

# Bedrich Benes

*November 4, 2018*

Purdue University  
Department of Computer Graphics Technology and Computer Science (courtesy)  
West Lafayette, In 47907-2021  
Phone: (765)-496-2954 Email: [bbenes@purdue.edu](mailto:bbenes@purdue.edu)

## Research Interests

Computer graphics, geometric modeling, procedural modeling, generative algorithms, simulation of natural phenomena, additive manufacturing.

## Education

Ph.D. Computer Science, Czech Technical University in Prague, 1998.

M.S. Computer Science, Czech Technical University in Prague, 1991.

## Professional Experience

Dec. 2017 - present

Professor of Department of Computer Science (by courtesy) Purdue University, USA

Aug. 2015 - present

Professor of Department of Computer Graphics Technology Purdue University, USA

Aug. 2010 - Aug. 2015

Associate Professor of Department of Computer Graphics Technology Purdue University, USA

Aug. 2011 - Aug. 2012

Assistant Head of Department of Computer Graphics Technology Purdue University, USA

Aug. 2005 - Aug. 2010

Assistant Professor of Department of Computer Graphics Technology Purdue University, USA

Aug. 2000 - Aug. 2005

Assistant Professor of Department of Computer Science Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM), Mexico

Jul. 1999 - Jun. 2000

Visiting Professor of Department of Computer Science Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM), Mexico

Jun. 1998 - Jul. 1999

Assistant Professor of Computer Science Czech Technical University in Prague, Czech Republic

## Awards and Honors

- 2018 COMPDES, University of San Carlos, Costa Rica, Keynote address,
- 2017 IEEE, Senior Member
- 2017 Eurographics 2017, Full papers chair
- 2017 Best paper committee Eurographics 2017, “Interactive Modeling and Authoring of Climbing Plants”, Honorable mention
- 2012 Purdue University, Outstanding Award in Discovery
- 2011 Siggraph Bogota, Keynote address
- 2011 Purdue University, Faculty Scholar
- 2011 Purdue University, Outstanding Award in Discovery
- 2009 Purdue University, Early Faculty Discovery Award
- 2006 ACM Spring Conference on Computer Graphics, Keynote address
- 2005 Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) (Premio Rómulo Garza), Outstanding faculty award in discovery and technical development
- 2003 IEEE International Conference Theory and Practice of Computer Graphics. “Modeling Virtual Gardens by Autonomous Procedural Agents”, Best paper, Ken Brodlie award
- 2003 Campus Ciudad de México of the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM), Outstanding Faculty in Discovery
- 2002 Campus Estado de México of the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM), Outstanding Graduate Advisor

## Publications

### *Journal Articles*

1. Kang, H., and Li, H., Zhang, J., Lu, X., and Benes, B., (2018) FlyCam: Multitouch Gesture Controlled Drone Gimbal Photography, in *IEEE Robotics and Automation Letters*, 3(4), pp: 3717-3724.
2. Gazo, R., Wells, L., Krs, V., and Benes, B., (2018) Validation of automated hardwood lumber grading system, in *Computers and Electronics in Agriculture*, (in press)
3. Garcia, J., and Benes, B., (2018) Improving Printing Orientation for Fused Deposition Modeling Printers by Analyzing Connected Components, in *Additive Manufacturing*, 22, August 2018, pp: 720-728.

4. Cordonnier, G., Cani, M-P., Benes, B., Braun, J., and Galin, E., (2018) Sculpting Mountains: Interactive Terrain Modeling based on Subsurface Geology in *IEEE Transactions on Visualization and Computer Graphics*, 24(5), pp: 1717 – 1727.
5. Demir, I., Aliaga, D.G., and Benes, B., (2018) Near-Convex Decomposition and Layering for Efficient 3D Printing in *Additive Manufacturing*, 21, pp: 383-395.
6. Cordonnier, G., Ecomier, P., Galin, E., Gain, J., Benes, B., and Cani, M-P., (2018) Interactive Generation of Time-evolving, Snow-Covered Landscapes with Avalanches in *Computer Graphics Forum*, 37(2), pp: 497-509.
7. Hu, K, Yan, D., Bommers, B., Alliez, P., and Benes, B., (2017) Error-Bounded and Feature Preserving Surface Remeshing with Minimal Angle Improvement in *IEEE Transactions on Visualization and Computer Graphics*, 23(12), pp:2560-2573.
8. Guérin, E., Digne, J., Galin, E., Peytavie, A., Wolf, C., Benes, B., and Martinez, B., (2017). Interactive Example-Based Terrain Authoring with Conditional Generative Adversarial Networks in *ACM Transactions on Graphics*, 36(6), Article 228, 13 pages.
9. Abdul-Massih, M., Yoo, I., and Benes, B., (2017). Motion Style Retargeting to Characters with Different Morphologies in *Computer Graphics Forum*, 36(6), pp:86-99.
10. Vojtech Krs, Ersin Yumer, Nathan Carr, Bedrich Benes, and Radomir Mech (2017) Skippy: Single View 3D Curve Interactive Modeling in *ACM Transactions on Graphics*, 36(4), Article 128, 12 pages.
11. Cordonnier, G., Galin, E., Gain, J., Benes, B., Guerin, E., Peytavie A., and Cani, M.P., (2017) A Flexible Framework for Landscape Editing, Combining Vegetation and Terrain Erosion in *ACM Transactions on Graphics*, 36(4), Article 134, 12 pages.
12. Cordonnier, G., Cani, M.P., Benes, B., Braun, J., and Galin E., (2017) Sculpting Mountains: Interactive Terrain Modeling based on Subsurface Geology in *IEEE Transactions on Visualization and Computer Graphics*, 24(5), pp: 1756-1769.
13. Pirk, S., Krs, V., Hu, K., Deepak, S.R., Kang, H., Benes, B., Yoshiyasu, Y., and Guibas, L. J. (2017) Understanding and Exploiting Object Interaction Landscapes in *ACM Transactions on Graphics*, 36(3).
14. Hädrich, T., Benes, B., Deussen, O., and Pirk, S (2017) Interactive Modeling and Authoring of Climbing Plants in *Computer Graphics Forum*, 36(2), pp: 49-61. **Best Paper Awards – honorable mention**
15. Fiser, M., Ravi, J., Benes, B., Shi, B., and Hirst, P (2017) IMapple: a source-sink developmental model for 'Golden Delicious' apple trees in *Acta Horticulturae* 1160, pp:51-60.
16. Nishida, G., Garcia-Dorado, I., Aliaga, D.G., Benes, B., and Bousseau, A., (2016) Interactive Sketching of Urban Procedural Models in *ACM Transactions on Graphics*, 35(4), Article 130, 11 pages.
17. Zhao, H., Gu, F., Huang, Q., Gacria Galicia, J.A., Chen, Y., Tu, C., Benes, B., Zhang, H., Cohen-Or, D., and Chen, B. (2016) Connected Fermat Spirals for Layered Fabrication in *ACM Transactions on Graphics*, 35(4), Article 100, 10 pages.

