Volodymyr Kindratenko

National Center for Supercomputing Applications (NCSA)
University of Illinois at Urbana-Champaign (UIUC)
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Professional Experience

Senior Research Scientist **2004-present**
National Center for Supercomputing Applications, University of Illinois at Urbana-Champaign

Leading NCSA's R&D efforts in high-performance computing, special-purpose computing architectures, and AI.

Research Associate Professor **2018-present**
Department of Computer Science, University of Illinois at Urbana-Champaign

Machine learning/deep learning systems and architectures.

Adjunct Associate Professor **2013-present**
Lecturer **2009-present**
Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign

ECE 120 – Introduction to Computing (S15, F15, F18); **ECE 198JL** – Introduction to Computer Engineering (S13, F13, F14); **ECE 190** – Introduction to Computing Systems (F09, S10, F10, S11, F11, F12); **ECE 220** – Computer Systems & Programming (Su15, S16, Su16, Su17, F19); **ECE 290** – Computer Engineering I (F11, S12, S13, S14); **ECE 385** – Digital Systems Laboratory (S14, F16); **ECE 425** – Intro to VLSI system design (F17, S19); **ECE 297/296** – Individual Study; **ECE 397/396** – Individual Study in ECE Problems/Honors Project; **CS 499** - Senior Thesis; **ECE 496/499** – Senior Research Project/Senior Thesis; **ECE 597** - Individual Study in ECE; **ECE 599** - Thesis Research

Adjunct Associate Professor **2017-present**
Zhejiang University/University of Illinois at Urbana-Champaign Institute (ZJI-UIUC Institute), China/US

ECE 120 – Introduction to Computing (S17, S18, S20); **ECE 220** – Computer Systems & Programming (F17); **CS 225** – Data Structures (S18, S19); **ECE 397** – Individual Study in ECE Problems (S19, S20); **ECE 498** – IoT and Cognitive Computing (S20)

Visiting Lecturer **2012, 2013, 2016**
Faculty of Electrical-Electronics Engineering, HoChiMinh City University of Technology, Vietnam

ECE 290 – Computer Engineering I (Su12, Su13); **ECE 120** – Introduction to Computing (W16); **ECE 220** – Computer Systems & Programming (W16)

Research Scientist **1998-2004**
Postdoctoral Research Associate **1997-1998**
National Center for Supercomputing Applications, University of Illinois at Urbana-Champaign

Design of a software-defined radio-based sensor platform and development of DSP algorithms and software. Architecture design and software implementation of a proximity-based wide-area location tracking system IntelliBadge®. Design of an augmented reality system for enhanced vehicle operator visibility. Design and implementation of a virtual reality system for real-time human-in-the-loop simulation of earth moving machinery. Development of geometry optimization algorithms and software for processing large CAD-based virtual reality models. Development of electromagnetic trackers calibration methodology and software. Development of vehicle operator controls interface with virtual environments. Implementation of a multi-

projector display color balancing system. Tiled display wall and visualization cluster deployment. Development of a distributed virtual reality system for collaborative product design.

Faculty/Research Affiliations/Appointments/Committees

Affiliate in the Discovery Partners Institute	**2020-present**
UofI Engineering College IT Education Committee	**FY16-FY19**
Center for Artificial Intelligence Driven Health Data Systems and Analytics, UIUC	**2018-present**
Parallel Computing Institute, University of Illinois at Urbana-Champaign	**2012-present**
Computational Science and Engineering, University of Illinois at Urbana-Champaign	**2013-present**
CompGen initiative, University of Illinois at Urbana-Champaign	**2013-present**
Laboratory for Cosmological Data Mining, University of Illinois at Urbana-Champaign	**2010-2016**

Professional Membership

Senior Member, **The Institute of Electrical and Electronics Engineers (IEEE)**
Senior Member, **The Association for Computing (ACM)**

Education

D.Sc. (summa cum laude)
University Institute of Antwerp, University of Antwerp, Antwerp, Belgium **1993-1997**

Thesis: *Development and application of image analysis techniques for identification and classification of microscopic particles*. Developed digital image analysis techniques for SEM, TEM, and optical imagery for analyzing and classifying airborne and other microscopic particle shapes.

Specialist diploma (cum laude)
Vynnychenko State Pedagogical University, Kropyvnytskyi, Ukraine **1988-1993**

Thesis: *Automatic object classification with a teacher*. Created an expert system for object classification based on Nearest Neighbor and Confidence Intervals methods for supervised classification.

Grants and awards

Grants

- Co-PI: *Collaborative Research: Frameworks: Machine learning and FPGA computing for real-time applications in big-data physics experiments*, NSF-CSSI, $651,314, 2019-2022.
- Co-PI: *Collaborative Research: Advancing Science with Accelerated Machine Learning*, NSF-HDR, $577,652, 2019-2021.
- Co-PI: *MR Fingerprinting*, Mayo-Illinois Alliance Grand Challenge, 2019.
- Co-PI: *NCSA Computational Program in Racial Health Disparities: CPRHD*, NCSA Center-Directed Discretionary Research, $180,000, 2019.
- Co-PI: *Modeling, simulation and fabrication of bio-hybrid creatures: Roadmap to NSF-STC 2019*, UIUC Strategic Research Initiative, $75,000, 2018.
- Co-PI: *MRI: Development of an Instrument for Deep Learning Research*, NSF, $2,721,983, 2017-2020.

