

# Ryan J. Meuth

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## Education:

Missouri University of Science and Technology, Rolla, MO

- PhD Computer Engineering, Graduated December '09
  - Emphasis: Computational Intelligence and Robotics
  - Dissertation: *Meta-Learning Computational Intelligence Architectures*
- M.S. Computer Engineering, Graduated May '07
  - Minor Degree: Cognitive Neuroscience
  - Thesis: *Adaptive Multi-Vehicle Mission Planning for Search Area Coverage*
- B.S. Computer Engineering, Graduated, May '05

## Entrepreneurship:

Rolla Engineered Solutions, LLC ([www.rollaeng.com](http://www.rollaeng.com)), Rolla, MO.

*Partner*

- Generated software development contracts up to \$7000 and managed sub-contractors.
- Designed and developed internet connected home energy monitoring system.
- Designed and developed LabRat™ open source educational mobile robot kit.
- Received regional Idea-2-Product Competition Honorable Mention.
- Developed web-based software products: NxBz - resource management software for lean business, and NxPg - professional content management software.

## Experience:

University of Advancing Technology, Phoenix, AZ

*Assistant Professor, Program Champion, Robotics and Embedded Systems, 2005 – Fall 2009*

- Instructor for Robotics and Embedded Systems degree program.
- Developed and delivered over 10 courses ranging from introductory (Introduction to Digital Logic) to advanced levels (Digital Vision and Sensor Processing).
- Contributed significantly to Computer Science and Embedded Systems curricula design and catalog development.
- Developed industry contacts for program advisement and student career placement.

Applied Computational Intelligence Laboratory Missouri University of Science and Technology, Rolla, MO

*PhD Graduate Research Assistant, 2005 – Fall 2009*

- Implemented Computational Intelligence Methods on Graphics Processing Units.
- Developed image processing and obstacle avoidance software for DARPA Learning Applied to Ground Robotics (LAGR) Project.

- Designed and implemented computational intelligence algorithms and architectures for Boeing Vehicle Swarms Project.

Intelligent Systems Center, Nanyang Technical University, Singapore

*Research Attachment*, Spring 2008

- Developed Multi-Scale Memetic Algorithms for Autonomous Agent Evolution.

Boeing Phantom Works, Seattle, WA

*Research Support Contractor*, Summers 2006 - 2008

- Designed Algorithms for Adaptive Multi-Vehicle Search Area Coverage Optimization.
- Implemented Swarm Continuous and Discrete Event Simulation.
- Developed Algorithms for Mission Management Optimization.

Imagination Engines Inc. St. Louis, MO

*Research Associate*, Summers 2003-2004

- Developed FPGA-based Artificial Neural Network (ANN).
- Designed and implemented adaptive gait learning architecture for ANN controlled 6-legged walking robot.

Distribution Control Systems Hazelwood, MO

*Product Development Internship*, Summers 2001-2002

- Migrated product firmware into compatibility with GNU Tool chain.
- Updated product hardware to surface mount components.

## **Teaching Experience:**

Summer '10 – Assistant Professor, University of Advancing Technology

RBT211 – Embedded Programming, RBT307 – Physical Computing Studio, SPT323 – Mechatronics.

Spring '10 – Assistant Professor, University of Advancing Technology

RBT173 – Introduction to Microprocessors, RBT337 – Digital Vision and Sensor Processing, MSE575 – Robotics and Autonomous Agents (Graduate Level).

Fall '09 – Assistant Professor, University of Advancing Technology

RBT131 – Introduction to Digital Logic, RBT211 – Embedded Programming, RBT347 – Mobile Autonomous Systems, CSC360 – Artificial Life Programming, MSE542 – Artificial Life Programming (Graduate Level).

Fall '08 – Lecturer, Missouri S&T

EE/CpE 300 - Introduction to Robotics (Graduate Level Course), CpE 111 - Introduction to Computer Engineering.

Spring '08 – Teaching Assistant, Missouri S&T

EE 255 - Electronics I Laboratory.

## **Research Interests:**

Computational Intelligence Algorithm Development and Application

- Neural Networks
- Evolutionary Computation
- Particle Swarm Optimization
- Cellular Automata
- Hybrid and Biologically Inspired Algorithm Design

Robotics (Involvement in 25+ robotics development projects over the last 13 years)

Machine Vision

Human-Machine Interfaces

## **Continuing Research:**

Meta-Learning applied to:

Traveling Salesman Problem.