18. Kim, H.; Dorantes, M. J.; Schulze, D. G. and Benes, B. (2016) Computer Graphics Procedural Modeling of Soil Structure in *Digital Soil Morphometrics*, Springer International Publishing, pp: 133-144.
19. Moore, B. A.; Yoo, I.; Tyrrell, L. P.; Benes, B. Fernandez-Juricic, E. (2016) FOVEA: A New Program to Standardize the Measurement of Foveal Pit Morphology in *PeerJ*, 4, e1785.
20. Abdul-Massih, M., Yoo, I., and Benes, B., (2016). Motion Style Retargeting to Characters with Different Morphologies in *Computer Graphics Forum*, 36(6), pp:86-99.
21. Escobar-Castillejos, D., Noguez, J., Neri, L., Magana, A., and Benes, B., (2016). A Review of Simulators with Haptic Devices for Medical Training in *Journal of Medical Systems*, 40(4), pp: 1-22.
22. Magana, A., Sanchez, K. L., Shakik, U. A. S., Jones, G. M., Tan, H. Z., Guayaquil, A., and Benes, B., (2016) Exploring Multimedia Principles for Supporting Conceptual Learning of Electricity and Magnetism with Visuohaptic Simulations in *Computers in Education (COED) Journal*, 8(2) pp:8-23.
23. Cordonnier, G., Braun, J., Cani, MP., Benes, B., Galin, E., Peytavie, A., and Guerin, E., (2016). Large Scale Terrain Generation from Uplift and Erosion in *Computer Graphics Forum*, 35(2), pp: 165-175.
24. Chen, X., Zhang, H., Lin, J., Hu, R., Lu, L., Huang, Q., Benes, B., Cohen-Or, D., and Chen B., (2015). Dapper: Decompose-and-Pack for 3D Printing in *ACM Transactions on Graphics*, 34(6), Article 213 12 pages.
25. Grosbellet, F., Peytavie, A., Guerin, E., Galin, E., Merillou, S., and Benes, B., (2015) Environmental Objects for Authoring Procedural Scenes. in *Computer Graphics Forum*, 35(1), pp: 296-308.
26. Emilien, A., Vimont, U., Cani, M.P., Poulin, P., and Benes, B., (2015) WorldBrush: Interactive Example-based Synthesis of Procedural Virtual Worlds in *ACM Transactions on Graphics*, 34(4), Article 106, 11 pages.
27. Demir, I., Aliaga, D. G., and Benes, B., (2015) Coupled Segmentation and Similarity Detection on Architectural Models in *ACM Transactions on Graphics*, 34(4), Article 104, 11 pages.
28. Skorkovska, V., Kolingerova, I., and Benes, B., (2015) Hydraulic Erosion Modeling on a Triangular Mesh in Surface Models for Geosciences Lecture Notes in *Geoinformation and Cartography*, pp: 237-247.
29. G enevaux, J.D., Galin, E., Peytavie, A., Gu erin, E., Briquet, C., Grosbellet, F., and Benes, B., (2015), Terrain Modeling from Feature Primitives in *Computer Graphics Forum*, 34(2) pp: 198-210.
30. Kratt, J, Spicker, M., Guayaquil, A., Fiser, M., Pirk, S., Deussen, O., Hart, J.C., and Benes, B., (2015) Woodification: User-Controlled Cambial Growth Modeling in *Computer Graphics Forum*, 34(2), pp: 361-372.