- Co-PI: *SPX: Collaborative Research: Asynchronous, Parallel-Adaptive Solution of Extreme Multiscale Problems in Seismology*, NSF, $621,257, 2017-2020.
- Co-PI: *CyberTraining: CIP: NCSA Internship Program for CI Professionals*, NSF, $499,999, 2017-2020.
- PI: *Designing, deploying, and operating commodity-based storage*, NCSA, $120K, 2015.
- Co-PI: *Collaborative Research: Preparing Lattice QCD for Accelerated Computing and Future Algorithms*, NSF, $288,000, 2012-2016.
- Co-PI: *Creating the World's Best Computer Engineering Core*, UIUC Strategic Instructional Initiatives Program, $125,000, 2012-2013.
- Co-PI: *Collaborative Research: Cyberinfrastructure and Research Facilities: Chemical Computations on Future High-end Computers*, NSF CHE-0626354, $1,335,300, 2006-2012.
- PI: *SGER: Investigating Application Analysis and Design Methodologies for Computational Accelerators*, NSF STCI #0810563, $166,000, 2008-2009.
- Co-PI: *Developing and Deploying Advanced Astrophysical Algorithms to Novel Supercomputing Hardware*, NASA IASR, $779,000, 2006-2009.
- Co-PI: *Next Generation RFID Systems: People and Object Tracking for Homeland Security Applications*, University of Illinois Critical Research Initiative, $180,000, 2005-2007.
- Co-PI: *Geoscience Applications on Petascale Systems: Requirements Workshops*, NSF ATM #0540688, $100,000, 2005-2009.
- PI: *Advanced Backhoe Display Development*, Caterpillar Inc., $233,000, 2004-2005.
- Co-PI: *Software Defined Radio and Extensible Sensor Platform*, NCASSR (ONR), $600,000, 2004-2005.
- Co-PI: *Software Defined Radio and Extensible Sensor Platform*, NCASSR (ONR), $984,000, 2003-2004.
- PI: *Virtual Reality Earthmoving Machinery Prototyping R&D* (multiple projects), Caterpillar Inc., $80,000, 2003-2005.
- *IntelliBadge*, NSF PACI REU, $12,000, 2003-2004.
- Co-PI: *ITR/AP: Simulation of Machine-Medium Interaction in a Real-Time Virtual Environment*, NSF (award #0113745), $399K, Caterpillar Inc., $452,000, 2001-2004.
- *Development of software tools for simplified and accurate calibration of electromagnetic trackers in virtual environments*, NSF PACI REU, $18,000, 2000-2001.
- Co-PI: *Unencumbered Display and Interaction*, NCSA Private Sector Program, $292,000, 2000-2001.
- *Application of Virtual Reality Technology for Large Model Visualization and Simulation*, NSF PACI REU, $8,000, 1999-2000.
- *Calibration of Electromagnetic Tracking Devices*, NSF PACI REU, $8,000, 1999-2000.

Awards/Honors

- *RC Evans **Innovation Fellow***, Gies College of Business, UIUC, 2019-2020.
- *List of Teachers Ranked as **Excellent** by Their Students*, Summer 2015, Fall 2015, Sprint 2016, Summer 2017, Fall 2018, Fall 2019.
- *Outstanding Service Award*, 9th ACS/IEEE International Conference on Computer Systems and Applications, 2011
- *SRC Award for Excellence in Reconfigurable Computing*, 2007
- D.Sc. with the *Greatest Distinction* (summa cum laude), University of Antwerp, Belgium, 1997
- M.Sc. with an *Honorary Diploma* (cum laude), Vynnychenko State Pedagogical University, Ukraine, 1993

Publications

Journal papers

- Eliu Huerta, Asad Khan, Edward Davis, Colleen Bushell, William Gropp, Daniel Katz, **Volodymyr Kindratenko**, Seid Koric, William Kramer, Brendan McGinty, Kenton McHenry, Aaron Saxton, *Convergence of Artificial Intelligence and High-Performance Computing on NSF-supported Cyberinfrastructure*, submitted to Computing and Software for Big Science, 2020.
- S. Luo, J. Cui, M. Vellakal, J. Liu, E. Jiang, S. Koric, **V. Kindratenko**, *Review and Examination of Input Feature Preparation Methods and Machine Learning Models for Turbulence Modeling*, arXiv:2001.05485
- E. Park, **V. Kindratenko**, Y. Hashash, *Shared Memory Parallelization of Large-Scale 3D Polyhedral Particle Simulation*, submitted to Computers and Geotechnics, 2020.
- E. Huerta, G. Allen, I. Andreoni, E. Bachelet, G. Berriman, F. Bianco, R. Biswas, M. Carrasco, K. Chard, M. Cho, P. Cowperthwaite, Z. Etienne, D. George, T. Gibbs, M. Graham, W. Gropp, A. Gupta, R. Haas, E. Jennings, D. Katz, A. Khan, **V. Kindratenko**, W. Kramer, X. Liu, A. Mahabal, K. McHenry, J. Miller, M. Neubauer, S. Oberlin, A. Olivas, S. Rosofsky, M. Ruiz, A. Saxton, B. Schutz, A. Schwing, E. Seidel, S. Shapiro, H. Shen, Y. Shen. B. Sipocz, L. Sun, J. Towns, A. Tsokaros, W. Wei, J. Wells, T. Williams, J. Xiong, Z. Zhao, *Deep Learning for Multi-Messenger Astrophysics. A Gateway for Discovery in the Big Data Era*, submitted to Computing and Software for Big Science, 2019
- E. Huerta, G. Allen, I. Andreoni, J. Antelis, E. Bachelet, B. Berriman, F. Bianco, R. Biswas, M. Carrasco, K. Chard, M. Cho, P. Cowperthwaite, Z. Etienne, M. Fishbach, F. Forster, D. George, T. Gibbs, M. Graham, W. Gropp, R. Gruendl, A. Gupta, R. Haas, S. Habib, E. Jennings, M. Margaret, E. Katsavounidis, D. Katz, A. Khan, **V. Kindratenko**, W. Kramer, X. Liu, A. Mahabal, Z. Marka, K. McHenry, J. Miller, C. Moreno, M. Neubauer, S. Oberlin, A. Olivas, D. Petravick, A. Rebei, S. Rosofsky, M. Ruiz, A. Saxton, B. Schutz, A. Schwing, E. Seidel, S. Shapiro, H. Shen, L. Singer, B. Sipocz, L. Sun, J. Towns, A. Tsokaros, W. Wei, J. Wells, T. Williams, J. Xiong, Z. Zhao, and Y. Shen, *Enabling real-time multi-messenger astrophysics discoveries with deep learning*, Nature Reviews Physics, vol. 1, pp. 600–608, 2019.
- F. Pratas, P. Trancoso, L. Sousa, A. Stamatakis, G. Shi, **V. Kindratenko**, *Fine-grain Parallelism using Multi-core, Cell/BE, and GPU Systems*, Parallel Computing, vol. 38, no. 8, pp. 365-390, 2012.
- **V. Kindratenko**, A. Myers, R. Brunner, *Implementation of the two-point angular correlation function on a high-performance reconfigurable computer*, Scientific Programming, vol. 17, no. 3, pp. 247-259, 2009.
- G. Shi, **V. Kindratenko**, S. Gottlieb, *The bottom-up implementation of one MILC lattice QCD application on the Cell blade*, International Journal of Parallel Programming, vol. 37, no. 5, pp. 488-507, 2009.
- G. Shi, **V. Kindratenko**, I. Ufimtsev, T. Martinez, J. Phillips, S. Gottlieb, *Implementation of scientific computing applications on the Cell Broadband Engine*, Scientific Programming, vol. 17, no. 1-2, pp. 135-152, 2009.
- T. El-Ghazawi, E. El-Araby, M. Huang, K. Gaj, **V. Kindratenko**, D. Buell, *The Promise of High-Performance Reconfigurable Computing*, IEEE Computer, vol. 41, no. 2, pp. 78-85, 2008.
- **V. Kindratenko**, and W. Sherman, *Neural network-based calibration of electromagnetic tracking systems*, Virtual Reality, 2006, vol. 9, pp. 70-78.
- **V. Kindratenko** and D. Pointer, *Mapping a sensor interface and a reconfigurable communication system to an FPGA core*, Sensor Letters, 2005, vol. 3, no. 2, pp. 174-178.
- **V. Kindratenko**, *On using functions to describe the shape*, Journal of Mathematical Imaging and Vision, 2003, vol. 18, no. 3, pp. 225-245.

