
Saurabh Mittal, PhD

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Profile

- Nearly 10 years experience in **Modeling Simulation research and OO software project development over their complete life-cycle**
- Led projects with atleast **\$0.5 million** budget
- Professional research, planning, management, and customer interfacing experience for over 7 years in leadership role
- Strong research and analytical skills with referred publication record
- Proven skills in Java, XML, SOA, Event-driven Architectures, Server-side, UML/SysML, MDA and SDLC
- Strong DSL development and model transformation skills
- Qualified expert in Discrete Event Modeling and Simulation-Based Systems engineering
- Goal-oriented, team-player and adept in managing multiple projects
- Areas of Expertise
 - Software design, agent modeling, 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, Zachmann
 - Interoperability and cross-platform software engineering & Modeling-Simulation software w/o SOA w/o real-time execution
 - Unified Process for integrated development and testing of Systems and systems

Education

2007	3.57/4.0	PhD, Electrical and Computer Engineering, University of Arizona, Tucson, AZ Minors: Systems and Industrial Engineering, Management in Information Systems
2003	3.71/4.0	MS, Electrical and Computer Engineering, University of Arizona, Tucson, AZ
2001	9.18/10.0	BTech, Electrical Engineering, Jamia Millia Islamia, New Delhi, India
2000	9.00/10.0	IBM Certified Application Developer

Employment History

08/2010 – Present	Research Scientist, L-3 Communications, Air Force Research Laboratory (AFRL)
05/2010 – 08/2010	Applications Systems Engineer, Wells Fargo
12/2008 – 05/2010	Software Engineer, Apollo Group, Inc.
10/2007 – 05/2008	Research Assistant Professor, Electrical and Computer Engineering, Univ. of Arizona
06/2005 – 10/2007	Research Engineer, Northrup Grumman Information Technology at Arizona Center for Integrative Modeling and Simulation (ACIMS), Univ. of Arizona
08/2001 – 06/2005	Research Assistant, ACIMS, Electrical and Computer Engineering, Univ. of Arizona

Awards Received

2008-09	Classified by US Immigration Services as an alien of Extraordinary Ability (top 0.5% worldwide) and in US National Interest (top 4% US)
2006	Golden Eagle Award – Joint Interoperability Test Command, US DoD
2006	Best M&S Development in Cross-functional area (Team) - National Training Simulation Association
2006	Outstanding Research Assistant/Staff – Nominee, Graduate Students Professional Council, Univ. Of Arizona
2004	Herculean Effort Leadership Award – University of Arizona
2001-05	Graduate Research Assistant Scholarship, ECE Department, Univ. of Arizona

Funding

Co-PI	2010-12	\$1M	Large Scale Cognitive Modeling (US Air Force Office of Scientific Research)
Co-PI	2012-15	\$0.5M	Domain Ontology for Increasing the autonomy of Cognitive Agents (AFOSR)
Co-I	2012-15	\$4.5M	Developing Autonomic Sensing Framework Using Neuromorphic Computing Methods on a High-performance computing platform

Startup (Doing Business As: DBA)**DUNIP Technologies, Tempe, AZ**

Founder and Lead Developer (Sole Proprietor / Independent Contractor) August 2008 – Present

- Modeling and Simulation-Based open-source IT consultancy firm advocating DEVS Unified Process for Integrated Development and Testing for System of Systems
- 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
- Hosted at www.duniptechnologies.com

Teaching Experience

Electrical and Computer Engineering, University of Arizona

2008	Lecturer	Distributed Simulation (ECE 676)
2007	Lecturer	Object Oriented Modeling and Discrete Event Simulation (ECE 575)
2005	Teaching Assistant	Software Engineering Concepts (ECE 473/573)
2003	Teaching Assistant	Object Oriented Modeling and Discrete Event Simulation (ECE 575)

Invited Talks

Mittal, S., Net-centric Cognitive Architecture using DEVS Unified Process, Researching and Developing Persistent and Generative Cognitive Models Workshop, sponsored by US Air Force Research Lab, 711th Human Performance Wing and European Office of Aerospace Research and Development, Nov 9-11, Scottsdale, AZ, USA

