Voicu Popescu

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Research Interests

Virtual, augmented, and mixed reality, visualization, computer graphics, and applications in engineering, education, and health care.

Education

Ph.D. Computer Science, University of North Carolina, 2001.

B.Sc. Computer Science, Technical University of Cluj-Napoca, Romania, 1995.

Professional Experience

August 2007 - present: Associate Professor of Computer Science, Purdue University.

August 2001 - July 2007: Assistant Professor of Computer Science, Purdue University.

Summer 1999: Intern, GPU architecture group, NVIDIA, Santa-Clara, CA.

May 1996 - February 2001: Research Assistant, University of North Carolina.

Publications

Journal Articles

1. Popescu, V., Sacks, E., Cui, J., and Ashok, R. (2023). Efficient and Robust From-Point Visibility. *IEEE Transactions on Visualization and Computer Graphics*, accepted June 2023.
2. Zhou, Y., and Popescu, V. (2023). Dynamic Redirection for VR Haptics with a Handheld Stick. *IEEE Transactions on Visualization and Computer Graphics*, 29(5), 2753-2762.
3. Wu, J., Wang, L., Zhang, H., and Popescu, V. (2022). Quantifiable Fine-Grain Occlusion Removal Assistance for Efficient VR Exploration. *IEEE Transactions on Visualization and Computer Graphics*, 28(9), 3154-3167.

4. Zhou, Z., Wang, L., and Popescu, V. (2021). A Partially-Sorted Concentric Layout for Efficient Label Localization in Augmented Reality. *IEEE Transactions on Visualization and Computer Graphics*, 27(11), 4087-4096. Presented at 2021 IEEE International Symposium on Mixed and Augmented Reality, ISMAR 2021.

5. Rojas-Muñoz, E., Lin, C., Sanchez-Tamayo, N., Cabrera, M. E., Andersen, D., Popescu, V., Barragan, J. A., Zarzaur, B., Murphy, P., Anderson, K., Douglas, T., Griffis, C., McKee, J., Kirkpatrick, A., and Wachs, J. P. (2020). Evaluation of an Augmented Reality Platform for Austere Surgical Telementoring: a Randomized Controlled Crossover Study in Cricothyroidotomies. *NPJ digital medicine*, 3(1), 1-9.

6. Rojas-Muñoz, E., Cabrera, M. E., Lin, C., Andersen, D., Popescu, V., Anderson, K., Zarzaur, B., Mullis, B., and Wachs, J. P. (2020). The System for Telementoring with Augmented Reality (STAR): A Head-Mounted Display to Improve Surgical Coaching and Confidence in Remote Areas. *Surgery*, 167(4), 724-731.

7. Rojas-Muñoz, E., Cabrera, M. E., Lin, C., Sánchez-Tamayo, N., Andersen, D., Popescu, V., Anderson, K., Zarzaur, B., Mullis, B., and Wachs, J. P. (2020). Telementoring in Leg Fasciotomies via Mixed-Reality: Clinical Evaluation of the STAR Platform. *Military Medicine*, 185(Supplement_1), 513-520.

8. Kappagantula, S. R. K., Adamo-Villani, N., Wu, M. L., and Popescu, V. (2019). Automatic Deictic Gestures for Animated Pedagogical Agents. *IEEE Transactions on Learning Technologies*, 13(1), 1-13.

9. Andersen, D., Villano, P., and Popescu, V. (2019). AR HMD Guidance for Controlled Hand-Held 3D Acquisition. *IEEE Transactions on Visualization and Computer Graphics*, 25(11), 3073-3082. Presented at 2019 IEEE International Symposium on Mixed and Augmented Reality, ISMAR 2019.

10. Wang, L., Wu, J., Yang, X., and Popescu, V. (2019). VR Exploration Assistance Through Automatic Occlusion Removal. *IEEE Transactions on Visualization and Computer Graphics*, 25(5), 2083-2092. Presented at 2019 IEEE Conference on Virtual Reality and 3D User Interfaces, IEEE VR 2019.

11. Rojas-Muñoz, E., Andersen, D., Cabrera, M. E., Popescu, V., Marley, S., Zarzaur, B., Mullis, B., and Wachs, J. P. (2019). Augmented Reality as a Medium for Improved Telementoring. *Military Medicine*, 184(Supplement_1), 57-64.

12. Andersen, D. S., Cabrera, M. E., Rojas-Muñoz, E. J., Popescu, V. S., Gonzalez, G. T., Mullis, B., Marley, S., Zarzaur, B., and Wachs, J. P. (2019). Augmented Reality Future Step Visualization for Robust Surgical Telementoring. *Simulation in Healthcare*, 14(1), 59-66.

13. Rojas-Muñoz, E., Cabrera, M. E., Andersen, D., Popescu, V., Marley, S., Mullis, B., Zarzaur, B., and Wachs, J. (2019). Surgical Telementoring Without Encumbrance: a Comparative Study of See-Through Augmented Reality-Based Approaches. *Annals of Surgery*, 270(2), 384-389.

14. Wang, L., Liang, X., Meng, C., and Popescu, V. (2018). Fast Ray-Scene Intersection for Interactive Shadow Rendering with Thousands of Dynamic Lights. *IEEE Transactions on*

Visualization and Computer Graphics, 25(6), 2242-2254. Presented at ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games, 2019.

15. Wang, L., Zhang, W., Li, N., Zhang, B., and Popescu, V. (2018). Intermediate Shadow Maps for Interactive Many-Light Rendering. *The Visual Computer*, 34(10), 1415-1426.

