Curriculum Vitæ

Wayne O. Cochran
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Research and Technical Interests

Computer Graphics, Rasterization, GPU programming, Geometric Modeling, Image Processing, Mobile Application Development. My career in computer graphics started by implementing and optimizing rasterization firmware for industrial graphics boards based on TI's TMS34010 line of graphics processors. Later I developed a 3D rendering system that used the TMS34082 floating point coprocessor. Essentially I was programming GPU's long before the current wave of GPU coding become popular. Later, during graduate school, I developed an interest in a class of fractal models that were used for compressing images at unusually high bit rates. I extended these algorithms (along with methods based on the DCT) to compress 3-D volumetric data produced by CT and MRI machines. Following this, I developed a variety of methods based on fractal interpolation functions to model and render intricate curves and surfaces. Due to the availability of cheap video hardware, GPU programming has now extended beyond the realm of computer graphics. General Purpose GPU (GPGPU) techniques are also an interest of mine. I designed and implemented the real-time video stitching algorithm used by Intel Sports TrueVR stereo panorama camera system. I also helped develop and implement the color processing pipeline for this system which is used for broadcasting live sporting events as 180° stereo panoramic video for head mounted displays.

Professional Experience

- **Computer Scientist**, 2020 - present, Quintar, Inc. Design and implementation of long range image registration system for augmented reality at sport venues.
- **Software Engineer**, 2017 - 2020, Intel Sports, Intel Corporation. Design and implement video processing software for stereo panorama system. Create GPU pipeline modules for a live video processing pipeline that captures, transforms, projects, rectifies, stitches, encodes, and transmits large stereo panorama streams at 60 FPS that is targeted for viewing with a head mounted display. Construction of computer vision pipeline for detecting athletes from multi-camera video and reconstructing 3D skeletons. Expertise includes computer graphics, image processing, low-level computer vision, and GPU programming.
- **Clinical Associate Professor**, 1999-2017, Washington State University Vancouver. I taught 17 different computer science courses at WSU that cover a wide range of topics from the sophomore to graduate level that includes Computer Graphics, Numerical Computing, Compiler Design, Theory of Computation, Operating Systems, and Computer Networks. Promoted to the Associate Professor rank in 2015. I was heavily involved in program development for the computer science program which started in the fall of 1999. Any research performed as clinical professor involves intricate surface and texture modeling using recurrent fractal models. Maintained a primary interest in GPU programming for both graphical applications and general purpose parallel computing.
- **Instructor**, 1998-1999, Washington State University. I performed research and taught five courses including Computer Networks, Introduction to Microprocessors, and several introductory programming classes.
- **Research Assistant**, 1992-1998, Washington State University. My research included volumetric compression using fractals, and other techniques using fractals to model complex geometry (*e.g.,* rough curves and surfaces). Research was part of the *Recurrent Modeling Project* funded by Intel and a

grant from the NSF. Contributed research for and implementation of knowledge based systems.

- **Software Engineer**, 1990-1992, Raster Graphics Inc (assets acquired by Peritek Corporation in 2001, now located in Berkeley, CA) `http://www.rastergraf.com`. Job Overview: Design and implementation of rasterization firmware for industrial graphics boards. Design and implementation of 3D rendering libraries.

Education

- **Ph.D.** Computer Science, 1998, Washington State University.
  Dissertation Title: "A Recurrent Modeling Toolset."
- **M.S.** Computer Science, 1994, Washington State University. Curtis Fellowship.
  Thesis title: "Fractal Volume Compression."
- **B.S.** Mathematics, cum laude, 1990. University of Washington. Golden Key National Honor Society, Dean's List, Phi Beta Kappa.

Patents

1. Method and apparatus for processing and distributing live virtual reality content,
   inventors: Wayne Cochran, Fai Yeung, et al. US20200349672A1

2. Point cloud playback mechanism,
   inventors: Fai Yeung, Wayne Cochran, Pratibha Pandhare, US20210042964A1

Publications

1. Basel Salahieh, Wayne Cochran, Jill Boyce, Delivering Object-Based Immersive Video Experiences, *Electronic Imaging*, January, 2021. doi 10.2352/ISSN.2470-1173.2021.18.3DIA-103

2. Matthew J. Lambert, Wayne O. Cochran. Kyle G. Olsen, Cynthia D. Cooper, Evidence for widespread subfunctionalization of splice forms in vertebrate genomes, *Genome Research.* 2015 May; 25(5): 624D632.

