P08 – ZNTU. Software tools Department Course Syllabus
Quality of Informational Systems

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Zaporizhzhya National Techcical University

Software Tools Department

- **Bachelor programs**
  - Software Engineering
  - Computer Sciences
- **Master Programs**
  - Software Engineering
  - Software Development for Automotive Systems
  - Information technologies for Design
  - Artificial Systems

Software Tools Department Students

My Experience

- Main courses
  - Object Oriented Programming
  - OOAD
  - Requirements Analysis
  - Software Quality Assurance
  - Software Project Management
  - Software Testing;
- Leadership in research work
  - Methods and Information Technology Development for compound objects and systems automation (2010-2011)
  - Methods and information technologies for process automation control of compound objects and systems (2012-2015)

My Experience: publications

Books:

Tabunshchyk G., Kudermetov R., Pritula A. Design, Modeling and Analysis of the Information systems. Zaporizhzhe:ZNTU. -2011. -362p. (In Ukrainian)

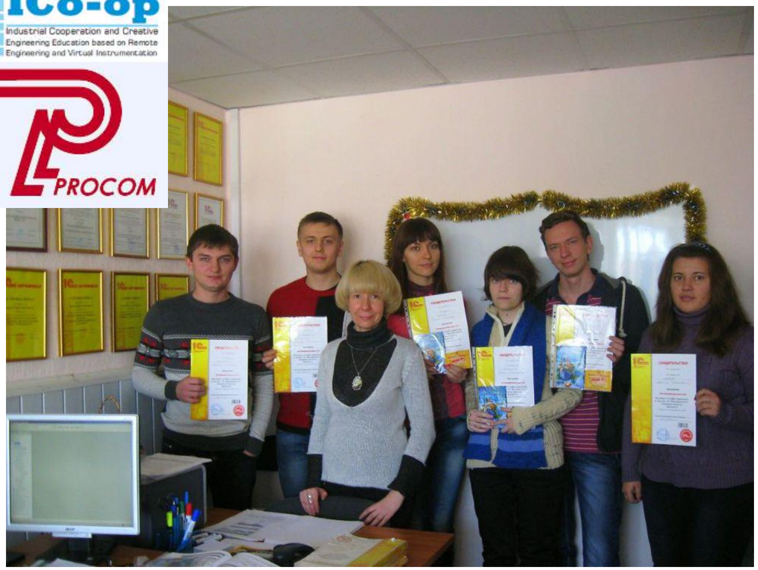
Tabunshchyk G., Kudermetov R., Bragina T. Software Quality Engineering. Zaporizhzhe:ZNTU. -2013. -362p. (In Ukrainian)

Articles - more that 150 publications, 3 inv. cert., 1 patent

Main Journals: Systems of information processing; Radio Electronics, Computer Science, Control; International Journal of Computing

Main Conferences: . TCSET, CADSM, IDAACS'2013, REV2014, ISDMCI

Connection with Enterprises



PJSC «Ukrgrafit»