16. Wu, M. L., and Popescu, V. (2017). Efficient VR and AR Navigation Through Multiperspective Occlusion Management. *IEEE Transactions on Visualization and Computer Graphics*, 24(12), 3069-3080. Presented at 2018 IEEE Conference on Virtual Reality and 3D User Interfaces, IEEE VR 2018.

17. Cui, J., Popescu, V., Adamo-Villani, N., Cook, S. W., Duggan, K. A., and Friedman, H. S. (2017). Animation Stimuli System for Research on Instructor Gestures in Education. *IEEE Computer Graphics and Applications*, 37(4), 72-83.

18. Andersen, D., Popescu, V., Cabrera, M. E., Shanghavi, A., Mullis, B., Marley, S., Gomez, G., and Wachs, J. P. (2017). An Augmented Reality-Based Approach for Surgical Telementoring in Austere Environments. *Military Medicine*, 182(suppl_1), 310-315.

19. Cook, S. W., Friedman, H. S., Duggan, K. A., Cui, J., and Popescu, V. (2017). Hand Gesture and Mathematics Learning: Lessons from an Avatar. *Cognitive Science*, 41(2), 518-535.

20. Xie, N., Wang, L., and Popescu, V. (2017). Non-Redundant Rendering for Efficient Multi-View Scene Discretization. *The Visual Computer*, 33(12), 1555-1569.

21. Andersen, D., Popescu, V., Cabrera, M. E., Shanghavi, A., Gomez, G., Marley, S., Mullis, B., and Wachs, J. P. (2016). Medical Telementoring Using an Augmented Reality Transparent Display. *Surgery*, 159(6), 1646-1653.

22. Andersen, D., Popescu, V., Cabrera, M. E., Shanghavi, A., Gomez, G., Marley, S., Mullis, B., and Wachs, J. (2016). Virtual Annotations of the Surgical Field Through an Augmented Reality Transparent Display. *The Visual Computer*, 32(11), 1481-1498.

23. Wu, M. L., and Popescu, V. (2015). Multiperspective Focus+Context Visualization. *IEEE Transactions on Visualization and Computer Graphics*, 22(5), 1555-1567.

24. Wang, L., Xie, N., Ke, W., and Popescu, V. (2014). Second-Order Feed-Forward Rendering for Specular and Glossy Reflections. *IEEE Transactions on Visualization and Computer Graphics*, 20(9), 1316-1329. Presented at Pacific Graphics 2014.

25. Wang, L., Zhou, S., Ke, W., and Popescu, V. (2014). GEARS: A General and Efficient Algorithm for Rendering Shadows. *Computer Graphics Forum*, 33(6), 264-275. Presented at Eurographics Symposium on Rendering 2015.

26. Popescu, V., Benes, B., Rosen, P., Cui, J., and Wang, L. (2014). A Flexible Pinhole Camera Model for Coherent Nonuniform Sampling. *IEEE Computer Graphics and Applications*, 34(4), 30-41.

27. Cui, J., Ma, Z., and Popescu, V. (2014). Animated Depth Images for Interactive Remote Visualization of Time-Varying Data Sets. *IEEE Transactions on Visualization and Computer Graphics*, 20(11), 1474-1489.

28. Wang, L., Shi, Y., Chen, Y., and Popescu, V. (2013). Just-in-Time Texture Synthesis. *Computer Graphics Forum*, 32(1), 126-138. Presented at Pacific Graphics 2013.

29. Adamo-Villani, N., Popescu, V., and Lestina, J. (2013). A Non-Expert User Interface for Posing Signing Avatars. *Disability and Rehabilitation: Assistive Technology*, 8(3), 238-248.

30. Rosen, P., and Popescu, V. (2011). Simplification of Node Position Data for Interactive Visualization of Dynamic Data Sets. *IEEE Transactions on Visualization and Computer Graphics*, 18(9), 1537-1548. Presented at IEEE Visualization 2012.

31. Rosen, P., Popescu, V., Hayward, K., and Wyman, C. (2011). Non-Pinhole Approximations for Interactive Rendering. *IEEE Computer Graphics and Applications*, 31(6), 68-83.

32. Rosen, P., and Popescu, V. (2011). An Evaluation of 3-D Scene Exploration Using a Multiperspective Image Framework. *The Visual Computer*, 27(6), 623-632. Presented at Computer Graphics International 2011.

33. Cui, J., Rosen, P., Popescu, V., and Hoffmann, C. (2010). A Curved Ray Camera for Handling Occlusions Through Continuous Multiperspective Visualization. *IEEE Transactions on Visualization and Computer Graphics*, 16(6), 1235-1242. Presented at IEEE Visualization 2010.

34. Popescu, V., Rosen, P., Arns, L., Tricoche, X., Wyman, C., and Hoffmann, C. M. (2010). The General Pinhole Camera: Effective and Efficient Nonuniform Sampling for Visualization. *IEEE Transactions on Visualization and Computer Graphics*, 16(5), 777-790.

35. Rosen, P., Popescu, V., and Adamo-Villani, N. (2009). The Graph Camera. *ACM Transactions on Graphics* 28(5). Presented at ACM SIGGRAPH Asia 2009.

36. Jia, C., and Popescu, V. (2009). Compact Real-Time Modeling of Seated Humans by Video Sprite Sequence Quantization. *The Visual Computer*, 25(5), 565-572. Presented at Computer Graphics International 2009.