31. Yoo, I., Abdul-Massih, M., Ziamtsov, I., Hassan, R., and Benes, B., (2015) Motion Retiming by using Bilateral Time Control Surfaces, in *Computers & Graphics*, 47, pp: 59-67.
32. Pirk, S., Niese, T., Hadrich, T., Benes, B., and Deussen O., (2014) Windy Trees: Computing Stress Response for Developmental Tree Models in *ACM Transactions on Graphics*, 33(6), Article 204.
33. Vanek, J., Garcia, J., and Benes, B., (2014) Clever Support: Efficient Support Structure Generation for Digital Fabrication, in *Computer Graphics Forum*, 33(5), pp: 121-133.
34. Vanek, J., Garcia, J., Benes, B., Mech, R., Carr, N., Stava, O., and Miller, G (2014) Pack Merger: A 3D Print Volume Optimizer in *Computer Graphics Forum*, 33(6), pp: 322-332.
35. Zhou, S., Yoo, I., Benes, B., and Chen, G. (2014), A Hybrid Level of Detail Representation for Large-Scale Urban Scenes Rendering, in *the Journal Computer Animation and Virtual Worlds*, 25(3-4), pp: 245-255.
36. Popescu, V., Benes, B., Rosen, P., Cui, J., and Wang, L. (2014), A Flexible Pinhole Camera Model for Coherent Non-Uniform Sampling in *Computer Graphics & Applications*, 34(4), pp: 30-41.
37. Stava, O., Pirk, S., Kratt, J., Chen, B., Mech, R., Deussen, O., and Benes, B., (2014) Inverse Procedural Modeling of Trees in *Computer Graphics Forum*, 33(6), pp: 118-131.
38. Benes, B., Aliaga, D. (2014). Foreword to Special Section on Advances in Procedural Modeling in *Computers & Graphics*, 37(4), pp: 2-3.
39. Yoo, I., Vanek, J., Nizotseva, M., Adamo-Villani, N., and Benes, B. (2014). Sketching Human Character Animations by Composing Sequences from Large Motion Database in *The Visual Computer*, 30(2), pp: 212-227.
40. Smelik, R. M., Tutenel, T., Bidarra, R., and Benes, B (2014) A Survey on Procedural Modelling for Virtual Worlds in *Computer Graphics Forum*, 33(6), pp: 31-50.
41. Genevaux, J-P., Galin, E., Guerin, E., Peytave, A., and Benes, B. (2013). Terrain Generation using Procedural Models based on Hydrology in *ACM Transactions on Graphics*, 32(4), pp: 143:1-143:10.
42. Bojrab, M., Massih M-A., and Benes, B. (2013). Perceptual Importance of Lighting Phenomena in Rendering of Animated Water in *ACM Transactions on Applied Perceptions*, 10(1), pp: 2:1-2:18.
43. Vanegas, C, A., Garcia-Dorado, I., Aliaga, D., Benes, B., and Waddell, P., (2012) Inverse Design of Urban Procedural Models in *ACM Transactions on Graphics*, 31(6), Article 168, 11 pages
44. Gurney, K., Razlivanov, I., Song, Y., Zhou, Y., Benes, B., and Abdul-Massih, M., (2012) Quantification of fossil fuel CO<sub>2</sub> emissions at the building/street scale for a large US city in *Environmental Science & Technology*, 46(21), pp: 12194–12202.

45. Stava, O., Vanek, J., Benes, B., Carr, N., and Mech, R., (2012). Stress relief: improving structural strength of 3D printable objects in *ACM Transactions on Graphics*, 31, 4, Article 48, 11 pages.
46. Pirk, S., Stava, O., Kratt, J., Said, M.A., Neubert, B., Měch, R., Benes, B., and Deussen, O., (2012). Plastic trees: interactive self-adapting botanical tree models in *ACM Transactions on Graphics*, 31(4), Article 50, 10 pages.
47. Vanegas, C., Aliaga, D., and Benes, B., (2012) Automatic Extraction of Manhattan-World Building Masses from 3D Laser Range Scans in *IEEE Transactions on Visualization and Computer Graphics*, 18(10), pp: 1627-1637.
48. Vanek, J., Benes, B., Herout, A., and Stava, O., (2011) Large-Scale Physics-Based Terrain Editing Using Adaptive Tiles on the GPU in *IEEE Computer Graphics and Applications*, 31(6), pp:35-44.
49. Peytavie, A., Galin, E., Guerin, E., and Benes, B., (2011) Authoring Hierarchical Road Networks in *Computer Graphics Forum*, 30(7), pp: 2021-2030.
50. Liang, Z., Wildeson, I., Colby, R., Ewoldt, R., Zhang, T., Sands, T. D., Stach, E., Benes, B., and Garcia, E., (2011) Built-In Electric Field Minimization in (In,Ga)N Nanoheterostructure in *NANO Letters*, 11(11), pp: 4515-4519.
51. Benes, B., Stava, O., Mech, R., and Miller, G., (2011) Guided Procedural Modeling in *Computer Graphics Forum*, 30(2), pp: 325-334.
52. Vanegas, C., Aliaga, D., Beneš, B., Waddell, P., (2009) Interactive Designing and Editing of Urban Spaces using Geometric and Behavioral Modeling in *ACM Transactions on Graphics*, 28(5) pp: 1-10.
53. Stava, O., Benes, B., Mech, R., Aliaga, D., Kristof, P., (2010) Inverse Procedural Modeling by Automatic Generation of L-systems in *Computer Graphics Forum*, 29(2), pp: 665-674.
54. Malkova, M., Parus, J., Kolingerova, I., and Benes, B. (2010) An intuitive Polygon Morphing in *The Visual Computer*, 26 (3), pp: 205-215
55. Kristof, P., Benes, B., Krivanek, J., and Stava, O. (2009) Hydraulic Erosion Using Smoothed Particle Hydrodynamics in *Computer Graphics Forum*, 28(2), pp: 219-228.
56. Andryscio, N., Gurney, K. R., Benes, B., Corbin, K. (2009) Visual Exploration of the Vulcan CO<sub>2</sub> Data in *IEEE Computer Graphics & Applications*, 29(1), pp: 6-11.
57. Vanegas, C., Aliaga, D. G., Benes, B., and Waddell, P. (2009) Visualization of Simulated Urban Spaces: Inferring Parameterized Generation of Streets, Parcels, and Aerial Imagery in *IEEE Transactions on Visualization and Computer Graphics*, 15(2), pp: 424-435.
58. Aliaga, D. G., Vanegas, C., and Benes, B. (2008) Interactive Example-Based Urban Layout Synthesis in *ACM Transactions on Graphics*, 27(5), pp: 1:106-10:106.
59. Aliaga, D. G., Benes, B., and Vanegas, C. (2008) Interactive Reconfiguration of Urban Layouts in *IEEE Computer Graphics & Applications*, 28(3), pp: 38-47.

