ARI RAPKIN BLENKHORN*

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EDUCATION

Ph.D., Computer Science, University of Maryland, Baltimore County, 2018. Dissertation title: GPU-accelerated rendering of atmospheric glories. Advisor: Marc Olano.

M.S., Computer Science (Graphics & Animation), Carnegie Mellon University, 1997. Topic: storytelling control for physically-plausible rigid-body simulations. Advisors: Andrew Witkin and David Baraff.

M.C.S., Computer Science (Computer Vision), University of Virginia, 1995. Project: A Multi-camera Tracking System for Virtual Environments. Advisor: Thomas Olson.

Graduate study in Educational Psychology (Gifted), University of Virginia, 1992 – 1993. Topic: contributions of technology to math/science education for gifted students. Advisor: Carolyn Callahan.

B.A., Mathematics (Physics concentration), Johns Hopkins University, 1992. General & departmental honors. Dean's List.

EMPLOYMENT: INDUSTRY and RESEARCH

Johns Hopkins University Applied Physics Lab (APL), Senior Professional Staff II (Sept 2019 – present)
Computer graphics and UI/UX software developer in a university-affiliated research center.
XR Collaboration Center (Nov 2020 – present): The XRCC provides XR knowledge and support lab-wide (10,000+ staff). Write AR and VR software applications in Unity and Unreal Engine. Evaluate new systems and devices. Advise colleagues and clients who are considering using immersive technology for their projects. Provide demos and training for Lab senior staff, collaborators, and sponsors. Produce weekly newsletter and webinar of XR news and analysis. Mentor junior staff and interns. Co-chair annual APL XR Symposium.

Received an APL Peer Recognition Award (2023) for facilitating an XR teambuilding exercise for attendees of an APL / Navy workshop, many of whom were experiencing XR for the first time.

REPAIR augmented reality application designer/developer (2023-24): Worked with AR and AI teams to develop an AR application that used AI for interaction (speech-to-text and back) and electronics fault diagnosis and repair guidance. The application ("TuQR") used QR codes to establish a 3D reference frame for the repair tech, environment, and electronics. Received two Peer Recognition Awards for contributions to REPAIR project.

TANG Holodeck NAVAIR (aka "Digital Fridge Box") project lead (2023-2024): Coordinated small team of software developers and artists on an interactive VR experience in which the pilot controlled a future helicopter. The application demonstrated the team's ability to change 3D models, interactions, and storylines rapidly, while serving as a testbed for the larger Holodeck team to explore new immersive technologies.

DARPA ACE VR team lead (2022-23): Managed small team creating a virtual fighter cockpit enabling humans to ride along with AI pilots in combat. Coordinated software implementation, integration, testing, and quarterly demos with colleagues across four companies. For the final Capstone event I orchestrated transport of multiple fighter-cockpit VR rigs across the country for simultaneous live demonstrations. I was named individually in ACE's nomination for an APL Achievement Award.

IRADs
Co-PI on "LAVAA" Ignition Grant (2022) using augmented reality to display invisible hazards in context.
Co-author of "Contamination View" Ignition Grant proposal (early 2020) for augmented reality application to educate

* **Previously: Arlene Rapkin**, **Ari Rapkin**.

users about disease transmission. Review committee created a new award for Best Pitch Video based on our through-the-headset recording of our interactive prototype.

AOS/QAT (Sept 2019 – Nov 2020): Developed a desktop visualization in Unity to replay multi-sensor data and analysis in a 2D/3D real-time map context.

Leidos
PSIM (Periscope Simulator) team, Senior Software Engineer (May 2019 – Sept 2019)
Developed, extended, and maintained real-time 3D graphics software supporting multiple US Navy training systems including a submarine periscope simulation and a submarine bridge simulation. Features supported include ocean-wave simulation and atmospheric optics rendering. Development environment: C++, Python, and OpenGL shading language (GLSL) on Linux, with tools including Mercurial, Jira, and Confluence, in a US Navy secure facility.

University of Maryland, Baltimore County
Graphics research group, Graduate Research Assistant (2015 – 2017)
Developed an OpenSceneGraph application which provided real-time multi-projector graphics for an arbitrary screen surface in a CAVE-style virtual reality environment. Contributed to computer vision tools which identify and compensate for projector hotspots and which reconstruct projection-screen geometry. Worked with students and faculty at UMBC and neuroscience researchers at Howard Hughes Medical Institute. Published as poster at SIGGRAPH 2016.

