Shuang (Sean) Luan

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Current Position:

Associate Professor of Computer Science and Joint Associate Professor of Radiology, University of New Mexico

Education:

- Ph.D. Computer Science, University of Notre Dame, Notre Dame, Indiana, 2004. Dissertation: Geometric Algorithms for Leaf Sequencing Problems in Intensity Modulated Radiation Therapy. Advisor: Prof. Danny Z. Chen.
- M.S. Computer Science, University of Notre Dame, Notre Dame, Indiana, 2002. Master Thesis: An Experimental Study and Comparison of Topological Peeling and Topological Walk. Advisor: Prof. Danny Z. Chen
- B.S. Computer Science and Engineering, Harbin Institute of Technology, Harbin, China, 1998.

Research Interests:

- Computational Medicine and Biomedical Engineering
- Algorithm Design, Analysis, and Implementation
- Computational Geometry

Professional Experience:

- July 2010 --- present: Associate Professor of Computer Science with Tenure, University of New Mexico, Albuquerque, New Mexico. (August 2004 --- July 2010: Assistant Professor of Computer Science.)
- October 2011 --- present: Joint Associate Professor of Radiology, University of New Mexico, Albuquerque, New Mexico. (October 2004 --- October 2011: Joint Assistant Professor of Radiology.)
- Sept 2011 --- Oct 2011, Guest Scientist, University of Heidelberg Hospital Department for Radiation Oncology and Radiotherapy. Researched on Monte Carlo simulations for micro-dosimetry and DNA damages.
- July 2008 and August 2009, Visiting Assistant Professor, University of California San Francisco (UCSF) Radiation Oncology Department. Researched on dynamic Gamma Knife and Cyberknife radiosurgeries.
- June 2009 --- July 2009, Guest Scientist, DKFZ (German Cancer Research Center) Medical Physics Department. Researched on (1) the impact on treatment quality from patient set up errors and CT uncertainties, and (2) beam angle selection for carbon ion therapy.
- June 2007 --- July 2007, June 2006 --- July 2006, June 2005 --- July 2005: Visiting Assistant Professor, University of Maryland Radiation Oncology Department. Developed (1) 4-dimensional intensity-modulate arc therapy (IMAT) treatment planning system, and (2) Arc-modulated radiation therapy, a single-arc form of IMRT.
- June 2004 --- July 2004, January 2003 --- May 2003, and August 2002 --- October 2002: Consultant, University of Maryland Radiation Oncology Department. Developed leaf sequencing software SLS for intensity modulated radiation therapy (IMRT).

Supervision of Ph.D. Students:

- Nathan Swanson, PhD with distinction, March 2009. Dissertation Title: Computer Assisted Dynamic Radiosurgery Treatment Planning. Nate is the winner of the 2008 Student Award for Innovation in Informatics. Nate is now a Senior Geospatial Scientist with GeoEye Inc., doing research on satellite images. GeoEye is the world's largest space imaging corporation and provides satellite maps images to companies such as Microsoft, Yahoo and Google.
- Roy Keys, PhD in Physics, Nov 2011. (co-Advisor with Prof. Michael Holzscheiter, UNM Physics Department). Dissertation Title: Charged Hadron Beam Therapy: Fast Computational Physics Methods. Roy is now a medical physicist at the New Mexico Cancer Center.
- Cabal Gonzalo, PhD in Medical Physics, 2012. (co-Advisor with Prof. Oliver Jakel, German Cancer Research Center (DKFZ)). Gonzalo is currently an Assistant Professor at Ludwig Maximilian University of Munich.
- Viktor Chekh, in progress. Topic: Early Stage Diabetic Foot Diagnosis using Infrared Imaging.
- Daniel Riofrio, in progress. Topic: High Dose Rate Brachytherapy for Prostate Cancer
- Hiba Alkhafaji, in progress. Image Reconstruction for Megavoltage X-ray Beam with Application to Homeland Security.
- Shaun Bloom, in progress. Geometric algorithms for simulating DNA damages following ionizing radiation exposure.

