DukSu Kim

Senior Researcher

Dept. of High Performance Visualization,

Supercomputing R&D Center,

Div. of Supercomputing,

Korea Institute of Science and Technology

Information (KISTI)

Work : +82-42-869-1076

Fax : +82-42-869-1687

Email : bluekdct@gmail.com

URL : http://sglab.kaist.ac.kr/bluekds

Address : 245 Daehak-ro, Yuseong-gu,

Daejeon, 305-701, South Korea

Education

- **Integrated Master's Ph.D. Program**   02/2008 – 08/2014

  Advisor: Prof. Sung-Eui Yoon

  Scalable Graphics/Geometry Lab.

  KAIST (Korea Advanced Institute of Science and Technology)

  GPA: 3.66/4/3

- **B.S., Information & Communication Engineering**   03/2001 - 02/2008

  (06/2003-11/2005: Obligatory military service)

  SungKwunKwan University, Suwon, South Korea

  GPA: 4.24/4.5

Research Interest

- Volume Rendering, Scientific Visualization
- Heterogeneous parallel computing, GPU computing, Supercomputing
- Proximity computation, simulation and other geometry problems
- Fluid simulation, Motion planning

Awards/Honors

1. **Spotlight paper**, IEEE Transactions on Visualization and Computer Graphics (TVCG), Sept., 2013
   Duksu Kim, Jinkyu Lee, Junghwan Lee, Insik Shin, John Kim , Sung-Eui Yoon

2. **Distinguished paper award,** Pacific Graphics 2009 (http://cg.postech.ac.kr/pg2009/)
   HPCCD: Hybrid Parallel Continuous Collision Detection using CPUs and GPUs
   DukSu Kim, Jae-Pil Heo, JaeHyuk Huh, John Kim and Sung-eui Yoon

3. **1st place at ACM Student Research Competition Award (ACMC SRC),** ACM SIGGRAPH, 2009
   (http://www.siggraph.org/s2009/performances_special_events/acm_src_final/index.php)
   3rd place at the graduate level in the Grand Finals
   ACM Award Banquet, ACM SRC, 2010 (http://src.acm.org)
   Representative recipient: Tae-Joon Kim
   RACBVHs: Random-Accessible Compressed Bounding Volume Hierarchies
   Tae-Joon Kim, Bochang Moon, **Duksu Kim**, and Sung-Eui Yoon

4. **2nd Place**, NVIDIA (Korea) CUDA coding contest, 2015

5. **Best programming award,** NVIDIA (Korea) CUDA coding contest 2010

6. **Student stipend award,** Invited poster, ACM symposium on Interactive 3D Graphics and Games 2009
   (http://graphics.cs.williams.edu/i3d09/)

7. **Best award** , Thesis project competition, Dept. of ICE, SungKwunKwan University, South Korea, 2008
   (http://icc.skku.ac.kr/eng/home.htm)
   3D Cartoon Making Tool
   DukSu Kim and HyunGu Lee

8. **Graduate Fellowship**, Software R&D Center, Samsung electronics, 09/2013 – 08/2014

9. **National scholarship**, KAIST, South Korea
   (http://www.kaist.edu/english/)
   M.S. course, 02/2008 – 02/2010
   Integrated Master's Ph.D program, 03/2010 – 08/2013

10. **Academic scholarship,** Sung Kyun Kwan University, South Korea
    (http://www.skku.edu/new_home/eng/index_pc.jsp)
    The spring semester, 2002
    Spring and fall semesters, 2006 – 2007

Publications

* : SCI (Science Citation Index)-listed journal   *+ : SCI-E (Science Citation Index – Extended)-listed journal*

1. **Out-of-Core Proximity Computation for Particle-based Fluid Simulation**
   Duksu Kim, Myung-Bae Son, Young J. Kim, Jeong-Mo Hong, Sung-Eui Yoon
   High-Performance Graphics, June, 2014
   Cited by 5 (google scholar)
   Invited to submit extended version to computer graphics forum

2. **Scheduling in Heterogeneous Computing Environments for Proximity Queries**
   Duksu Kim, Jinkyu Lee, Junghwan Lee, InSik Shin, John Kim, Sung-eui Yoon
   IEEE Transactions on Visualization and Computer Graphics* (TVCG), Sept., 2013
   JCR impact factor: 1.858 (recent 5 years), JCR journal ranking: 25/106 (Q1)
   Cited by 6 (google scholar), 0 (JCR citation report)
   Selected as Spotlight paper for Sept. 2013 issue