2014 Bachelor Student Work

Sergiy Kurson
Simulation of 3-Axis-Portal

STAUDINGER GMBH

Simulation

3-Achs-Portal
3-Axis-Portal

Artikel-Nr. *Article No.* 220010

Das Modell 3-Achs-Portal simuliert einen flurfreien, stationären Handhabungsroboter mit quaderförmigem Arbeitsraum zur Weitergabe von Werkstücken aus einer Lagereinrichtung an eine Bearbeitungs- oder Sortiereinrichtung, wie er z. B. in stark automatisierten Fertigungsbetrieben Einsatz findet. Das Modell besteht aus dem Portalroboter mit drei translatorischen Bewegungsachsen und einem elektromagnetischen Greifer, der in Z-Richtung fahrbar ist, einem Werkstückmagazin und einem Ablageplatz. Die Endlagen der einzelnen Bewegungselemente werden durch Software-Endschalter erkannt. Im Simulationsablauf werden metallische Werkstücke aus dem Magazin mit Hilfe des Greifers entnommen, mit dem Roboter bis zu einem Ablageplatz gebracht und dort abgelegt: Die Inkremental-Wegmeßsysteme der X- und Y-Achse werden zunächst in einer Referenzfahrt, bei der sich der Greifer in seiner oberen Endlage befindet, mit den tatsächlichen Positionen der Bewegungselemente abgeglichen. Anschließend wird der Greifer in X- und Y-Richtung bis zu seiner Sollposition über dem Werkstückmagazin verfahren. Der Greifer bewegt sich in –Z-Richtung, bis der Elektromagnet auf dem Werkstück aufsetzt. Der Magnet wird eingeschaltet und das Werkstück wird am Greifer fixiert. Der Greifer fährt in +Z-Richtung bis in seine obere Endlage und wird dann in X- und Y-Richtung bis zu seiner Sollposition über dem Ablageplatz bewegt. Dort wird er wiederum in –Z-Richtung verfahren, bis er mit dem Werkstück auf dem Ablageplatz aufsetzt. Der Elektromagnet wird deaktiviert und dadurch das Werkstück abgelegt. Auf dem Ablageplatz wird es durch einen Initiator erkannt. Die drei Bewegungsrichtungen sind mit Hardware-Endschaltern begrenzt, um die Anlage gegen Programmierfehler, die ein Verfahren über die Grenzen des Arbeitsbereichs hinaus bewirken würden, abzusichern. Sie bewirken bei Betätigung eine sofortige Abschaltung der entsprechenden Achse. Der elektronische Aufbau des Modells ist so konzipiert, dass aus einer solchen Position die Wiederinbetriebnahme nur mit einer Bewegung zum Arbeitsraum hin möglich ist.

The model 3-axis-portal simulates a stationary used handling robot with an orthogonal work space used for passing on work pieces to processing or sorting unit, as used e. g. in factories being automated in a large degree. The model consists of the portal robot that is able to move in three linear directions and an electromagnetic gripper, fit to be moved in Z-direction, a piece store and a discharge station. The end positions of the several moving parts are each recognized by software end position switches. The simulated process shows metal work pieces being withdrawn from the store by

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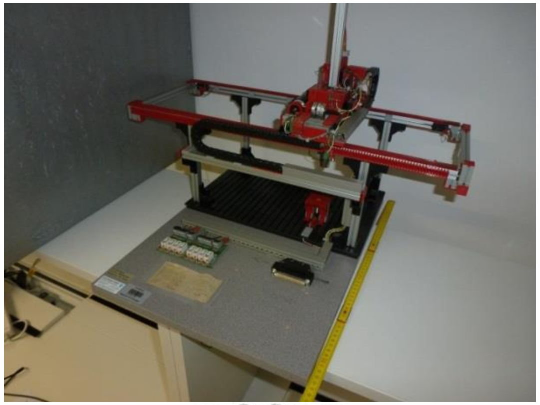
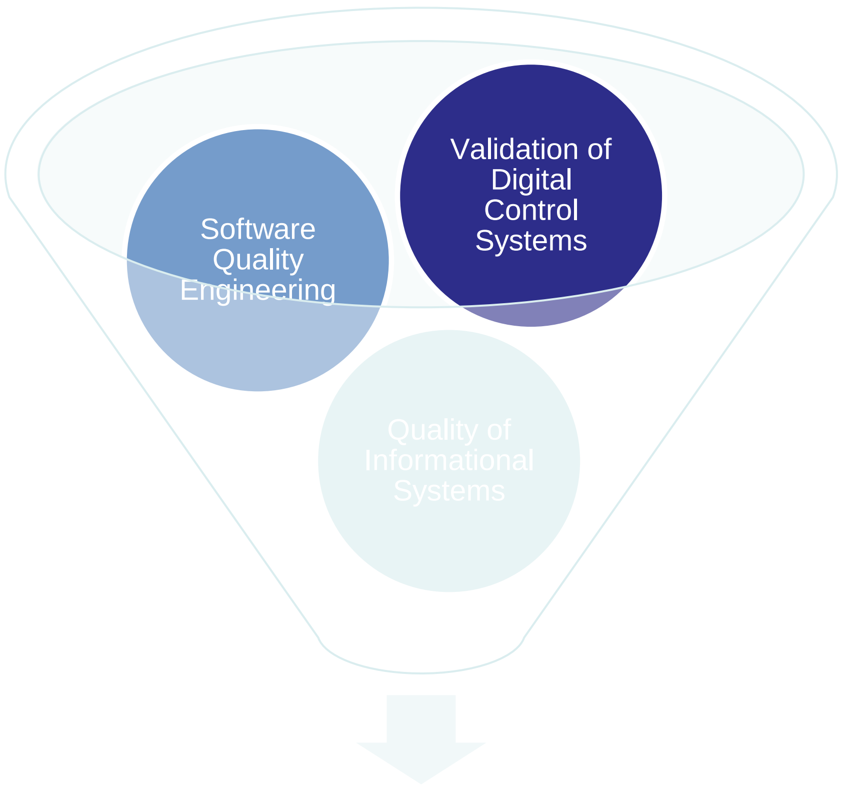