37. Rosen, P., Popescu, V., Hoffmann, C., and Irfanoglu, A. (2008). A High-Quality High-Fidelity Visualization of the September 11 Attack on the World Trade Center. *IEEE Transactions on Visualization and Computer Graphics*, 14(4), 937-947.

38. Mudure, M., and Popescu, V. (2008). 1001 Acquisition Viewpoints: Efficient and Versatile View-Dependent Modeling of Real-World Scenes. *The Visual Computer*, 24(7), 669-678. Presented at Computer Graphics International 2008.

39. Dondera, R., Jia, C., Popescu, V., Nita-Rotaru, C., Dark, M., and York, C. S. (2008). Virtual Classroom Extension for Effective Distance Education. *IEEE Computer Graphics and Applications*, 28(1), 64-74.

40. Popescu, V., and Hoffmann, C. (2007). CAD Visualization by Outsourcing. *Computer-Aided Design and Applications*, 4(1-4), 89-98.

41. Aliaga, D. G., Xu, Y., and Popescu, V. (2007). Occlusion-Resistant Camera Design for Acquiring Active Environments. *IEEE Computer Graphics and Applications*, 27(5), 68-78.

42. Hoffmann, C., Pizlo, Z., Popescu, V., and Price, S. (2007). Perception of Surfaces from Line Drawings. *Displays*, 28(1), 1-7.

43. Popescu, V., Sacks, E., and Mei, C. (2006). Sample-Based Cameras for Feed Forward Reflection Rendering. *IEEE Transactions on Visualization and Computer Graphics*, 12(6), 1590-1600.

44. Popescu, V., Bahmutov, G., Sacks, E., and Mudure, M. (2006). The ModelCamera. *Graphical Models*, 68(5-6), 385-401.

45. Popescu, V., Rosen, P., and Aliaga, D. G. (2006). Three-Dimensional Display Rendering Acceleration Using Occlusion Camera Reference Images. *Journal of Display Technology*, 2(3), 274-283.

46. Aliaga, D. G., Rosen, P., Popescu, V., and Carlbom, I. (2006). Image Warping for Compressing and Spatially Organizing a Dense Collection of Images. *Signal Processing: Image Communication*, 21(9), 755-769.

47. Hoffmann, C. M., Pizlo, Z., Popescu, V. S., and Rosen, P. (2006). Study of the Perception of Three-Dimensional Spatial Relations for a Volumetric Display. *Journal of Electronic Imaging*, 15(3), 033002.

48. Bahmutov, G., Popescu, V., and Mudure, M. (2006). Efficient Large Scale Acquisition of Building Interiors. *Computer Graphics Forum*, 25(3), 655-662. Presented at Eurographics 2006.

49. Popescu, V., Mei, C., Dauble, J., and Sacks, E. (2006). Reflected-Scene Impostors for Realistic Reflections at Interactive Rates. *Computer Graphics Forum*, 25(3), 313-322. Presented at Eurographics 2006.

50. Popescu, V., and Rosen, P. (2006). Forward Rasterization. *ACM Transactions on Graphics*, 25(2), 375-411.

51. Mei, C., Popescu, V., and Sacks, E. (2005). The Occlusion Camera. *Computer Graphics Forum*, 24(3), 335-342. Presented at Eurographics 2005.

52. Popescu, V., and Hoffmann, C. (2005). Fidelity in Visualizing Large-Scale Simulations. *Computer-Aided Design*, 37(1), 99-107.

53. Hoffmann, C., Popescu, V., Kilic, S., and Sozen, M. (2004). Modeling, Simulation and Visualization: the Pentagon on September 11th. *Computing in Science & Engineering*, 6(1), 52-60.

54. Rafferty, M. , Aliaga, D. G., Popescu, V., and Lastra, A. (1998). Images for Accelerating Architectural Walkthroughs. *IEEE Computer Graphics and Applications*, 18(6), 38-45.

Conference papers

55. Liao, S., Zhou, Y., and Popescu, V. (2023). AR Interfaces for Disocclusion–A Comparative Study. *2023 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, 530-540.

56. Strobel, F., and Popescu, V. (2023). Improved Directional Guidance with Transparent AR Displays. *18th International Conference on Computer Graphics Theory and Applications (GRAPP/VISIGRAPP)*, 27-38. **Best Paper Award Honorable Mention.**

57. Popescu, V., Magana, A., and Benes, B. (2023). Towards Immersive Visualization for Large Lectures: Opportunities, Challenges, and Possible Solutions. *The 44th Annual Conference of the European Association for Computer Graphics, Education Track*, 1-8.

58. Popescu, V., Lee, S. H., Choi, A. S., and Fahmy, S. (2022). Complex Virtual Environments on Thin VR Systems Through Continuous Near-Far Partitioning. *2022 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*, 35-43.

59. Lin, C., and Popescu, V. (2022). Fast Intra-Frame Video Splicing for Occlusion Removal in Diminished Reality. *2022 EuroXR International Conference on Virtual Reality and Augmented Reality*, 111-134.

60. Zhou, Y., and Popescu, V. (2022). Tapping with a Handheld Stick in VR: Redirection Detection Thresholds for Passive Haptic Feedback. *2022 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, 83-92.

61. Tang, M. T., Zhu, V. L., and Popescu, V. (2021). AlterEcho: Loose Avatar-Streamer Coupling for Expressive VTubing. *2021 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*, 128-137. **Best Student-Led Conference Paper Award.**

62. Palash, M., Popescu, V., Sheoran, A., and Fahmy, S. (2021). Robust 360° Video Streaming via Non-Linear Sampling. *IEEE INFOCOM 2021-IEEE Conference on Computer Communications*, 1-10.