- **V. Kindratenko**, *A survey of electromagnetic position tracker calibration techniques*, Virtual Reality: Research, Development, and Applications, 2000, vol. 5, pp. 169-182.
- **V. Kindratenko**, *A comparison study of the accuracy of electromagnetic and ultrasound/inertia position tracking systems*, Presence: Teleoperators and Virtual Environments, 2001, vol. 10, no. 6, pp. 657-663.
- **V. Kindratenko**, *Calibration of electromagnetic tracking devices*, Virtual Reality: Research, Development, and Applications, 1999, vol. 4, pp. 139-150.
- **V. Kindratenko**, B. Treiger and P. Van Espen, *Classification of silver halide microcrystals via K-NN clustering of their shape descriptors*, Journal of Chemometrics, 1997, vol. 11, pp. 131-139.
- **V. Kindratenko**, B. Treiger and P. Van Espen, *Shape reconstruction of partially overlapping objects in SEM images: applied to silver halide microcrystals*, Microscopy, Microanalysis and Microstructures, 1997, vol. 8, pp. 115-123.
- **V. Kindratenko**, B. Treiger and P. Van Espen, *Chemometrical approach to the determination of fractal dimension(s) of real objects*, Chemometrics and Intelligent Laboratory Systems, 1996, vol. 34, pp. 103-108.
- V. Oleshko, **V. Kindratenko**, R. Gijbels, P. Van Espen, W. Jacob, *Study of quasi-fractal many-particle-systems and percolation networks by zero-loss spectroscopic imaging, electron energy-loss spectroscopy and digital image analysis*, Microchimica Acta, 1996, suppl. 13, pp. 444-451.
- **V. Kindratenko**, P. Van Espen, B. Treiger, R. Van Grieken, *Characterisation of the shape of microparticles via fractal and Fourier analyses of their SEM images*, Microchimica Acta, 1996, suppl. 13, pp. 355-361.
- **V. Kindratenko**, P. Van Espen, B. Treiger, R. Van Grieken, *Fractal dimensional classification of aerosol particles by computer-controlled scanning electron microscopy*[1], Environmental Science and Technology, 1994, vol. 28, pp. 2197-2202.

Conference and workshop proceedings

- **V. Kindratenko**, D. Mu, Y. Zhan, J. Maloney, S. Hashemi, B. Rabe, K. Xu, R. Campbell, J. Peng, W. Gropp, *HAL: Computer System for Scalable Deep Learning*, In Proc. PEARC'20: Practice and Experience in Advanced Research Computing Proceedings, 2020.
- D. Lapine, **V. Kindratenko**, L. Rosu, *NCSA Internship Program for Cyberinfrastructure Professionals*, In Proc. PEARC'20: Practice and Experience in Advanced Research Computing Proceedings, 2020.
- A. Misra, **V. Kindratenko**, *HLS-based Acceleration Framework for Deep Convolutional Neural Networks*, to appear in Proc. 16th International Symposium on Applied Reconfigurable Computing (ARC2020), 2020.
- S. Hashemi, P. Rausch, B. Rabe, K. Chou, S. Liu, **V. Kindratenko**, R. Campbell, *tensorflow-tracing: A Performance Tuning Framework for Production*, In Proc. 2019 USENIX Conference on Operational Machine Learning (OpML'19), 2019.
- G. Shi, R. Babich, M. Clark, B. Joo, S. Gottlieb, **V. Kindratenko**, *The Fat-Link Computation On Large GPU Clusters for Lattice QCD*, In Proc. Symposium on Application Accelerators in High-Performance Computing (SAAHPC), 2012.
- G. Shi, **V. Kindratenko**, R. Kooper, P. Bajcsy, *GPU Acceleration of an Image Characterization Algorithm for Document Similarity Analysis*, In Proc. 9th ACS/IEEE International Conference on Computer Systems and Applications (AICCSA), 2011, pp. 209-216.