Supervision of M.S. Students:

- Jake Proctor, M.S. with Distinction, December 2005. Thesis: A New Algorithm for Reducing Delivery Time of Radiation Therapy (co-Advisor with Prof. Jared Saia). Jake is now with Sandia National Lab.
- Rory McGuire, M.S. with Distinction, Apr 2007. Thesis: Automated Quality Assurance of Plain Radiographs". Rory is now with Apple Inc.
- Vikrant Gaur, M.S., August 2007, Thesis: Leaf Sequencing Algorithm for Reducing the Number of MLC Apertures for Step-and-Shoot IMRT (co-Advisor with Prof. Jared Saia). Vikrant is now a senior software engineer with Rockwell Collins.
- Zhe (Alex) Chen, M.S., August 2010, Thesis: Dynamic Photon Painting. Alex is now with Los Alamos National Laboratory.
- Daniel Riofrio, M.S., Nov 2011. Thesis: Applications of Voronoi Partitions in Particle Therapy.
- Dominic Maes, M.S., in progress. Dominic is a 2011-2012 Fellow of the New Mexico Cancer Nano Science and Microsystems Training Center (CNTC).
- Ekaterina Davydenko, M.S. Nov 2012. MS Project: Geometric Algorithms for Simulating Diffusion Limited Radiochemical Reactions.

Supervision of Undergraduate Students:

- Peter Wilkins: Peter is now with Disney Interactive.
- Jonathan Baca
- Robert Pulsipher
- Eric Webb
- Christian Romano: Christian did a one-year intern at Sandia National Laboratory, and is not doing his graduate study at Carnegie Mellon.
- Amy Reynaud (Female): Amy is now with VanDyke Software.
- Greg Iven.

Other Students Supervised:

- M. Leigh Fanning (Female), M.S., August 2007. Thesis: Parallel Simulated Annealing Applied to RNAi Inexact Match Gene Family Knockdown.
- Vamsi Potluru, M.S., Dec 2007. Thesis: Group learning using contrast NMF: Application to functional and structural MRI of schizophrenia.
- Lonny Trestrail, M.S. in Medical Physics, Dec 2008. Enloe Medical Center, Chico, CA.
- Mark Fleharty, M.S. May 2010. Molecular Simulations of Dendritic Molecules: a Study of PAMAM and Phenyl-Acetylene Dendrimers.

Publications:

Journal Articles (in reverse chronological order):

- Biedl T, Durocher S, Hoos H, **Luan S**, Saia J, Young M. A Note on Improving the Performance of Approximation Algorithms for Radiation Therapy. *Information Processing Letters*, 2011, (111)7, 326-333.
- Bansal N, Chen D, Hu X, **Luan S**, Misiolek E, Schieber B, Wang C. Shape Rectangularization Problems in Intensity-Modulated Radiation Therapy. *Algoirthmica,* 2011, 60(2), pages 421-450.
- Chen D, **Luan S**, Wang C. Coupled Path Planning, Region Optimization, and Applications to Intensity-Modulated Radiation Therapy. *Algorithmica,* 2011, 60(1), pages 152-174.
- Tang G, Earl M, **Luan S**, Wang C, Naqvi S, Mohiuddin M, and Yu C. Comparing Radiation Treatments Using Intensity-Modulated Beams, Multiple Arcs and Single Arc. *International Journal of Radiation Oncology, Biology, Physics*, 2010, 76 (5), pages 1554-1562.
- **Luan S**, Swanson N, and Ma L. Dynamic Gamma Knife Radiosurgery, *Physics in Medicine and Biology*, 54 (2009), 1579-1591.
- Wang C, **Luan S**, Tang G, Chen D, Earl M, Yu C. Arc-modulated Radiation Therapy (AMRT): a single-arc form of Intensity-Modulated Arc Therapy. *Physics in Medicine and Biology*. Vol 53, No. 22, Nov. 2008, pages 6291-6304. Runner up of the Roberts Prize, *Physics in Medicine and Biology Paper of the Year Award*.
- Tang G, Earl M, **Luan S**, Wang C, Cao D, Yu C, and Naqvi S. Stochastic vs. deterministic kernel based superposition approaches for dose calculation of intensity-modulated arcs. *Physics in Medicine and Biology*, 53 (2008), 4733-4746.
- Chen D, Hu X, **Luan S**, Wang C, and Wu X. Mountain Reduction, Block Matching, and Medical Applications, *International Journal of Computational Geometry and Applications (IJCGA),* Vol. 18, Nos. 1-2 (April 2008), 63-106.
- **Luan S**, Wang C, Cao D, Chen D, Shepard D, and Yu C. Leaf-sequencing for intensity-modulated arc therapy using graph algorithms, *Medical Physics*, Vol 35, No. 1, 2008, 61-69.
- **Luan S**, Saia J, and Young M. Approximation algorithms for minimizing segments in radiation therapy. *Information Professing Letters*, Vol. 101, 2007, 239-244.
- Yu C, Shepard D, Earl M, Cao D, **Luan S**, Wang C, and Chen D. New Developments in Intensity Modulated Radiation Therapy. *Technology in Cancer Research and Treatment*, 2006, 451-564.
- **Luan S**, C. Wang, Chen D, Hu X, Naqvi S, Wu X, and Yu C. An improved MLC segmentation algorithm and software for step-and-shoot IMRT delivery without tongue-and-groove error. *Medical Physics*, Vol 33, No. 5, 2006 pages 1199-1212.
- Cao D, Earl M, **Luan S**, and Shepard D. Continuous Intensity Map Optimization (CIMO): A Novel Approach to Leaf Sequencing in Step and Shoot IMRT. *Medical Physics*, Vol 33, No. 4, 2006, pages 859-867.
- Chen D, Hu X, **Luan S**, Naqvi S, Wang C, and Yu C. Generalized Geometric Approaches for Leaf Sequencing Problems in Radiation Therapy. *International Journal of Computational Geometry and Applications (IJCGA)*, Vol. 16, No 2-3, June 2006. 175-204.