63. Wang, L., Chen, J., Ma, Q., and Popescu, V. (2021). Disocclusion Headlight for Selection Assistance in VR. *2021 IEEE Virtual Reality and 3D User Interfaces (VR)*, 216-225.

64. Andersen, D., and Popescu, V. (2020). AR Interfaces for Mid-Air 6-DOF Alignment: Ergonomics-Aware Design and Evaluation. *2020 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*, 289-300.

65. Wang, L., Wu, W., Zhou, Z., and Popescu, V. (2020). View Splicing for Effective VR Collaboration. *2020 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*, 509-519.

66. Lin, C., Rojas-Muñoz, E., Cabrera, M. E., Sanchez-Tamayo, N., Andersen, D., Popescu, V., Barragan-Noguera, J. A., Zarzaur, B., Murphy, P., Anderson, K., Douglas, T., Griffis, C., Wachs, J. (2020). How About the Mentor? Effective Workspace Visualization in AR Telementoring. *2020 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, 212-220.

67. Cao, A., Wang, L., Liu, Y., and Popescu, V. (2020). Feature Guided Path Redirection for VR Navigation. *2020 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, 137-145.

68. Wu, M. L., and Popescu, V. (2019). RGBD Temporal Resampling for Real-Time Occlusion Removal. *2019 ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D)*, 1-9.

69. Wang, L., Zhao, H., Wang, Z., Wu, J., Li, B., He, Z., and Popescu, V. (2019). Occlusion Management in VR: A Comparative Study. *2019 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)*, 708-716.

70. Lin, C., and Popescu, V. (2019). Subpixel Catadioptric Modeling of High Resolution Corneal Reflections. *VISIGRAPP (5: VISAPP)*, 673-683.

71. Wu, M. L., and Popescu, V. (2018). Anchored Multiperspective Visualization for Efficient VR Navigation. *2018 EuroVR International Conference on Virtual Reality and Augmented Reality*, 240-259.

72. Andersen, D., and Popescu, V. (2018). HMD-Guided Image-Based Modeling and Rendering of Indoor Scenes. *2018 EuroVR International Conference on Virtual Reality and Augmented Reality*, 73-93.

73. Lin, C., Andersen, D., Popescu, V., Rojas-Muñoz, E., Cabrera, M. E., Mullis, B., Zarzaur, B., Anderson, K., Marley, S., Wachs, J. (2018). A First-Person Mentee Second-Person Mentor AR Interface for Surgical Telementoring. *2018 IEEE International Symposium on Mixed and Augmented Reality (ISMAR-Adjunct)*, 3-8.

74. Wang, L., Cao, A., Li, Z., Yang, X., and Popescu, V. (2018). Effective Free Field of View Scene Exploration in VR and AR. *2018 IEEE International Symposium on Mixed and Augmented Reality (ISMAR-Adjunct)*, 97-102.

75. Andersen, D., Lin, C., Popescu, V., Rojas-Muñoz, E., Cabrera, M., Mullis, B., Zarzaur, B., Marley, S., and Wachs, Juan. (2018). Augmented Visual Instruction for Surgical Practice and Training. *2018 IEEE Workshop on Augmented and Virtual Realities for Good (VAR4Good)*, 1-5.

76. Yeo, A., Cook, S. W., Nathan, M. J., Popescu, V., and Alibali, M. W. (2018). Instructor gesture improves encoding of mathematical representations. *Annual Conference of the Cognitive Science Society (CogSci)*, 2723-2728.

77. Hanau, E., and Popescu, V. (2017). Motionreader: Visual Acceleration Cues for Alleviating Passenger E-Reader Motion Sickness. *Proceedings of the 9th International Conference on Automotive User Interfaces and Interactive Vehicular Applications Adjunct*, 72-76.

78. Andersen, D., Popescu, V., Lin, C., Cabrera, M. E., Shanghavi, A., and Wachs, J. (2016). A Hand-Held, Self-Contained Simulated Transparent Display. *IEEE International Symposium on Mixed and Augmented Reality (ISMAR-Adjunct)*, 96-101.

79. Wang, L., Zhao, Q., Meng, C., and Popescu, V. (2016). 4D-rasterization for Fast Soft Shadow Rendering. *Eurographics Symposium on Rendering: Experimental Ideas and Implementations (EGSR EI&I)*, 13-21.

80. Andersen, D., Popescu, V., Cabrera, M. E., Shanghavi, A., Gomez, G., Marley, S., Mullis, B.H., and Wachs, J. P. (2016). Avoiding Focus Shifts in Surgical Telementoring Using an Augmented Reality Transparent Display. *Studies in health technology and informatics (MMVR)*, 220, 9-14.

81. Anasingaraju, S., Wu, M. L., Adamo-Villani, N., Popescu, V., Cook, S. W., Nathan, M., and Alibali, M. (2016). Digital Learning Activities Delivered by Eloquent Instructor Avatars: Scaling with Problem Instance. *SIGGRAPH Asia 2016 Symposium on Education*, 1-7.

82. Andrysco, N., Rosen, P., Popescu, V., Beneš, B., and Gurney, K. R. (2011, September). Experiences in Disseminating Educational Visualizations. *International Symposium on Visual Computing*, 239-248.

