

Adam Kubach

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Research Interests

Geographic Information Systems, Interactive Computer Graphics, Scientific Visualization, and Virtual Reality.

Experience

Fulton High Performance Computing Initiative, ASU, Tempe, AZ October 2007-Present
Software Engineer

- Developing Minerva (www.minerva-gis.org), a multi-threaded geospatial engine based on OpenSceneGraph.
 - Developed to provide geospatial support for policy makers in areas such as disease propagation, school enrollment, airport planning, and urban growth.
 - Key features are: adaptive tiling for terrain visualization; vector data overlays (points, lines, buildings); temporal animation of vector data; raster data from WMS, ArcIMS via ArcXML protocol, or file system; plugin architecture for extending file formats.
 - Created plugin to read formats supported by GDAL (<http://www.gdal.org>) and OSSIM (<http://www.ossim.org>).
 - Created plugin to load vector data from PostGIS (<http://postgis.refractory.net/>) database.
 - Runs on both desktop and virtual reality environments.
 - Manages large terrain and raster datasets by only loading to appropriate level-of-detail for the current camera position and direction. Because of this out-of-core management, large aerial datasets can be loaded.
 - Implemented with C++ and leveraging techniques such as reference counting, smart pointers, interface querying, and XML serialization. Minerva also makes use of design patterns such as observer, command, and visitor.
- Set up MapServer (<http://mapserver.gis.umn.edu/>) and TileCache (<http://tilecache.org/>) to provide remote access of large aerial datasets through WMS.
- Developed program to visualize output from the astrophysical code FLASH3 (<http://www.flash.uchicago.edu/website/home/>), which generates a hierarchy of volumetric data sets (<http://www.vimeo.com/1523202>).

Decision Theater at Arizona State University, Tempe, AZ July 2006-October 2007
Software Engineer

- Developed desktop and virtual reality visualization software for ASU faculty using OpenSceneGraph, Boost, and VR Juggler.
- Created software to visualize output from Weather Research Forecasting (WRF). The simulation's results are a geospatially referenced, time-varying, volumetric dataset. The largest dataset worked with was 85 GB, with 4 separate channels of information (cloud, rain, northward and eastward wind velocities) and 262 time-steps. To manage the amount of data, a system was

devised to page data in and out of memory as needed
(http://serv.asu.edu/serv/php/alex_mahalov.php).

- Developed multi-screen, 3D Geographic Information System (GIS) for several projects including Scottsdale Unified School District (<http://picasaweb.google.com/perryiv/ScottsdaleUnifiedSchoolDistrict>) and West Nile Virus (<http://picasaweb.google.com/perryiv/WestNileVirus>)
 - Set up and maintained PostGIS database to store data for the above GIS projects.

IMTS, Dayton, OH
Software Engineer

August 2004 – July 2006

- Collaborated with Research Scientists at the Materials and Manufacturing Directorate (ML) at Wright-Patterson Air Force Base (WPAFB) under the Computational Tools for Material Development (CTMD) contract to provide software to meet the researchers' computational and visualization needs.
- Developed generic viewer/editor (Helios) to meet a wide range of visualization needs within ML.
 - Implementation extensible plugin architecture
 - Leveraged industry standard toolkits where possible (OpenSceneGraph, Boost).
- Developed interactive 3D application for the efficient viewing and repair of large triangle models (e.g., STL files).
 - Improved rendering speed using spacial partitioning to maximize culling effects.
 - Managed memory impact using multiple, smaller OpenGL display lists.
 - Merged repeated vertices during file-load and vertex creation phases.
 - Created efficient connectivity data structure.
 - Implemented several algorithms that utilized this connectivity information, including methods for finding and/or deleting all triangles “connected” to a user-defined seed triangle.
 - Capped “holes” in the surface model by finding open loops and inserting new triangles.
- Extended Helios' visualization capabilities to include volume rendering, so that users can create volume display with either 3D texture or a stack of 2D textures and apply several standard image-processing algorithms to the volume in memory.
- Developed command-line program to convert volumetric data to triangle-based surface models.
 - Used Visualization Toolkit (VTK, www.vtk.org)
 - Worked closely with developers of down-stream application to create specifications for binary file format to hold resulting triangle data.

Computer Science Corporation, Fairborn, OH
Help Desk

January 2003-May 2004

- Provided 1st level support for custom software developed for the Air Force

Education

Arizona State University, Tempe, AZ

9 credit hours towards **Masters of Science, Computer Science**

Overall GPA: 3.67

Wright State University, Dayton, OH, March 2004

Bachelor of Science, Computer Science

Overall GPA: 3.08

Major GPA: 3.43

Computer Skills

Programming Languages C++ – 8 years Java – 4 years HTML/CSS – 4 years SQL – 3 years XML – 3 years PHP – 2 years PERL – 2 years Python – 1 year JavaScript – 1 year C# – 1 year XSLT – 3 months	Development Tools MS Visual C++ – 8 years g++ – 6 years gdb – 6 years Emacs – 6 years Xcode – 2 years	Operating Systems (Developing on platform) Windows – 8 years Linux – 6 years MacOS X – 3 years IRIX – 2 years
Graphics Toolkits OpenGL – 5 years OpenSceneGraph – 4 years OpenGL Shading Language – 2 years	Toolkits/APIs STL – 7 years Boost – 4 years Qt – 2 years FOX Toolkit – 2 years VR Juggler – 2 years OSSIM – 2 years GDAL – 1 year libcurl – 1 year VTK – 1 year Collada – 6 months	Applications MS Office – 6 years PostGIS – 2 years MySQL – 1 year Eclipse – 6 months MapServer – 1 month ArcGIS – 1 month
Testing Frameworks Google C++ Testing Framework – 4 months	Open Geospatial Consortium (OGC) Standards WMS – 2 years KML – 2 years	Other UML – 2 years

Presentations

- “Minerva: Integrating GIS, 3D, and Virtual Reality,” FOSS4G, 27 September 2007

Advanced Classes

- Software Engineering
- Computer Graphics
- Computer Vision
- Data Mining
- Geometric Modeling

Projects

Contributor to CAD toolkit (CadKit), an open source project hosted by SourceForge.net

- CadKit is a collection of libraries and stand-alone header files that aid in the creation of computer-aided geometric design and visualization programs.

Awards

- Eagle Scout

Personal

- US Citizen
- Secret Clearance (currently inactive)
- Available immediately
- Willing to travel and relocate

Professional References

Dr. Perry L Miller IV
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