

Christian Alexander Duncan

Work Address

Assistant Professor
Department of Computer Science
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2220 Secoffee Terrace
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Higher Education

- **The Johns Hopkins University**, Baltimore, MD
Ph.D. in Computer Science, 1999 (*Balanced Aspect Ratio Trees*)
M.S.E. in Computer Science, 1994
B.S. Degree double major in Computer Science and Math. Sciences, 1994

Experience

- **Max-Planck-Institut für Informatik** (AG1)
Saarbrücken, Germany
Post-Doctoral Fellow
Fall 1999–Fall 2000
- **University of Miami**
Assistant Professor
Fall 2000–Present
- **Astral Empire**
Game Programming Consultant
Summer 2002

Research Interests

Computational Geometry, Algorithms, Data Structures, Graph Drawing, and
Computer Graphics

Dissertation Publication

- C. A. Duncan, *Balanced Aspect Ratio Trees*, Dissertation for the Doctor of
Philosophy degree, Department of Computer Science, The Johns Hopkins Uni-
versity, 1999.

Book Chapters

- C. A. Duncan and M. T. Goodrich, “Approximate Geometric Query Structures,”
in *Handbook of Data Structures and Applications* (edited by D. P. Mehta and S.
Sahni), Chapman & Hall/CRC Computer & Information Science Series, Volume
4, CRC Press, pp. 26-1–26-17, 2004.

Journal Publications

- C. A. Duncan, S. G. Kobourov, and V. S. A. Kumar, “Optimal Constrained
Graph Exploration,” *ACM Transactions on Algorithms*, *accepted, to appear*.
- P. Brass, E. Cenek, C. A. Duncan, A. Efrat, C. Erten, D. Ismailescu, S. G.
Kobourov, A. Lubiw, and J. Mitchell, “On Simultaneous Planar Graph Embed-
dings,” *CGTA: Computational Geometry: Theory and Applications*, *accepted,
to appear*.
- T. Biedl, E. Demaine, C. A. Duncan, R. Fleischer, and S. G. Kobourov, “Tight
Bounds on Maximal and Maximum Matching,” *Discrete Mathematics*, **285(1-3):7–15**, 2004.

- C. A. Duncan and S. G. Kobourov, “Polar Coordinate Drawing of Planar Graphs with Good Angular Resolution,” *Journal of Graph Algorithms and Applications*, **7(4)**:311–333, 2003. (Invited to this special issue on the best papers from Graph Drawing 2001.)
 - C. A. Duncan, M. T. Goodrich, and S. G. Kobourov, “Planarity-Preserving Clustering and Embedding for Large Planar Graphs,” *CGTA: Computational Geometry: Theory and Applications*, **24(2)**:95–114, 2003. (Invited to this special issue on the best papers from the 4th CGC Workshop on Computational Geometry, 1999.)
 - C. C. Cheng, C. A. Duncan, M. T. Goodrich, and S. G. Kobourov, “Drawing Planar Graphs with Circular Arcs,” *Discrete & Computational Geometry*, **25**:405–418, 2001.
 - C. A. Duncan, M. T. Goodrich, and S. G. Kobourov, “Balanced Aspect Ratio Trees: Combining the Advantages of k -d Trees and Octrees,” *Journal of Algorithms*, **38**:303–333, 2001. (Invited to this special issue on the best papers from SODA 1999.)
 - C. A. Duncan, M. T. Goodrich, and S. G. Kobourov, “Balanced Aspect Ratio Trees and Their Use for Drawing Very Large Graphs,” *Journal of Graph Algorithms and Animation*, **4**:19–46, 2000. (Invited to this special issue on the best papers from Graph Drawing 1998.)
 - A. K. Laing, R. Cypher, and C. A. Duncan, “On the Flattest Common Super-sequence Method for Deadlock-Free Routing in Arbitrary Networks,” *Theory of Computing Systems* **33**:393–426, 2000.
 - G. Barequet, S. Bridgeman, C. A. Duncan, M. T. Goodrich, and R. Tamassia, “GeomNet: Geometric Computing Over the Internet,” *IEEE Internet Computing*, **3(2)**:21–29, April 1999.
 - G. Barequet, C. A. Duncan, and S. Kumar, “RSVP: A Geometric Toolkit for Controlled Repair of Solid Models,” *IEEE Transactions on Visualization and Computer Graphics*, **4(2)**:162–177, April 1998.
- Refereed
Conference
Publications
- C. A. Duncan, D. Eppstein, and S. G. Kobourov, “The Geometric Thickness of Low Degree Graphs,” *Proceedings of the 20th Annual Symposium on Computational Geometry (SCG 2004)*, 340–346, 2004.
 - C. A. Duncan, “Multi-way Space Partitioning Trees,” *LNCS 2748: Algorithms and Data Structures 8th International Workshop (WADS 2003)*, 219–230, 2003.
 - P. Brass, E. Cenek, C. A. Duncan, A. Efrat, C. Erten, D. Ismailescu, S. G. Kobourov, A. Lubiw, and J. Mitchell, “On Simultaneous Planar Graph Embeddings,” *LNCS 2748: Algorithms and Data Structures 8th International Workshop (WADS 2003)*, 243–255, 2003.
 - C. A. Duncan and S. G. Kobourov, “Polar Coordinate Drawing of Planar Graphs with Good Angular Resolution,” *LNCS 2265: Graph Drawing, 9th International Symposium (GD 2001)*, 407–421, 2002.
 - C. A. Duncan, A. Efrat, S. G. Kobourov, and C. Wenk, “Drawing Graphs with Fat Edges,” *LNCS 2265: Graph Drawing, 9th International Symposium (GD 2001)*, 162–177, 2002.
 - T. Biedl, E. Demaine, C. A. Duncan, R. Fleischer, and S. G. Kobourov, “Tight Bounds on Maximal and Maximum Matchings,” *LNCS 2223: Algorithms and Computation, 12th International Symposium (ISAAC 2001)*, 308–319, 2001.
 - M. Pop, G. Barequet, C. A. Duncan, M. T. Goodrich, W. Huang, and S. Kumar, “Efficient Perspective-accurate Silhouette Computation and Applications,”

