ARLO L. AMES
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Arlo Ames holds bachelor's and master's degrees in mechanical engineering from Brigham Young University, where he emphasized control systems theory, optimization, and computer-aided engineering. Arlo joined Sandia National Laboratories in 1984, where he spent over 20 years in development of geometric representation and automatic reasoning algorithms addressing a wide variety of engineering analysis and robotic manufacturing applications , including part handling, assembly planning, welding planning, meat cutting, free-form fabrication of fully 3D metal structures, computer-aided design in a virtual environment, finite element modeling of tires, representation of functional interrelationships between parts, automatic manufacture of insect-shaped objects, automatic inference of the design of the interior of a building given only externally observable information, and part classification and coding. Arlo is named on an R&D 100 award presented jointly to Sandia and the Goodyear Tire and Rubber Company entitled "Assurance Featuring TripleTred Technology". His current focus is on devising an approach to creating engineered changes to complex adaptive dynamical systems of systems, critical infrastructure modeling, and verification and validation of human, social, cultural and behavioral models.

SUMMARY

With 24 years of professional experience in algorithms, parallel computing, CAD representation, geometric reasoning, manufacturing, robotics, modeling, dynamic simulation, and systems engineering, Mr. Ames' current focus includes complex systems, critical infrastructure modeling, and behavior analysis of dynamic systems. He is committed to customer interface, delivering solutions, growing business, and mentoring.

EXPERIENCE

2008 – 2009 Veterans Health Administration Threat Modeling: ???

2006 – 2008 CIPDSS/CEMSA Project: Collaboration with Thomas F. Corbet to develop a capability for modeling critical infrastructure that is adaptable to new DHS requirements, theoretically sound, and provides thorough understanding of the model behavior space.

2007 – 2008 CASoS Roadmap: Collaboration with Robert J. Glass et al. to develop R&D roadmap for engineering solutions for complex adaptive systems of systems, which encompass some of the world's big problems. Roadmap commissioned by Les Shepherd, VP 6000.

2007 – 2008 QASPR V&V: Wrote requirements and V&V plans, oversaw and documented execution of V&V activities at code and system level, for project developing simulation of fast neutron damage in electronic devices.

1998 – 2006	AUTOGEN Automatic Welding Planning: Collaboration with U.S. Shipbuilders at NGSS Ingalls, NGSS Avondale, GD Electric boat to develop algorithms to enable fully automatic robotic welding of steel ship structure. Demonstrated excellent welds and automatic processes with 9 DOF commercial robots. Certain weld continuity difficulties persisted past 2006 demonstration.
2005 – 2006	Interiors DARPA project: Collaborated with Dwight Miller to develop algorithms for inferring interior structures of building given only externally observed data. Demonstrated the approach, successfully determined 60-80% of interior structure for sample traditional Muslim homes from Iraq.
2003	Acquired STL-usable representations of insect bodies for DARPA research project.
1992 – 2004	Tire Geometry Meshing: Development of a tool for creating meshable 3D tire geometry from 2D wireframe description (GTO2ACIS) for the Goodyear Tire and Rubber Company as part of the Goodyear Tire Mechanics CRADA. Enabled nearly automatic FEA meshing, reduced a months-long manual process to hours. Developed a suite of 2D geometric algorithms as well. Use of tools persists, and has resulted in continuing funding for related Sandia development activity to the present day.
2000 – 2001	CAD for MEMS: Collaboration with Vic Yarberry and Paul Wolfenbarger to develop algorithms for creation of 3D solid representation of MEMS geometries, covering all SUMMIT-V processes. Work included development of a rolling-ball offsetting algorithm.
1997 – 2000	Cloud to CAD: Principal Investigator of LDRD to develop processes for recognizing 3D CAD representation from 3d scanned point clouds. Successfully developed surface recognition algorithms; funding ended before stitching algorithms were complete.
1996 – 1998	Immersive CAD: Principal Investigator of LDRD to develop processes for editing CAD representations in an immersive environment using virtual reality techniques. Demonstrated real-time local solid model updating algorithms.
1997 – 1998	CAD2FAB: Developed geometric reasoning processes for creating fully 3D objects using LENS material deposition process (LENS was previously only 2-1/2 D).
1992 – 1994	Developed Adobe Photoshop and Illustrator plug-ins for the Wm. F. Wrigley Jr. Company and Kaleidoscope Imaging to support geometric distortions, work flow improvement, font transliteration for non-English alphabets. A non-Sandia activity.

