOFTWARE TEST AUTOMATION: Focuses on the development of novel techniques and tools to improve testing effectiveness and efficiency, particularly through automatic test generation based on models and patterns.

- **AAL4ALL - Ambient Assisted Living for All - Testing & Certification** [QREN, 1MSc, 2011-15]
- **GENT - Automatic test generation from algebraic specs of generic types** [2MSc, 2010-14]
- **PBGT - Pattern-based GUI testing** [2PhDs, 3MScs, 2011-2015]
- **UML Checker - A Toolset for Conformance Testing against UML Sequence Diagrams** [1PhD, 1MSc, 2010-]
SOFTWARE PROCESS IMPROVEMENT: Concerned with the improvement of the methods and processes of software development to achieve higher levels of productivity, predictability and quality.

- **ProcessPAIR** - Automated Software Process Performance Analysis & Improvement Recommendation [+SEI, 1MSc, 1PhD, 2011-15]
- **AIMS** - SaaS Platform To Support the Accelerated Improvement Method [QREN, +Strongstep+Multicert, 2MSc, 11-14]
- **Framework to Evaluate & Improve the Quality of Implementation of CMMI Practices** [1PhD, +UC+SEI, 2010-15]
MODEL-DRIVEN SOFTWARE ENGINEERING: Focuses on the development of novel generative and interpretative model-driven engineering approaches, for rapid application development and adaptation, ensuring quality by construction.

- Automatic UI Gen. from Rigorous Domain and Use Case Models [1PhD, 2008-11]
SOFTWARE TEST AUTOMATION: GenT
software engineering

SOFTWARE TEST AUTOMATION: UML Checker
SOFTWARE TEST AUTOMATION: UML Checker
SOFTWARE PROCESS IMPROVEMENT: Process PAIR

A. Model and catalogue building
- Literature and specifications
- Large training data set

Performance model
- Performance indicators (Table 1, Fig. 2)
- Cause-effect relationships between PIs (Fig. 2)
- Recommended ranges for each PI (Table 1)
- Approximate statistical distribution of each PI (Fig. 3)
- Sensitivity coefficients between related PIs (Table 2)

B. Performance analysis
- Performance data of a single subject

B1. Identify performance problems and root causes (Table 3)

B2. Rank root causes of performance problems (Fig. 4)

B3. Recommend improvement actions for the highest-ranked causes

- P7 Time Estimation Accuracy [1.7; 34%]
- Productivity Estimation Accuracy [0.57; 36%]
- Productivity Stability [0.37; 48%]
- Design Productivity Stability [0.15; 53%]
- Unit Test Productivity Stability [0.50; 22%]
- Postmortem Productivity Stability [0.49; 31%]
- Design Review Productivity Stability [0.41; 21%]
- Plan Productivity Stability [0.66; 19%]
- Code Productivity Stability [0.80; 15%]
- Code Review Productivity Stability [0.88; 2%]
- Size Estimation Accuracy [0.98; 1%]
software engineering

Research Opportunities

Model-based Testing
Security Testing
Mobile Testing
Data Analytics & Data Mining for SPI
Usage Monitoring for Requirements Maintenance
NLP and MDE in Requirements Engineering
Games for Software Engineering Education
Reverse Engineering (Model Extraction)
software engineering

CONTACTS

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