University of Maryland, Baltimore County
High-Performance Computing Research Experience for Undergraduates (HPCREU)
Graduate Research Assistant (Summer 2015)
Mentored and supported a team of undergraduates during an eight-week interdisciplinary research experience. Students learned about high-performance computing, conducted a research project for an external client, and presented their findings in a technical report and a poster.

TouchShare, Inc., Senior Software Engineer (Oct 2014 – Jan 2015)
Software developer and technical project lead for touch-input 2D and 3D real-time geospatial collaboration. Performed user-interface assessment and provided recommendations to colleagues.

Orbis Technologies, Inc., Senior Software Engineer (2012 – 2014)
User Interaction specialist and technical project lead for Annapolis-based contractor, developing cloud-based semantic text analysis tools for federal, defense, and commercial clients. Served as Orbis's technical point-of-contact to external customers and prime contractor. Worked closely with software, testing, and documentation teams employing agile development methods. Planned company-wide update to user interface suite -- design, implementation, tools, and documentation. Provided recommendations and business-development assistance to senior management. Prepared contract proposals, white papers, and patent applications. Mentored junior software staff and educate co-workers about user interaction issues. UI/UX lead and primary developer on Data Center Dashboard project, leading to a patent.

Perceptive Pixel, Inc., Senior Software Engineer (2010 – 2012)
User Interaction specialist for private company developing cutting-edge multi-touch hardware and software. Position was entirely telecommuting. Maintained active collaboration with other members of the completely virtual Professional Services and Solutions (PS) team. Worked closely with PPI's software architects, in-house developers, and external customers. Designed and implemented custom multi-touch applications. Created customer training materials. Provided consulting, training, and support to clients integrating multi-touch capabilities into existing applications.

Lockheed Martin IS&GS, Software Engineer (May 2010 – September 2010)
User Interaction specialist for defense contractor, developing web-based software to automate and streamline the grants management process for the Air Force Office of Scientific Research. Co-located at AFOSR client site. Worked closely with Program Managers and financial personnel to design user experience and ensure core functionality. Provided user interaction support for international research collaboration web community.

Two Lights Technologies, LLC, Managing Director / Owner (2007 – 2010)
Founder and Human-Computer Interaction expert for defense contractor specializing in jobsite robotics and unmanned systems. Technical project lead for C-Strike, an R&D effort to develop new technologies for Close Air Support. Provided support for business development, company and project administration. Co-authored proposals and technical reports.

C-Strike: handheld system for soldiers on the ground to request, target, and control Close Air Support from Unmanned Aerial Vehicles. Weapons and UAV modifications design.
GAPS: deployment and navigation systems for self-guiding long-distance cargo parachute. Design, construction, and air testing of prototype parachute.

CoreGuard, LLC, Director of Technology / Owner (2008 – 2010)
Founder and Human-Computer Interaction expert for government/defense contractor specializing in data security. Technical project lead for preliminary phase of the WindTalker software suite and Redactomatic document-redaction system. Worked closely with designers, developers, and subject-matter experts to design user experience and ensure core functionality. Provided support for business development. Co-authored proposals and patent applications.

Windtalker: credential-based fine-grained access control for differential sharing of documents.
Redactomatic: automated classification (using computer vision) and redaction of documents in a bulk processing pipeline.

21st Century Systems, Inc., Senior Usability Engineer (2006 – 2008)
Human-Computer Interaction specialist for defense contractor. Worked closely with software developers and subject-matter experts to design user experience and interaction. Assessed user interfaces of existing software and provide recommendations. Planned and conducted software usability testing throughout spiral development cycle. Educated colleagues about usability and human-computer interaction.

Industrial Light + Magic, R&D Software Engineer (2000 – 2006),
Cloth simulation project lead (2002 – 2004), Production Software Engineer (1998 – 2000)
Designed, developed, and maintained interactive computer graphics programs to meet ongoing visual effects production requirements for feature films. Simulation team projects (2000 – 2006): Fluid dynamics (smoke, water, fire) simulation engines for multiple platforms. Advanced physics-based simulation systems for digital cloth, flesh, and hair. Planned and supervised cloth system port between in-house software platforms. Dynamic cloth tearing techniques. User interface and simulation controls for new system. This cloth simulation software produced digital cloth in feature films including Star Wars Episodes I/II/III, the Harry Potter series, and the Pirates of the Caribbean series.
Additional responsibilities: Extended RenderMan source code with proprietary ILM rendering features, then managed deployment to hundreds of production machines. Investigated feasibility of parallelizing an in-house lighting tool in conjunction with ILM's job-queueing system. Developed tools to transfer raw motion-control data from cameras into various scene formats (e.g. SoftImage).