Publications**Book (In Preparation)**

Mittal, S., Martin, J.L.R. (2012), Net-centric system of systems engineering with DEVS unified process, CRC Press

Book Chapters

- Mittal, S. (2011), Agile net-centric systems with DEVS unified process, In Intelligence-based Systems Engineering, Ed. Tolk, A., and Jain, L., Springer-Verlag
- Wainer, G., Zoubi, K., Dalle, O., Hill, D., Mittal, S., Martin, J.L.R., Sarjoughian, H., Touraille, L., Traore, M., Zeigler, B.P. (2010), Standardizing DEVS simulation middleware, In Discrete Event Modeling and Simulation: Theory and Applications, Ed. Wainer, G., Mosterman, P., CRC Press
- Wainer, G., Zoubi, K., Dalle, O., Hill, D., Mittal, S., Martin, J.L.R., Sarjoughian, H., Touraille, L., Traore, M., Zeigler, B.P. (2010), Standardizing DEVS model representation, In Discrete Event Modeling and Simulation: Theory and Applications, Ed. Wainer, G., Mosterman, P., CRC Press
- Wainer, G., Zoubi, K., Mittal, S., Martin, J.L.R., Sarjoughian, Zeigler, B.P (2010), An introduction to DEVS Standardization, In Discrete Event Modeling and Simulation: Theory and Applications, Ed. Wainer, G., Mosterman, P., CRC Press
- Wainer, G., Zoubi, K., Dalle, O., Hill, D., Mittal, S., Martin, J.L.R., Sarjoughian, H., Touraille, L., Traore, M., Zeigler, B.P. (2010), DEVS Standardization: Ideas, trends and future, In Discrete Event Modeling and Simulation: Theory and Applications, Ed. Wainer, G., Mosterman, P., CRC Press
- Mittal, S., Zeigler, B.P., Martin, J.L.R., Sahin, F., Jamshidi, M. (2008), Modeling and simulation for systems of systems engineering, In System of Systems Engineering for 21st Century, Ed. Mo Jamshidi, Wiley

Journal Articles (Published)

- Mittal, S., Zeigler, B.P., Martin, J.L.R. (2010), Implementation of formal standard for Interoperability in M&S/System of systems integration with DEVS/SOA, International Command and Control Journal, 3(1), 2009
- Mak, E., Mittal, S., Hwang, M.H., Nutaro, J. (2010), Automated Link-16 testing using the discrete event system specification and extensible markup language, Journal of Defense Modeling and Simulation, 7(1), 39-62
- Martin, J.L.R., Mittal, S., Mendel, J., Zeigler, B.P. (2009), eUDEVs: Executable UML using DEVS theory of modeling and simulation, Transactions of SCS, 85(7), 750-777
- Mittal, S., Martin, J.L.R., Zeigler, B.P. (2009), DEVS/SOA: A cross-platform framework for net-centric modeling and simulation in DEVS unified process, Transactions of SCS, 85(7), 419-450
- Mittal, S., Mak, E., Nutaro, J. (2006), DEVS-based dynamic model reconfiguration and simulation control in the enhanced DoDAF design process, Journal of Defense Modeling and Simulation, 3(4), 239-267

- Mittal, S. (2006), Extending DoDAF to allow DEVS-based Modeling and Simulation, *Journal of Defense Modeling and Simulation*, 3(2), 95-123
- Hu, X., Zeigler, B.P., Mittal, S. (2005), Variable structure in DEVS component-based modeling and simulation, *Transactions of SCS*, 81(2), 91-102

Technical Reports

- Mittal, S., Seo, C. (2007), GENETSCOPE: Generic Network System Capable of Planned Expansion: A Manual, JITC
- Mittal, S, Zeigler, B.P., Veena, M., Hammonds, P. (2004), Network simulation environment for evaluation and benchmarking HLA/RTI implementations, Joint Interoperability Test Command (JITC), Defense Information Systems Agency (DISA), Fort Huachuca
- Zeigler, B.P., Mittal, S. (2002), Modeling and simulation of ultra-large networks: A framework for new research directions, supported by NSF Grant ANI-0135530
- Zeigler, B.P., Sarjoughian, H., Mittal, S. (2001), Modeling and simulation of ultra-large networks: Thirteen Recommendations for new research directions, ULN Workshop, Tucson, AZ