Proceedings of the 17th Annual Symposium on Computational Geometry (SCG 2001), 60–68, 2001.

- C. A. Duncan, S. G. Kobourov, and A. Kumar, “Optimal Constrained Graph Exploration,” *12th ACM-SIAM Symposium on Discrete Algorithms (SODA 2001)*, 807–814, 2001.
- M. Dickerson, C. A. Duncan, and M. T. Goodrich, “K-D Trees Are Better when Cut on the Longest Side,” *LNCS 1879: Algorithms, European Symposium on Algorithms (ESA 2000)*, 179–190, 2000.
- C. A. Duncan, M. T. Goodrich, and S. G. Kobourov, “Planarity-Preserving Clustering and Embedding for Large Planar Graphs,” *LNCS 1731: Graph Drawing, Seventh International Symposium (GD 1999)*, 186–196, 1999.
- C. C. Cheng, C. A. Duncan, M. T. Goodrich, and S. G. Kobourov, “Drawing Planar Graphs with Circular Arcs,” *LNCS 1731: Graph Drawing, Seventh International Symposium (GD 1999)*, 117–126, 1999.
- M. Pop, G. Barequet, C. A. Duncan, M. T. Goodrich, W. Huang, and S. Kumar, “Efficient Perspective-accurate Silhouette Computation,” *Proceedings of the 15th Annual Symposium on Computational Geometry (SCG 1999)*, 417–418, 1999.
- C. A. Duncan, M. T. Goodrich, and S. G. Kobourov, “Balanced Aspect Ratio Trees: Combining the Advantages of k-d Trees and Octrees,” *10th ACM-SIAM Symposium on Discrete Algorithms (SODA 1999)*, 300–309, 1999.
- C. A. Duncan, M. T. Goodrich, and S. G. Kobourov, “Balanced Aspect Ratio Trees and Their Use for Drawing Very Large Graphs,” *LNCS 1547: Graph Drawing, Sixth International Symposium (GD 1998)*, 111–124, 1998.
- C. A. Duncan, M. T. Goodrich, and E. Ramos, “Efficient Approximation and Optimization Algorithms for Computational Metrology,” *8th ACM-SIAM Symp. on Discrete Algorithms (SODA 1997)*, 121–130, 1997.
- G. Barequet, S. Bridgeman, C. A. Duncan, M. T. Goodrich, and R. Tamassia, “Classical Computational Geometry in GeomNet,” *Proceedings of the 13th Annual Symposium on Computational Geometry (SCG 1997)*, 412–414, 1997.