1990 – 1993	Archimedes assembly planner: Provided geometric algorithms and development as part of a larger team.
1990 – 1993	PCTH volume fraction generation: Developed volume fraction generation capabilities, graphical interface, parallel file I/O and boundary condition sharing in support of effort to develop a prototype parallel version of CTH. Collaborative effort with Allen Robinson.
1986 – 1990	Mitro automatic group technology part coding expert system: Developed software capable of performing graph-theoretical pattern recognition of manufacturing features within boundary representation solid model data to support NWC part coding efforts.
1997 – present	Mentoring. Mentored 5 staff members through SNL Mentoring program. Mentored numerous summer students.
Ongoing	Opportunity development. Continuously seeking opportunities for new work within and outside of Sandia.

AWARDS

2005 Named on an R&D 100 Award**.** Contributed to "Assurance featuring TripleTred Technology" Awarded to Goodyear Tire and Rubber Company and Sandia National Laboratories, R&D Magazine, 2005.

EDUCATION

1979-1984 BS, MS Mechanical Engineering, Brigham Young University. GPA: 3.85/4.0. Thesis: Development of an Interactive Three-Dimensional Finite Element Mesh Generator.

PUBLICATIONS

CEMSA Needs Assessment, Submitted to Department of Homeland Security, September 15, 2008.

CEMSA Operational Requirements Document, Submitted to Department of Homeland Security, October 15, 2008.

Ames, A., et al, "Integrated Qualification Alternatives for SPRIII (QASPR) Validation Plan: Volume 1A – Charon Modeling for Silicon Device Technology", unpublished SAND document.

Glass, R., et al, "A Roadmap for the Complex Adaptive Systems of Systems (CASoS) Engineering Initiative", SAND 2008-4651, Sept 2008.

Ames, A., E. Hinman-Sweeney, J. Sizemore, "Automated Generation of Weld Path Trajectories", *6th IEEE International Symposium on Assembly and Task Planning*, IEEE, Montreal, Canada, 2005.

Ames, A., D. Hensinger, J. Sizemore, "AUTOmated GENeration of Control Programs for Robotic Welding of Ship Structure (AUTOGEN)", 2001 Ship Production Symposium, June 13-15, 2001.

Ames, A., "Immersive CAD", SAND 99-0326, 1999.

Ames, A., "Cloud to CAD", SAND2001-1283, 2001.

Ames, A., R. Robison, "Analysis Driven Mechanical Redesign", SAND 97-2052, 1997.

Ames, A., D. Kholwadwala, R. Wilson, "Liaison Based Assembly Design", SAND 96-30904, 1996.

Ames, A., A. Robinson, A. Edwards, "VFGEN: A Parallel Volume Fraction Generator for Hydrocodes", *Proceedings OON-SKI* , 1993.

Ames, A., "Production Ready Feature Recognition Based Automatic Group Technology Part Coding", *Proceedings ACM Symposium on Solid Modeling Foundations and CAD/CAM Applications*, 1991.

Ames, A., "Automated Generation of Uniform Group Technology Part Codes from Solid Model Data", *Proceedings ASME Computers in Engineering*, 1988.

SKILLS

Dynamic systems behavior analysis, automatic geometric reasoning algorithms, computational geometry, modeling representations (geometric: b-rep, CSG, NURBS, feature-based, ACIS, Pro-Engineer, SolidWorks; simulation: systems dynamics, agent-based, network-based), game theory, differential geometry, systems engineering, robotics (particularly kinematics and dynamics), verification and validation, many computer programming languages (C++, C, Fortran, Lisp, Pascal, Prolog, Ada, Java), parallel programming (although rather dated).

REFERENCES

Robert Glass, Sandia National Laboratories, Dept. 6326, (505) 844-5606
Robert Butler, Sandia National Laboratories, Dept. 6325, (505) 845-9664
Ray Trechter, Sandia National Laboratories, Dept. 6323, (505) 844-9475

INTERESTS

Church service, Boy Scouts of America, metalworking, live steam and Stirling engines, woodworking, guitar, banjo, choir, ballroom dance.