Validation of Digital Control Systems

Main Topics:

1. Composition/ decomposition of automata
2. design tools
- methodology,
- comparison,
- tools summary
3. Modelling, simulation, validation
- model description,
- model checking,
- simulation tools
- visualization



Validation and verification of Digital Control Systems

Basic Information

The aim of the course:

To provide student knowledge in verification and validation of digital systems. The main focus will be on the test generation , simulation of digital devices and rational presentation of diagnostic information.

Learning outcomes:

The students will be able to use algorithms and methods for logic simulation serviceable and unserviceable digital devices, demand for solving technical diagnostics.

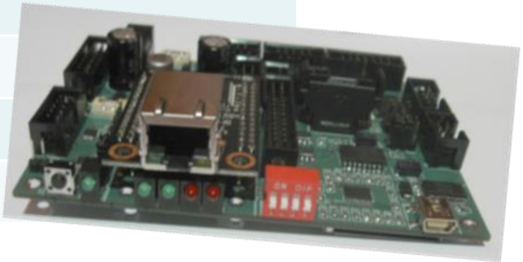
The students will be able to use methods of construction inspection and diagnostic tests for combination devices and memory are widely used at the stages of design and operation.

The students will be able to process the results of testing and diagnostic devices , as well as to use methods for reducing the diagnostic information to locate faults .

The students will get skills in verification with FSM-based specification and functional testing with Verilog.

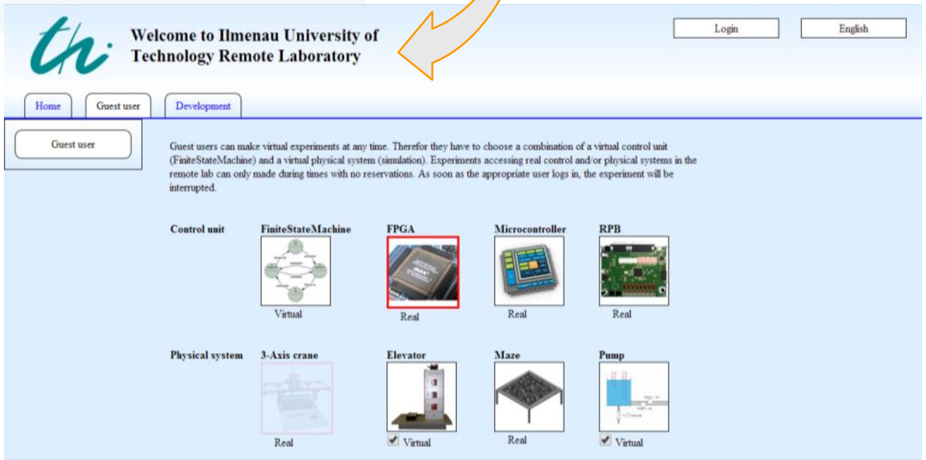
Tentative Lecture Schedule

Week	Subject
1	Introduction
2	Digital devices Modelling
3	Levels and spheres of Modelling
4	Physical defects and faults
5	Methods for faults modelling
6	Stuck and nonstuck faults
7	Midterm Exam
8	Consequent and parallel fault modelling
9	Classical methods for fault modelling
10	Methods for tests synthesis
11	Evolutionary methods for tests synthesis
12	Compact methods for testing
13	Presentation of diagnostic information
14	Methods for decreasing diagnostic information
15	Comparison of IT technologies used for verification and validation
16	Review, Exam



Tentative Subjects of Experiments, Lab Works.

