

**Arun Gangadhar Gudur Rao**

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**Education:**

**University of Illinois at Chicago (UIC), M.S. in Computer Science, 2006, GPA 4.0/4.0**

**University of Illinois at Chicago (UIC), B.S. in Computer Science, 2003, GPA 4.72/5.0**

**College of DuPage (COD), Associate in Engineering Science, 2001**

**Experience**

**Nvidia, Santa Clara, CA**

**Software Intern (Oct, 2006 – current)**

- Debugging and Performance Improvements on OpenGL ES Driver
- Implemented Hardware/Software Accelerated Blitting
- Improved and Supported multi-node test system
- Developed OpenGL ES test applications
- Supported work to verify results during chip transitions

**UIC, Chicago, IL**

**Graduate Research Assistant (Jan, 2004 – Aug, 2006)**

- Worked on CoreWall project for use on drilling operations on oceans, lakes and Antarctica
- Created tools to organize tiled display of LCDs
- Participated in initial architecture for collaborative work environments using tiled displays
- Planned user-interface prototypes

**UIC, Chicago, IL**

**Undergraduate Lab Assistant (Jan 2002 – Dec 2003)**

- Designed, programmed and documented virtual simulations of laboratory accidents (refer to Storage and Attire projects).
- Other responsibilities include: weekly meetings, dealing with hardware issues when necessary, assisting other projects.
- Created documentation eventually used as starting guide for new WorldToolKit programmers.
- Worked on following features: weather affects based on time of year for Virtual UIC project, ray tracing for terrain following and collision detection for various projects, use of MilkShape3D models in WorldToolkit and Java3D simulations.
- Acquired understanding of event loops, scene graph hierarchies, 3D modeling and animation, collision detection concepts, path creation concepts, general graphics principles.
- Started test group to determine usability of Half-life game engine for laboratory accident simulations.
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## Computer Skills

- *Operating Systems*: Mac OS X, Linux, Windows
- *Programming Languages*: GLSL, NVIDIA Cg, C/C++, Java, SmallTalk (Visual Works 2), MIPS RISC Assembler, Mainframe Assembler, LISP, HTML, BlitzBasic, DarkBasic
- *Software and API's*: OpenGL, OpenGL ES, JNI, wxWidgets, FreeType, libtiff, libjpeg, libpng, VTK 4.2.5, Quanta, FLTK, Electro, ImageMagick, XCode, Microsoft Visual Studio, Milkshape 3D, Wally, Valve Hammer Editor, Adobe Photoshop, Adobe Illustrator, Half-life Game Engine.

## Course Work

Special Topics: GPU Programming, Human Computer Interaction, Virtual Reality, Computer Graphics I & II, Multi-Media Systems, Artificial Intelligence I & II, Software Engineering, Real-Time Interactive Systems, Operating Systems, Object-Oriented Languages and Environments, Software Design, Undergraduate Research (Virtual Reality), Digital Circuits, Computer Algorithms

## Projects

- **Corewall** – a visualization tool for looking at high-resolution, line-scan images of geological cores, juxtaposed with sensor log data. Program took advantage of texture memory available on modern video cards, as well as hardware features including compression. Program designed to run on single windows machine driving up to 6 displays, or on a GeoWall-2 (a linux cluster driven, high-resolution, tiled LCD display). Interactivity with geological database created in MySQL. Designed to be extensible with a plug-in API. Future plug-ins include image analysis, data correlation and education/outreach.  
<http://www.evl.uic.edu/cavern/corwall>
- **GPU Projects** – Implemented several small projects using OpenGL and GLSL. Projects included effects like toon-shading, procedural textures, shader-based animated water, cube-map environment mapping, water reflection/refraction, parallax normal mapping, depth of field with automatically adjusting focal distance, glowing neon billboard.  
<http://www.evl.uic.edu/arao/cs594>
- **Scooter the Surfing Shooter** – a virtual reality game similar to Space Harrier. Employed tracking devices to allow the user to control acceleration and fire at incoming enemies. Game was done in stereo to provide better depth perception. Done using BlitzBasic
- **TileConfig** – a set of functions and classes used to describe a virtual desktop across a set of cluster nodes in any 2D configuration. Used in the Scalable Adaptive Graphics Environment (SAGE)  
<http://www.evl.uic.edu/cavern/sage>
- **Day & Night** – a 3D remake of Archon using Quake 3 BSP levels for fighting sequences, featuring two types of units: a knight and a wizard. Done using DarkBasic.  
<http://www.evl.uic.edu/spiff/class/cs426/projects/fall2003/Slingshot>
- **Elevation Visualization** – Computer Graphics coursework in Scientific

Visualization. Program uses VTK pipelines to generate 3D elevation models from grayscale images. Elevation models can be seen in original grayscale, with texture map draped on model, 3D contour lines and Red-Blue stereo.