- Chen D, Hu X, **Luan S**, Wu X, and Yu C. Optimal Terrain Construction Problems and its application in intensity modulated radiation therapy. *Algorithmica*, Vol. 42, No. 3-4, June 2005, pp. 265-288.
- Chen D, Hu X, **Luan S**, Wang C, and Wu X. Geometric Algorithms for Static Leaf Sequencing Problems in Radiation Therapy. *International Journal of Computational Geometry and Applications (IJCGA)*, Vol. 14, October 2004, pp. 311-339.
- **Luan S**, Wang C, Chen D, Hu X, Naqvi S, Lee C, and Yu C. A new MLC segmentation algorithm/software for step-and-shoot IMRT delivery. *Medical Physics*, Vol. 31, No. 4, April 2004, page 695-707.
- **Luan S**, Chen D, Zhang L, Wu X, and Yu C. An Optimal Algorithm for Computing Configuration Options of One-dimensional Intensity Modulated Beams. *Physics in Medicine and Biology*, Vol. 48, No. 15, August 2003, page 2321-2338.
- Chen D, **Luan S**, and Xu J. Topological peeling and applications. *International Journal of Computational Geometry and Applications (IJCGA)*, Vol. 13, No. 2, April 2003, page 135-172.

Full Conference Articles (in reverse chronological order):

- Mu J, Liu X, Heintz P, **Luan S**, Mlady G, and Chen D. Segmentation of Knee Joints in X-ray Images Using Decomposition-based Sweeping and Graph Search. *SPIE Medical Imaging*, 2011.
- Chen D, **Luan S**, and Wang C. Coupled Path Planning, Region Optimization, and Applications in Intensity-Modulated Radiation Therapy. *Proceedings of the 16th Annual European Symposium on Algorithms (ESA 2008).*
- Chen D, Hu X, **Luan S**, Misiolek E, and Wang C. Shape Rectangularization Problems in Intensity-Modulated Radiation Therapy. *17th International Symposium on Algorithms and Computation (ISAAC'06).*
- **Luan S**, Wang C, Chen D, and Hu X. Leaf Sequencing Software for Intensity-Modulated Radiation Therapy. the *19th IEEE Symposium on Computer Based Software Systems*, 2006.
- Chen D, Hu X, **Luan S**, Wang C, and Wu X. Mountain Reduction, Block Matching, and Applications in Intensity-Modulated Radiation Therapy. *Proc. 21st ACM Symp. on Computational Geometry (SoCG'05)*, pp. 35-44.
- Chen D, Hu X, **Luan S**, Naqvi S, Wang C, and Yu C. Generalized Geometric Approaches for Leaf Sequencing Problems in Radiation Therapy. *15th International Symposium on Algorithms and Computation (ISAAC 2004),* December 2004.
- Chen D, Hu X, **Luan S**, Wang C, and Wu X. Geometric Algorithms for Static Leaf Sequencing Problems in Radiation Therapy. *Proc. of 19th ACM Symposium on Computational Geometry (SoCG03)*, San Diego, CA, June 2003, page 88-97.
- Chen D, Hu X, **Luan S**, Wu X, and Yu C. Optimal Terrain Construction Problems and Applications in Intensity-Modulated Radiation Therapy. *Lecture Notes in Computer Science*, Vol.~2461, Springer Verlag, *Proc. of the Tenth Annual European Symposium on Algorithms (ESA)*, Rome, Italy, September 2002, page 270-283.
- Chen D, **Luan S**, and Xu J. An Experimental Study and Comparison of Topological Peeling and Topological Walk. Lecture Notes in Computer Science, Vol. 2387, Springer Verlag, *Proc. of the Eighth Annual International Computing and Combinatorics Conference (COCOON)*, Singapore, August 2002, page 456-466.
- Chen D, Luan S, and Xu J. Topological peeling and implementation, in Springer-Verlag, *Lecture Notes in Computer Science*. Vol. 2223, *Proc. 12th International Symposium on Algorithms and Computations (ISAAC)*, page 454-466, 2001.