Experiments, Projects, Lab Works	Subject
Remote experiments 1	Verification with FMS
Remote experiments 2	Functional testing with Verilog
Lab work 1	Modelling digital devices with Verilog
Lab work 2	Verilog system function development
Lab work 3	Big data processing
Lab work 4	Simulation wrong input data



Grading Policy

Assessment strategy	Weight in %	Deadlines	Assessment criteria
Products and performance assessments	50		All labs should be passed
Written and Oral Exam	50		Grade A (excellent) - clarity of expression – excellent, confident delivery, practical tasks – full done. Grade B (good) – clarity of expression – good, thoughts and ideas clearly expressed, practical tasks - well done. Grade C (good) - clarity of expression – well-placed, delivery is fluctuate, practical tasks - well done. Grade D (passed) - clarity of expression – poor, delivery is fluctuate, practical tasks done with mistakes. Grade E (fail) - failure in theoretical or practical tasks.

Literature

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- 2. IEEE 1012:2004. Standard for Software Verification and Validation.
- 3. • IEEE 829:1998. Standard for Software Test Documentation.
- 4. • IEEE 1016:2009. IEEE Standard for Information technology – Systems Design - Software Design Descriptions.
- 5. • IEEE 1028:1997. IEEE Standard for Software Review.
- 6. • IEEE 1076:2008. VHDL Language Reference Manual.
- 7. IEC 61508 :2010. Functional safety of electrical/ electronic/ programmable electronic safety-related systems .
- 8. Sutherland S. The Verilog PLI Handbook: A User's Guide and Comprehensive Reference on the Verilog Programming Language Interface, Second Edition / S. Sutherland. – Kluwer Academic Publishers, 2002. – 784 p.
- 9. Palnitkar S. Verilog HDL: A Guide to Digital Design and Synthesis, Second Edition / S. Palnitkar. – Prentice Hall PTR, 2003. – 496 p.
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- 11. IEEE Std 1364-2001. IEEE Standard Verilog® Hardware Description Language. – Revision of IEEE Std 1364-1995; Published 28.09.2001. – NY: The Institute of Electrical and Electronics Engineers Inc., 2001. – 778 p.
- 12. Modelling, diagnostics and testing of digital systems [Available electronically]/ INTUIT. Access mode: http://www.intuit.ru/studies/courses/3440/682/info [RU]
- 13. Henke, K. Fields of Applications for Hybrid Online Labs / Karsten Henke, Steffen Ostendorff, Heinz-Dietrich Wuttke, Tobias Vietzke, Christian Lutze // International Journal of Online Engineering (iJOE), Vol 9 (2013) – Access mode: http://online-journals.org/i-joe/article/view/2542 [EN]
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- 16. Wuttke, H- D. Sharing e-Learning Resources – Contributions to an Infrastructure in Thuringia / Heinz- Dietrich Wuttke, Sabine Fincke, Karsten Henke // International Conference on Interactive Computer-Aided Blended Learning, Antigua, Guatemala, November 2011, pp.70-75 [EN]
- 17. Henke K. Web-based Rapid Prototyping of Digital Systems/ Karsten Henke, Silvia Krug // International Conference on Interactive Computer-Aided Blended Learning, Antigua, Guatemala, November 2011, pp. 22-27[EN]
- 18. Wuttke H- D. Remote and Virtual Laboratories in Problem-Based Learning Scenarios / Heinz- Dietrich Wuttke, Raimund Ubar, Karsten Henke//, IEEE International Symposium on Multimedia, Taichung, Taiwan, December 2010, pp.377-382 [EN]
- 19. http://www.altera.ru/

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