60. Hartman, C., and Benes, B. (2006) Autonomous Boids in *Computer Animation and Virtual Worlds*, 17(3-4), pp: 199-206.
61. Benes, B., Tesinsky, V., Hornys, J., and Bhatia, S. K. (2006) Hydraulic Erosion in *Computer Animation and Virtual Worlds*, 17(2), pp: 99-108.
62. Benes, B., Soto, J.M, and Cordoba, A. (2003) Interacting Agents with Memory in Virtual Ecosystems in *the Journal of International Conference in Central Europe on Computer Graphics Visualization and Computer Vision (WSCG)*, I (11), pp: 49-56.
63. Benes, B., and Forsbach, R. (2002). Visual Simulation of Hydraulic Erosion in *the Journal of International Conference in Central Europe on Computer Graphics Visualization and Computer Vision (WSCG)*, pp: 79-86.
64. Benes, B., and Espinosa E. (2001). Using Particles for 3D Texture Sculpting in *The Journal of Visualization and Computer Animation*, 12, pp: 191-201.

### Conference papers

1. Skorkovska, V., Kolingerova, I., and Benes, B., (2018) A Simple and Robust Approach to Computation of Meshes Intersection in *Proceedings of the 13th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications*, Volume: 1
2. Patil, S., Lee, T., Ramalingam, S., Taguchi, Y., and Benes, B., (2017). Barcode: Global Binary Patterns for Fast Visual Inference in *Proceedings of the International Conference on 3D Vision (3DV)*, pp: 630-639 (Acceptance rate: 17% oral, 65% Overall)
3. Yeum, C. M., Dyke, S. J., Benes, B., Hacker, T., Ramirez, J., Lund, A., and Pujol, S., (2017) Rapid, Automated Post-Event Image Classification and Documentation in *Proceedings of the 7th AESE International Conference on Experimental Structural Engineering*,
4. Fiser, M., Benes, B., Garcia-Galicia, J., Abdul-Massih, M., Aliaga, D.G., and Krs, V., (2016) Learning Geometric Graph Grammars in *Proceedings of the 32nd Spring Conference on Computer Graphics (SCCG '16)*, pp:7-15.
5. Kang, H., Fiser, M., Shi, B., Sheibani, F., Hirst, P., and Benes, B., (2016) IMapple — Functional Structural Model of Apple Trees in *Proceedings of the IEEE International Conference on Functional-Structural Plant Growth Modeling, Simulation, Visualization and Applications (FSPMA)*, pp: 90-97.
6. Demir, I., Aliaga, D.G., and Benes, B., (2015). Procedural Editing of Building Point Clouds. International Conference on Computer Vision in *Proceedings of the IEEE International Conference on Computer Vision (ICCV)*, pp: 2147-2155. (Acceptance rate: 30.92%)
7. Zhuo, H., Zhou, S., Benes, B., and Whittinghill, D., (2015). User-assisted Inverse Procedural Facade Modeling and Compressed Image Rendering in *Advances in Visual Computing (ISVC)*, Lecture Notes in Computer Science, vol 9475.
8. Demir, I., Aliaga, D. G., and Benes, B., (2014) Proceduralization at City Scale in *Proceedings of the 2nd International Conference on 3D Vision*, pp: 456-463.

9. Gazo, R., Benes, B. (2013). Computed tomography log scanning: An industrial application in *Proceedings of ISCHP 2013 – 4th International Scientific Conference on Hardwood Processing*, pp: 140-147.
10. Kristof, P., Benes, B., Song, X.C., and Zhao, L. A. (2013) A system for large-scale visualization of streaming Doppler data in *Proceedings of the IEEE International Conference on Big Data*, pp: 33-40. (Acceptance rate: 17%)
11. Vanegas, C., Aliaga, D., Benes, B., (2010) Building Reconstruction using Manhattan-World Grammars in *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pp: 358-365. (Acceptance rate: 26.1%)
12. Andryscio, N., Rosen, P., Popescu, V., Benes, B., and Gurney, K., (2011) Experiences in Disseminating Educational Visualizations in *Advances in Visual Computing (ISVC)*, Lecture Notes in Computer Science, vol 6939, pp: 239-248.
13. Massih, M. A., Benes, B., Zhang, T., Platzler, C., Leavenworth, W., Garcia, R.E., and Zhiwen, L., (2011) Augmenting Heteronanostructure Visualization with Haptic Feedback in *Advances in Visual Computing (ISVC)*, Lecture Notes in Computer Science, vol 6939, pp: 627-636.
14. Benes, B., Massih, M-A., Jarvis, P., Aliaga, D.G., and Vanegas, C., (2011) Urban Ecosystem Design, in *Proceedings of the ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D)*, pp: 167-174. (Acceptance rate: 38%)
15. Benes, B., Andryscio, N., and Stava, O. (2009) Interactive Modeling of Virtual Ecosystems, in *Proceedings of the Eurographics Workshop on Natural Phenomena*, pp: 9-16.
16. Stava, O., Benes, B., Brisbin, M., and Krivanek, J. (2008). Interactive Terrain Modeling Using Hydraulic Erosion in *Proceedings of the Eurographics/SIGGRAPH Symposium on Computer Animation*, pp: 201-210. (Acceptance rate: 40%)
17. Sundaram, V., Ru, Y., Benes, B., Zhao, L., Song, X. C., Park, T., Bertoline, G., and Huber, M. (2008) System for Near Real-Time 3D Visualization of NEXRAD Level II Data Using TeraGrid in *Proceedings of the TeraGrid Conference*, pp: 9-13.
18. Benes, B. (2007) Hydraulic Erosion Using Shallow-Water Equation Simulation in *Proceedings of the Workshop on Virtual Reality Interactions and Physical Simulation*, pp: 43-50.
19. Brisbin, M., and Benes, B. (2007) Interval-Based Motion Blending for Grasping in *Proceedings of the Theory and Practice of Computer Graphics*, Eurographics, pp: 201-205.
20. Dorjgotov, E., Benes, B., and Madhavan, K. (2007) An Immersive Granular Material Visualization System with Haptic Feedback in *Proceedings of the Theory and Practice of Computer Graphics*, Eurographics, pp: 107-113.
21. Foldes, D., and Benes, B. (2007) Occlusion-Based Snow Accumulation Simulation in *Proceedings of the Workshop on Virtual Reality Interactions and Physical Simulation*, Eurographics, pp: 35-41.
22. Benes, B., and Tesinsky, V. (2006) Compression Scheme for Volumetric Animations of Running Water, in *Proceedings of the Computational Imaging and Vision*, (32), Springer-Verlag, pp: 2063-1068.