[1] This article was featured by *Analytical Chemistry* magazine (Vol. 66, No. 24, December 15, 1994) under Analytical Currents: Synopses of significant analytical articles from other publications – Spectroscopy.

- D. Ye, A. Titov, **V. Kindratenko**, I. Ufimtsev, T. Martinez, *Porting Optimized GPU Kernels to a Multi-core CPU: Computational Quantum Chemistry Application Example*, In Proc. Symposium on Application Accelerators in High-Performance Computing (SAAHPC), 2011, pp. 73-75.
- G. Shi, S. Gottlieb, A. Torok, **V. Kindratenko**, *Design of MILC lattice QCD application for GPU clusters*, in Proc. IEEE International Parallel and Distributed Processing Symposium (IPDPS), 2011.
- S. Gottlieb, G. Shi, A. Torok, **V. Kindratenko**, *QUDA programming for staggered quarks*, In Proc. The XXVIII International Symposium on Lattice Field Theory (Lattice), 2010.
- A. Torok, S. Basak, A. Bazavov, C. Bernard, C. DeTar, E. Freeland , W. Freeman, S. Gottlieb, U. Heller, J.E. Hetrick, **V. Kindratenko**, J. Laiho, L. Levkova, M. Oktay, J. Osborn, G. Shi, R. Sugar , D. Toussaint, R.S. Van de Water, *Electromagnetic splitting of charged and neutral mesons*, In Proc. The XXVIII International Symposium on Lattice Field Theory (Lattice), 2010.
- J. Enos, C. Steffen, J. Fullop, M. Showerman, G. Shi, K. Esler, **V. Kindratenko**, J. Stone, J. Phillips, *Quantifying the Impact of GPUs on Performance and Energy Efficiency in HPC Clusters*, In Proc. Work in Progress in Green Computing, 2010.
- G. Shi, S. Gottlieb, A. Totok, **V. Kindratenko**, *Accelerating Quantum Chromodynamics Calculations with GPUs*, In Proc. Symposium on Application Accelerators in High-Performance Computing (SAAHPC), 2010.
- A. Titov, **V. Kindratenko**, I. Ufimtsev, T. Martinez, *Generation of Kernels to Calculate Electron Repulsion Integrals of High Angular Momentum Functions on GPUs – Preliminary Results*, In Proc. Symposium on Application Accelerators in High-Performance Computing (SAAHPC), 2010.
- G. Shi, I. Ufimtsev, **V. Kindratenko**, T. Martinez, *Direct Self-Consistent Field Computations on GPU Clusters*, In Proc. IEEE International Parallel and Distributed Processing Symposium(IPDPS), 2010.
- **V. Kindratenko**, J. Enos, G. Shi, M. Showerman, G. Arnold, J. Stone, J. Phillips, W. Hwu, *GPU Clusters for High-Performance Computing*, in Proc. IEEE International Conference on Cluster Computing, Workshop on Parallel Programming on Accelerator Clusters, 2009.
- R. Cavis, **V. Kindratenko**, S. Tipei, *SoundMaker: a Web-based Teaching Tool for Sound Design*, in Proc. 2009 International Computer Music Conference (ICMC), 2009.
- G. Shi, J. Enos, M. Showerman, **V. Kindratenko**, *On testing GPU memory for hard and soft errors*, in Proc. Symposium on Application Accelerators in High-Performance Computing (SAAHPC), 2009.
- K. Huang, **V. Kindratenko**, Rizwan-uddin, *GPU-Based Parallel Computing: A New Computational Approach and its Applications to Nuclear Engineering*, in Proc. American Nuclear Society 2009 Annual Meeting, 2009, vol. 100, pp. 319-321.
- **V. Kindratenko**, R. Brunner, *Accelerating Cosmological Data Analysis with FPGAs*, In Proc. IEEE Symposium on Field-Programmable Custom Computing Machines (FCCM), 2009, pp. 11-18.
- D. Roeh, **V. Kindratenko**, R. Brunner, *Accelerating Cosmological Data Analysis with Graphics Processors*, In Proc. 2nd Workshop on General-Purpose Computation on Graphics Processing Units (GPGPU-2), 2009, pp. 1-8.
- M. Showerman, J. Enos, A. Pant, **V. Kindratenko**, C. Steffen, R. Pennington, W. Hwu, *QP: A Heterogeneous Multi-Accelerator Cluster*, In Proc. 10th LCI International Conference on High-Performance Clustered Computing (LCI), 2009.
- A. Pant, H. Jafri, **V. Kindratenko**, *Phoenix: A Runtime Environment for High Performance Computing on Chip Multiprocessors*, In Proc. 17th Euromicro International Conference on Parallel, Distributed and Network-Based Processing (PDP), 2009, pp. 119-126.
- G. Shi, **V. Kindratenko**, S. Gottlieb, *Cell processor implementation of a MILC lattice QCD application*, In Proc. The XXVI International Symposium on Lattice Field Theory (Lattice), 2008.

