

# Saurabh Mittal, Ph.D.

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## Objective

Position in the area of Agile, OOAD, SOA, MDA, EDA, M&S and Net-centric System of Systems using Java/J2EE frameworks

- Lead Architect
- Sr. Research Scientist/Analyst/Specialist

## Profile

- Over 8 years experience in **OO software project development over their complete life-cycle**
- Led project with an estimated budget of **\$0.5 million**
- Professional research, planning, management, and customer interfacing experience for over 5 years in leadership role
- Strong research and analytical skills with referred publication record
- Proven skills in C, Java, XML, SOA, Event-driven Architectures, Server-side programming, UML, MDA and SDLC
- Qualified expert in Discrete Event Modeling and Simulation-Based Systems engineering
- Excellent verbal and written presentation skills
- Goal-oriented, team-player and adept in managing multiple projects
- Areas of Expertise
  - Software design, test and analysis for distributed system of systems
  - XML based Software engineering using structured Natural Language Processing (NLP)
  - Executable enterprise architectures for Net-centric Systems including frameworks like DoDAF, Zachman
  - Interoperability and cross-platform software engineering & Modeling-Simulation software w/o SOA w/o real-time execution
  - Agent directed modeling
  - Unified Process for integrated development and testing of Systems and systems
- US Permanent Resident (**Green Card holder as of Aug. 2009**)

## Honors

- Classified by US Immigration Services (USCIS) both as an alien of Extraordinary Ability (**EB-1**) and in US National Interest (**NIW**) category (topmost categories with approval rate of less than 5%) (2008-2009)
- Recipient of **JITC's Golden Eagle** Award (Highest civilian contractor award by US government) for the project GENETSCOPE in the capacity of Lead Architect and Developer (2006)
- US National Training Simulation Association (**NTSA**) **award for Best M&S Development** in the Cross-functional area for project ATC-Gen (as a team-member at NGIT) (2006)
- **Nominated for outstanding Research Assistant/Staff** award at Graduate Professional Students Association (GPSA) among 8000/36000 graduate students at the University of Arizona (2006)
- Appointed as one of the judges for evaluation of Travel Grant Applications at Graduate Students Professional Council (GPSA) at University of Arizona (2006)
- **Graduate Research Assistant Scholar** at ECE Department from Fall 2001 to Fall 2005
- **'Herculean Effort' Leadership** award by ECE Department, University of Arizona, 2004
- Official Research Assistant for the largest of NSF funded ULN (Ultra Large Networks) Workshop, Nov. 2001

## Skill Set (proficiency shown in bold)

- Languages/Environment **Java 5, C, Swing, SWT/JFace, Eclipse RCP, C++, XML, XSLT, XQUERY**
- System Engg., Design **RUP/UML, MDA/MDE, SysML, StateMate, Design Patterns, HWIL**
- Agile Methodologies **Test Driven Development (TDD), JUnit, log4j, Mockito, Clover, Bamboo**
- Project planning and execution **SCRUM, MS Project, Use-case Modeling, SDLC, JIRA**
- Data-engineering & Tools **Rational Rose, Enterprise Architect, MS Visio, Borland Together,**
- Net-centric Engineering **SOA, Axis 1.4, JAXB, BPMN/BPEL, ESB**
- IT Frameworks **Zachmann, DoDAF, NCES, TOGAF**
- Frameworks/ORM **Spring, Hibernate, Event Driven Architectures**
- Modeling & Simulation Discrete Event Simulation Framework (**DEVS**), HLA
- Messaging **JMS, ActiveMQ, Apache Camel, WebsphereMQ**
- Enterprise J2EE **JSF, JSP/Servlets, EJB3, ZK, RIA, Velocity, Freemarker, JMX**
- RDBMS **MySQL, Oracle10g, Derby, JDBC, PL/SQL**
- Scripting and Web Shell, CGI, **Ant, Maven**, Perl, **CSS**, Javascript, **AJAX: Prototype**
- Web servers **Apache/Tomcat, Glassfish, Jboss**, Weblogic
- Network Protocols OSPF, BGP, RIP, RTP, TCP (Tahoe and Reno), IPv4, IPv6, LAN/WAN
- Operating Systems AIX/Linux, Windows 2000/NT/XP/Vista, Solaris, Macintosh OSX