Conference/Workshop Papers

- Mittal, S., & Douglass, S. A. (2011). Net-centric ACT-R-Based cognitive architecture with DEVS unified process. To appear in the proceedings of the DEVS Symposium, Spring Simulation Multiconference -- SpringSim'11, Boston, MA.
- Mittal, S., & Douglass, S. A. (2011). From domain specific languages to DEVS components: Application to cognitive M&S. To appear in the proceedings of the Workshop on Model-driven Approaches for Simulation Engineering -- SpringSim'11, Boston, MA.
- Douglass, S. A., & Mittal, S. (2011). Using domain specific modeling languages to improve the scale and integration of cognitive models. To appear in the proceedings of the 20th Annual Conference on Behavior Representation in Modeling & Simulation. Provo, UT.
- Murano, A., Martin, J.L.R., Portas, E.B., Mittal, S., Aranda, J. (2009), DEVS/SOA: Towards DEVS Interoperability in distributed M&S, IEEE/ACM International Symposium on Distributed and Real-Time Applications
- Zeigler, B.P, Mittal, S., Hu, X. (2008), Towards a formal standard of interoperability in M&S/System of systems engineering, Critical Issues in C4I, AFCEA-George Mason University Symposium
- Mittal, S., Zeigler, B.P. (2008), DEVS unified process for web-centric development and testing of system of systems, Critical Issues in C4I, AFCEA-George Mason University Symposium
- Mittal, S., Martin, J.L.R., Zeigler, B.P. (2008), WSDL-based DEVS agent for net-centric systems engineering, International Workshop on Modeling and Applied Simulation, Italy
- Mittal S., Zeigler B.P. (2008), "DEVS Unified Process for integrated development and testing of system of systems", Critical Issues in C4I, AFCEA-George Mason University Symposium
- Mittal, S., Martin, J.L.R., Zeigler, B.P. (2007), DEVSML: Automating DEVS simulation over SOA using transparent simulators", DEVS Symposium
- Mittal, S., Martin, J.L.R., Zeigler, B.P. (2007), DEVS-Based web services for net-centric T&E", Summer Computer Simulation Conference
- Mittal, S., Zeigler, B.P. (2005), Dynamic simulation control with queue visualization, Summer Computer Simulation Conference
- Mittal, S., Wu, W., Zeigler, B.P. (2004), A multiconstraint-based real-time routing scheme using simulation methodology, Summer Computer Simulation Conference

Whitepaper

- Hammonds, P.E., Mittal, S., Zeigler, B.P., *Automated Attention Agent Assessment of Current States and Prediction of Future States using DEVS Cognitive Agent*, 2007

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

Professional ActivitiesSociety Memberships

Society of Computer Simulation (SCS)
 Association for Computing Machinery (ACM)
 Institution of Electronics and Electrical Engineers (IEEE)
 Market Advisory Board, Business Week Magazine

Conference Committees

IEEE Workshop on Modeling and Simulation on Grid and Cloud Computing 2012, Ottawa, Canada
 Spring Simulation Multiconference, Spring '12, Orlando, FL
 Summer Computer Simulation Conference, SCSC'11
 Spring Simulation Multiconference, SpringSim'11, Boston, USA
 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
 22nd 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

Review Service

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
 4th 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)

Skill Set (proficiency shown in bold)