83. Popescu, V., and Mudure, M. (2008). Interactive Photorealistic Inside-Looking-Out Automated 3-D Modeling. *2008 Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC)*, 1-11.

84. Popescu, V., and Hoffmann, C. (2008). General-Purpose Visualization of Large-Scale Finite Element Analysis Simulations. *2008 Interservice/Industry Training, Simulation and Education Conference*, 1-10.

85. Rosen, P., and Popescu, V. (2008). The Epipolar Occlusion Camera. *2008 Symposium on Interactive 3D Graphics and Games*, 115-122.

86. Mo, Q., Popescu, V., and Wyman, C. (2007). The Soft Shadow Occlusion Camera. *Pacific Conference on Computer Graphics and Applications (PG'07)*, 189-198.

87. Dark, M. J., York, C. S., Popescu, V., and Nita-Rotaru, C. (2007). Evaluating Interactivity and Presence in an Online Distance Learning System. *2007 Annual Frontiers In Education Conference-Global Engineering: Knowledge Without Borders, Opportunities Without Passports*, T2D-24.

88. Mei, C., Popescu, V., and Sacks, E. (2007). A Hybrid Backward-Forward Method for Interactive Reflections. *International Conference on Computer Graphics Theory and Applications*, 1-8.

89. Nita-Rotaru, C., Dark, M., and Popescu, V. (2007). A Multi-Expertise Application-Driven Class. *2007 ACM Special Interest Group Conference on Computer Science Education, (SIGCSE)*, 39(1), 119-123.

90. Popescu, V., Dauble, J., Mei, C., and Sacks, E. (2006). An Efficient Error-Bounded General Camera Model. *2006 Third International Symposium on 3D Data Processing, Visualization, and Transmission (3DPVT)*, 121-128.

91. Popescu, V., and Aliaga, D. (2006). The Depth Discontinuity Occlusion Camera. *2006 Symposium on Interactive 3D Graphics and Games (I3D)*, 139-143.

92. Aliaga, D., Xu, Y., and Popescu, V. (2006). Lag Camera: A Moving Multi-Camera Array for Scene-Acquisition. *JVRB-Journal of Virtual Reality and Broadcasting*, 3(10).

93. Bahmutov, G. and Popescu, V. and Sacks, E. (2005). Depth Enhanced Panoramas. *Institute of Mathematics and its Applications - Vision, Video and Graphics (VVG 2005)*, 1-8.

94. Popescu, V., Sacks, E., and Bahmutov, G. (2004). Interactive Point-Based Modeling from Dense Color and Sparse Depth. *Eurographics Symposium on Point-Based Graphics (PBG)*, 69-76.

95. Popescu, V., Sacks, and Bahmutov, G (2004). Interactive Modeling from Dense Color and Sparse Depth. *International Symposium on 3D Data Processing, Visualization and Transmission (3DPVT)*, 430-437.

96. Rosen, P., Pizlo, Z., Hoffmann, C., and Popescu, V. S. (2004). Perception of 3D Spatial Relations for 3D Displays. *Stereoscopic Displays and Virtual Reality Systems XI, International Society for Optics and Photonics*, 5291, 9-16.

97. Popescu, V., Sacks, E., and Bahmutov, G. (2003). The ModelCamera: a Hand-Held Device for Interactive Modeling. *International Conference on 3-D Digital Imaging and Modeling (3DIM)*, 285-292.

98. Popescu, V., Hoffmann, C., Kilic, S., Sozen, M., and Meador, S. (2003). Producing High-Quality Visualizations of Large-Scale Simulation. *IEEE Visualization (VIS)*, 575-580.

99. Popescu, V., and Lastra, A. (2001). The Vacuum Buffer. *2001 Symposium on Interactive 3D Graphics*, 73-76.

100. Nyland, L. S., Lastra, A. A., McAllister, D. K., Popescu, V., Mccue, C., and Fuchs, H. (2000). Capturing, Processing, and Rendering Real-World Scenes. *Videometrics and Optical Methods for 3D Shape Measurement*, 4309, 107-116.

101. Popescu, V., Eyles, J., Lastra, A., Steinhurst, J., England, N., and Nyland, L. (2000). The WarpEngine: An Architecture for the Post-Polygonal Age. *27th Annual Conference on Computer Graphics and Interactive Techniques (SIGGRAPH 2000)*, 433-442.

102. Popescu, V., Lastra, A., and Eyles, J. (2000). Sort-First Parallelism for Image-Based Rendering. *Eurographics Workshop on Parallel Graphics and Visualization*, 1-9.

103. McAllister, D. K., Nyland, L., Popescu, V., Lastra, A., and McCue, C. (1999). Real-Time Rendering of Real World Environments. *Eurographics Workshop on Rendering Techniques*, 145-160.

104. Nyland, L. S., McAllister, D. K., Popescu, V., McCue, C., and Lastra, A. A. (2000). Interactive Exploration of Acquired 3D Data. *28th AIPR Workshop: 3D Visualization for Data Exploration and Decision Making*, 3905, 46-57.

105. Nyland, L., McAllister, D., Popescu, V., McCue, C., Lastra, A., Rademacher, P., Oliveira, M., Bishop, G., Meenakshisundarama, G., Cutts, M., and Fuchs, H. (1999). The Impact of Dense Range Data on Computer Graphics. *IEEE Workshop on Multi-View Modeling and Analysis of Visual Scenes (MVIEW'99)*, 3-10.