## Education

### **University of Arizona, Tucson, AZ, USA**

- Ph.D. – Electrical and Computer Engineering Minor: SIE, MIS GPA 3.57/4.0 Apr. 2007
  - M.S. - Electrical and Computer Engineering GPA 3.70/4.0 Nov. 2003
- Advisor (MS/PhD): Prof. Bernard P. Zeigler

### **Jamia Millia Islamia, New Delhi, India**

- Bachelor of Technology - Electrical Engineering GPA 3.70/4.0 Jul. 2001

## Certifications

- IBM Certified Application Developer since June 2000
- Brainbench Java 2 certification score 3.71/5.0: Advanced (Master)

## Professional Memberships

- Society of Computer Modeling and Simulation ([www.scs.org](http://www.scs.org))
- Institute of Electronics and Electrical Engineering ([www.ieee.org](http://www.ieee.org))

## Academic Services

- Reviewer (by invitation)
  - Journal: IEEE Systems
  - Journal: IEEE Software
  - Journal of Defense Modeling and Simulation
  - International Journal of Modeling and Simulation (ActaPress)
  - Journal: Simulation Modeling Practice and Theory
  - Journal: ACM Transaction on Modeling and Computer Simulation
  - Journal: SCS Transactions of the Society for Modeling and Simulation International
  - Journal: Intelligent Automation and Soft Computing
  - 4<sup>th</sup> Annual IEEE Conference on Automation Science and Engineering (CASE), Washington DC, USA
  - First International Conference on Simulation Tools and Techniques for Communications, Networks and Systems, SIMUTools 2008, France
  - Summer Computer Simulation Conference (SCSC'07)
  - Winter Simulation Multi-conference (WSC'07)
- Member of International Program Committee for:
  - Summer Computer Simulation Conference, SCSC'10, Ottawa Canada
  - DEVS Integrative M&S Symposium, Spring Simulation Multi-conference (DEVS'10), FL, USA
  - Second Workshop on Parallel Architectures and Bioinspired Algorithms at PACT 2009, Raleigh, NC, USA
  - Summer Computer Simulation Conference (SCSC'09), Istanbul, Turkey
  - First Workshop on Parallel Architectures and Bioinspired Algorithms at PACT 2008, October, Canada
  - 22<sup>nd</sup> European Conference on Modeling and Simulation, ECMS 2008, Nicosia, Cyprus
  - High Performance Computing and Simulation Symposium, HPCS 2008, Ottawa, Ontario, Canada
  - DEVS Integrative M&S Symposium, Spring Simulation Multi-conference (SpringSim' 07), Virginia, USA
  - DEVS Integrative M&S Symposium, Spring Simulation Multi-conference (SpringSim' 06), Alabama, USA
- Program Chair
  - Executable Architecture Track at Summer Computer Simulation Conference SCSC'10, Ottawa, Canada
- Session chair for:
  - Special session on "DEVS Collaborative Execution over SOA" in DEVS' 07, Virginia, 2007
  - IEEE International Conference on Systems, Man and Cybernetics, SMC05, Hawaii, 2005

## Publications

### **Book (manuscript in progress)**

- **Saurabh Mittal**, José Luis Risco-Martín, **Net-centric System of Systems Engineering with DEVS Unified Process: A book in System of Systems Engineering Series by Mo Jamshidi**, to be published by CRC Press, Francis and Taylor Group, 2010.