Languages/Environment	Java 5, C, Swing, SWT/JFace, C++, XML, XSLT
Platform Programming	Eclipse RCP/EMF/GMF
System Engg., Design	RUP/UML, MDA/MDE, SysML, Statemate, Design Patterns, HWIL
Agile Methodologies	Test Driven Development (TDD), JUnit, 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, JAX-WS, JAXB, BPMN/BPEL, ESB
IT Frameworks	Zachmann, DoDAF, NCES, TOGAF
J2EE Frameworks/ORM	Spring, Hibernate, EJB3, Event Driven Architectures
Modeling & Simulation	Discrete Event Simulation Framework (DEVS), HLA
Messaging/ESB	JMS, ActiveMQ, Apache Camel, WebsphereMQ, Mule
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, IPv4, IPv6, LAN/WAN
Operating Systems	AIX/Linux/Openuse/Ubuntu (64-bit), Macintosh OSX

Job Responsibilities**L-3 Communications, US Air Force Research Lab, 711th Human Performance Wing) Mesa, AZ
Research Scientist Aug. 2010 – Present**

- Lead the development of theory and applications for multiplatform modeling and simulation using DEVS
- Contribute towards development of Domain Specific Languages for Cognitive Science
- Advance the net-centric modeling and simulation DEVS/SOA framework
- Manage software design and development using Eclipse plugin framework
- Projects:
 - Large Scale Cognitive Modeling:
 - Lead the initiative in taking the cognitive modeling to high performance discrete event simulation infrastructure on SOA/Cloud
 - Domain Ontology for Increasing the Autonomy of Cognitive Agents:
 - Co-Lead the initiative in developing Domain specific languages for cognitive models and the associated ontology to design situated behavior of agents in an artificial environment. Eventually, running the agents on the infrastructure developed in the above project
 - Developing Autonomic Sensing Framework Using Neuromorphic Computing Methods on a High-performance computing platform:
 - Co-Investigate and capitalize on the above projects and develop domain ontologies and specific languages for abduction based enquiry and sense making in a cognitive agent.

**Wells Fargo & Co. (Lending Business Services) Tempe, AZ
Applications Systems Engineer V May. 2010 – Aug. 2010**

- 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

Impact	○ High transaction system
	○ Clustered environment (over 20 domains) with BEA Weblogic and Apache Tomcat
	○ Lending Grid sits between the loan application and the Creditors such as Fannie Mai and is a highly mission critical application with SLAs ~200ms
Responsibility	○ Design/document implementation options for a flexible middleware framework with event driven capabilities
	○ Development of Framework component with basic ESB features
	○ Infrastructure architecture/Implementation and framework support.
	○ Application of Event Driven Architecture and SOA design pattern with performance testing/monitoring
	○ Develop services, message brokers using MQ/ActiveMQ, XML transformers, adapters and business logic in an open source environment
	○ Develop component architecture and manage the build and design process using Maven, SVN and Continuous integration
	○ Develop routing mechanisms using Apache Camel
Technologies	○ 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, Camel, SVN, Hudson
Team Size	○ 2

**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	○ System used by enrolment counselors and managers to manage potential and current leads
	○ Highly visible project directly impacting the performance of 6000 Enrolment Counselors, couple hundred Enrolment Managers and the Business's growth
	○ Facilitates business processes such as Enrollments turnover and Performance

Responsibility	<ul style="list-style-type: none"> ○ monitoring of employees ○ High transaction system with over 500K hits per day ○ Design and develop a new Enrolment Manager module ○ Conduct requirements gathering, elicitation, contextual enquiries with Managers on floor ○ Perform coding using Agile methodologies and SCRUM processes ○ Develop Business logic and DAO layers ○ Participate in unit-testing, planning and overall SDLC ○ Coordinate with other groups to develop Service layer for EM Module ○ Sole-developer on this module in a team setup
Technologies Used	<ul style="list-style-type: none"> ○ 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
Team Size	○ 5

ECE Department, University of Arizona, Tucson, AZ

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"> ○ 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. ○ JITC is authorized to be the nationally certifying agency for all Information Technology (IT) and National Security Systems (NSS) in USA
Responsibility	<ul style="list-style-type: none"> ○ Conceptualized and developed the systems framework for developmental and operational testing as lead researcher and team-member ○ Requirements analysis, Use Case modeling ○ Integrated BPMN/BPEL as requirements format for simulation Operational Model ○ Developed M&S data-engineering framework as per MDA/MDE ○ Developed customized XML parsers ○ Published as journal papers
Technologies	<ul style="list-style-type: none"> ○ 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
Team Size	○ 2

