

WESLEY N. COLLEY

Center for Modeling Simulation and Analysis
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Profile

Experienced: Over 15 years in modeling & simulation and analysis:
○ M&S: VV&A, Physics-Based, Discrete Event, Distributed, Parallel, Agent-Based.
○ Analysis: Statistics, Algorithms, Optimization, Image Processing, Complex Systems.
○ Subject Areas: Test & Evaluation, Missile Defense, Space, Supply Chain, Transportation.
Scholarly: Over 50 publications and professional presentations.

Education

PHILOSOPHY DOCTOR 1993–1997
Princeton University, Astrophysical Sciences
Thesis Topic: *Statistics for New Datasets in Cosmology*
Honors: Hertz Fellow, Jacobus Fellow Nominee

BACHELOR OF ARTS WITH HIGHEST DISTINCTION 1989–1993
University of Virginia, Astronomy and Physics
Thesis Topic: *Improved Centroiding of Stellar Images for Parallax Studies*
Honors: Echols Scholar, Robert C. Byrd Scholar, D. Nelson Limber Award

Modeling & Simulation Experience

Center for Modeling Simulation and Analysis 2005–
PRINCIPAL RESEARCH SCIENTIST AND ADJ. PROFESSOR OF MGMT SCIENCE

- Verification, Validation & Accreditation, Analysis and Algorithm Development
 - Created quantitative validation methodologies in support of test & evaluation of Netcentric Warfare Systems under Test Resource Management Center, in the context of missile defense and Joint Fires scenarios. Implemented methodologies as a suite of Webservice tools for use in a service-oriented architecture (SOA).
 - Developed a novel algorithm for quantitatively validating non-uniformly sampled radar cross-section models for the Army's Virtual Targets Center.
 - Created a new qualitative-to-quantitative technique for assessing need-to-re-validate discrete-event simulations of intelligence infrastructure for a DoD agency.
 - Developed a custom discrete-event simulation to validate analytic Air Force Command & Control system queuing models.
 - Developed novel automated statistical techniques for optimizing by-item stocking level for tens of thousands of items across the US Army Material Command (AMC) enterprise.
 - Developed Web-based dashboard for enterprise-wide supply chain assessment for AMC.
 - Provided rankings of college football teams to the Bowl Championship series, using the novel Colley Matrix algorithm that treats strength-of-schedule in a straight-forward manner.
- Physics-based Modeling / Space
 - Developing a smoothed-particle hydrodynamics model for smoke obscurant behaviors to support live/virtual training and test & evaluation for Army Aviation & Missile Research Development and Engineering Center (AMRDEC).
 - Developed HLA visualization federate linking with NASA Constellation's DSES federation.
 - Developed a Java-based tool to provide NASA stakeholders with exhaustive rocket configurations from existing hardware to meet particular payload weights to orbit.
 - Conducted a survey and quantitatively analyzed NASA modeling & simulation tools used in support of systems engineering.
- Discrete-Event Simulation
 - Modeled traffic movements related to major industry sectors in Alabama under the stressors including high volume and temporary impediments. Developed the simulation within a multi-threaded, agent-based, event-driven Java architecture.
 - Developed discrete event simulation-based workload allocation model for foreign military sales units within the US Army Security Assistance Command.
 - Simulated Army Aviation supply chain for optimizing stocking strategies of fill-rates for major aviation parts to OCONUS units.
 - Modeled economic sector scenarios for BP Disaster impacted region of Alabama.

Modeling & Simulation Experience (cont'd)

Virginia Modeling, Analysis and Simulation Center

2004–2005

SENIOR RESEARCH SCIENTIST, ADJ. PROFESSOR OF PHYSICS

- Modeled a mass casualty event (biological, chemical or explosion) using up to one million social, intelligent agents within a 32-node parallel system for DHS.
- Implemented a Missions×Means Validation methodology for the Joint Theater Level Simulation at the Terminal Fury '05 Operational Training Exercise (Naval COMOPTEVFOR).

Massachusetts Institute of Technology-Lincoln Laboratory

2001–2002

TECHNICAL RESEARCH STAFF

- Developed efficient algorithm for associating mid-course ballistic missile tracks with statistical rigor in the Global Ballistic Missile defense context.
- Simulated observations of launch, decoy and re-entry vehicles from optical and IR platforms.
- Integrated system into DARPA/AFSPC funded Space-Based Infrared System (Low) parallel testbed.

Astrophysics Research

University of Virginia

2002–2004

LECTURER, DEPARTMENT OF ASTRONOMY

- Developed precise, efficient anti-aliasing algorithms for ray-tracing light in the caustic regime.
- Detected the faint photometric signature of a gravitational microlensing event in quasar Q0957.
- Quantified topology of large-scale structures in NASA's WMAP microwave background data.

Harvard-Smithsonian Center for Astrophysics

1997–2000

POSTDOCTORAL FELLOW (CfA Fellowship)

- Formed an international collaboration of 13 observatories and over 40 astronomers.
- Architected automated image processing software for pre-processing, registration, pattern recognition, source-identification, and photometry on 1000s of images from 13 disparate optical systems.
- Measured Q0957 lens time-delay to within a few hours, providing unprecedented precision to the observational error on the Hubble Constant.

Teaching and Outreach

- Modeling and Simulation: Graduate Physics-Based Modeling (UAH, ODU)
- Statistics: Business Statistics (UAH).
- Astronomy/Physics: Introduction to Sky and Solar System, and Night Lab; Physics lab for Pre-Medical Students, Graduate Seminar (U.Va.).
- Continuing Education: Hand-on MATLAB (UAH).
- Dozens of public astronomical viewing sessions and public lectures covering a broad host of astronomy topics.

Programming Skills

- Languages: C++, Java, FORTRAN, MATLAB, IDL, Perl
- Web: Java EE, JSP, Servlets, JavaScript, Java Webservice, SOA, Glassfish, NetLogic
- Environments: Windows, Linux, Unix
- Database: MySQL, Oracle, JDBC/ODBC
- Interoperability: High-Level Architecture (HLA), MPI, TCP/IP

Misc.

Website Owner and Manager: colleyrankings.com

- Developed the ColleyMatrix algorithm to rank Division FCS college football teams.
- Algorithm adopted by the Bowl Championship Series to seed college football national championship game for 13 years
- Produced all related Web content, including fan-interactive interfaces