### **Book Chapter(s)**

- **Saurabh Mittal**, *Agile Net-centric Systems using DUNIP-Based Event Driven Architectures*, Chapter for "Intelligence-based Systems Engineering", Editor Andreas Tolk and Lakhmi Jain, Springer, 2010, (*abstract accepted, manuscript in progress*)
- **Saurabh Mittal**, Bernard P. Zeigler, *Modeling and Simulation for Systems of Systems Engineering*, Chapter for "Systems of Systems Engineering for 21<sup>st</sup> Century", Editor Mo Jamshidi, Wiley, 2009

### Thesis

- **Ph.D.:** DEVS Unified Process for Integrated Development and Testing of Service Oriented Architectures
- **M.S.:** Attention-Focusing Architecture for Scalable Networked Systems using Discrete Event Modeling
- **B.S.:** Performance Evaluation of Static Routing Algorithms over Dynamic Multi-service Networks

### Journals

- **J.8:** Saurabh Mittal, José Luis Risco Martín, Bernard P. Zeigler, James Nutaro, *Design and Analysis of Service Oriented Architectures using DEVS/SOA based Modeling and Simulation*, IEEE Transactions on Systems, Man and Cybernetics: Special issue on Information Reuse and Integration, *submitted*
- **J.7:** Saurabh Mittal, Bernard P. Zeigler, José Luis Risco Martín, *Implementing a Formal Standard for Interoperability in M&S/Systems of Systems Engineering with DEVS/SOA*, International C2 Journal, 2009
- **J.6:** José Luis Risco-Martín, Saurabh Mittal, et.al, *eUDEVS: From UML to DEVS Executable Systems invited Journal paper for SIMULATION: Transactions of SCS*, 2009
- **J.5:** Saurabh Mittal, José Luis Risco Martín, Bernard P. Zeigler, *DEVS/SOA: A Cross-Platform Framework for Net-Centric Modeling and Simulation in DEVS Unified Process*, SIMULATION: Transactions of SCS, 2008
- **J.4:** Eddie Mak, Saurabh Mittal, Moon Ho Hwang, *Automating Link 16 Testing using DEVS and XML*, Journal of Defense Modeling and Simulation JDMS, *to appear*
- **J.3:** Saurabh Mittal, Eddie Mak, James J. Nutaro, *DEVS-Based Dynamic Model Reconfiguration and Simulation Control to in the Enhanced DoDAF Design Process*, Journal of Defense Modeling and Simulation (JDMS), Vol. III No. 4, 2006
- **J.2:** Saurabh Mittal, *Extending DoDAF to Allow DEVS-based Modeling and Simulation*, Special issue on DoDAF, Journal of Defense Modeling and Simulation JDMS, Vol. III No. 2, 2006
- **J.1:** Xiaolin Hu, Bernard P. Zeigler, Saurabh Mittal, *Dynamic Configuration in DEVS Component-based Modeling and Simulation*, SIMULATION: Transactions of the Society of Modeling and Simulation International, 2003