Machine Vision – Object Learning and Recognition.

Evolutionary Architectures based on Adaptive Cellular Automata.

Hierarchical Robotic Swarm Mission Management.

Adaptive Search Area Coverage and Path Planning for semi-autonomous vehicles with mobility constraints.

Embodied Intelligence and Evolutionary Neural Architectures.

## **Patents:**

(Pending) R. J. Meuth, J.L. Vian, E.W. Saad, D.C. Wunsch, "Adaptive Multi-Vehicle Area Coverage Optimization System and Methods." The Boeing Company. Submitted May, 2007.

(Pending) R.J. Meuth, J.L. Vian, E.W. Saad, D.C. Wunsch, "Hierarchical Multi-Vehicle Mission Management System and Method." The Boeing Company. Submitted August 2009

## **Invited Speaker:**

"Computational Intelligence and Robotic Swarm Management," 10 April 2008, Nanyang Technical University, Singapore.

## **Editorial / Conference Activities:**

Program Committee: 2009 IEEE Workshop on Memetic Algorithms, IEEE Symposium Series on Computational Intelligence, Nashville, Tennessee, USA, March 30 - April 2, 2009

## **Skills:**

Programming Languages:	C, C++, C#, Java, BASIC, Assembly, MatLab.
Development Environments:	Visual Studio, Eclipse, OpenCV, gcc, gdb, valgrind, STL.
3D / GPU Programming:	DirectX, OpenGL, RapidMind, NVIDIA CUDA.
Operating Systems:	Windows, Linux, Unix.
Embedded Programming:	AVR, 8051 and PIC $\mu$ Controllers.
Hardware Design:	VHDL, Verilog, Xilinx FPGAs.
Mechanical Design:	AutoCAD, Inventor, rapid prototyping.
Electronic Design:	Mentor Graphics (Ux), PCB123, Eagle, PCB Layout, design for EMC.

## **Referee:**

IEEE Transactions on Evolutionary Computation – 2008 – Present  
Memetic Computing Journal (Springer) – 2008 – Present  
IEEE Transactions on Neural Networks – 2008 - Present  
IEEE Transactions on Systems, Man, and Cybernetics, Part B - 2006 - Present  
IEEE Potentials, 2007 - Present  
IEEE Multi-Conference on Systems and Control, 2008  
World Congress on Computational Intelligence, 2008  
IEEE American Control Conference, 2008

## **Awards:**

First Place - Missouri S&T Elevator Pitch Competition 2008 - "LabRat"  
Travel Fellowship - World Congress on Computational Intelligence '08  
Travel Fellowship - International Conference on Cognitive and Neural Systems '08  
Best Student Paper - Evolutionary Computation Course Fall '05

## **Professional Societies:**

Institute of Electrical and Electronic Engineers (IEEE)  
International Neural Network Society (INNS)  
Association for Unmanned Systems International (AUVSI)  
Association of Engineering Educators (ASEE)

## **Publications:**

- [1] R. Meuth, E. Saad, D. Wunsch, and J. Vian, "Memetic Mission Management [Application Notes]," *Computational Intelligence Magazine, IEEE*, vol. 5, pp. 32-40, 2010.
- [2] R. Meuth, "Meta-Learning Genetic Programming," in *Genetic and Evolutionary Computation Conference (GECCO'10)* Portland, OR, 2010.
- [3] P. Robinette, J. Seiffert, R. J. Meuth, R. Dolan, and D. C. Wunsch, "An Agent-Based Computational Model of Self-Organizing Project Management Paradigm for Research Teams," in *International Joint Conference on Neural Networks*, 2009.