3. **Multi-Resolution Cloth Simulation**
   YongJoon Lee, Sung-eui Yoon, SeungWoo Oh, **DukSu Kim**, SungHee Choi
   Computer Graphics Forum+ (Pacific Graphics), 2010
   JCR impact factor: 1.83 (recent 5 years), JCR journal ranking: 17/106 (Q1)
   Cited by 27 (google scholar), 7 (JCR citation report)

4. **FASTCD: Fracturing-Aware Stable Collision Detection**
   Jae-Pil Heo, Joon-Kyung Seong, **DukSu Kim**, Miguel A. Otaduy, Jeong-Mo Hong, Min Tang, and Sung-Eui Yoon
   ACM SIGGRAPH/Eurographics Symp. on Computer Animation (SCA), 2010
   Cited by 18 (google scholar)

5. **RACBVHs: Random-Accessible Compressed Bounding Volume Hierarchies**
   Tae-Joon Kim, Bochang Moon, **Duksu Kim**, and Sung-Eui Yoon, IEEE Transactions on Visualization and Computer Graphics* (TVCG), 2010
   JCR impact factor: 1.858 (recent 5 years), JCR journal ranking: 25/106 (Q1)
   Cited by 32 (google scholar), 9 (JCR citation report)
   Won 1st place at ACM Student Research Competition held at ACM SIGGRAPH 09
   Won 3rd place at the ACM Grand Finals

6. **HPCCD: Hybrid Parallel Continuous Collision Detection using CPUs and GPUs**
   DukSu Kim, Jae-Pil Heo, JaeHyuk Huh, John Kim, and Sung-Eui Yoon
   Computer Graphics Forum+ (Pacific Graphics), 2009
   JCR impact factor: 1.83 (recent 5 years), JCR journal ranking: 17/106 (Q1)
   Cited by 81 (google scholar) and 22 (JCR citation report)
   Received a distinguished paper award, equivalent to a best paper award in other conferences

Domestic Publications

1. **비정렬 격자 볼륨 렌더링을 위한 다중코어 CPU기반 메모리 효율적 광선 투사 병렬 알고리즘 (Memory Efficient Parallel Ray Casting Algorithm for Unstructured Grid Volume Rendering on Multi-core CPUs)**
   김덕수(Duksu Kim)
   Journal of KIISE, Vol. 43, No. 3, pp 304-313, 2016

2. **신호등 신호에 따른 차량 주행 제어를 위한 인종 전위 함수 (Artificial Potential Function for Driving a Road with Traffic Light)**
   김덕수(Duksu Kim)
   Journal of KIISE, Vol. 42, No. 10, pp. 1231-1238. 2015

3. **도심 교통 시뮬레이션 (Urban Mobility Simulation)**
   김경아, **김덕수(Duksu Kim)**, 윤성의
   한국컴퓨터그래픽스학회/컴퓨터그래픽스 논문지, Vol. 17, No. 4, pp-23-31, 2011

Technical Reports

1. **Out-of-Core Proximity Computation for Particle-based Fluid Simulation**
   Duksu Kim, Myung-Bae Son, Young J. Kim, Jeong-Mo Hong, Sung-Eui Yoon
   Dept. of CS, KAIST, Technical Report CS-TR-2014-385, 2014

2. **Hybrid Parallel Computation for Proximity Queries**
   Duksu Kim, Jinkyu Lee, Junghwan Lee, Insik Shin, John Kim , and Sung-eui Yoon
   KAIST Tech. Report, 2012

3. **PCCD: Interactive Parallel Continuous Collision Detection**

   DukSu Kim, Jae-Pil Heo, and Sung-Eui Yoon

   Dept. of CS, KAIST, Technical Report CS-TR-2008-298, Oct., 2008

4. **RACBVHs: Random-Accessible Compressed Bounding Volume Hierarchies**

   Tae-Joon Kim, Bo-Chang Moon, **Duk-Su Kim**, and Sung-Eui Yoon

   Dept. of CS, KAIST, Technical Report CS-TR-2008-299, Sep., 2008

Invited Talks/Presentations

- **Memory Efficient Parallel Ray-casting Algorithm for Unstructured Grid Volume Rendering**
  - Euro Visualization 2017 poster
- **Out-of-Core Proximity Computation for Particle-based Fluid Simulation**
  - GPU Technology Conference (GTC), 2015
- **Hybrid Parallel Computation for Proximity Queries**
  - Invited talk at ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D), 2014
  - GPU Technology Conference (GTC), 2013
- **Fundamentals of GPGPU and Tips for Optimization**
  - LG CTO and KAIST, Mar., 2012
- **HPCCD: Hybrid Parallel Continuous Collision Detection**
  - SIGGRAPH 2009 poster
  - High Performance Graphics 2009 poster
  - Koran Supercomputing conference, Oct., 2009
- **PCCD: Parallel Continuous Collision Detection**
  - Invited poster at ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D), 2009