### Conferences

- **C.13:** A. Murano, JL Risco-Martin, E Besada-Portas, Saurabh Mittal, J Aranda, *DEVS/SOA: Towards DEVS Interoperability in Distributed M&S*, IEEE/ACM International Symposium on Distributed and Real-time Applications, October 2009
- **C.12:** Saurabh Mittal, Bernard P. Zeigler, J.L. Risco-Martin, *WSDL-Based DEVS Agent for Net-Centric Systems Engineering*, International Workshop on Modeling and Applied Simulation, Italy, September 2008
- **C.11:** J.L. Risco-Martin, Saurabh Mittal, *Optimization of Dynamic Data Types in Embedded Systems using DEVS/SOA-based Modeling and Simulation*, 3rd International ICST Conference on Scalable Information Systems, Italy, June 2008
- **C.10:** Saurabh Mittal, Bernard P. Zeigler, *DEVS Unified Process for Integrated Development and Testing of System of Systems*, Critical Issues in C4I, AFCEA-George Mason University Symposium, May 2008
- **C.9:** Bernard P. Zeigler, Saurabh Mittal, Xiaolin Hu, *Towards a Formal Standard for Interoperability in M&S/Systems of Systems Engineering*, Critical Issues in C4I, AFCEA-George Mason University Symposium, May 2008
- **C.8:** José Luis Risco-Martín, Saurabh Mittal, et.al, *From UML Statecharts to DEVS State Machines using XML*, Multi-paradigm Modeling, IEEE/ACM International Conference on Model-Driven Engineering Languages and Systems, Nashville September 2007
- **C.7:** Saurabh Mittal, José Luis Risco Martín, Bernard P. Zeigler, *DEVS-Based Web Services for Net-centric T&E*, Summer Computer Simulation Conference (SCSC'07), San Diego, July 2007
- **C.6:** Saurabh Mittal, José Luis Risco Martín, Bernard P. Zeigler, *DEVSML: Automating DEVS Execution over SOA Towards Transparent Simulators*, Special Session on DEVS Collaborative Execution and Systems Modeling over SOA, DEVS Integrative M&S Symposium DEVS' 07, Spring Simulation Multi-Conference, March 2007
- **C.5:** José Luis Risco-Martín, Saurabh Mittal, et.al, *A W3c XML Schema for DEVS Scenarios*, DEVS Integrative M&S Symposium DEVS' 07, Spring Simulation Multi-Conference, March 2007
- **C.4:** Saurabh Mittal, Amit Mitra, Amar Gupta, Bernard P. Zeigler, *Strengthening OV-6a Semantics with Rule-Based Meta-models in DEVS/DoDAF Based Life-cycle Architecture Development*, IEEE-Information Reuse and Integration (IRI06) Conference, Special section on DoDAF, Hawaii September 2006
- **C.3:** Bernard P. Zeigler, Saurabh Mittal, *Enhancing DoDAF with a DEVS-based System Lifecycle Development Process*, In Proceedings of IEEE International Conference on Systems, Man and Cybernetics, SMC05, Hawaii 2005
- **C.2:** Saurabh Mittal, Bernard P. Zeigler, *Dynamic Simulation Control with Queue Visualization*, Summer Computer Simulation Conference SCSC'05, Philadelphia, July 2005
- **C.1:** Saurabh Mittal, Wenji Wu, Bernard P. Zeigler, *A Multiconstraint-Based Real-time Routing Scheme using Simulation Methodology*, Summer Computer Simulation Conference, San Jose, July 2004

### Workshops

- **W.2:** Saurabh Mittal, Bernard P. Zeigler, *Modeling/Simulation Architectures for Autonomous Computing*, Autonomic Computing Workshop: The Next Era of Computing, January 2003
- **W.1:** Bernard P. Zeigler, Saurabh Mittal, *Modeling and Simulation of Ultra-large Networks: Methodology Responds to Challenges*, ULN Workshop, Nov. 2001

### Technical Reports (JITC/NSF)

- Saurabh Mittal, Chungman Seo, *GENETSCOPE Manual for JITC*, 2007

- **Saurabh Mittal**, Bernard P. Zeigler, Mahesh Veena, Phillip Hammonds, *Network Simulation Environment for Evaluation and Benchmarking HLA/RTI Implementations*, Joint Interoperability Test Command (JITC), Defense Information Systems Agency (DISA), Fort Huachuca, October 2004
- Bernard P. Zeigler and **Saurabh Mittal**, *Modeling and Simulation of Ultra-large Networks: A Framework for New Research Directions*, supported by NSF Grant ANI-0135530, July 2002
- Bernard P. Zeigler, Hessam Sarjoughian, **Saurabh Mittal**, *Modeling and Simulation of Ultra-large Networks: Thirteen Recommendations for New Research Directions*, ULN Workshop, November 2001

**Experience**

**PROFESSIONAL**

**Wells Fargo & Co. (Lending Business Services), Tempe, AZ**

**Applications Systems Engineer V**

**May. 2010 – Present**

- Develop and contribute towards message oriented middleware (MOM) for Lending Grid framework within Lending Business Services group that manages the lending business of Wells Fargo and is a message broker between creditors and end users.