Other Publications

- F. J. Brandenburg, C. A. Duncan, E. Gansner, and S. G. Kobourov, “Graph-Drawing Contest Report,” *LNCS 3383: Graph Drawing, 12th International Symposium (GD 2004)*, 512–516, 2002.
- C. A. Duncan, “Multi-way Space Partitioning Trees,” DIMACS Workshop on Computational Geometry, 2002.
- A. Chaudhary, B. F. de Medeiros, C. A. Duncan, M. T. Duncan, and A. S. Szalay, “Parameterized Balanced Aspect Ratio Trees,” 4th CGC Workshop on Computational Geometry, Baltimore, 1999.
- C. A. Duncan, M. T. Goodrich, and S. G. Kobourov, “Planarity-Preserving Clustering and Embedding for Large Planar Graphs,” 4th CGC Workshop on Computational Geometry, Baltimore, 1999.
- C. A. Duncan, M. T. Goodrich, and S. G. Kobourov, “Balanced Aspect Ratio Trees: An Introduction,” 3rd CGC Workshop on Computational Geometry, Providence, 1998.

Christian Alexander Duncan

- Professional Service*
- Program Committee Member for the 10th International Symposium on Graph Drawing, Irvine, CA, 2002
 - Contest Committee Member for the 12th International Symposium on Graph Drawing, New York, NY, 2004
 - Contest Committee Member for the 13th International Symposium on Graph Drawing, Limerick, Ireland, 2005
 - Contest Committee Chair for the 14th International Symposium on Graph Drawing, Karlsruhe, Germany, 2006
 - Academic Appeals Committee Member, University of Miami, 2004-present
 - University Curriculum Committee Member, University of Miami, 2004-present
 - Journal, Conference, and Grant Reviews
Computational Geometry: Theory and Applications, Journal of Algorithms, SIAM Journal of Computing, International Journal of Computational Geometry and Applications, Journal of Graph Algorithms and Animations, Ars Combinatoria
Symposium on Graph Drawing (GD), Symposium on Discrete Algorithms (SODA), SIGGRAPH, European Symposium on Algorithms (ESA), Symposium on Theoretical Aspects of Computer Science (STACS)
NWO (the Dutch Research Council, Veni-grant)
- Teaching*
- Courses taught or currently teaching:
- Introduction to Programming
 - Introduction to Programming (Honors)
 - Programming II (Data Structures)
 - Introduction to Game Programming (*new course development*)
 - Computational Geometry
 - Computer Graphics
 - Data Structures and Algorithm Analysis
 - Programming Languages
 - Graph Drawing (*new course development*)
- Collaborators*
- Gill Barequet (Technion), Therese Biedl (Waterloo), Franz Brandenburg (Passau), Peter Braß (City College, CUNY), Stina Bridgeman (Hobart & William Smith), Amitabh Chaudhary (Notre Dame), Eowyn Cenek (Waterloo), Christine Cheng (Wisconsin-Milwaukee), Robert Cypher (Sun Microsystems), Erik Demaine (MIT), Matthew Dickerson (Middlebury), Alon Efrat (Arizona), Cesim Erten (ISIK), David Eppstein (UC-Irvine), Rudolf Fleischer (HKUST), Emden Gansner (AT& T), Michael Goodrich (UC-Irvine), Wenjing Huang (Hopkins), Dan Ismailescu (Hofstra), Stephen Kobourov (Arizona), Subodh Kumar (Hopkins), V. S. Anil Kumar (Virginia Tech), Ambrose Laing (Tufts), Anna Lubiw (Waterloo), Dinesh Mehta (Colorado School of Mines), Joe Mitchell (Stony Brook), Mihai Pop (TIGR), Edgar Ramos (Illinois-UC), Sartaj Sahni (Florida), Roberto Tamassia (Brown), Carola Wenk (Texas-San Antonio)