Minchen Li

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RESEARCH INTERESTS

I'm interested in computer graphics research, especially geometry processing and physics-based simulation.

EDUCATION

M.Sc. in Computer Science **Sep. 2015 – Apr. 2018(expected)**

Department of Computer Science, The University of British Columbia Vancouver, Canada

Supervisor: Prof. Alla Sheffer **Grade Average:** 95.3/100

B.Eng. (Hons) in Computer Science & Technology (Mixed Class) **Sep. 2011 – Jul. 2015**

College of Computer Science & Technology and Chu Kochen Honors College, Zhejiang University Hangzhou, China

Overall GPA: 3.81/4.00 **Major GPA:** 3.88/4.00 **Major Ranking:** Top 3%

HONORS AND SCHOLARSHIPS

Mitacs Globalink Graduate Fellowship (10,000 CAD) Jun. 2015

Excellent Bachelor's Thesis Award at Zhejiang University Jun. 2015

First Class Scholarship for Outstanding Merits (Top 3% in Academic Performance, 5,000 RMB) 2013-2014

PUBLICATIONS

- Xinxin Zhang, **Minchen Li**, and Robert Bridson. Resolving Fluid Boundary Layers with Particle Strength Exchange and Weak Adaptivity. *ACM Transactions on Graphics (SIGGRAPH)*, 2016.
- **Minchen Li**, Wei Cai, Ke Wang, Hong Ji, and Victor C.M. Leung. Prototyping Decomposed Cloud Software: A Case Study on 3D Skeletal Game Engine. *IEEE International Conference on Cloud Computing Technology and Science (CloudCom)*, 2015.
- Wei Cai, Conghui Zhou, **Minchen Li**, Xiuhua Li, and Victor C.M. Leung. MCG Test-bed: An Experimental Test-bed for Mobile Cloud Gaming. *ACM MobiSys Workshop on Mobile Gaming (MobiGames)*, 2015.

TEACHING EXPERIENCE

Teaching Assistant at The University of British Columbia **Sep. 2015 – Apr. 2016**

- **CPSC 418 - Parallel Computation** **Instructor:** Prof. Mark R. Greenstreet **Jan. 2016 - Apr. 2016**
- **CPSC 314 - Computer Graphics** **Instructor:** Dr. Mikhail Bessmeltsev **Sep. 2015 - Dec. 2015**

RESEARCH EXPERIENCE

■ **Research Assistant in The Imager Lab at The University of British Columbia** **May. 2016 – Present**

Project: Physics-driven and Sketch-based Modeling **Supervisor: Prof. Alla Sheffer**

- Discuss research ideas and methods for solving research problems and conduct experiment using C++ or MATLAB.
- Host the project weekly meeting to present results, analysis, and ideas on improvement to supervisors.

■ **Research Assistant at Institute of Artificial Intelligence, Zhejiang University** **Nov. 2014 – May. 2015**

Project: Skeletal Animation in a Human Modeling System **Supervisor: Dr. Jijun Li**

- Designed an auto-rigging scheme to animate different human models with CMU MoCap data using linear blend skinning

(implemented with CUDA C) and dual quaternion skinning.

- The skinning weights computation is formulated and solved as a quadratic optimization problem.

■ **Mitacs Globalink Research Intern at The University of British Columbia** **Jul. 2014 – Sep. 2014**

Project: Cognitive Platform for Ubiquitous Cloud-Based Gaming **Supervisor: Prof. Victor C.M. Leung**

- Developed a basic 3D skeletal animation editor distributively using Three.JS on a cognitive cloud-gaming platform.
- Designed and conducted experiments that demonstrate the efficiency of dynamic partitioning for game graphic rendering.

■ **National Training Program on Innovation for Undergraduates in China** **Oct. 2013 – Apr. 2014**

Project: Multi-Platform 3D Human Face Reconstruction Apps **Supervisor: Prof. Kun Zhou**

- Reconstructed 3D human faces from single frontal face photos using the Morphable Model.
- Developed apps for Windows PC, iOS phone and Android phone respectively based on Software as a Service.