Impact	<ul style="list-style-type: none"> <li>o High transaction system</li> <li>o Clustered environment (over 20 domains) with BEA Weblogic and Apache Tomcat</li> <li>o Lending Grid sits between the loan application and the Creditors such as Fannie Mai and is a highly mission critical application with SLAs ~200ms</li> </ul>
Responsibility	<ul style="list-style-type: none"> <li>o Design/document implementation options for a flexible middleware framework with event driven capabilities</li> <li>o Development of Framework component with basic ESB features</li> <li>o Infrastructure architecture/Implementation and framework support.</li> <li>o Application of Event Driven Architecture and SOA design pattern with performance testing/monitoring</li> <li>o Develop services, message brokers using MQ/ActiveMQ, XML transformers, adapters and business logic in an open source environment</li> <li>o Develop component architecture and manage the build and design process using Maven, SVN and Continuous integration</li> <li>o Develop routing mechanisms using Apache Camel</li> </ul>
Technologies Used	<ul style="list-style-type: none"> <li>o Java 5+, JDBC, J2EE - JSP, Servlets, EJBs, JMS and MQ Messaging, Java Web Services, Java Design Patterns, Spring, Hibernate, Struts, MVC, OO Model concepts, UML modeling, OOAD, XML, XSLT, DOM and SAX Parser, AJAX, JavaScript, MAVEN, ANT, Log4J, Perl, Shell scripting, Oracle 9i+, Weblogic or WebSphere, Apache Tomcat, Apache Camel, SVN, Hudson</li> </ul>
Team Size	<ul style="list-style-type: none"> <li>o 2</li> </ul>

**Apollo Group, Inc., Tempe, AZ**

**Software Engineer II**

**Dec. 2008 – May 2010**

- Develop and contribute towards in-house Agile/J2EE project for fully owned subsidiary University of Phoenix.

Impact	<ul style="list-style-type: none"> <li>o System used by enrolment counselors and managers to manage potential and current leads</li> <li>o Highly visible project directly impacting the performance of 6000 Enrolment Counselors, couple hundred Enrolment Managers and the Business's growth</li> <li>o Facilitates business processes such as Enrollments turnover and Performance monitoring of employees</li> <li>o High transaction system with over 500K hits per day</li> </ul>
Responsibility	<ul style="list-style-type: none"> <li>o Design and develop a new Enrolment Manager module</li> <li>o Conduct requirements gathering, elicitation, contextual enquiries with Managers on floor</li> <li>o Perform coding using Agile methodologies and SCRUM processes</li> <li>o Develop Business logic and DAO layers</li> <li>o Participate in unit-testing, planning and overall SDLC</li> <li>o Coordinate with other groups to develop Service layer for EM Module</li> <li>o Sole-developer on this module in a team setup</li> </ul>
Technologies Used	<ul style="list-style-type: none"> <li>o Java 5+, Spring, Hibernate, Ajax-Prototype, Clover code coverage, Bamboo, Oracle10g, Eclipse/Netbeans, JBoss, Web Services, Design patterns (Model View Controller, Command Pattern, Session Façade, Data Access Object Pattern, Business Delegate), MDE, Java/J2EE, JavaMail, JMS, i18n</li> </ul>
Team Size	<ul style="list-style-type: none"> <li>o 5</li> </ul>

**ECE Department, University of Arizona, USA**

**Assistant Research Professor (Engineer V)**

**Oct. 2007 – May 2008**

- Developed a distributed Modeling and simulation software framework based on Service Oriented Architecture that provides foundation for JITC's (US Defense Information Systems Agency) net-centric testing.
- Implemented Discrete event real-time simulation software kernel using Web service framework known as DEVS/SOA with multiple servers in USA and Spain
- Led a team of two PhD Computer engineering students
- Developed and deployed a web based modeling and simulation platform for net-centric simulation using Apache Tomcat, MySql and Visual JSF.
- Research and Teaching involved
  - Automated code generation using XML towards UML/MDA based software
  - XML Based software engineering using Natural Language Processing
  - Net-centric systems engineering using CASE, UML, RUP and xUML
  - Development of Agent middleware
- Event Driven Architectures