- S. Lee, D. Raila, **V. Kindratenko**, *LLVM-CHiMPS: compilation environment for FPGAs using LLVM compiler infrastructure and CHiMPS computational model*, In Proc. 4th Annual Reconfigurable Systems Summer Institute (RSSI), 2008.
- **V. Kindratenko**, I. Ufimtsev, T. Martínez, *Evaluation of two-electron repulsion integrals over Gaussian basis functions on SRC-6 reconfigurable computer*, In Proc. 4th Annual Reconfigurable Systems Summer Institute (RSSI), 2008.
- G. Shi, **V. Kindratenko**, *Implementation of NAMD molecular dynamics non-bonded force-field on the Cell Broadband Engine processor*, In Proc. 9th IEEE International Workshop on Parallel and Distributed Scientific and Engineering Computing (PDSEC), 2008.
- **V. Kindratenko**, R. Brunner, A. Myers, *Dynamic load-balancing on multi-FPGA systems: a case study*, In Proc. 3rd Annual Reconfigurable Systems Summer Institute (RSSI), 2007.
- B. Hayes, R. Brunner, **V. Kindratenko**, *Angular Power Spectrum Estimation using High Performance Reconfigurable Computing*, In Proc. 3rd Annual Reconfigurable Systems Summer Institute (RSSI), 2007.
- R. Brunner, **V. Kindratenko**, and A. Myers, *Developing and Deploying Advanced Algorithms to Novel Supercomputing Hardware*, in Proc. NASA Science Technology Conference (NSTC), 2007.
- **V. Kindratenko**, R. Brunner, A. Myers, *Mitrion-C Application Development on SGI Altix 350/RC100*, In Proc. IEEE Symposium on Field-Programmable Custom Computing Machines (FCCM), 2007.
- D. Meixner, **V. Kindratenko**, D. Pointer, *On Using Simulink to Program SRC-6 Reconfigurable Computer*, in Proc. Military and Aerospace Programmable Logic Device (MAPLD), 2006.
- D. Meixner, **V. Kindratenko**, D. Pointer, *Running Simulink-based Designs on SRC-6*, in Proc. High Performance Embedded Computing (HPEC), 2006, pp. 45-46.
- **V. Kindratenko**, *Code partitioning for reconfigurable high-performance computing: a case study*, in Proc. Engineering of Reconfigurable Systems and Algorithms (ERSA), 2006, pp. 143-149.
- **V. Kindratenko**, and D. Pointer, *A case study in porting a production scientific supercomputing application to a reconfigurable computer*, in Proc. IEEE Symposium on Field-Programmable Custom Computing Machines (FCCM), 2006, pp. 13-22.
- M. Hall, A. Betts, D. Cox, D. Pointer, and **V. Kindratenko**, *The Visible Radio: process visualization of a software-defined radio*, in Proc. IEEE Visualization, 2005, pp. 159-165.
- Betts, M. Hall, **V. Kindratenko**, M. Pant, D. Pointer, V. Welch, and P. Zawada, *The GNU software radio transceiver platform*, in Proc. Software Defined Radio Technical Conference, 2004, Vol. C, pp. 41-46.
- D. Pointer, **V. Kindratenko**, P. Zawada, and M. Pant, *The extensible sensor platform*, in Proc. Software Defined Radio Technical Conference, 2004, Vol. A, pp. 201-205.
- R. Hornbaker, **V. Kindratenko**, and D. Pointer, *An RFID agricultural product and food security tracking system using GPS and wireless technologies*, in Proc. 7th International Conference on Precision Agriculture and Other Precision Resources Management, 2004, CD-ROM, paper # 212.
- R. Hornbaker, A. Hansen, **V. Kindratenko**, D. Pointer, and A. Apgar, *Improving agricultural operational efficiency with wireless communication*, in Proc. 7th International Conference on Precision Agriculture and Other Precision Resources Management, 2004, CD-ROM, paper #209.
- D. Cox, **V. Kindratenko**, and D. Pointer, *IntelliBadge™: towards providing location-aware value-added services at academic conferences*, in Proc. 5th International Conference on Ubiquitous Computing - UbiComp 2003, Lecture Notes in Computer Science series, 2003, vol. 2864, pp. 264-280.
- D. Cox, **V. Kindratenko**, D. Pointer, *IntelliBadge™*, in Proc. 1st International Workshop on Ubiquitous Systems for Supporting Social Interaction and Face-to-Face Communication in Public Spaces, UbiComp 2003 Adjunct proceedings, 2003, pp. 41-47.

- J. Ghaboussi, Y. Hashash, and **V. Kindratenko**, *Real-time soil modeling for machine-medium interaction in virtual reality*, in Proc. 8th International Symposium on Numerical Models in Geomechanics - NUMOG VIII, Swets & Zeitlinger, Lisse, The Netherlands, 2002, pp. 207-212.
- **V. Kindratenko**, *Intelligent Automated Motion Imagery Acquisition*, in Proc. Defining a Motion Imagery Research and Development Program Workshop, 2001, CD-ROM.
- **V. Kindratenko**, *Computer vision guided cross-projector color alignment on multi-projector displays*, in Proc. 4th International Immersive Projection Technology Workshop, 2000, CD-ROM.
- **V. Kindratenko**, and A. Bennett, *Evaluation of rotation correction techniques for electromagnetic position tracking systems*, in Proc. 6th Eurographics Workshop - Virtual Environments 2000, Springer Computer Science Series, Springer-Verlag, Berlin, Germany, 2000, pp. 13-22.
- **V. Kindratenko**, and B. Kirsch, *Sharing virtual environments over a Transatlantic ATM network in support of distant collaboration in vehicle design*, in Proc. 4th Eurographics Workshop - Virtual Environments '98, Springer Computer Science Series, Springer-Verlag, Berlin, Germany, 1998, pp. 151-161.
- **V. Kindratenko** and P. Van Espen, *Classification of irregularly shaped micro-objects using complex Fourier descriptors*, in Proc. 13th International Conference on Pattern Recognition - ICPR'96, IEEE Computer Society Press, Los Alamitos, California, vol. 2, pp. 285-289.
- **V. Kindratenko**, B. Treiger, and P. Van Espen, *Binarization of inhomogeneously illuminated images*, in Proc. 8th International Conference on Image Analysis and Processing - ICIAP'95, Lecture Notes in Computer Science series, 1995, vol. 974, pp. 483-487.

