MARTIN LUKAC

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Professional Experience

- *Graduate School of Information Sciences, Tohoku University* *Sendai, Japan*
  Assistant Professor: February 2009 - present

  – New Concepts For Real World Robotics
  – VLSI Design
  – Reversible and Quantum Computation

- *Departement of Academic Research and Computing* *Portland, OR*
  Graduate Assistant: July 2003 - January 2009

  – Super Computing and Clustering technologies
  – HPC - High Performance Computing
  – Parallel computing and system design

- *Department of Electrical and Computer Engineering* *Portland, OR*
  Teaching and Research Assistant: September 2001-2003

  – Quantum Computing Research
    • Conference Speaker • Associate Lecturer • Grader and Evaluator
  – Robotics Research
  – Logic Synthesis

- *Comenius University Bratislava* *Bratislava, Slovak Republic*
  Computational Researcher: June 2000 - September 2001

  – Selected to direct Research and Direct Students
    • Distributed Intelligence • Instructor
    • Computational Structures
    • Computational Theory of Complexity through Bio inspiration

- *Department of Biosignal Processing* *Bratislava, Slovak Republic*
  Computational Researcher: September 1999 - June 2000

  – ECG signal processing
    • Bio Deedback devices • ECG Analysis
    • Learning Software programming Frequency processing software

Education

- *Portland State University* *Portland, OR*
  2001-2009
  - PhD. Computer Engineering Student Robotics and Artificial Intelligence
    Graduation Date: January 9th, 2009
- *Polytechnic School* *Parris, France*
  1998-1999
  - MS. Cognitive Science Computational Intelligence
- *University BordeauxI/II* *Bordeaux, France*
  1994-1998
  - BS. Cellular Biology and Physiology Neuro-physiology

Skills

- **Operating Systems:** Linux, UNIX (several variants), Windows 98/2000/XP
- **Computer Languages:**
  - C, C++, HTML, Java, LaTeX, PHP, UNIX Shells , VHDL, Verilog, Perl, SQL, XML, CSS, XSLT, JavaScript, DOS
- **Tools and Systems:**
  - Matlab, Octave, Scilab, Mathematica, Mapple

Awards

- **2007:** Maseeh Scholarship
- **2006:** Student employee of the year
- **2005:** Outstanding Graduate Student of the year

Selected Publications

- Lukac M., Kameyama M., Miller, D.M., Perkowski M. High Speed Genetic Algorithms in Quantum Logic Synthesis: Low Level Parallelization vs. Representation,Journal of Multiple-Valued Logic and soft Computing, Accepted
- Perkowski M., Lukac M., Shah D., Kameyama M. Synthesis of quantum circuits in Linear Nearest Neighbormodel using Positive Davio Lattices,FACTA UNIVERSITATIS, Ser.: Electronics and Energetics, vol. 24, No. 1, April 2011, pp. 73-89

- Lukac M., Kameyama M., Perkowski M., Evolutionary quantum logic synthesis of boolean reversible logic circuits embedded in ternary quantum space using heuristics, Physical review A, accepted
- Lukac M., Kameyama M., Adaptive Functional Module Selection using Machine Learning: framework for intelligent robotics, International conference on Instrumentation, Control, Information Technology and System Integration, 2011
- Lukac M., Shuai B., Kameyama M., Miller M., Information Preserving Logic - Using Logical Reversibility to Reduce the CPU-Memory Bottleneck, ISMVL 2011
- Lukac M., Kameyama M., Emotion Aware Probabilistic Robotics, ISAC2010, on CDLukac M., Ozaki Y., Kameyama M., Adaptive Functional Module Selection for Live-Feeling Communication using Probabilistic Cellular Automaton,Tohoku - Section Joint Convention Record of electrical and Information Engineers, Japan,1C07,p.84, 2010
- Lukac M., Perkowski M., Kerntopf P., Kameyama M., GPU Acceleration Methods and Techniques for Quantum Logic Synthesis, International Workshop on Boolean Problems, 2010
- Lukac M., Kameyama M., Perkowski M., Adaptive Selection of Intelligent Processing Modules and its Applications, The 2010 International Conference on Artificial Intelligence, WORLDCOMP'10, pp. 513-520, 2010
- Lukac M., Perkowski M., Kameyama M., Evolutionary Quantum Logic Synthesis of Boolean Reversible Logic Circuits Embedded in Ternary Quantum Space using Structural Restrictions, WCCI, on CD, 2010
- Lukac M., Sasaki A, and Kameyama M., Model of Cellular Automaton for Behavioral Arbitration and Its Application to Robotics , The annual meeting of the Society of Instrument and Control Engineers, pp. 89-93, September 2009
- Lukac M., Sasaki A, and Kameyama M., Intelligent Processing Platform for robotics Based on Functional Behavioral Architecture, Tohoku-Section Joint Convention, pp. 61-62, august 20-21, 2009
- Lukac M., and Perkowski M., Quantum Finite State Machines as Sequential Quantum Circuits, 39th International Symposium on Multiple-Valued Logic, pp. 92-97, 2009
- Lukac M., and Perkowski M., Projective Measurement-based Logic Synthesis of Quantum Circuits, 38th International Symposium on Multiple-Valued Logic workshop on Post-Binary ULSI Systems, pp. 191-196, 2008
- Lukac M., Perkowski M., Inductive Learning of Quantum Behaviors, Facta Universitatis, special issue on Binary and Multiple-Valued Switching Theory and Circuit Design, Vol. 20, no 3, pp. 561-586, December 2007
- Lukac M., and Perkowski M., A quantum Mechanical model of Robotic Emotions, 37th International Symposium on Multiple-Valued Logic workshop on Post-Binary ULSI Systems, pp. 19-24 2007
- Lukac M., and Perkowski M., Quantum Emotions: a cellular approach, 16th International Workshop on Post-Binary ULSI Systems, on CD 2007 Serchuk P., Sharlin E., Lukac M., and Perkowski M., The Vagueness of Robot Emotions, 15th International Workshop on Post-Binary ULSI Systems, on CD, 2006