106. Popescu, V., Lastra, A., Aliaga, D., and Oliveira, M. (1998). Efficient Warping for Architectural Walkthroughs Using Layered Depth Images. *IEEE Visualization (VIS)*, 211-215.

Patents

107. Popescu, V. S., and Wachs, J. P. (2016). Simulated Transparent Display with Augmented Reality for Remote Collaboration. U.S. Patent No. 9,503,681.

108. Popescu, V. S., and Sacks, E. (2010). System and Method for Three Dimensional Modeling. U.S. Patent No. 7,747,067.

109. Popescu, V., Lastra, A., and Eyles, J. (2004). Methods and Apparatus for Rendering Images Using 3D Warping Techniques. U.S. Patent No. 6,756,993.

Invited Presentations

2022 Indiana Orthopaedic Society Annual Meeting, *The Role of Augmented and Virtual Reality in Orthopaedic Surgical Training.*

2021 Massachusetts Institute of Technology, *Image Generalization Through Camera Model Design.*

2021 Harvard University, *Image Generalization Through Camera Model Design* (given remotely).

2020 University of California Davis, *Image Generalization Through Camera Model Design* (given remotely).

2020 University of Utah, *Image Generalization Through Camera Model Design* (given remotely).

2020 Yale University, *Image Generalization Through Camera Model Design* (given remotely).

2020 New York University, *Image Generalization Through Camera Model Design* (given remotely).

2020 Princeton University, *Image Generalization Through Camera Model Design* (given remotely).

2020 Cornell University, *Image Generalization Through Camera Model Design* (given remotely).

2015 University of California San Diego, *Image Generalization Through Camera Model Design.*

2015 University of California Los Angeles, *Camera Model Design: a Paradigm for Effective and Efficient Image Generalization.*

2014 Beihang University of Aeronautics and Astronautics, Beijing, China, *Camera Model Design.*

2013 Beihang University of Aeronautics and Astronautics, Beijing, China, *How to Write a Graphics Paper.*

2012 Beihang University of Aeronautics and Astronautics, Beijing, China, *Interactive 3D Graphics.*

2010 Defense Advanced Research Projects Agency, Washington, DC, *New Core Representations of Geometry.*

2009 Massachussets Institute of Technology, *The Graph Camera.*

Funding

NSF - Collaborative Research: HCC: Buenas - Giving All a Seat at the Table Using Mixed Reality Anitha Chennamaneni (Co-PI), Walter Murphy (Co-PI), Voicu Popescu (Co-PI), Edgar Rojas-Muñoz (Co-PI). National Science Foundation, $600,000, 2023-2026.

NSF - ACHIEVE: High-Performance Computing Virtual Environment for AI Education Voicu Popescu (PI), Alejandra Magana-de-Leon (Co-PI), and Bedrich Benes (Co-PI). National Science Foundation, $400,000, 2023-2025.

NSF - HCC: Small: Super Reality – Immersive Visual Interfaces with No Line-of-Sight Restriction. Voicu Popescu (PI), and Elisha Sacks (Co-PI). National Science Foundation, $250,000, 2022-2024.

NSF - Collaborative Research: CNS Core: Medium: Rethinking Multi-User VR - Jointly Optimized Representation, Caching and Transport. Sonia Fahmy (PI), Voicu Popescu (Co-PI), George Kesidis (Co-PI), Gustavo De Veciana (Co-PI). National Science Foundation, $1,200,000, 2022-2025.

Virtual Reality Support at the Edge. Sonia Fahmy (PI), George Kesidis (Co-PI), and Voicu Popescu (Co-PI). Meta (Facebook) Research, $50,000, 2021-2022.

DoD - See-what-I-do: Increasing Mentor and Trainee Sense of Co-Presence in Trauma Surgeries with the STAR Platform. Juan Wachs (PI), Voicu Popescu (Co-PI), Gerardo Gomez (Trauma Surgery IUSM, Co-PI), Brian Mullis (Orthopedic Trauma Surgery IUSM, Co-PI). Medical Practice Initiative Augmented Reality for Medical Applications (MPI-ARM), Department of Defense Joint Program Committee 1 and the Telemedicine and Advanced Technology Research Center, $1,729,745, 2014-2019.

DoEd - Connecting Mathematical Ideas through Animated Multimodal Instruction. Martha Alibali (University of Wisconsin, PI), Mitchell Nathan (University of Wisconsin, Co-PI), Voicu Popescu (Purdue University, PI), Nicoletta Adamo-Villani (Purdue University, Co-PI), Susan Wagner-Cook (University of Iowa, PI). R305A130016, Institute of Education Sciences, Department of Education, $1,599,992, 2013-2017.

NSF - EXP: Collaborative Research: A System of Animation Gestures for Effective Teaching Avatars. Voicu Popescu (Purdue University, lead institution, PI), Nicoletta Adamo-Villani (Purdue University, Co-PI), Howard Friedman (University of California Riverside, PI), and Susan Wagner-Cook (University of Iowa, PI). National Science Foundation, IIS, Cyberlearning, $550,000, 2012-2015.

NSF - CPATH-2: Computer Science Pathways for Educators. Susanne Hambrusch (Co-PI, former PI), Christoph Hoffmann (PI, former Co-PI), Voicu Popescu (Co-PI), Jim Lehman (Co-PI), Aman Yadav (Co-PI), and Anthony Rud (former Co-PI). National Science Foundation, CNS, $871,456, 2009-2014.

Towards Product Lifecycle Management Visualization on Mobile Devices. Voicu Popescu and Nate Hartman. Product Lifecycle Management Center for Excellence, $30,000, 2010-2011.