**• Projects: Data-Strategy/Scalability Modeling for testing Net-centric SOA Systems:**

Impact	<ul style="list-style-type: none"> <li>○ JITC sponsored research (for the next 5 years) related to three major Department of Defense acquisition programs; Single Integrated Air Picture (SIAP), Net Centric Enterprise Services (NCES), and Net Centric Command and Control.</li> <li>○ JITC is authorized to be the nationally certifying agency for all Information Technology (IT) and National Security Systems (NSS) in USA</li> </ul>
Responsibility	<ul style="list-style-type: none"> <li>○ Conceptualized and developed the systems framework for developmental and operational testing as lead researcher and team-member</li> <li>○ Requirements analysis, Use Case modeling</li> <li>○ Integrated BPMN/BPEL as requirements format for simulation Operational Model</li> <li>○ Developed M&amp;S data-engineering framework as per MDA/MDE</li> <li>○ Developed customized XML parsers</li> <li>○ Published as journal papers</li> </ul>
Technologies Used	<ul style="list-style-type: none"> <li>○ DEVS, NCES, GIG/SOA, Web Services, WSDL, JAX-WS, Axis, Apache/Tomcat, Glassfish, MySql, JRE6, JAXB, XML, XSLT, JAXP, BPMN/BPEL, MDA/MDE, JSF, JSP</li> </ul>
Team Size	<ul style="list-style-type: none"> <li>○ 2</li> </ul>

**ECE Department, University of Arizona, USA**

**Research Engineer (Engineer III)**

**Jun. 2005 – Sep. 2007**

- Full-time job based at Arizona Center for Modeling and Simulation ([www.acims.arizona.edu](http://www.acims.arizona.edu)) , towards projects related to Northrup Grumman Information Technology (NGIT) and Joint Interoperability Test Command (JITC)
- Conduct research related to Enterprise Architectures, Discrete Event Modeling Language (DEVSML), SOA, Global Information Grid (GIG)
- Un-sponsored pilot projects:
  - **Project: Learning Agent**

Impact	<ul style="list-style-type: none"> <li>○ This project was the first step in development of a web based natural language processor learning agent</li> </ul>
Responsibility	<ul style="list-style-type: none"> <li>○ Lead the development of a Learning Agent based on Discrete event modeling for its usage in social networks, and Network health and monitoring in a proactive manner</li> </ul>
Technologies Used	<ul style="list-style-type: none"> <li>○ JAVA, JAXB, Neuroscience</li> </ul>
Team Size	<ul style="list-style-type: none"> <li>○ 1</li> </ul>

○ **Project: Simulation-Based Software engineering**

Impact	<ul style="list-style-type: none"> <li>○ Used in Graduate Study Software engineering and Discrete Event modeling and simulation courses (ECE 676, 575, 473/573)</li> <li>○ Software Tools for systems of systems modeling</li> </ul>
Responsibility	<ul style="list-style-type: none"> <li>○ Lead the development of a complete methodology for simulation-based software engineering</li> <li>○ Use case modeling, component based engineering</li> <li>○ Publish as journal papers</li> </ul>
Technologies Used	<ul style="list-style-type: none"> <li>○ UML, RUP, Finite Deterministic Discrete Event Modeling, CASE, JUnit, Java, C#, C++</li> </ul>
Team Size	<ul style="list-style-type: none"> <li>○ 2</li> </ul>

- Worked on three major sponsored projects from NGIT/JITC:

- **Project: GENETSCOPE**

Impact	<ul style="list-style-type: none"> <li>○ 10 year old legacy code made state-of-the-art (from C to Java)</li> <li>○ Currently deployed and used at US Air Force and US Navy</li> <li>○ Over \$500,000 estimated budget</li> <li>○ Recipient of JITC's highest civilian contractor 'Golden Eagle' award</li> <li>○ <i>THE</i> model in use by US Department of Defense</li> </ul>
Responsibility	<ul style="list-style-type: none"> <li>○ Lead Architect and Developer for over 2 years</li> <li>○ Management, budgeting and technical expertise</li> <li>○ Directed GUI development and personally developed the core multithreaded simulation engine</li> <li>○ Directed both the Scenario builder GUI and the Data Fusion engine to assimilate data for a 15-20 hours simulation run using open source visualization libraries such as JFreeChart</li> <li>○ Developed real-time visualization of simulation and directed post-simulation animation from the logged simulation data</li> <li>○ TLOC ~ 70,000</li> <li>○ Requirements analysis, Use case modeling, technical feasibility negotiations</li> <li>○ Led a team of 3 developers (all PhD candidates)</li> <li>○ Reporting directly to JITC Task Leader</li> <li>○ Simulation model transformed from C to JAVA using Discrete Event modeling and simulation-based automated processes</li> <li>○ Conform to standards like MIL-144B (High Frequency Automatic Link Establishment protocol) and simulation of Transport protocol</li> <li>○ Deliverable of product GENETSCOPE (Generic Network Systems Capable of Planned Expansion)</li> <li>○ Publish as journal paper</li> </ul>
Technologies Used	○ DEVS, C, C++, XML, ICEPAC, VOACAP, Java, Swing, JBuilder, Eclipse, UML
Team Size	○ 5