- Lukac M., Perkowski M., Combining Evolutionary and Exhaustive Search to find the Least expensive Quantum Circuits, Proceedings of ULSI, on CD, 2005
- Lukac M., Giesecke N., Hossain S., Kim D.G., Perkowski M., Quantum Behaviors: synthesis and Measurement, 7th International Symposium on Representations and Methodology of Future Computing Technologies, on CD, 2005
- Lukac M., Perkowski M., GOi H., Pivtoraiko M., Yu C-H., Chung K., Jee H., Kim B-G., Kim Y-D., Evolutionary Approach to Quantum and Reversible Circuits Synthesis, Artificial Intelligence Review 20, Kluwer Academic Publishers, pp. 361-417, 2003.
- Lukac M., Pivtoraiko M., Mishchenko A., Perkowski M., Automated Synthesis of Generalized Reversible Cascades using Genetic Algorithms, 5th International Workshop Boolean Problems, Freiberg, Germany, September 2002.
- Lukac M., Perkowski M., Evolving Quantum Circuits Using Genetic Algorithm, 2002 NASA/DoD Conference on Evolvable Hardware (EH'02), Alexandria, Virginia, July 15 - 18, 2002
- Negovetic G., Perkowski M., Lukac M., Buller A., Evolving quantum circuits and an FPGA-based Quantum Computing Emulator, 5th International Workshop Boolean Problems, Freiberg, Germany, September 2002.
- Lukac M., Cognitive Science and complexity, 2nd Proceeding on Cognitive Sciences, Bratislava, Slovakia, 2001.
- Lukac M., Bourgine P., Tetris Player: Strategy driven algorithm 1st Proceeding of the European Symposium on Computational Intelligence, 2000, 238-242.
- Chudy L., Krajcovic G., Chudy V., Lukac M., Nagy J., Vicenik K., Modelling of brain-wave entrainment processes. In: Analysis of Biomedical Signals and Images.15th Biennial Int. Eurasip Conference. Euroconference BIOSIGNAL 2000. Proceedings. Brno, Czech Republic, University of Technology, 2000, 115-117
- Chudy L ., Krajcovic G., Chudy V., Lukac M., Vicenik K. Modelling EEG-driven stimulation of the brain. In: Engineering of Intelligent Systems. Proceedings of the Second ICSC Symposium. Ed. Fyfe, C. International Computer Science Conventions, 2000. CD-ROM.

Summary of Qualifications

C	**9 years**	**Advanced User**
Quantum Computing	*Quantum Circuit Synthesis, Minimization through optimized exhaustive search Logic Decomposer*	
Benchmarking	*Tester for various Logic Decomposer*	
Artificial Intelligence	*Software, Various Tree Search algorithms and Optimization, Computational Catalysis Estimation with Neural Networks.*	
Digital Signal Processing	*ECG analysis in frequency domain*	
Others	TA for Engineering Computation Structures and C programming languages Portland State University	
C++	**7 years**	**Advanced User**
Quantum Computing	*Quantum Circuit Synthesis using evolutionary approach*	
Artificial Intelligence	*Neural Networks, Genetic Algorithms, Trees, Symbolic Data Processing*	
Java++	**7 years**	**Expert**
Artificial agents	*Agents Based Simulations, Complexity Exploration*	
Neural Networks	*Classical and Pulsed Networks, Data analysis*	
Genetic Algorithms	*Various applications, Problem Solving and related Course work*	
Artificial Life Simulations	*Exploration of Complex Agent Decision Making, Robotics*	
Streaming Media Processing	*Image Processing*	
Web Programming	*Applets/Servelets, smart Web Agents, Internet Data Mining, Web site data mining*	
Robotic Head	*Bio Inspired Brain Design, Control Theory, Emotion Simulations*	
Game Theory	*Tetris Player based on reinforcement learning*	
Lisp	**2 years**	**Intermediate User**
Assistant Instructor and Invited Lecturer	*ECE 487/587 Portland State University*	
Artificial Intelligence	*Maze Search, Agent Control, Smart Decision Making Strategies*	
Symbolic Data Processing	*Searches and Optimization*	