Refereed Conference Abstracts (in reverse chronological order):

- Chekh V, Soliz P, Barriga S, McGrew E, Kanagy N, **Luan S**. Novel model of thermoregulation based on control theory used to evaluate peripheral microvascular function. Experimental Biology 2013.
- Keyes R, Maes D, **Luan S**. Fast estimation of secondary particle therapy dose using a modified track repeating method. *The 54th Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2012. Short Oral Presentation.
- Riofrio D, Sellner S, Cabal G, Keyes R, Holzscheiter M, Jakel O, **Luan S**. Impact of variable beam spot size on treatment time in particle therapy. *The 54th Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2012.
- Zamora G, Chekh V, Burge M, Barriga E, **Luan S**, Heintz P, Edwards A, McGrew E, Soliz P. Optical Measurements of Microvascular Circulatory Function in the Foot for Detection of Peripheral Neuropathy. Photonics West, BIOS, San Francisco, CA, January 2012.
- Burge M, Zamora G, Barriga E, Chekh V, **Luan S**, Heintz P, Edwards A, McGrew E and Soliz P. Thermal Functional Imaging for Screening of Peripheral Neuropathy in the Diabetic Foot. American Diabetes Association, 72nd Scientific Session, Philadelphia, PA, June 8-12, 2012.
- Riofrio D, Keyes, R, Maes, D, **Luan S**. Simultaneous Optimization of Dose and LET in Proton Therapy Using Voronoi Partitions. *The 53rd Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2011, oral presentation.
- Keyes R, Arnold D, Raynaud A, **Luan S**. McCloud: Toward 10 Million Monte Carlo Primaries in 5 Minutes for Clinical Use. *The 53rd Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2011.
- Ma L, Hu W, **Luan S**. An Investigation of Kernel-Based Dynamic Dose Painting Treatment Approach. *The 53rd Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2011.
- Chen Z, **Luan S**, Riofrio D, Ma L. A study on the focusing power of dynamic photon painting. *The 52nd Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2010. (John R. Cameron Young Investigator Competition Finalist, 12 out of 198 submissions.)
- Keyes R, Romano C, Arnold D, **Luan S**. Medical physics calculation in the cloud, a new paradigm for clinical computing. *The 52nd Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2010.
- Riofrio D, Cabal G, Keyes R, Holzscheiter M, DeMarco J, Jäkel O, **Luan S**. Minimizing energy change in particle therapy using Voronoi partitions. *The 52nd Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2010.
- Gabal G, **Luan S**, Jäkel O. A beam angle selection algorithm for particle therapy. *The 52nd Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2010.
- Keyes R, Romano C, Arnold D, **Luan S**. Cloud computing as a Monte Carlo cluster for radiation therapy. *The XVth International Conference on the Use of Computers in Radiation Therapy (ICCR)*, 2010.
- Cabal G, **Luan S**, Jäkel O. An algorithm for optimizing beam angle configuration in particle therapy. *Particle Therapy Cooperative Group (PTCOG) 2009*.
- Cabal G, **Luan S**, Jäkel O. Impact of the beam angle configuration on the quality and the robustness of a particle therapy plan. *Particle Therapy Cooperative Group (PTCOG) 2009*.
- Trestrail L, Sanchez D, Sandoval D, Heintz P, **Luan S**, Chen D. A Web-based Automated QA Analysis Program for Digital Image Tracking. *The Radiological Society of North America (RSNA) 95th Scientific Assembly and Annual Meeting*, 2009, oral presentation.
- Riofrio D, Keyes R, Hecht A, **Luan S**, Holzscheiter M, DeMarco J, Fahimian B. Planning Dynamic Particle Therapy *The 51st Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2009.