Xerox Palo Alto Research Center, ISTL Lab, Research Intern (Summer 1996)
Designed and developed "Alaska", a web-based non-photorealistic rendering service to enhance time-stamped image sequences.

Digital Equipment Corporation Systems Research Center, Research Intern (Summer 1995)
Ported handwriting recognition system to various platforms including the Lectrice, an experimental tablet computer. Developed pen-input interface and integrated it with existing keyboard-based software.
(http://www.hpl.hp.com/techreports/Compaq-DEC/SRC-RR-157.pdf)

Carnegie Mellon University, Graphics & Animation group, Graduate Research Assistant (1995 – 1997)
Developed an animation system that blends scripting control with physically realistic rigid-body simulation, using perceptual psychology principles to minimize visual artifacts.

University of Virginia, Computer Vision group, Graduate Research Assistant (1993 – 1995)
Developed a multi-camera calibration and stereo position-tracking system. Integrated it with an existing virtual reality system.

University of Virginia, National Research Center on the Gifted & Talented, Graduate Research Assistant (1992 – 1993)
Peer Referral and National Database projects.

Johns Hopkins University, Homewood Academic Computing Center, Student Consultant. (1991 – 1992)
Assisted students and faculty with use of university mainframes and PCs. Prepared training documents. Worked with sysadmins and subject-matter consultants to update systems and evaluate new software.

The Jackson Laboratory, Student Researcher (Summer 1987)
As a high-school student, planned and performed independent research in reproductive genetics. Extracted and cultured biological material, conducted data analysis, and reported results at end-of-summer lab seminar. Topic: viability of mouse oocytes after suspension followed by in-vitro maturation. Supervisors: John Eppig and Allen Schroeder.

EMPLOYMENT: TEACHING

United States Naval Academy, Math Department
Adjunct Professor (Fall 2012, Fall 2013)
Taught one section of SM131, Advanced Calculus I.

United States Naval Academy, Center for Academic Excellence
Instructor (Spring 2013)
Taught two sections of XS121, Calculus I.

Northern Virginia Tutoring Service, Math, Science, and SAT Tutor (2007 – 2010)
One-on-one tutoring for all levels from 7th grade through advanced college courses.

University of San Francisco, Computer Science Department
Adjunct Professor (Fall 2005)
Developed curriculum and taught new graduate seminar on Human-Computer Interaction.
Co-taught twice-a-week seminar sessions, supervised student projects and presentations.

Johns Hopkins University Center for Talented Youth (CTY)
Math Program Coordinator (Summers 1992 – 1994), Math Instructor (Summers 1989 – 1994)
Developed new curriculum and supervised staff of intensive summer program for gifted high-school students.
Coordinated student placement testing, ongoing assessment, and placement into school-year courses following CTY summers. Taught pre-algebra through calculus, and enrichment courses.

Carnegie Mellon University "Andrew's Leap" program
Computer Graphics Instructor (Summer 1997)
Developed curriculum and taught intensive course on 3D animation and rendering to gifted high-school students.

Carnegie Mellon University, Computer Science Department (1997)
University of Virginia, Computer Science Department (1993 – 1994)
Johns Hopkins University, Math and Computer Science Departments (1991 – 1992)
Teaching Assistant for undergraduate and graduate courses.
Conducted office hours and review sessions, graded student assignments, taught weekly 'section' classes, assisted with curriculum preparation.

- CMU: CS 347 Computer Architecture, Spring 1997
- CMU: CS 412 Operating Systems, Fall 1997
- CMU: CS 827 Security & Cryptography, Fall 1997
- CMU: CS/Robotics/MechEng 39-245 Virtual and Physical Prototyping, Spring 1996
- UVA: CS 551 Artificial Intelligence, Spring 1994
- UVA: CS 120 Introduction to Business Computing, Fall 1993
- JHU: Introductory Math Courses (Calc 1/2/3, Linear Algebra, and Diff Eqns), Fall 1991 & Spring 1992
- JHU: Computer Literacy, Fall 1991

REFEREED PUBLICATIONS

Caroline Cunningham, Carolyn Callahan, Jonathan Plucker, S. Christopher Roberson, **Arlene Rapkin**. "Identifying Hispanic students of outstanding talent: Psychometric integrity of a peer nomination form" (1998). Exceptional Children, 64, 197-208. https://journals.sagepub.com/doi/pdf/10.1177/001440299806400204

Carolyn Callahan et al. "Reliability and Validity Evidence on a Peer Nomination Form to be Used in Screening Hispanic Students of Outstanding Talent," 10th World Congress on Gifted and Talented Education (Toronto, Canada, August 11, 1993). Additional presentation at the 40th annual conference of the National Association for Gifted Children (Atlanta, GA, November 1993).