3. Wayne O. Cochran, Recurrent Interpolation Surfaces, *Proceedings of the Western Computer Graphics Symposium,* March 2003, pp. 9–15.

4. Wayne. O. Cochran, R. R. Lewis, J. C. Hart, The Normal of a Fractal Surface, *The Visual Computer,* vol. 17, no. 4, April 2001, pp. 209–218.

5. Wayne O. Cochran, Fractal Interpolation Surfaces for Digital Elevation Maps, *Proceedings of the Western Computer Graphics Symposium,* March 2001, pp. 8–14.

6. Wayne O. Cochran, A Recurrent Modeling Toolset, Ph.D. dissertation. Washington State University, December 1998.

7. Wayne O. Cochran, John C. Hart, Patrick J. Flynn, On Approximating Rough Curves with Fractal Functions, *Proceedings of Graphics Interface,* June 1998.

8. J.C. Hart, P.J. Flynn, W.O. Cochran. Similarity Hashing: A Model-Based Vision Solution to the Inverse Problem of Recurrent Iterated Function Systems. *Fractals 5* April 1997, pp. 39-50.

9. Wayne O. Cochran, John C. Hart, Patrick J. Flynn, Hashing Fractal Functions *Proceedings of the Western Computer Graphics Symposium,* April 1997, pp. 69–78.

10. Wayne O. Cochran, John C. Hart, Patrick J. Flynn, Fractal Volume Compression, *IEEE Transactions on Visualization and Computer Graphics* 2 (4), December 1996, pp. 313–322.

11. Wayne O. Cochran, John C. Hart, Patrick J. Flynn, Similarity and Affinity Hashing, *Proceedings of the Western Computer Graphics Symposium,* March 1996, pp. 89–100.

12. Wayne O. Cochran, J.C. Hart and P.J. Flynn. Recurrent Modeling. *Intel Forum: Enabling Live Media in Cyberspace,* invited poster. January 1996.

13. Wayne O. Cochran, John C. Hart, Patrick J. Flynn, Principal Component Classification for Fractal Volume Compression, *Proceedings of the Western Computer Graphics Symposium,* March 1995, pp. 9–18.

Consulting

- Voke VR (acquired by Intel 2016) 3201 Scott Blvd, Santa Clara, CA, USA 95054 Designed and implemented a video stitching algorithm for a stereo panorama camera system. The solution was implemented using NVidia's CUDA parallel computing platform for Telsa GPU-based systems.
- GeoMonkey, Inc, 5512 NE 109th Ct. Ste 101 Vancouver, WA 98662, (360) 718-8120, `www.geomonkey.com`. Converted large KML polygonal datasets into a form used for fast multiresolution viewing in Google Maps. Also helped implement the `MapWithUs GIS` iPhone app using Apple's core location technology and Google's map API.
- Smith-Root Inc, 14014 NE Salmon Creek Avenue, Vancouver, WA 98686. Helped design and port control software for an electronic fish barrier. The system is now web based, and uses a client/server protocol for remote control.

Professional Service

- Paper Chair for Thirteen Annual *Consortium for Computing Sciences in Colleges* (CCSC) Northwestern Regional Conference 2011. Responsible for collecting all submitted papers, procuring referees, and organizing the paper acceptance committee.
- Paper Referee for the following Journals and Conferences:
  - ACM SIGGRAPH
  - ACM Transactions on Graphics
  - IEEE Transactions on Visualization and Computer Graphics
  - IEEE Transactions on Pattern Analysis and Machine Intelligence
  - Information Processing Letters
  - Graphics Interface
  - IEEE Visualization
  - Shape Modeling International
  - International Conference on Cyberworlds
  - Perspectives on Science and Christian Faith, The Journal of the American Scientific Affiliation.

References

Upon request.