Other publications

- **V. Kindratenko**, G. Peterson, *Application accelerators in HPC*, Editorial introduction, Parallel Computing, vol. 38, no. 8, p. 343, 2012.
- **V. Kindratenko**, *Scientific Computing with GPUs*, Guest Editors' Introduction, IEEE/AIF Computing in Science and Engineering, vol. 14, no. 3, 2012.
- **V. Kindratenko**, P. Trancoso, Trends in High-Performance Computing, *Novel Architectures* department article, IEEE/AIF Computing in Science and Engineering, vol. 13, No. 3, pp. 92-95, 2011.
- D. Bader, D. Kaeli, **V. Kindratenko**, *Special Issue on High-Performance Computing with Accelerators*, Guest Editor's Introduction, IEEE Transactions on Parallel and Distributed Systems, vol. 22, no. 1, pp. 3-6, 2011.
- **V. Kindratenko**, R. Wilhelmson, R. Brunner, T. Martinez, W. Hwu, *High-Performance Computing with Accelerators*, Guest Editors' Introduction, IEEE/AIF Computing in Science and Engineering, vol. 12, no. 4, pp. 12-16, 2010.
- G. Shi, **V. Kindratenko**, F. Pratas, P. Trancoso, M. Gshwind, Application Acceleration with the Cell Broadband Engine, *Novel Architectures* department article, IEEE/AIF Computing in Science and Engineering, vol. 12, No. 1, pp. 76-81, 2010.
- **V. Kindratenko**, *Novel Computing Architectures*, inaugural *Novel Architectures* department article, IEEE/AIF Computing in Science and Engineering, vol. 11, no. 3, pp. 54-57, 2009.
- **V. Kindratenko**, G. Thiruvathukal, S. Gottlieb, *High-Performance Computing Applications on Novel Architectures*, Guest Editors' Introduction, IEEE/AIF Computing in Science and Engineering, vol. 10, no. 6, pp. 13-15, 2008.
- **V. Kindratenko**, D. Buell, *Reconfigurable Systems Summer Institute 2007*, Guest Editorial, Parallel Computing, vol. 34, no. 4-5, pp. 199-200, 2008.
- **V. Kindratenko**, C. Steffen, R. Brunner, *Accelerating scientific applications with reconfigurable computing*, invited *Scientific Programming* department article, IEEE/AIF Computing in Science and Engineering, vol. 9, no. 5, pp. 70-77, 2007.

- D. Buell, T. El-Ghazawi, K. Gaj, **V. Kindratenko**, *High-Performance Reconfigurable Computing*, Guest Editors' Introduction, IEEE Computer, vol. 40, no. 3, pp. 27-31, 2007.

Edited volumes/books

- Kindratenko, Volodymyr (Ed.), Numerical Computations with GPUs, Springer, ISBN 978-3-319-06547-2, 2014.
- Shi, Xuan; Kindratenko, Volodymyr; Yang, Chaowei (Eds.), Modern Accelerator Technologies for Geographic Information Science, Springer, ISBN 978-1-4614-8744-9, 2013.
- *Proceedings of the 2011 Symposium on Application Accelerators in High-Performance Computing* (SAAHPC), IEEE Publishing, ISBN 978-0-7695-4448-9, 2011.
- *Proceedings of the 4th international workshop on High-performance reconfigurable computing technology and applications* (held in conjunction with SC10), IEEE Publishing, ISBN 978-1-4244-9517-7, 2010.
- *Proceedings of the 3rd international workshop on High-performance reconfigurable computing technology and applications* (held in conjunction with SC09), ACM Press, ISBN 978-1-60558-721-9, 2009.
- *Proceedings of the 2st international workshop on High-performance reconfigurable computing technology and applications* (held in conjunction with SC08), IEEE Publishing, ISBN 978-1-4244-2826-7, 2008.
- *Proceedings of the 1st international workshop on High-performance reconfigurable computing technology and applications* (held in conjunction with SC07), ACM Press, ISBN 978-1-59593-894-7, 2007.

Professional Service

Journal editorial duties

- **Department Editor**, *IEEE/AIF Computing in Science and Engineering*, Novel Architectures department, 2009-present
- **Associate Editor**, *International Journal of Reconfigurable Computing (IJRC)*, 2007-present
- **Guest Editor**, *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, Special Issue on High-Performance Computing with Accelerators, 2011
- **Guest Editor**, *ACM Transactions on Reconfigurable Technology and Systems (TRETS)*, Proceedings of HPRCTA'08 Special Issue, 2009; Proceedings of RSSI'08 Special Issue, 2009; Proceedings of HPRCTA'07 Special Issue, 2008
- **Guest Editor**, *IEEE/AIF Computing in Science and Engineering*, Special Issue on the High-Performance Computing Applications on Novel Architectures, 2008; Special Issue on High-Performance Computing with Accelerators, 2010; Special Issue on Scientific Computing with GPUs, 2012.
- **Guest Editor**, *Parallel Computing*, Proceedings of RSSI'07 Special Issue, 2007; Application accelerators in HPC Special Issue, 2011
- **Guest Editor**, *IEEE Computer*, Special Issue on High-Performance Reconfigurable Computing, 2007

Conference and symposia leadership

- **Workshop Chair**, International Workshop on the Application of Machine Learning Techniques to Computational Fluid Dynamics Simulations and Analysis (CFDML), in conjunction with the International Supercomputing Conference (ISC) High Performance, Frankfurt, Germany, June 2020
- **Co-chair**, 2012 International Workshop on Modern Accelerator Technologies for GIScience, 2012