23. Kolingerova, I., Marz, P., and Benes, B. (2005) Tensor Product Surfaces as Rewriting Process in *Proceedings of the 22nd Spring Conference on Computer Graphics*, pp: 107-112.
24. Benes, B., Dorjgotov, E., Arns, L., and Bertoline, G. (2006) Granular Material Interactive Manipulation: Touching Sand with Haptic Feedback in *Proceedings of International Conference in Central Europe on Computer Graphics Visualization and Computer Vision (WSCG)*, pp: 295-304.
25. Benes, B., and Arriaga, X. (2005) Table Mountains by Virtual Erosion in *Proceedings of the Eurographics Workshop on Natural Phenomena*, pp: 33-40.
26. Benes, B., Gomez, N. (2005) GI-Collide: Collision Detection with Geometry Images in *Proceedings of the Spring Conference on Computer Graphics*, pp: 95-102.
27. Hernandez, E., and Benes, B. (2005) Robin Hood's Algorithm for Time-Critical Level of Detail, in *Proceedings of Graphicon*
28. Benes, B., and Soto, J. M. (2004) Clustering in Virtual Ecosystems in the *Proceedings of the International Conference in Central Europe on Computer Graphics Visualization and Computer Vision (WSCG) Short Communication Papers, I (11)*, pp: 10-21.
29. Benes, B., and Roa, T. (2004) Simulating Desert Scenery in *Proceedings of the International Conference in Central Europe on Computer Graphics Visualization and Computer Vision (WSCG) Short Communication Papers, I (11)*, pp: 110-119.
30. Zara, J., Benes, B., and Rodarte, R. R. (2004) Virtual Campeche: A web-based Virtual Three Dimensional Tour in *Proceedings of the IEEE Fifth Mexican International Conference in Computer Science - ENC*, pp: 133-140.
31. Benes, B., and Espinosa, E. (2003) Modeling Virtual Ecosystems with Proactive Guidance of Agents in *Proceedings of the IEEE Computer Animation and Social Agents*, pp: 23-35.
32. Benes, B., Soto, J. M, and Cordoba, A. (2003) Modeling Virtual Gardens by Autonomous Procedural Agents in *Proceedings of the IEEE Theory and Practice of Computer Graphics*, pp: 73-85. **Ken Brodli prize for the best paper**
33. Benes, B. (2002) A Stable Modeling of Large Plant Ecosystems in the *Proceedings of the International Conference on Computer Vision and Graphics*, pp: 94-101.
34. Benes, B., and Millan, E. (2002) Virtual Climbing Plants Competing for Space in *Proceedings of the IEEE Symposium on Computer Animation*, pp: 33-42.
35. Benes, B., and Forsbach, R. (2001) Parallel Implementation of Terrain Erosion Applied to the Surface of Mars in *Proceedings of Afrigraph*, pp: 53-57. (Acceptance rate: 54%)
36. Benes, B. an Forsbach, R. (2001) Layered Data Representation for Visual Simulation of Terrain Erosion in *Proceedings of the IEEE Spring Conference on Computer Graphics*, pp: 80-86.
37. Benes, B. (1998) Skylight Approximation for Simulation of Plant Development, in *Proceedings of the IEEE Conference on Information Visualization*, pp: 146-150.

38. Benes, B. (1998) Direct Illumination of Dense Foliage Using Z-buffer in *Proceedings of the Spring Conference on Computer Graphics*, pp: 237-246.
39. Benes, B. (1997) Visual Simulation of Plant Development with Respect to Influence of Light in *Proceedings of the Computer Animation and Simulation*, Springer-Verlag, pp: 125-136.
40. Benes, B. (1997) Fast Estimation of Light in Simulation of Plant Development in *Proceedings of the International Conference in Central Europe on Computer Graphics Visualization and Computer Vision (WSCG)*, pp: 1-10.
41. Marak, I., Benes, B., and Slavik, P. (1997) Terrain Erosion Model Based on Rewriting of Matrices in *Proceedings of the International Conference in Central Europe on Computer Graphics Visualization and Computer Vision (WSCG)*, pp: 341-351.
42. Benes, B., Marak, I., Simek, and Slavik, P. (1997) Hierarchical Erosion of Synthetic Terrains in *Proceedings of the Spring Conference of Computer Graphics*, pp: 93-100.
43. Benes, B. (1996) An Efficient Estimation of Light in Simulation of Plant Development in *Proceedings of the Computer Animation and Simulation*, Springer-Verlag, pp: 153-165.

