# Lee A. Butler
561 Country Ridge Cirlce, Bel Air, MD 21015
443 417 7386          lbutler3@comcast.net

**Objective:** Position as a software engineer or systems architect for projects in 3D computer graphics.

**Areas of Interest:** 3D modeling/CAD, interactive ray tracing, virtual reality, visualization, high-performance computing, human-computer interface design, computer and network security.

**Computer Skills:** C, Objective-C, C++, Python, Unix/Linux/OS X/Windows, Tcl/Tk, Qt, OpenGL/GLSL, TCP/IP networking, user interface design, SQL, CMMI.

**Applications Skills:** BRL-CAD, Blender, Maya, Photoshop, Eclipse, Xcode, SVN/CVS, VTK.

**Employment:**  Computer Scientist, US Army Research Laboratory 1989-Present
Current duties:
- **Leader**, Advanced Computer Systems team for the Army Research Laboratory.
- **Model Manager**, US Army BRL-CAD CAD/CAE package.  Principle architect, project manager, and software developer.
- **Information Assurance Security Officer**, responsible for computer and network security posture

I am currently the technical lead for a team of 6 that includes computer scientists, a mathematician, and a simulation specialist.  My team's primary work is to develop BRL-CAD, a CAD/CAE package used throughout DoD for performing ballistic analysis of tissue and hard objects and other simulations. I have designed and implemented significant portions of the package including performance enhancements, user interface design, geometry modeling and editing tools, and the testing Q/A framework. In addition, my team and I routinely work with specialists from a wide variety of other disciplines to develop tools to perform computer based analysis and simulation.  We have worked in areas including ballistics, medicine, behavioral modeling, manufacturing, computer security, information assurance, communications, and other radiation transport.

Developed a prototype to demonstrate the performance gains possible by re-designing stochastic ballistic penetration applications used for tissue and hard object penetration and damage analysis.  The approach takes into account current CPU and memory architectures.  The architectural change produced roughly a 30X speedup over previous designs.  Published results in the paper *Bullet Ray Vision* for the IEEE Symposium on Interactive Ray Tracing 2007.

Conceived and directed a program that achieved a 4x speedup in critical engineering analysis applications. Trained staff on key research in the area of ray tracing and lead the project to prototype new a ray-tracing engine.  Marketed the concept using the prototype to management and obtained full funding for project.  Directed the full-scale development program.

Designed and implemented a 3D graphic software application to assist engineers in calculating and visualizing the probability of damage to hard components when shot.  The interface allows the user to intuitively adjust parameters and see results presented in a visual form.  This turned a tedious and inscrutable process into an intuitive, visual, interactive process.  In addition to speeding the work, Engineers can now present their work in a form that is understandable by management and customers.

Developed a prototype Electro-Magnetic radiation transport simulation to analyze wideband radio transmission in urban environments.  This combined technologies from animation and rendering, physical data about the properties of RF propagation at various wavelengths, and data on material permissivity and absorption at various wavelengths. Building data was obtained from construction documents to generate the physical structures for the simulation. The prototype EM code included

visualization of coverage and path loss for signal. This resulted in funding for full-scale 1 year development effort. I am providing consultative oversight to this project at University of Utah.

Created computer model of Fort Hunter-Liggett (24km x 32km) for the Synthetic Wideband Imaging Spectrophotometer project. Model included terrain, vegetation, roads, and building information obtained from Geographic Information System (GIS) databases. To manage the vast tracts of vegetation, I developed a procedural algorithm for modeling grasses and their distribution based upon collaboration with botanical experts. This model saved approximately 1TB in model representation. Published results in the technical sketch *Procedural Grass* at ACM Computer Graphics and Interactive Techniques Conference 1998.

Directed effort to move BRL-CAD from closed, non-redistribution license to open-source GPL license. This effectively doubled development staff for no cost through open source contributors. User base was expanded 300% in first year. Adopted SourceForge.net to achieve visibility, and other CRM capabilities. This formed the core of an effort to formalize bug tracking, and project prioritization, scheduling and tracking. Created centralized reference resource for user community through web portal.

As an Information Assurance Security Officer, I am responsible for the security posture of branch computing assets. I review and approve requests for software within the branch. When IT security incidents arise, I assist in remediation after-action review. I have performed damage control, containment, and remediation in incidents of local, organization and national scope. I draft policy and procedures that enable users to accomplish their jobs while maintaining proper security.

**Publications:**
*Bullet Ray Vision.* IEEE Symposium on Interactive Ray Tracing 2007.
*BRL-CAD Tutorial Series: Volume III - Principles of Effective Modeling.* ARL SR-119 2003.
*BRL-CAD Tutorial Series: Volume I - Overview and Installation.* ARL SR-113 2002.
*BRL-CAD Tutorial Series: Volume II – Introduction to MGED.* ARL SR-102 2001.
*Comparing CPU Performance Between and Within Processor Families.* CMG 2000.
*Procedural Grass.* SIGGraph sketch 1998
*A Review of the Appliqué Computer.* ARL-TR 373 1997.
*Animation Techniques in BRL-CAD.* ARL-TR 313 1993.
*N-Manifold Geometry* 1990, Conference on the State-of-the-Art in Computer Graphics 1990
*N-Manifold Geometry* Ausgraph, 1990

**Education:**
PhD Student, University of Utah (current)
Master's Degree Candidate, University of Maryland, Baltimore County (not completed. Transferred to University of Utah PhD program)
Attendance at SIGGraph conference, incl. courses and papers 1989-Present
Bachelor's degree in Computer Science, Rochester Institute of Technology

**Honors:**
US Army Technical Achievement Award for BRL-CAD[tm] 1999
ARL Technical Achievement Award for development of BRL-CAD[tm]

**Hobbies:**
Photography, recumbent bicycling, Toastmasters International, flute, woodworking.

**Community Service:** Annual High School student Mentor, Army Science & Engineering Apprenticeship Program