Life-Like Computer Animation of American Sign Language: from Research to Classroom. Nicoletta Adamo-Villani and Voicu Popescu. Dr. Scholl Foundation, $25,000, 2010-2011.

Cutting Edge Visualization for Product Lifecycle Management. Voicu Popescu and Christoph Hoffmann. Product Lifecycle Management Center for Excellence, $30,000, 2009-2010.

NSF - Effective Distance Learning through Sustained Interactivity and Visual Realism. Voicu Popescu (PI), Cristina Nita-Rotaru (Co-PI), Gary Bertoline (Co-PI), and Melissa Dark (Co-PI). National Science Foundation, CISE, Educational Research and Curriculum Development, $540,000, 2004-2007.

DoD - Integrated Modeling, Simulation, and Visualization. Part of *Center for Security of Large Scale Systems/Task 3, 5, 8.* Air Force Office of Scientific Research. $2,000,000, 2004-2006.

The ModelCamera: A System for Interactive Modeling. Voicu Popescu (PI) and Elisha Sacks (Co-PI). Office of Technology Commercialization, Purdue, $66,280, 2004.

Computer Science Graphics Laboratory Equipment Grant. Christoph Hoffmann and Voicu Popescu. *Equipment grant*, Tellabs Foundation, $300,000, 2003.

Instructional Display Equipment. Christoph Hoffmann and Voicu Popescu. *Equipment grant*, IBM Corporation, Shared University Research (SUR) grant, $251,970, 2002.

Graphics and Visualization: Instruction and Research. Christoph Hoffmann and Voicu Popescu. *Equipment grant*, Intel Corporation, $271,313, 2002.

Service

Journal Editorial Boards

2021-present IEEE Transactions on Visualization and Computer Graphics

2021-present Computer Graphics Forum

2021-present IEEE Computer Graphics and Applications

Conference Program Committee Chairing and Membership

2023, 2024 IEEE Conference on Virtual Reality and 3D User Interfaces (VR), program committee (technical papers) co-chair.

2022 IEEE Conference on Virtual Reality and 3D User Interfaces (VR), IEEE Transactions on Visualization and Computer Graphics paper track.

2022, 2021 IEEE Conference on Virtual Reality and 3D User Interfaces (VR), conference paper track.

2023, 2022, 2021 IEEE International Symposium on Mixed and Augmented Reality (ISMAR), IEEE Transactions on Visualization and Computer Graphics paper track.

2020 International Symposium on Mixed and Augmented Reality (ISMAR).

2022, 2020, 2019 International Conference on Virtual and Augmented Reality (EuroXR, EuroVR).

2022-2018, 2013-2011 IEEE Visualization Conference (VIS).

2018-2017 Eurographics Symposium on Rendering (EGSR).

2103-2005, 2003 ACM Symposium on Interactive 3D Graphics and Games (I3D).

2008-2005 Symposium on Point-Based Graphics (PBG).

2010, 2008, 2006 International Symposium on 3D Data Processing, Visualization, and Transmission.

2008-2006 International Conference on Computer Graphics Theory and Applications (GRAPP).

2005, 2007, 2009 Conference on 3-D Digital Imaging and Modeling (3DIM) 2009, 2007, 2005.

2004 SCS High Performance Computing Symposium.

2008-2006 Brazilian Symposium on Computer Graphics and Image Processing (SIBGRAPI).

2008-2006 Pacific Conference on Computer Graphics and Applications (PG).

2009-2008 Computer Graphics International.

Reviewing

IEEE Transactions on Visualization and Computer Graphics (TVCG), IEEE Conference on Virtual Reality and 3D Interfaces (VR), IEEE International Symposium on Mixed and Augmented Reality (ISMAR), ACM SIGGRAPH, ACM SIGGRAPH Asia, IEEE Visualization (VIS), Journal of Graphics Tools, Eurographics Symposium on Rendering (EGSR), IEEE Computer Graphics and Applications (CG&A), Computer Graphics Forum (CGF), Graphics Hardware Workshop, IEEE Transactions on Image Processing, Three-Dimensional Imaging and Modeling (3DIM), Symposium on Interactive 3D Graphics and Games (I3D), Eurographics (EG), ACM Transactions on Applied Perception, SPIE Journal of Optical Engineering, ACM International Conference on SuperComputing, Symposium on Point-Based Graphics, International Conference on Computer Graphics Theory and Applications (GRAPP), International Symposium on 3D Data Processing, Visualization, and Transmission (3DPVT), Pacific Conference on Computer Graphics and Applications (PG).

Proposal Reviewing

National Science Foundation, Directorate for Computer & Information Science & Engineering (CISE), Division of Information and Intelligent Systems (IIS): core programs, computer graphics and visualization, cyberlearning.

Teaching and Students

Course Development

CS 490/590 Introduction to Virtual Reality and Augmented Reality (undergraduate and graduate level).

CS 635 Image-Based 3D Computer Graphics (advanced graduate level).

CS 535 Interactive Computer Graphics (graduate level).

CS 434 Advanced Computer Graphics (advanced undergraduate level).

Teaching

f—fall semester, s—spring semester

CS 490/590VRAR Introduction to Virtual Reality and Augmented Reality. 2024s, 2022s, 2021s, 2020s.

CS 535 Interactive Computer Graphics. 2023f, 2020f, 2018f, 2017f, 2015f, 2013f, 2011f, 2009f, 2006f, 2004f, 2003f.