#### *Refereed Conference Papers in Education*

1. Felkel, P., Magana, A.J., Folta, M., Sears, A.G., and Benes, B., (2018) I3T: Using Interactive Computer Graphics to Teach Geometric Transformations in *Proceedings of Eurographics Education Papers*
2. Neri, L., Magana, A., Noguez, J., Walsh, Y., Gonzalez-Nucamendi, A., Robledo-Rella, V., and Benes, B., (2018) Visuo-haptic Simulations to Improve Students' Understanding of Friction Concepts in *Proceedings of the IEEE-ERM 48th Annual Frontiers in Education (FIE)*
3. Walsh, Y., Magana, A. J., Quintana, J. P., Krs, V., Silva Coutinho, G., Berger, E. J., Ngambeki, I., Efendy, E., and Benes, B. (2018). Designing visuohaptic simulations for promoting graphical representations and conceptual understanding of structural analysis in *Proceedings of the IEEE-ERM 48th Annual Frontiers in Education (FIE)*
4. Yuksel, T., Walsh, Y., Krs, V., Benes, B., Ngambeki, I., Berger, E., and Magana, A., (2017) Exploration of Affordances of Visuo-Haptic Simulations to Learn Concept of Friction in *Proceedings of the IEEE-ERM 47th Annual Frontiers in Education (FIE)*
5. Neri, L., Escobar-Castillejos, D., Noguez, J., Shaikh, U.A.S., Magana, A.J., and Benes, B. (2015). Improving the learning of physics concepts using haptic devices in *Proceedings of the 45th Annual Frontiers in Education (FIE)*

#### *Books and Book Chapters*

1. Stava, O., and Benes, B., (2010) Connected Component Labeling in CUDA, Chapter in *GPU Computing Gems*
2. Stava, O., Benes, B., and Krivanek, J., (2009) Interactive Erosion Simulation on the Graphical Processing Unit, Chapter in *ShaderX7 advanced rendering techniques*, Charles River Media

3. Žára, J., Benes, B., Sochor, J., Felkel,P., (2004) Modern Computer Graphics 2nd edition, Computer Press **an official textbook of computer graphics in Czech and Slovak republic**
4. Žára, J., Benes, B., Felkel,P., (1998) Modern Computer Graphics, Computer Press
5. Žára, J., Benes, B., Limpouch, T., Werner, T., (1992) Computer Graphics - Principles and Algorithms, Grada 1992

## Invited Presentations

- 2018 Shenzhen University, China – Modeling Plant Life in Computer Graphics
- 2018 Keynote address, COMPDES, University of San Carlos, Costa Rica
- 2018 University of Magdalena Colombia – Geometric Models in Additive Manufacturing
- 2018 Purdue University - Digital Agriculture Forum, Inverse Procedural Modeling
- 2017 Czech Technical University in Prague – Virtual Life of Plants
- 2015 Tecnológico de Monterrey - Inverse Procedural Modeling
- 2014 Indiana Horticultural Congress - Self-Adapting Botanical Tree Models in Comp. Graphics
- 2013 INRIA Grenoble, IMAGINE - Inverse Procedural Modeling
- 2013 Czech Technical University in Prague – Inverse Procedural Modeling
- 2012 University of San Juan Bogota - Complex Cities, Biologically-Based Plants, and Terrain Modeling for Computer Graphics
- 2011 Back to Class - New and Improved: How Computer Graphics Technology is Changing Everyday Life - Purdue President's Council
- 2011 Keynote address, Siggraph Bogota
- 2011 Delft University - Inverse Procedural Modeling
- 2011 The Best of Eurographics at FMX - 16th Conference on Animation, Effects, Games and Interactive Media
- 2011 Department of Computer Science, University of Konstanz Germany
- 2010 Virtual Landscaping, at the International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision
- 2009 Computer Graphics Applications in Forestry Products, at Purdue University, Department of Forestry
- 2007 Hydraulic Erosion in Computer Graphics at Brigham Young University, Department of Computer Science

- 2006 Keynote address, ACM Spring Conference on Computer Graphics
- 2005 Computer Graphics at the V Simposium de Computación
- 2005 Hydraulic Erosion at St. Louis University, Department of Computer Science
- 2004 Computer Graphics, Segundo Congreso de Ingeniería en Sistemas Computacionales Instituto Tecnológico Superior de Poza Rica, México
- 2003 Artificial Life and Computer Graphics at Telecomunicaciones Electrónica y Computación, México
- 2000 Artificial Life and Computer Graphics at Mexican International Conference on Artificial Intelligence, MICAI'2000
- 1999 Virtual Plants, Charles University Prague, Faculty of Biology, Czech Republic
- 1995 Modeling of plant development Technical University Delft, Netherlands

## Sponsored Research

*Elements: Data: Integrating Human and Machine for Post-Disaster Visual Data Analytics: A Modern Media-Oriented Approach*

National Science Foundation/OAC, co-Primary Investigator  
\$597,955 (30% of total), 2019-2021