ECE Department, University of Arizona Tucson, AZ

Research Engineer (Engineer III)

Jun. 2005 – Sep. 2007

- Full-time job based at Arizona Center for Modeling and Simulation (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 (DEVSMML), SOA, Global Information Grid (GIG)

- Un-sponsored pilot projects:

Project: Learning Agent

Impact	○ This project was the first step in development of a web based natural language processor learning agent
Responsibility	○ 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
Technologies	○ JAVA, JAXB, Neuroscience
Team Size	○ 1

Project: Simulation-Based Software engineering

Impact	○ Used in Graduate Study Software engineering and Discrete Event modeling and simulation courses (ECE 676, 575, 473/573)
Responsibility	○ Software Tools for systems of systems modeling ○ Lead the development of a complete methodology for simulation-based software engineering ○ Use case modeling, component based engineering ○ Publish as journal papers
Technologies	○ UML, RUP, Finite Deterministic Discrete Event Modeling, JUnit, Java, C#, C++
Team Size	○ 2

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

Project: GENETSCOPE

Impact	○ 10 year old legacy code made state-of-the-art (from C to Java) ○ Currently deployed and used at US Air Force and US Navy ○ Over \$0.5M estimated budget ○ Recipient of JITC's highest civilian contractor 'Golden Eagle' award ○ <i>THE</i> model in use by US Department of Defense
Responsibility	○ Lead Architect and Developer for over 2 years ○ Management, budgeting and technical expertise ○ Directed GUI development and personally developed the core multithreaded simulation engine ○ 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 ○ Developed real-time visualization of simulation and directed post-simulation animation from the logged simulation data ○ TLOC ~ 70,000 ○ Requirements analysis, Use case modeling, technical feasibility negotiations ○ Led a team of 3 developers (all PhD candidates) ○ Reporting directly to JITC Task Leader ○ Simulation model transformed from C to JAVA using Discrete Event modeling and simulation-based automated processes ○ Conform to standards like MIL-144B (High Frequency Automatic Link Establishment protocol) and simulation of Transport protocol ○ Deliverable of product GENETSCOPE (Generic Network Systems Capable of Planned Expansion) ○ Publish as journal paper
Technologies	○ DEVS, C, XML, ICEPAC, VOACAP, Java, Swing, JBuilder, Eclipse, UML
Team Size	○ 5

Project: Hydrology

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|----------------|---|
| Impact | <ul style="list-style-type: none"> ○ JITC sponsored research project towards Hydrographic Information Harmonization Working Group Data Modeling (HIHWG) ○ Estimated budget of \$60000 |
| Responsibility | <ul style="list-style-type: none"> ○ Conceptualized and developed the framework for data transformation between various proprietary formats using XQuery and XML mapping ○ 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) ○ Deliverable product as HIHWG Translation Workbench |
| Technologies | <ul style="list-style-type: none"> ○ JAVA, XQUERY, XPATH, XSLT, Swing, Eclipse, Stylus Studio |
| Team Size | <ul style="list-style-type: none"> ○ 2 |

Project: Automated Test Case Generator (ATC-Gen)

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

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

Graduate Course work

Computer Engg. and Networks

Distributed Computer Networking
 Computer Networks and Design Evaluation
 Algorithms, Graphs and Networks
 Data Structures and Algorithms
 Advanced Computer Networks
 Integrated Telecommunication Systems
 Random Processes for Engg. Applications
 Web Computing and Data Mining
 Engineering of Computer Based Systems
 Design Science and Research Methodologies
 Computer Architecture Design

Simulation and Systems

OO Modeling/Discrete Event Simulation
 Distributed Simulation
 Continuous System Simulation
 Principles of Artificial Intelligence
 Computational Intelligence
 Advanced Motion Control
 Principles of Operating Systems
 Systems Engineering Process
 E-Business Systems Development
 Entrepreneurship for Engineers
 Accelerating Business Process Engineering and Systems
 Development with Reusable Business Knowledge

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