- Cao D, Rao M, Chen F, Ye J, **Luan S**, Shepard D. A novel approach to machine specific QA for volumetric modulated arc therapy. *The 51st Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2009.
- Chen F, Rao M, Ye J, **Luan S**, Shepard D, Cao D. Study of systemic and random errors on VMAT and IMRT plan quality and deliver accuracy. *The 51st Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2009. oral presentation.
- Keyes RW, **Luan S**, Holzscheiter M. Antiproton Therapy: A simplified method to characterize and compare dose from peripheral radiation fields. *The 51st Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2009.
- Fahimian BP, DeMarco JJ, Keyes RW, **Luan S**, Zankl M, Holzscheiter M. Antiproton Radiotherapy: Development of Physically and Biologically Optimized Monte Carlo Treatment Planning Systems for Intensity and Energy Modulated Delivery. *The 51st Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2009, oral presentation.
- **Luan S**, Swanson N, Chen Z, and Ma L. Treatment Planning for Dynamic Gamma Knife Radiosurgery. *The 9th Bi-Annual Congress of International Society of Stereotactic Radiosurgery* (*ISRS'2009*), oral presentation.
- Wang C, **Luan S**, Chen D, Tang G, and Yu C. Dynamic leaf sequencing with monitor unit control, *the 50th Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2008.
- Wang C, **Luan S**, Tang G, Earl M, Chen D, and Yu C. Arc modulated radiation therapy, a novel method for rotational radiation therapy, *the 50th Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2008.
- Tang G, Earl M, **Luan S**, Wang C, Chen D, and Yu C. Is dose variation crucial for single-arc radiation therapy delivery, *the 50th Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2008, oral presentation.
- Tang G, Earl M, **Luan S**, Wang C, Chen D, Naqvi S, and Yu C. Comparison of intensity-modulated radiation therapy, intensity-modulated arc therapy, and arc modulated radiation therapy, *the 50th Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2008.
- **Luan S**, Swanson N, Ma L, and Li K, Dynamic Gamma Knife Radiosurgery, *the 8th Bi-Annual Congress of International Society of Stereotactic Radiosurgery* (*ISRS'2007*), oral presentation.
- Wilkins P, **Luan S**, Swanson N, Heintz P, and Ketai L. A New Algorithm/Software for CT Measurement of Airway Wall Volume. *The Radiological Society of North America (RSNA) 92nd Scientific Assembly and Annual Meeting*, 2006.
- **Luan S**, Wang C, Cao D, Chen D, D'Souza W, and Yu C. Patient Breathing Motion Synchronized IMAT: A New Technique for Compensating Intra Fraction Organ Motions. *The 48th Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2006.
- Cao D, Earl M, **Luan S**, and Shepard D. Continuous Intensity Map Optimization (CIMO): A Novel Leaf Sequencing Algorithm. *48th Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2006, oral presentation.
- **Luan S**, Heintz P, Sorensen S, Jimenez A, Chen D, Roedersheimer K, and Wong G. The Effect of Collimator Rotation on IMRT Treatment Planning. *The 47th Annual Meeting of American Society of Therapeutic Radiology and Oncology (ASTRO)*, 2005.
- Roedersheimer K, Chen D, **Luan S**, and Xing L. The Impact of Multileaf Collimator Rotation in IMRT Planning. *The 47th Annual Meeting of the American Association of Physicists in Medicine (AAPM)*, 2005.
- Wang C, **Luan S**, Chen D, Hu X, and Yu C. A Generalized MLC Segmentation Algorithm for Step-and-Shoot IMRT with no Tongue-and-Groove Error. *The 47th Annual Meeting of American Association of Physicists in Medicine (AAPM)*, 2005, oral presentation.

- **Luan S**, Wang C, Chen D, Hu X, Naqvi S, and Yu C. A New MLC Segmentation Algorithm for Step and Shoot IMRT Without Tongue-and-Groove Error. *Forty-Sixth Annual Meeting and Technical Exhibition of the American Association of Physicists in Medicine (AAPM)*, 2004, oral presentation.
- **Luan S**, Wang C, Chen D, Hu X, and Yu C. A Study of the Impact of MLC Constraints on the Number of Segments in Step-and-Shoot IMRT Delivery. *Forty-Sixth Annual Meeting and Technical Exhibition of the American Association of Physicists in Medicine (AAPM)*, 2004, oral presentation.
- **Luan S**, Wang C, Naqvi S, Chen D, Hu X, Lee C, and Yu C. A New Leaf Sequencing Algorithm/Software for Step and Shoot IMRT. *Forty-Fifth Annual Meeting and Technical Exhibition of the American Association of Physicists in Medicine (AAPM)*, 2003, oral presentation.
- Wu X, Chen D, Hu X, **Luan S**, Zhang L, and Yu C. A new leaf-sequencing algorithm for intensity-modulated arc therapy. *Forty-Third Annual Meeting and Technical Exhibition of the American Association of Physicists in Medicine (AAPM)*, 2001, oral presentation.