*Functional Proceduralization of 3D Geometric Models*

National Science Foundation/CISE/CHS, co-Primary Investigator  
\$499,937 (50% of total), 2018-2021

*Multimodal Affective Pedagogical Agents for Different Types of Learners*

National Science Foundation/CISE/IIS, co-Primary Investigator  
\$758,823 (total), \$498,823 (Purdue, 50% of Purdue part) 2018-2021

*Development of a 3D Printer for Polymer Structure and Polymer Computation – Purdue PolymerMakers*

National Science Foundation/CNS/MRI, co-Primary Investigator  
\$1,867,017 (20% of total), 2017-2020

*Inverse Procedural Material Modeling for Battery Design*

National Science Foundation/CISE/IIS, Primary Investigator  
\$250,000 (total) \$150,000 (Purdue, 50% of Purdue part), 2017-2018

*Solution for Predictive Physical Modeling in CDTE and Other Thin-Film PV Technologies*

Department of Energy, co-Primary Investigator  
\$325,081 (total), \$160,051 (Purdue, 100% of Purdue part) 2016-2019,

*CDS&E: Enabling Time-critical Decision-support for Disaster Response and Structural Engineering*

National Science Foundation/CMMI, co-Primary Investigator  
\$299,999 (40% of total) 2016-2019

*Haptic-Based Learning Experiences as Cognitive Mediators for Conceptual Understanding and Representational Competence in Engineering Education*

National Science Foundation/EEC, co-Primary Investigator  
\$325,081 (25% of total), 2016-2019

*Enhancing Computer Graphics Education with Many Integrated Core Computing*

Intel Inc., Primary Investigator  
\$20,000 (100% of total) unrestricted gift, 2014-2017

*Software Analysis for 3D Printing*

Siemens, Primary Investigator  
\$55,000 (100% of total), 2014-2015

*Optimizations for Additive Manufacturing, Advancing Purdue's Research Enterprise*

Purdue University, Primary Investigator  
\$34,000 (100% of total), 2014-15

*Integrating Spatial Educational Experiences (Isee) – Mapping a New Approach to Teaching and Learning Soil Science*

USDA/HECG, co-Primary Investigator  
\$629,619 (6% of total), 2013-2015

*Procedural Modeling*

Adobe Research, Primary Investigator  
\$150,000 (100% of total), unrestricted gift 2008-2018

*Integrating Spatial Education Experience (ISEE) into Crop, Soil, and Environmental Science Curricula*

USDA/HECG, co-Primary Investigator  
\$312,607 (5% of total), 2008-2011

*Integrating Behavioral, Geometrical and Graphical Modeling to Simulate and Visualize Urban Areas,*

National Science Foundation/CISE/IIS, co- Primary Investigator  
\$990,000 (total), \$449,818 (Purdue, 50% of Purdue part), 2010-2013

*Urban Simulation Visualization*

Metropolitan Transportation Commission, co-Primary Investigator  
\$285,000 (50% of total), 2010-2013

*A Global High-Resolution Fossil Fuel CO<sub>2</sub> Inventory Built from assimilation of in Situ and Remotely-Sensed Datasets to Advance Satellite Greenhouse Gas Detection Support Systems*

NASA, co-Primary Investigator  
\$997,440 (20% of total), 2007-2011

## Service

### *Journal Editorial Boards*

2018-present Editor in Chief of Computer Graphics Forum (Blackwell)

- 2018-present Associate Editor of *in Silico Plants* (Oxford Academic)
- 2014-2017 Associate Editor of *Computer Graphics Forum* (Blackwell)
- 2012-present Associate Editor of *Computers & Graphics* (Elsevier)
- 2012-2016 Associate Editor of *Computer Animation and Virtual Worlds* (Wiley)
- 2016 Associate Editor of *IEEE Computer Graphics Applications*, Special Issue on Computational Design and Fabrication Meet Computer Graphics
- 2012 Associate Editor of *Computers & Graphics*, Special Issue on Procedural Modeling (Elsevier)

*Conference Chair*

- 2017 Eurographics, full papers chair

*Program Committees*

- 2019 International Conference on Geometric Modeling and Processing, PC member
- 2017 VISIGRAPP, PC member
- 2015-present Symposium on Geometry Processing, PC member
- 2015 Siggraph Asia, PC member
- 2014, 2017 Workshop on Procedural Content Generation in Games, PC member
- 2013, 14, 17 Siggraph, PC member
- 2012, 13 Extreme Science and Engineering Discovery Environment (XSEDE), PC member
- 2012-present *Computer Graphics International (CGI)*, PC member
- 2007, 10, 12-17 Eurographics, PC member
- 2007 Eurographics Animation Theater, PC member
- 2006-2010 Eurographics Workshop on Natural Phenomena, PC member
- 2005 Central European Multimedia and Virtual Reality Conference, PC member
- 2004-2013 Workshop in VR Interactions and Physical Simulations, PC member

*Journal Reviewing*

2017-present Journal of Microscopy  
2016-present Digital Applications in Archaeology and Cultural Heritage  
2016-present Plos One  
2015-present Shape Modeling International  
2015-present Computer Aided Design  
2015 ACM Cultural Heritage  
2015-present Additive Manufacturing  
2012-present IEEE Transactions on Visualization and Computer Graphics  
2011 ACM Journal of Computing and Cultural Heritage  
2011 International Journal of Computational Fluid Dynamics  
2010-present IEEE Computer Graphics & Applications  
2009 Journal of Plant Physiology  
2008 Journal of Virtual Reality and Broadcasting  
2009-present Journal of Pattern Recognition  
2009-present Journal of Computer Graphics and Virtual Worlds  
2005-present ACM Transactions on Graphics  
2005-present Computer Graphics Forum  
2007-present Computer Graphics and Visualization  
2002-2003 ACM SIGGRAPH Course