- [4] P. Robinette, R. J. Meuth, J. Seiffert, R. Dolan, and D. Wunsch, "Adaptive Resonance Theory Applied to Project Team Selection," in *Thirteenth International Conference on Cognitive and Neural Systems* Boston, MA, 2009.
- [5] R. J. Meuth, E. W. Saad, D. C. Wunsch, and J. Vian, "Adaptive task allocation for search area coverage," in *Technologies for Practical Robot Applications, 2009. TePRA 2009. IEEE International Conference on*, 2009, pp. 67-74.
- [6] R. J. Meuth, P. Robinette, R. Dolan, and D. C. Wunsch, "LabRat(tm): Miniature Robot For Students, Researchers, and Hobbyists," in *International Conference on Intelligent Robots and Systems*, 2009.
- [7] R. J. Meuth and P. Robinette, "Introducing Robots," in *American Society of Engineering Educators Annual Conference*, 2009.
- [8] R. J. Meuth, M.-H. Lim, Y.-S. Ong, and D. C. Wunsch, "A Proposition on Memes and Meta-Memes in Computing for Higher-Order Learning," *Journal of Memetic Computing*, vol. 1, 2009.
- [9] R. J. Meuth, "Gram-ART: Variable Length Representation with non-parametric probabilistic templates and complex cluster geometry.," in *Thirteenth International Conference on Cognitive and Neural Systems* Boston, MA, 2009.
- [10] R. J. Meuth and D. C. Wunsch, II, "Divide and Conquer Evolutionary TSP Solution for Vehicle Path Planning," in *Congress on Evolutionary Computation (WCCI'08)*, 2008.
- [11] R. J. Meuth, P. Robinette, and D. C. Wunsch, II, "Modeling Environmental Uncertainty in Ground Robot Navigation," in *AUVSI Unmanned Systems North America 2008 Conference*, 2008.
- [12] R. J. Meuth, P. Robinette, and D. C. Wunsch, II, "Computational Intelligence Meets the Netflix Prize," in *International Joint Conference on Neural Networks (WCCI'08)*, 2008.
- [13] R. J. Meuth, "Information Processing in Adaptive Cellular Automata," in *Twelfth International Conference on Cognitive and Neural Systems* Boston, MA, 2008.
- [14] Tae-Hyung Kim, R. J. Meuth, P. Robinette, and D. C. Wunsch, "GPU Go: Accelerating Monte-Carlo UCT," *UMR Intelligent Systems Center Poster Presentation*, 2007.
- [15] R. J. Meuth and D. C. Wunsch, "Approximate Dynamic Programming and Neural Networks on Game Hardware," in *Neural Networks, 2007. IJCNN 2007. International Joint Conference on*, 2007, pp. 852-856.
- [16] R. J. Meuth and D. C. Wunsch, "Neural Computation on Game Hardware," in *International Symposium on Intelligent Control*, Singapore, 2007.
- [17] R. J. Meuth, R. Dolan, P. Robinette, J. Jolly, S. Agarwal, and D. McAdams, "Modeling Environmental Uncertainty in Ground Robotics," in *18th Annual Argonne Symposium for Undergraduates in Science, Engineering and Mathematics* Argonne, IL, 2007.
- [18] R. J. Meuth, "Adaptive Multi-Vehicle Mission Planning for Search Area Coverage," Master's Thesis: Missouri University of Science and Technology, 2007.
- [19] R. J. Meuth, "GPUs surpass computers at repetitive calculations," *Potentials, IEEE*, vol. 26, pp. 12-23, 2007.
- [20] R. J. Meuth, "Final Report on Health Based Adaptive System and Algorithms Support," Boeing RFP #200655, Technical Report 2007.
- [21] R. J. Meuth, "Adaptive Mutli-Vehicle Search Area Coverage Optimization," Boeing RFP 200530, Technical Report 2006.

## **Submitted Publications:**

R. J. Meuth, J. Seiffertt, P. Robinette, D. Wunsch, "Gram-ART: Variable Length Representation with Non-Parametric Probabilistic Templates and Complex Cluster Geometry," Neural Networks.

R.J. Meuth, "Using the Processing Language in Engineering Education," American Society of Engineering Educators Annual Conference.

R.J. Meuth, D. Calkins, J. Harbour, "Multi-Core Programming with CUDA and OpenCL," Textbook, Cengage Learning.

R.J. Meuth, "Evolving computer players for PAC-MAN using Meta-Learning Genetic Programming", IEEE Transactions on Computational Intelligence and AI in Games

## **Activities:**

Missouri S&T Robotics Competition Team:

- Founder ('00), President ('01), Fundraising Chair ('02), Vice President ('03) and Chief Engineer ('06), Student Advisor ('07-'08)

Resident Assistant at Thomas Jefferson Residence Hall (2002)

President of Quadrangle Residence Hall Association (2001)

Eagle Scout (2000)

## **Hobbies:**

Camping / Rock Climbing, Amateur Photography: <http://picasaweb.google.com/rmeuth>, Cooking

A list of Robotics Projects and Samples of Work can be found at: <http://www.ironaco.com>