OTHER PUBLICATIONS AND REPORTS

Changling Huang, Christopher C. Lowman, Brandon E. Osborne, Gabrielle M. Salib, **Ari Rapkin Blenkhorn,** Jonathan S. Graf, Samuel Khuvis, Matthias K. Gobbert, Tyler Simon, and David J. Mountain. "Performance studies of the Blossom V algorithm," Technical Report HPCF-2015-26, UMBC High Performance Computing Facility, University of Maryland, Baltimore County, 2015.

Fernando X. Avila-Soto, Alec N. Beri, Eric Valenzuela, Abenezer Wudenhe, **Ari Rapkin Blenkhorn,** Jonathan S. Graf, Samuel Khuvis, Matthias K. Gobbert, and Jerimy Polf. "Parallelization for fast image reconstruction using the stochastic origin ensemble method for proton beam therapy," Technical Report HPCF-2015-27, UMBC High Performance Computing Facility, University of Maryland, Baltimore County, 2015.

Wesley Collins, Daniel T. Martinez, Michael Monaghan, Alexey A. Munishkin, **Ari Rapkin Blenkhorn,** Jonathan S. Graf, Samuel Khuvis, Matthias K. Gobbert, and John C. Linford. "Comparison of performance analysis tools for parallel programs applied to CombBLAS," Technical Report HPCF-2015-28, UMBC High Performance Computing Facility, University of Maryland, Baltimore County, 2015.

Arlene Rapkin. "A Multi-camera Tracking System for Virtual Environments." Master's degree project report, Department of Computer Science, University of Virginia, May 8, 1995.

Thomas J. Olson, Frank Z. Brill, Glenn S. Wasson, Jennifer A. Wong, **Ari S. Rapkin**. "Software for Advanced Vision Systems," Computer Science Report CS-94-31, Department of Computer Science, University of Virginia, April 13, 1995.

Arlene Rapkin, "Math Coordinator's Handbook," The Johns Hopkins University, Center for Talented Youth. 1994.

REFEREED PRESENTATIONS

Presenter

Ari Rapkin Blenkhorn, Yu Wang, and Marc Olano, “RatCAVE: Calibration of a Projection Virtual Reality System”. In *ACM SIGGRAPH 2016 Posters* (SIGGRAPH '16). ACM, New York, NY, USA, Article 13, 2 pages. DOI: https://doi.org/10.1145/2945078.2945091

Ari Rapkin Blenkhorn, Yu Wang, and Marc Olano, “Calibration of a Projection Virtual Reality System”. Poster presented at UMBC Graduate Research Conference (Catonsville, MD, March 23, 2016)

Ari Rapkin Blenkhorn and Marc Olano. “Real-time Rendering of Atmospheric Glories”. In *ACM SIGGRAPH 2015 Posters* (SIGGRAPH '15). ACM, New York, NY, USA, Article 86 , 1 pages. DOI: http://dx.doi.org/10.1145/2787626.2787632

Ari Rapkin Blenkhorn and Marc Olano, “Real-time GPU Rendering of Atmospheric Glories”. Poster presented at UMBC Graduate Research Conference (Catonsville, MD, March 25, 2015)

Nigel Sumner, **Ari Rapkin**, Steve Aplin, Andrew Cawrse, Leslie Fulton, Tony Pelle, Philip Peterson, and Eric Wong. 2004. There's more than one way to skin a wolf: wolf transformations in "Van Helsing". In *ACM SIGGRAPH 2004 Sketches* (Los Angeles, California, August 08 - 12, 2004). R. Barzel, Ed. SIGGRAPH '04. ACM, New York, NY, 52. http://doi.acm.org/10.1145/1186223.1186288

Ari Rapkin, Andy Anderson, William Clay, John Helms, Eric Wong. 2003. Getting Ripped: Hulking Out the Clothing Pipeline for Shredding, Tearing, and Electricity. Sketch presented at ACM SIGGRAPH 2003 (San Diego, CA, July 27-31, 2003).

Ari Rapkin. 2002. How to dress like a Jedi: techniques for digital clothing. In *ACM SIGGRAPH 2002 conference abstracts and applications* (SIGGRAPH '02). ACM, New York, NY, USA, 196-196. http://doi.acm.org/10.1145/1242073.1242209

Arlene Rapkin. “Cheating Impulses: Scripting Control Plus Physical Realism for Animation,” Poster, ACM student research poster contest in conjunction with SIGCSE conference. San Jose, February 1997.