*Proposal Reviewing*

Natural Sciences and Engineering Research Council of Canada  
King Abdullah University of Science and Technology  
National Science Foundation  
National Institutes of Health  
Consejo Nacional de Ciencia y Tecnología (Mexico)  
Czech Ministry of Education (Czech Rep)

### *Outreach*

- 2018-present Promotion and Tenure Committee (Purdue Polytechnic)
- 2017-2019 Research Integrity Committee (Purdue Provost)
- 2017-2018 Graduate Chair (Computer Graphics Technology)
- 2015-2017 Graduate Council (Purdue University)
- 2015-2017 Executive Committee Computational Interdisciplinary Graduate Programs
- 2014-2016 Academic Senate (College of Technology)
- 2014-present Grade Appeal Committee (Purdue Polytechnic)
- 2013-2014 Search and Screen committee (C&IT)
- 2012-2013 Head of the search for Associate Dean of Research (College of Technology)
- 2011-2012 Graduate chair (CGT)
- 2011-2013 Grievance committee (College of Technology)
- 2011-2012 Assistant head of department (CGT)
- 2010-2013 Grievance committee (Purdue)
- 2005-2007 Curriculum committee (CGT)
- 2005-2018 Search and Screen committee (CGT)

### *Professional societies*

- IEEE, Senior member
- ACM, member
- Eurographics, member

## Teaching and Students

### *Course Development*

- Parallel graphics and simulation (CGT 581-I), Graduate course, 2016
- Geometric modeling (CGT 581-G), Graduate course, 2014
- Graphics processing unit computing (CGT 620), Graduate course, 2013
- Applied perceptualization (CGT 581-8), Graduate course, 2010
- Advanced computer graphics programming (CGT 521), Graduate course, 2008



Introduction to computer graphics Programming (CGT 215), Undergraduate course, 2008

Computer graphics programming (CGT 520), Graduate course, 2006

Digital lighting and rendering (CGT 340), Undergraduate course, 2005

The development of graphics in technology (CGT 511), 2005

Programming in OpenGL (ITESM, Mexico), 2002

### *Teaching*

(S-spring, F-fall, CGT-Computer Graphics Technology at Purdue, ITESM-Tec de Monterrey Mexico)

Geometric modeling (CGT 581-G), Graduate course, CGT  
S18, F15, F14

Parallel Graphics and Simulation (CGT 581-I), Graduate course, CGT  
S17

Advanced Computer Graphics Programming (CGT 521), Graduate course, CGT  
F12, S12, S10, S09, F06

Computer Graphics Programming (CGT 520), Graduate course, CGT  
F16, F11, F10, F09, S08, S07

The development of graphics in technology (CGT 511), Graduate course, CGT  
F12, F11, F10, F09, F08, F07, F06

Graphics processing unit computing (CGT 620), Graduate course, CGT  
F14, S13, F11, S11, S10

Applied Perceptualization (CGT 581-8), Graduate course, CGT  
S16, S11

Introduction to Computer Graphics Programming (CGT 215), Undergraduate course, CGT  
F18, S18, F17, S17, S16, F15, S15, F11, S06

Digital Lighting and Rendering (CGT 340), Undergraduate course, CGT  
S13, S09, F08, S08, F07, S07, F06, S06, F05

Programming in OpenGL, Graduate course, ITESM  
F04, S04, F02, S02

Real Time Computer Graphics, Graduate course, ITESM  
F03

Realistic Image Synthesis, Graduate course, ITESM  
F03

Data Structures, Undergraduate course, ITESM  
F03, F02, S02

*Current Graduate Students*

Suren Deepak Rajasekaran (Polytechnic), PhD student, ABT

Vojtech Krs (Polytechnic), PhD student, ABT

Hao Kang (Polytechnic), PhD student, ABT

Mathieu Gaillard (Polytechnic), PhD student, second year

Yichen Sheng (Polytechnic), PhD student, first year

Jason Macnak (Polytechnic), PhD student, first semester

Wenbin Zhou (Polytechnic), PhD student, first semester

Shreya Randive (CGT), MS student

David Hrusa (CGT), MS student

*Graduated Students**Ondrej Stava*

Degree: PhD, Jul 2012

Research project: Inverse procedural modeling of trees

Currently at: Google, Inc.

*Juraj Vanek*

Degree: PhD, Apr 2014

Research project: 3D Model Optimization for 3D Printing

Currently at: Arevo Labs, Inc.

*Michel Abdul*

Degree: PhD, Jul 2014

Research project: Motion Style Retargeting

Currently at: Square Enix, Inc.

*Innfarn Yoo*

Degree: PhD, Jul 2015

Research project: Motion Pipeline: Searching, Editing, Representation, and Synthesis.

Currently at: Nvidia, Inc.

*Jorge Garcia*

Degree: PhD, Jul 2017

Research project: 3D Printing Speed Optimization by Minimizing Void Paths

Currently at: Nvidia, Inc.

*Hansoo Kim*

Degree: PhD, Dec 2017

Research project: Edge-based inverse procedural texture synthesis

Currently at: Google, Inc.

Worked on PhD committees of 22 PhD students (Purdue CS, Purdue Mechanical Eng., Purdue Materials Eng., King Abdullah University of Science and Technology, Inria, Delft University, and CTU Prague)

Graduated 52 MS students.

Worked on MS committees of 36 MS students.