CS 635 Image-Based 3D Computer Graphics. 2017s.

CS 434 Advanced Computer Graphics. 2016s, 2014s, 2013s, 2010s, 2006s, 2003s.

CS 334 Fundamentals of Computer Graphics. 2022f, 2014, 2010f, 2010s, 2007f, 2007s, 2005.

CS 690G Capturing and Rendering Real-World Scenes. 2011s, 2004s.

CS 590G Image-Based 3D Computer Graphics. 2002f, 2002s, 2001f.

CS 490G/590M Video Game Development. 2007.

CS 390 Great Issues in Computer Science. 2023s.

CS 240 Programming in C. 2019f, 2016f.

CS 251 Data Structures. 2009f, 2007f.

CS 381 Introduction to the Analysis of Algorithms. 2002s.

CS 177 Programming with Multimedia Objects. 2013s, 2012s.

Ph.D. Advisees (current)

Yuqi Zhou, 4^{rd} year, RA.

Shuqi Liao, 2^{nd} year, RA.

Siyu Huang, 2^{nd} year, RA.

Franklin Liu, 1^{st} year.

Yiyin (Ellen) Gu, 1^{st} year.

Ph.D. Advisees (former)

Chengyuan Lin, Ph.D., 2020, thesis *Lightweight and Sufficient Two Viewpoint Connections for Augmented Reality*, now at Meta Reality Labs.

Daniel Andersen, Ph.D., 2020, thesis *Effective User Guidance Through Augmented Reality Interfaces: Advances and Applications*, now at Meta Reality Labs.

Meng-Lin Wu, Ph.D., 2019, thesis *Occlusion Management in Conventional and Head-Mounted Display Visualization Through the Relaxation of the Single Viewpoint/Timepoint Constraint*, now at Qualcomm.

Jian Cui, Ph.D., 2015, thesis *Visibility Computation Through Image Generalization*, now at Alphabet.

Paul Rosen, Ph.D., 2010, thesis *Improved 3-D Scene Sampling by Camera Model Design*, now Associate Professor of Computer Science and Engineering at University of South Florida.

Mihai Mudure, Ph.D., 2008, thesis *Efficient and Versatile Three-Dimensional Scene Modeling by Sparse-Depth Dense-Viewpoint Acquisition*, now at Alphabet.

Gleb Bahmutov, Ph.D., 2007, thesis *Efficient Large Scale Acquisition of Building Interiors"*, now at Cypress.io.

Undergraduate Research Advisees (current)

Shuwen (Silvia) Yang, *Stable Second-Person Visualization of First-Person Video through Homography Approximation*, 2023.

Kabir Batra, *Unbounded Classroom Display Surfaces Through Mixed Reality*, 2023.

Minerva Curtis, *Virtual Reality Headset Inpainting*, 2023.

BreAzia Echols, *Lack of Eye Contact Detectability Thresholds in Video Conferencing*, 2023.

Eva Kato, *Advanced Rendering*, 2021-2023.

Rohan Ashok, *3D Dataset Reduction through Visibility Computation*, 2023.

Undergraduate Research Advisees (recent)

Santiago Jose Garcia Delgado, *Multiperspective Visualization*, 2023.

Seung Heon Lee, *Complex Virtual Environments on Thin VR Systems Trhough Continuous Near-Far Partitioning*, 2022.

Andrew Shinyoung Choi, *Complex Virtual Environments on Thin VR Systems Trhough Continuous Near-Far Partitioning*, 2022.

Man To (Tiger) Tang, *AlterEcho: Loose Avatar-Streamer Coupling for Expressive VTubing*, 2022.

Victor Long Zhu, *AlterEcho: Loose Avatar-Streamer Coupling for Expressive VTubing*, 2022.

Peter Villano, *AR HMD Guidance for Controlled Hand-Held 3D Acquisition*, 2022.

Rasvik Kudum, *Virtual Reality Neurovisual Training of Elite Athletes*, 2022.

John Zylstra, *Virtual Reality Neurovisual Training of Elite Athletes*, 2022.

Ankur Neogi, *Continuous Transition Between Immersive and Non-Immersive Visualization*, 2022.

Service

Department

Member of the **Diversity Committee**, 2023.

Member of the **Undergraduate studies committee**, 2022.

Member of the **Professor of Practice hiring committee**, 2019-2022.

Member of the **Graduate studies committee**, 2019-2021, 2007-2010.

Member of the **Department Head hiring committee**, 2018-2019.

Chair of the **Graduate studies committee**, 2014-2019.

Member of the **Faculty hiring committee**, 2016-2017.

Member of the **Personnel committee**, 2015-2016.

Member of the **Undergraduate committee**, 2011-2013.

Member of the **Undergraduate scholarship committee**, 2012-2013.

Member of the **Graduate admissions committee**, 2002-2003.

Computer Science faculty secretary, 2003-2007.

Designed, implemented, and supervised **Live Virtual Tour into the Future**, 2006.

College

Member of the Grade Appeal Committee, 2023-.

Member of the Graduate Studies Committee, 2014–2019.

Member of the College of Science Undergraduate Scholarship Committee, 2010–2013.

Member of the College of Science Awards Committee, 2013.

University

Purdue University Senate, 2013-2016.

Co-director of Product Lifecycle Management Center, Purdue University, 2010–2012.

Member of the Advisory Board of the Envision Center, 2003–2007.

Member of the Laser Safety Committee, 2003–2008.