Patents

1. **HYBRID PARRALLEL CONTINUOUS COLLISION DETECTION USING CPU AND GPU**

   DukSu Kim, JaePil Heo, Jaehyuk Huh, John Kim, and Sung-Eui Yoon

   South Korea, filed at 2009.8.31 and registered at 2011.02.01 (10-1013784)

2. **PARALLEL COLLISION DETECTION METHOD BASED ON INTER CONLLISION DETECTION AND COMPUTER READABLE MEDIA**

   DukSu Kim, JaePil Heo, Jaehyuk Huh, John Kim, and Sung-Eui Yoon

   South Korea, filed at 2009.12.17 and registered at 2011.11.14 (10-1084980)

3. **PROXIMITY QUERY PROCESS ACCELERATING SYSTEM**

   Duksu Kim, Jinkyu Lee, Junghwan Lee, InSik Shin, John Kim, Sung-eui Yoon

   South Korea, filed at 2013.1.18 (10-2013-0005992)

   PCT, filed at 2014. 01. 08 (PCT/KR2014/000170)

4. **NEIGHBOR DISCOVERY COMPUTATION SYSTEM**

   Duksu Kim, Myung-Bae Son, Sung-eui Yoon

   South Korea, field at 2015. 02. 06 and registered at 2016.0720 (10-1642823)

5. **PARALLEL NEIGHBOR SEARCH SYSTEM AND METHOD THEREOF**

   Duksu Kim, Myung-Bae Son, Sung-eui Yoon

   South Korea, field at 2015. 10. 29 and registered at 2016. 12. 21 (10-1690315)

6. **PARALLEL PARTICLE-BASED FLUID SIMULATION SYSTEM AND METHOD THEREOF**

   Duksu Kim, Min Ah Kim, Gi Beom Koo, Sehoon Lee, Joong Youn Lee, Young Ju Hur, Gyuhyun Hwang

   South Korea, field at 2015. 10. 29 (10-2015-0151244)

7. **METHOD AND SYSTEM FOR DRIVING A ROAD WITH TRAFFIC LIGHT**

   Duksu Kim, Min Ah Kim, Gi Beom Koo, Sehoon Lee, Joong Youn Lee, Young Ju Hur, Gyuhyun Hwang, Kum Won Cho

   South Korea, filed at 2016.05.13 (10-2016-0059053)

8. **PARALLEL VOLUME RENDERING APPARATUS FOR UNSTRUCTURED GIRD AND MEHTOD THEREOF**

   Duksu Kim, Min Ah Kim, Gi Beom Koo, Sehoon Lee, Joong Youn Lee, Young Ju Hur, Gyuhyun Hwang

   South Korea, filed at 2016.06.07 (10-2016-0070361)

   ----- co-inventor from here ----

9. **MULTI-RESOLUTION CLOTH SIMULATION METHOD USING SIMPLIFIED LINEAR SYSTEM AND COMPUTER READABLE**

   YongJoon Lee, Sung-eui Yoon, SeungWoo Oh, **DukSu Kim**, SungHee Choi

   South Korea, filed at 2011.3.23 and registered at 2012.12.18 (10-1215441)

10. **METHOD FOR GENERATING SECOND-ORDER VARIABLE OF FLUID SIMULATION DATA AND APPARATUS THEREOF**

    Young Ju Hur, Min Ah Kim, Joong Youn Lee, Gi Beom Koo, Sehoon Lee, **Duksu Kim**, Gyuhyun Hwang

    South Korea, field at 2015. 11. 17 (10-2015-0161207)

11. **METHOD AND APPARATUS FOR PROVIDING OPTIMAL SECONDARY VARIABLE CALCULATION PATH IN FLUID DYNAAMICS**

    Joong Youn Lee, Min Ah Kim, Young Ju Hur, Gi Beom Koo, Sehoon Lee, **Duksu Kim**, Gyuhyun Hwang

    South Korea, field at 2015. 12. 21 (10-2015-0183064)

Software Packages

- **OpenCCD** (2009)