- **Project: Hydrology**

Impact	<ul style="list-style-type: none"> <li>○ JITC sponsored research project towards Hydrographic Information Harmonization Working Group Data Modeling (HIHWG)</li> <li>○ Estimated budget of \$60000</li> </ul>
Responsibility	<ul style="list-style-type: none"> <li>○ Conceptualized and developed the framework for data transformation between various proprietary formats using XQuery and XML mapping</li> <li>○ Led the formulation of problem solution towards common operating software models between NGA's (National Geographic agency) proprietary nautical-formatted digital data and nautical digital data formats of other member, states of the International Hydrographic Organization (IHO)</li> <li>○ Deliverable product as HIHWG Translation Workbench</li> </ul>
Technologies Used	○ JAVA, XQUERY, XPATH, XSLT, Swing, Eclipse, Stylus Studio
Team Size	○ 2

- **Project: Automated Test Case Generator (ATC-Gen)**

Impact	<ul style="list-style-type: none"> <li>○ Adopted by JITC as the <i>defacto</i> testing methodology for systems testing</li> <li>○ Winner of JITC's highest civilian contractor 'Golden Eagle' award</li> <li>○ Winner of US National Training Simulation Association (NTSA) award for Best M&amp;S development tool in cross-functional area</li> </ul>
Responsibility	<ul style="list-style-type: none"> <li>○ Worked as a team-member and team-lead whenever appropriate</li> <li>○ Consultant to the research group at Northrop Grumman Information Technology</li> <li>○ Developed Automated Test Case Generation Tool using UML and Software engineering principles</li> <li>○ Automated various processes of code generation and rule-based analysis</li> <li>○ Publish as journal papers</li> </ul>
Technologies Used	○ DEVS, JAVA, XML, JAXB, Swing, JBuilder, UML, RUP
Team Size	○ 10

**Northrop Grumman Information Technology (NGIT),  
Joint Interoperability Test Command (JITC), Ft. Huachuca, AZ, USA**

**Research Intern (Engineer II)**

**Sep. 2004 - Jun. 2005**

- Part-time research internship leading a team of 3 Graduate students
- Laid the foundation of GENETSCOPE project listed above
- Resulted in continued funding for the subsequent periods

## **ECE Department, University of Arizona, Tucson, AZ, USA**

### **Research Assistant**

**Aug. 2001 - Jun. 2005**

Advisor: Professor Bernard P. Zeigler

- Position located at Arizona Center for Integrative Modeling and Simulation (Google: ACIMS)
- Developed architectural descriptions based on Department of Defense Architectural Framework (DoDAF) requirements
- Involved in writing proposals being submitted to SBIR/NSF. Contributed towards 3 proposals so far.
- Developed a completely scalable (self-configuring, self-organizing) autonomous network model capable of focusing resources and 'attention' to dynamic regions of importance using Object-oriented principles
- Maintained the Discrete Event (DEVS) Java software version 3.1 Beta for ACIMS center and responsible for its licensed distribution. Made contributions to Version 2.7 resulting in Version 3.0 with the capability of creating dynamic variable structure models.