COURSE PROJECTS

■ **Subspace Mesh Deformation with Constrained Nonlinear Least Squares Energy** **Nov. 2016 – Dec. 2016**

Course: CPSC 524 – Geometric Modeling **Instructor: Prof. Alla Sheffer**

- Implemented a basic subspace mesh deformer with local rotation-invariant Laplacian coordinates and volume preserving constraint according to *Subspace Gradient Domain Mesh Deformation, SIGGRAPH'06*.
- After applying Lagrange multipliers, it is solved via Gauss-Newton method with backtracking line search in a linear subspace constructed by mapping the original vertex coordinates to that of a control mesh using mean value interpolation.

■ **A Vertex-Edge Quadric for Edge Collapse Mesh Simplification** **Feb. 2016 – Apr. 2016**

Course: CPSC 548 – Directed Studies **Instructor: Prof. Alla Sheffer**

- Proposed a new quadric error metric based on the distances between the new vertex and the affected edges for edge collapse operations. Compared to QSlim and structure-aware mesh decimation, our method preserves structural edges and shapes better on man-made 3D models.
- The contour likelihood of mesh edges are computed with a view sampling method to serve as the weights for the quadric.

■ **Image Caption Generators based on Deep Neural Networks** **Mar. 2016 – Apr. 2016**

Course: CPSC 540 – Machine Learning **Instructor: Dr. Mark Schmidt**

- Systematically analyzed a deep neural network based image caption generation method. Wrote *A tutorial on Backward Propagation Through Time (BPTT) in The Gated Recurrent Units (GRU)* for future reference.
- Proposed a simplified GRU as the alternative recurrent layer. It achieves comparable results to the original Long Short-Term Memory (LSTM) method but with fewer parameters which saves memory and training time.

■ **Eulerian Liquid Simulation with Weakly Coupled Rigid Body** **Nov. 2015 – Dec. 2015**

Course: CPSC 530P – Sensorimotor Computation **Instructor: Prof. Dinesh K. Pai**

- Implemented a two-way Eulerian solid-fluid coupling simulator with integrated solid-fluid forces.
- Based on Batty's barebones 3D fluid simulator, Intel's TBB is applied to parallelize the simulation process. Advection schemes such as semi-Lagrangian, PIC and FLIP methods are implemented in order to analyze numerical dissipation.

■ **Air-Ground Image Matching for MAV Urban Localization** **Nov. 2015 – Dec. 2015**

Course: CPSC 515 – Computational Robotics **Instructor: Prof. Ian M. Mitchell**

- To localize a Micro Aerial Vehicle (MAV) flying in GPS shadowed areas, geo-tagged Google Street View images are used as the map, to which we match MAV captured images by visually similar and geometrically consistent features.
- Adding global geometric constraints to the air-ground matching method proposed by *MAV urban localization from Google Street View data, IROS'13*, our method achieves a higher recall rate at precision 1.0 on their Zurich dataset.

■ **Mesh Deformation with Linear Laplacian Coordinates** **May. 2014 – Jun. 2014**

Course: Advances in Computer Graphics **Instructor: Prof. Kun Zhou**

- Implemented a basic mesh deformer which preserves the linear Laplacian coordinates during user interaction.
- Graph geodesic information are used to propagate the pre-scripted rotations from picked anchors to the entire mesh.

PROGRAMMING SKILLS

Proficient: C/C++, OpenGL, MATLAB, LaTeX **Familiar:** Java, JavaScript, CUDA C, OpenCV, MFC

EXTRACURRICULAR ACTIVITIES

Photographer and Executive of Chinese Students and Scholars Association at UBC Oct. 2015 – Mar. 2016

Director of Photography of Chu Kochen Honors College's Graduate Short Film Apr. 2015 – Jun. 2015