  A library to find collision between two objects or within an object and provides general collision detection API for different applications. (Over 100 downloads)

  Project web page: https://sglab.kaist.ac.kr/projects/OpenCCD/

Professional Activities

- **Memberships**
  - ACM Professional member, IEEE Young Professional
- **Reviewer for**
  - Euro Graphics, Pacific Graphics, High-Performance Graphics, IEEE PacificVis, CAG, …

Professional/Research Experiences

- **Senior researcher**
  - Div. of supercomputing, Korea Institute of Science and Technology Information   07/2014 – Now
- **Research Assistant**
  - Scalable Graphics/Geometry Lab., Dept. Computer Science, KAIST   03/2008 – 07/2014
- **Teaching Assistant**
  - Motion Planning and Applications   09/2011 – 12/2011
  - Algorithm: Design and Analysis, Dept. Computer Science, KAIST   02/2011 – 05/2011
  - Computer Animation, Dept. Computer Science, KAIST   09/2009 – 12/2009
- **Project participations**
  - Development of VR visualization techniques for virtual towing tank   08/2016 – Now
    NST (National Research Council of Science and Technology)
  - Development of Virtual Wind Tunnel (Scientific visualization part)   07/2014 – 12/2014
    ADD (Agency for Defense Development)
  - Development of Total VFX Simulation Techniques based on Lego-style   06/2011 – 05/2014
    modular design
    KOCCA (Korea Creative Content Agency)
  - Development of Real-time Physics Simulation Engine for e-Entertainment   04/2008 – 03/2013
    Ministry of Knowledge Economy
  - Improvement of Graphics Performance   05/2012 – 11/2012
    Samsung Heavy Industries
  - Hybrid Parallel Proximity Computation Utilizing Heterogeneous Multi-Cores 06/2011 – 06/2102
    Microsoft

Skills

- **IT Skills**
  - Objective-Oriented/Script languages: C/C++, Java, Matlab, Latex, Etc.,
  - GPU and Heterogeneous computing programming: CUDA, OpenMP, OpenCL
  - Development platform (OS): Windows, Linux
  - Graphics/Modeling tools: Flash, 3D Max, Maya, Etc.
- **Languages**
  - Korean and English

Selected Cover Images

- An image of a cloth simulated by our multi-resolution cloth simulation method, Pacific Graphics, 2010
- An image of N-body simulation that is powered by hybrid parallel continuous collision detection, back cover, Pacific Graphics, 2009

Activities

- **Chairman of the Ph.D. student council,** Computer science department of KAIST, 2010
- **Deputy chairman of the M.S. council,** Computer science department of KAIST, 2009
- **Swing Dance**, career: 10 years
  - **Awards/Honors**
    - ◆ **Finalist (7th place), JnJ advanced**, 2016, Korea Lindy Hop Championship (KLHC)
    - ◆ **3rd Place, JnJ Open**, The Battle Korea 2015, Swing-It, Seoul
    - ◆ **2nd Place, Strictly Advanced (with Hyunjeong Jeong),** Battle Fever 2015
    - ◆ **Finalist, Strictly Open (with Saemmy Jang)**, Battle Fever 2015
    - ◆ **2nd place, JnJ Open,** Battle Fever 2013
    - ◆ **Finalist, JnJ Open,** The Battle Korea 2013**,** Swing-It, Seoul
  - **Instructor,** Swing Fever (Swing dance society, http://cafe.daum.net/swingfever)
    - ◆ High intermediate level class (Lindy hop), 2011–Now
    - ◆ Intermediate level class (Lindy hop), 2009–2011
    - ◆ Beginner class (Jitterbug), 2009
  - **Jury member**
    - ◆ The Battle Korean (TBK) – Daejeon & DaeGu, 2016
  - **Manager/Staff**, Swing Fever
    - ◆ The largest swing dance society in Daejeon
      - Over 5000 online members and over 200 offline dancers
    - ◆ **Manager (Head staff)**, 03/2015–08/2015, 09/2013–02/2014
    - ◆ **Staff**, 09/2015–02/2016, 03/2012–02/2013
  - **Organizer/Staff**, Daejeon Swing Exchange
    - ◆ One of the biggest swing dance events hold in Daejeon
    - ◆ **Organizer (Head staff)**: 2015-Now / **Staff**: 2012-2014
  - A member of a **performance team,** 2013/09–Now
    - ◆ Shooting stars, The largest swing dance performance team in Daejeon
- **Guitar**, career: 1 year
  - Instructor
    - ◆ Beginner class, 2014/01–2014/05