### **Project Leader (ECE 678)**

**Jan. 2004 - May 2004**

**Herculean Effort Leadership Award** for demonstrated performance in leadership and commitment in channelizing class effort by the ECE department

- Managed a team of 10+ Graduate students in 2 level hierarchical organization towards development of a Sensor Net Architectural Framework designed as a subset of specifications provided by C4ISR, DoDAF etc.
- Research-project being done as a graduate 600 level class intended to generate NSF proposals and publications
- Challenge was to come up with architecture document specifications extensively in UML language (Ver. 1.4). Project involved designing of custom protocols and their description/implementation in the setup
- Document was reviewed by an external panel that consisted of distinguished people from DoD, US Army, Professors from ECE and SIE departments at University of Arizona

## **TEACHING**

### **ECE Department, University of Arizona, Tucson, AZ, USA**

#### **Lecturer**

- ECE 676: Distributed Simulation
- ECE 575: Object Oriented Modeling and Discrete Event Simulation

Spring 2008  
Fall 2007

#### **Teaching Assistant**

- ECE 473/573: Software Engineering Concepts
- ECE 575: Object Oriented Modeling and Discrete Event Simulation

Spring 2005  
Fall 2003

## **STARTUP (Doing Business As: DBA)**

### **DUNIP Technologies, Tempe, AZ, USA**

**Founder and President (Sole Proprietor / Independent Contractor)**

**August 2008 – Present**

- Modeling and Simulation-Based open-source IT consultancy firm
- Planning of operations, M&S educational training, MDA, SOA-Based Simulation systems, open-source product development
- Hands-on technical proficiency in OOPS, systems M&S and Java/J2EE based simulation projects

## **Graduate Course work**

### **Computer Engg. and Networks**

ECE 677 Distributed Computer Networking  
ECE 577 Computer Networks and Design Evaluation  
SIE 546 Algorithms, Graphs and Networks  
MIS 541 Data Structures and Algorithms  
ECE 564 Advanced Computer Networks  
ECE 678 Integrated Telecommunication Systems  
ECE 503 Random Processes for Engg. Applications  
MIS 538 Web Computing and Data Mining  
ECE 576 Engineering of Computer Based Systems  
MIS 611 Design Science and Research Methodologies  
ECE 562 Computer Architecture Design

### **Simulation and Systems**

ECE 575 OO Modeling/Discrete Event Simulation  
ECE 676 Distributed Simulation  
ECE 549 Continuous System Simulation  
ECE 579 Principles of Artificial Intelligence  
ECE 696i Computational Intelligence  
ECE 547 Advanced Motion Control  
CSC 452 Principles of Operating Systems  
SIE 554 Systems Engineering Process  
MIS 582 E-Business Systems Development  
MAP 559 Accelerating Business Process Engineering and Systems Development with Reusable Business Knowledge  
ENGR 322 Entrepreneurship for Engineers

## **Other Relevant Projects**

- **Leaky Neuron Model** using DEVS continuous system simulation to model synapse formation and neuroplasticity
- **Theatre-stage control using wireless and advanced sensor infrastructure** (ECE 547): Live team-project of 16 students with a target to host an actual theatric performance (Bottom's Dream directed by Brent Gibbs) in the School of Theatre Arts at UofA within 17 weeks. Part of the complete design process from conception to complete implementation of a 32'x32' hydraulic controlled stage. Member of Motion Control sub-team. Responsibilities included the integration aspects of the project that ensures hardware-PLC, hardware-software, and software-software communications using softwares like Think'n Do and DirectSoft across a wireless channel.
- **Simulating Intelligent Behavior in Braitenberg Vehicles** using Breve environment and interpreting their psychological behavior. Team project with 5 students
- **Integration of Intelligent Vehicles with Intelligent Infrastructure** (VII): Project involves the development of System Design for integrating the next-generation vehicles with intelligent infrastructure. Clients included US Department of Transportation (USDOT) and Prof. Larry Head. **Served as a group leader for a team of 6 students** including 2 distance learning students
- **MIS Research Portal**: Project involved development of a search-engine exclusively for MIS discipline. Required development of spiders. Record-set of around 80,000; Page-rank algorithms and innovative visualization techniques were also developed
- **Distributed multi-player game** implemented over LAN using UDP protocol in C++
- **Develop of Multi-agent teleconferencing system using Statemate** modeling incorporating hardware-software co-design
- **Performance Evaluation of Static Routing algorithms over Dynamic Multi-service networks** using a constructed (**copyright**) Network Flow Simulator developed in Java. Algorithms like Widest-shortest, Shortest-widest were also coded and flows like Elastic Flows were considered for comparative evaluation