- **Program Chair**, Symposium on Application Accelerators in High Performance Computing (SAAHPC), 2009-2011; **event co-founder**
- **Workshop co-Chair**, *Path to Petascale: Adapting GEO/CHEM/ASTRO Applications for Accelerators and Accelerator Clusters*, Urbana (IL), April 2009
- **Program co-Chair**, High Performance Reconfigurable Computing track, *2008 International Conference on Reconfigurable Computing and FPGAs* (ReConFig), Cancun, Mexico, November 2008
- **Program co-Chair**, Reconfigurable Computing track, *51st IEEE International Midwest Symposium on Circuits and Systems (MWSCAS)*, Knoxville (TN), August 2008
- **Program Chair**, *Workshop on Programming Massively Parallel Processors (PMPP)*, Urbana (IL), July 2008
- **Program Chair**, *Reconfigurable Systems Summer Institute (RSSI)*, Urbana (IL), July 2008, 2007, 2006
- **Workshop Chair**, *International Workshop on High-Performance Reconfigurable Computing Technology and Applications (HPRCTA),* in conjunction with *IEEE/ACM Supercomputing*, New Orleans (LA), November 2010; Portland (OR), November 2009; Austin (TX), November 2008; Reno (NV), November 2007; also **event co-founder**
- ***@ IEEE/ACM Supercomputing***
  - Panel Chair, Can Developing Applications for Massively Parallel Systems with Heterogeneous Processors Be Made Easy(er)?, Austin (TX), November 2008
  - Panel Chair, (Super)computing on FPGAs, GPUs, Cell and Other Exotic Architectures: Challenges and Opportunities, Reno (NV), November 2007
  - Panel Chair, Is High-Performance, Reconfigurable Computing the Next Supercomputing Paradigm?, Tampa Bay (FL), November 2006
  - BoF Chair, Designing and Building Next-Generation Computer Systems for Deep Learning, Dallas (TX), November 2018; Denver (CO), November 2019
  - Emerging Technology Co-Chair, IEEE/ACM Supercomputing conference, Dallas (TX), November 2018
  - Doctoral Showcase Co-Chair, IEEE/ACM Supercomputing conference, Austin (TX), November 2015
  - Emerging Technology Committee, IEEE/ACM Supercomputing conference, November 2014
  - Doctoral Showcase Chair, IEEE/ACM Supercomputing conference, Seattle (WA), November 2011
  - Sub-committee, *IEEE/ACM Supercomputing*, Baltimore (MD), November 2002
- **Workshop co-Chair**, Second International Workshop on Ubiquitous Systems for Supporting Social Interaction and Face-to-Face Communication in Public Spaces, *UbiComp'04*, Nottingham, England, September 2004; First International Workshop on Ubiquitous Systems for Supporting Social Interaction and Face-to-Face Communication in Public Spaces, *UbiComp'03*, Seattle (WA), October 2003

Peer reviews

- **Journal paper reviews**

  IEEE Transactions on Visualization and Computer Graphics (2019); *IEEE Transactions on Parallel and Distributed Systems* (2007, 2009-2010, 2014, 2016, 2018); *IEEE Transactions on Very Large Scale Integration Systems* (2006); *IEEE Computer* (2006-2007); *IEEE Transactions on Computers* (2008-2009, 2011); *IEEE Transactions on Robotics* (2011-2012); *IEEE/AIF Computing in Science and Engineering* (2008-2013, 2015-2017); *ACM Transactions on Embedded Computing Systems* (2008-2010); *ACM Transactions on Reconfigurable Technology and Systems* (2008-2010); *Microprocessors and Microsystems* (2013); *International Journal of Parallel Programming* (2013); *Journal of Supercomputing* (2015); *Journal of Signal Processing Systems* (2013); *Journal of Parallel and*

Distributed Computing (2010-2011); *Computer Science and Information Systems* (2015); Computer Physics Communications (2015); *Geoinformatica* (2011, 2014); *Journal of Computer Assisted Radiology and Surgery* (2013); *International Journal of Computers and Applications* (2008, 2010); *EURASIP Journal on Embedded Systems* (2008); *Parallel Computing* (2008, 2010-2014); *Virtual Reality* (2006); *Image and Vision Computing* (2004); *International Journal of Remote Sensing* (2004); *Journal of Systemics, Cybernetics and Informatics* (2003); *Virtual Reality: Research, Development, and Applications* (2002); *Journal of Mathematical Imaging and Vision* (2002); *Micron: The International Research Review Journal for Microscopy* (1999); *IEEE Communications Letters* (1998)

- **Conference/workshop Technical Program Committees**

  IEEE Cluster Conference (2017-2018); International Supercomputing Conference (ISC 2014-2016); *IEEE International Conference on High Performance Computing and Communications* (HPCC 2014-2016); *IEEE International Parallel and Distributed Processing Symposium* (IPDPS 2013, 2018-2019); *International Conference on High Performance Compilation, Computing and Communications* (HP3C 2017); *IEEE International Conference on Application-specific Systems, Architectures and Processors* (ASAP 2013); *International Workshop on Frontiers of Heterogeneous Computing* (FHC 2013); *Euromicro International Conference on Parallel, Distributed and Network-Based Computing* (PDP 2012-2019); *IEEE International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications* (IDAACS 2013-2015); *IFIP International Conference on Network and Parallel Computing* (NPC 2013-2014); *IEEE/ACM International Symposium on Cluster, Cloud, and Grid Computing* (CCGrid 2012); *International Conference on High Performance Computing* (HPC-UA 2012-2013); *Cluster Computing* (regional conference in Ukraine 2012-2013); *ACM International Conference on Computing Frontiers* (CF 2011); *ACS/IEEE International Conference on Computer Systems and Applications* (AICCSA 2011); *Workshop on General-Purpose Computation on Graphics Processing Units* (GPGPU 2010-2012); *International Workshop on Frontier of GPU Computing* (FGC 2010-2012); *Many-Core and Reconfigurable Supercomputing Conference* (MRSC 2009-2011); *HiPEAC Workshop on Reconfigurable Computing* (WRC 2009-2011); *International Conference on Reconfigurable Computing and FPGAs* (ReConFig 2008-2018); *International Conference on Engineering of Reconfigurable Systems and Algorithms* (ERSA 2007-2010); *International Conference on Field-Programmable Technology* (FPT 2008-2010)