- **Geotiff/GPS** – an application to combine the use of a GPS unit with Geotiff files to display georeferenced locations. Future plans involve creating features to take advantage of user interfaces unique to a Tablet PC. Created functions to convert latitude/longitude coordinates of a given ellipsoid to pixel locations on image files.
- **Defenda** - game based off of 80's game Defender. Implemented using OpenGL, C/C++. Features: creation of 3D terrain from a file, placing objects on the terrain, complex collision detection, z-buffering, programmer simulated fog, wireframe view, textured environment, lighting, audio, different viewpoints, NPCs, textual displays. Gameplay revolving around saving NPCs.
- **Storage** - virtual simulation of laboratory accident dealing with proper storage of bottles, using the Half-life game engine. Project created as a mod to Half-life using the Half-life SDK. Creation of objects to be used in simulation. Linked newly created objects for game with level editor. Acquired better understanding of use of inheritance and polymorphism, level editor design, creation of dlls in Windows.
- **Attire** - creation of simulated laboratory accidents based on attire. Implemented using WorldToolKit API in C. Used scene graph hierarchy to organize simulation with scripted paths. Accidents were direct results of attire chosen by user. Created GUI for user to choose attire.
- **Asteroids** - Implemented using OpenGL, C/C++. Gameplay similar to classic 70s game. Implemented matrix transformation algorithms for ship movement. Used OpenGL function calls to do matrix transformations on asteroids in playing field. Used average radius collision detection.
- **Arun's Army** - Turn based army strategy game implemented using Java. Designed and implemented GUI and gameplay. Used state machine principles for control of game. Implemented randomly generated maps.
- **NetTraff** - a network traffic simulator that combined the use of a Java GUI interfaced with C functions and C++ Data structures for behind the scenes work. Implemented Java/C interface using JNI.

### **Publications**

Rao, A., Chen, Y., Lee, S., Leigh, J., Johnson, A., Renambot, L. **Corelyzer: Scalable Geologic Core Visualization using OSX, Java and OpenGL**, *Apple's Worldwide Developers Conference 2006*, 07/08/2006 - 08/11/2006

Rao, A., Rack, F., Kamp, B., Fils, D., Ito, E., Morin, P., Higgins, S., Leigh, J., Johnson, A., Renambot, L. **CoreWall: A Scalable Interactive Tool for Visual Core Description, Data Visualization, and Stratigraphic Correlation**, *Eos Trans. AGU, 86(52), Fall Meet. Suppl.*, San Francisco, CA, 12/05/2005 - 12/05/2005

Rao, A., Kamp, B., Noren, A., Ito, E., Schnurrenberger, D., Morin, P., Leigh, J., Rack, F., Johnson, A., Renambot, L. **CoreWall: A Visualization Environment for the Analysis of Lake and Ocean Cores**, *Geological Society of America Abstracts with Program*, Denver, Colorado, 12/12/2004 - 12/12/2004

Renambot, L., Rao, A., Singh, R., Jeong, B., Krishnaprasad, N., Vishwanath, V., Chandrasekhar, V., Schwarz, N., Spale, A., Zhang, C., Goldman, G., Leigh, J., Johnson, A. **SAGE: the Scalable Adaptive Graphics Environment**, *Proceedings of WACE 2004*, 09/23/2004 - 09/24/2004

Krishnaprasad, N., Vishwanath, V., Venkataraman, S., Rao, A., Renambot, L., Leigh, J., Johnson, A., **JuxtaView – a Tool for Interactive Visualization of Large Imagery on Scalable Tiled Displays**, *Proceedings of IEEE Cluster 2004*, San Diego, CA, 09/20/2004 - 09/23/2004

### **Memberships**

Association for Computing Machinery, UIC, 2001

Japan Karate Association of Chicago at UIC, 2001 - present (President)

### **Personal Achievements/ Interests**

- 1st place in kata and 2nd place in kumite at ISKF Nationals in Collegiate Color Belt Level, 2002
- Attained the level of 1st degree black belt in Shotokan Karate, 2004
- Recent cartoon work at <http://www.evl.uic.edu/arao/comics.html>

### **References**

Dr. Jason Leigh, UIC Associate Professor	(312) 996 – 3002
Dr. Andrew Johnson, UIC Associate Professor	(312) 996 – 3002
Dr. Luc Renambot, UIC Post-Doc Research Associate	(312) 996 – 3002