Patents and Software:

- Inventor of US Patent 7.283,611: Segmentation Algorithmic Approach to Step and-Shoot Intensity Modulated Radiation Therapy.
- Inventor of US Patent: 7,466,797: Error control in Algorithmic Approach to Step-and-Shoot Intensity Modulated Radiation Therapy.
- SLS software: Designed and developed the static leaf sequencing software for "step and shoot" intensity-modulated radiation therapy (IMRT). The software has been used clinically in the Department of Radiation Oncology, University of Maryland Medical Center, Baltimore, MD and the Helen P. Denit Cancer Center, Montgomery General Hospital, Olney, MD before the hospitals switched vendors of their linear accelerators.
- Co-Inventor of US Patent 8,014,494: Single Arc Dose Painting: An efficient method of precision radiation therapy. (Licensed by Varian Medical Systems Inc., the largest manufacturer of clinical linear accelerators.)
- Inventor of System and Method for using Dynamic Gamma Knife for Radiosurgery. PCT/US2009/002733 (pending). (Licensed by Elekta Instruments AB, the manufacture of Gamma Knife Brain Radiosurgery System.)
- Inventor of A method of Enhancing Photon Beam Focusing Power for Radiotherapy and Radiosurgery Delivery. Licensed by Accuray Inc., manufacturer of Cyberknife Robotic Radiosurgery System, and Varian Medical System.
- Co-Inventor of Method of Calculating Radiation Fluence and Energy Deposition Distributions on a Networked Virtual Computational Cluster. Provisional Patent filed through UNM STC. UNM-1036.PRO Application {M16/12100.P.2313}.

Honors and Awards:

- UNM STC 2012 Creative Award.
- Laureate in the 2011 Computerworld Honors Program for Arc-modulated Radiation Therapy.
- Qforma Endowed Lecturer. 2009-2010.
- Center for Applied Mathematics (CAM) Fellow, University of Notre Dame, August 2002 --- May 2003. The fellowship is awarded to winners of the CAM Graduate Student Fellowship Competition, and provides a nine-month stipend and travel funds for professional travel to technical meetings.

Funding:

- NCI R01CA117997, "4 Dimensional IMAT Planning using Graph Algorithms". This is a multi-institution grant. The total amount is $1,239,953 with a funding period from June 1, 2007 to April 30, 2011. The PI is Cedric Yu, Department of Radiation Oncology, University of Maryland School of Medicine. The UNM portion is $313,035.
- NSF CBET-0755054, titled: "Computer-Aided Dynamic Gamma Knife Radiosurgery Treatment Planning", $291,915, Feb 15, 2008 - Jan 31, 2011, Single PI.
- New Mexico Consortium, 1109, title: "3D Image Reconstruction with Minimum Radiation Exposure and its Applications to Interventional Radiology", $10,267, Feb, 2009 – May 2009, Role PI, co-PIs: Rick Chartrand, Los Alamos National Laboratory and Phil Heintz, Department of Radiology, University of New Mexico.
- NSF CBET-0853157: "Computer-Aided Treatment Planning for Antiproton Therapy", $375,000, Aug 1, 2009 - July 31, 2012, Role: PI, with co-PI Michael Holzscheiter.
- Amazon Web Service in Education Research Grant: $3,500 for using Amazon Elastic Cloud Service. June 1, 2010 – May 31, 2011.
- Amazon Web Service in Education Research Grant: $7,500 for using Amazon Elastic Cloud Service. July 1, 2011 – June 30, 2012.

Program Committee:

- Principal organizer of *The New Mexico Workshop on Monte Carlo for Particle Therapy Treatment Planning*, Albuquerque, NM, May 16-18, 2011.
- The *12th Annual International Computing and Combinatorics Conference (COCOON'06)*, Taipei, Taiwan, August 15-18, 2006
- The *3rd* and *4th Annual International Frontiers of Algorithmic Workshop.*

Service to Government:

- Served on National Science Foundation (NSF) review panel for computational geometry in May 2007.