- **Conference/workshop paper reviewer**

  International Conference on Field-Programmable Technology (ICFPT 2008); *IEEE International Midwest Symposium on Circuits and Systems* (MWSCAS 2008); *IEEE/ACM Supercomputing* (2006, 2015, 2017-2018); *International Conference on Computing, Communications and Control Technologies* (2005); *IEEE Visualization Conference* (2001- 2002)

- **Other conference committees**
  - International committee, *ACM SIGGRAPH*, Boston (MA), August 2006
  - Emerging Technologies jury and International Committee, *ACM SIGGRAPH*, Los Angeles (CA), August 2005

- **Agency proposal reviews and panels**
  - **NSF** (2008-2009, 2011-2016)
  - **NASA** (2007-2008)
  - **AAAS** (2018)
  - *Research Grants Council of Hong Kong* (2011-2019)
  - *Israel Science Foundation* (2005)

- **Executive/Advisory boards/Consulting**
  - Academic At-Large Board member, *OpenFPGA Board of Directors*, 2009-2012

- Technology Consultant to *Aries Automation*, 2010-2015
- Advisory board member, *NIST: Structural Health Integrated Electronic Life Determination (SHIELD)* (2003-2005)

Other

- **Tutorials**
  - Introduction to GPU Programming, *The 9th ACS/IEEE International Conference on Computer Systems and Applications,* Egypt, December 2011
  - Introduction to GPU Programming, *High Performance Computing Course*, Advanced Digital Sciences Center, Singapore, July 2011
  - Introduction to GPU Programming, *US-Egypt Collaboration Follow-up meeting*, The American University in Cairo, Egypt, December 2010
  - Introduction to GPU Programming, *High Performance Computing Course*, Advanced Digital Sciences Center, Singapore, June 2010
  - Introduction to GPU Programming, *CRA-W/CDC Careers in High Performance Systems (CHiPS) Mentoring Workshop*, Urbana (IL), July 2009
  - Reconfigurable Computing tutorial, *Reconfigurable Systems Summer Institute*, Urbana (IL), July 2008
  - Reconfigurable Supercomputing tutorial, *IEEE/ACM Supercomputing*, Reno (NV), November 2007; Tampa Bay (FL), November 2006
- **Panels**
  - Panel*: Battle of the Accelerator Stars* at the *Fifth International Workshop on Parallel Programming Models and Systems Software for High-End Computing* (P2S2) held in conjunction with the *41st International Conference on Parallel Processing* (ICPP), Pittsburg (PA), September 2012
  - BoF: *Application Grand Challenges in the Heterogeneous Accelerator Era*, IEEE/ACM Supercomputing, Seattle (WA), November 2011
  - Panel: *Key Challenges presented by next generation hardware system*, Key Challenges in Modeling and Simulation Fall Creek Falls conference, Nashville (TN), September 2007
  - BoF: *Programming FPGAs: Challenges and Successes*, IEEE/ACM Supercomputing, Tampa Bay (FL), November 2006
- **Invited presentations**
  - *Technologies for desktop HPC: Application developer's perspective*, 240th ACS National Meeting & Exposition, August 2010, Boston (MA)
  - *Overview of Hardware Accelerators*, NSF US/Egypt Meeting on Software Development for Multicore and Heterogeneous Processing Technologies, June 2009, Cairo, Egypt
  - *High Performance Computing with Accelerators*, First workshop of the Joint Laboratory for Petascale Computing, June 2009, Paris, France
  - *Accelerating Cosmology Applications: from 80 Mflops to 8 Gflops in 4 Steps*, Revolutionary Technologies for Acceleration of Emerging Petascale Applications – FPGAs Minisymposia, 13th SIAM Conference on Parallel Processing for Scientific Computing, Atlanta (GA), March 2008
  - *Tracker Calibration Techniques*, Advanced CAVE Programming Workshop Series, Norfolk (VA), October 2000, Ann Arbor (MI), August 2000
  - *Application Case Study III: Distributed Virtual Reality System*, NLANR Distributed Computing Workshop Series, Urbana-Champaign (IL), August 1998, Urbana-Champaign (IL), March 1998
  - *Distributed Virtual Reality*, Advanced Internet Applications Panel, University of Pennsylvania, Philadelphia (PA), May 1998

Patents

- R. Hornbaker, **V. Kindratenko**, and D. Pointer, *System for tracking grain*, US Patent 7,511,618 B2, March 31, 2009.
- R. Hornbaker, **V. Kindratenko**, and D. Pointer, *Tracking device for grain*, US Patent 7,162,328, January 9, 2007.
- R. Hornbaker, **V. Kindratenko**, and D. Pointer, *Method for tracking grain*, US Patent 7,047,103, May 16, 2006.
- **V. Kindratenko** and R. Fenwick, *System and method for hidden object removal*, US Patent 6,897,863, May 24, 2005.
- **V. Kindratenko** and R. Fenwick, *Cuts removal system for triangulated CAD models*, US Patent 6,744,434, June 1, 2004.