Sara Moore and **Arlene Rapkin**. “Adventures in Acceleration: Skipping the Senior Prom,” 41st annual conference of the National Association for Gifted Children. (Salt Lake City, UT, November 1994).

Arlene Rapkin. “Can't the Computer Do This For Me?” 40th annual conference of the National Association for Gifted Children (Atlanta, GA, November 1993).

Contributor

Carolyn Callahan, Cheryll Adams, Caroline Cunningham, **Arlene Rapkin**, Marcia Delcourt, Lori Lutz, Sara Moore, Anne Udall, and Susan Baum. “Non-traditional identification issues with promise,” 40th annual conference of the National Association for Gifted Children (Atlanta, GA, November 1993).

INVITED PRESENTATIONS

- Carnegie Mellon XR Technology Center symposium, 2024.
- Silicon Valley ACM SIGGRAPH chapter, 2004.
- Stanford University Computer Systems Lab (CSL) Colloquium, 2004. “Controlling Digital Cloth”
- Nimbus 2003. Keynote Luncheon. "Creating Digital Costumes and Environments for Feature Films"
- Johns Hopkins University, 2002.
- London Effects and Animation Festival (LEAF), 2002.
- Xerox PARC Forum, 2002. “Digital Environments and Costumes in Star Wars: Episode II”
- Xerox PARC Forum, 1999. “Digital Technologies in Star Wars: Episode I”
- SIGGRAPH Educators’ Forum, 1999. Panelist.

PROFESSIONAL COMMUNITY AND VOLUNTEER ACTIVITIES

Senior member of IEEE (Computer Society) and ACM (SIGGRAPH).

PACMCGIT: Proceedings of the ACM on Computer Graphics and Interactive Techniques.
Information Director, 2018 – present.

I3D: ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games.
Conference Program Committee member 2019 - 2020. Diversity & Inclusion committee 2020. Publicity chair and webmaster 2017 - 2022.

UIST: ACM User Interface Software and Technology symposium.
Proceedings co-chair 2011 and 2012. Proceedings chair 2003. Publicity chair 1997 – 2001.

SIGGRAPH: Real-Time Live jury member 2020. General submissions reviewer (2021, 2023, 2024) and juror (2022). Poster reviewer (2024). SIGGRAPH Pioneers member (2019 – present) and Pioneers steering committee (2021 – present). Organized Feb 2024 Pioneers panel on graphics + generative AI. Volunteer mentor for high-school students attending annual conference. Member of winning team in 2024 SIGGRAPH trivia contest.

Reviewer for CHI 2015, I3D 2015, JCGT, and 2004 Grace Hopper Celebration of Women in Computing "New Investigator" submissions. Reviewer for PRESENCE's special edition on Immersive Visualization Labs (MIT Press, 2023)

Co-founder of Capitol Graphics in 2018, now an annual Washington DC-area research gathering.

Co-chair of annual JHU/APL XR Symposium 2021-2025.

Volunteer & mentor for women-in-technology and children's STEM events and organizations including the US Naval Academy STEM Camp, UMBC Center for Women in Technology, JHU/APL STEM program, Anne Arundel County STEM magnet high school, and Anne Arundel County Public Libraries STEM Challenge.

Student volunteer at SIGCHI 1996, SIGGRAPH 1995, UIST 1995 and 1996.

Served on CMU Computer Science Doctoral Review Committee 1997.

Reviewer for 1995 National Educational Computing Conference.

Graduate student mentor, 1994, University of Virginia Computer Science Department.

Member of APL's Allies in the Workplace LGBTQ+ affinity group (2020 – present). Member of Training committee, conducting training sessions for coworkers on LGBTQ+ topics. Moderator for Allies Parents channel on Slack.

AWARDS AND OTHER RECOGNITION

US Patent No. 9,613,322: *Data Center Analytics and Dashboard*, issued April 4, 2017.

Film credits:

Harry Potter and the Goblet of Fire, 2005. Software Development.
Van Helsing, 2004. Research & Development.
Star Wars: Episode II – Attack of the Clones, 2002. Video Engineering and Digital Technologies.
Jurassic Park III, 2001. CG Software Engineer.
The Mummy, 1999. Production Engineering Software.
Small Soldiers, 1998. Production Software Engineer.

NSF Graduate Research Fellowship 1995-1997.
Johns Hopkins University "SEALS" leadership award
Diamond State, Beneficial-Hodson, and Byrd merit scholarships (undergraduate)