

Xingyi Du

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Education

Washington University in St. Louis

St. Louis, USA

PH.D. CANDIDATE IN COMPUTER SCIENCE

Aug. 2018 - present

- Advisor: Prof. Tao Ju · geometry processing and modeling
- GPA: 4.0/4.0

Tsinghua University

Beijing, China

M.E. IN SOFTWARE ENGINEERING

Aug. 2015 - Jun. 2018

- Advisor: Prof. Hui Zhang & Prof. Dong-Ming Yan · triangle and quad remeshing
- GPA: 3.7/4.0, Rank: 1/131, Graduate with Honors

Tsinghua University

Beijing, China

B.E. IN MATERIAL SCIENCE AND ENGINEERING (PHYSICS BRANCH)

Aug. 2011 - Jun. 2015

- GPA: 91/100
- Minor in Computer Science

Research Interests

Computer graphics, Geometry processing, Geometric modeling, Optimization

Publications

Optimizing Global Injectivity for Constrained Parameterization

XINGYI DU, DANNY M. KAUFMAN, QINGNAN ZHOU, SHAHAR Z. KOVALSKY, YAJIE YAN, NOAM AIGERMAN, TAO JU

ACM Transactions on Graphics (Proc. SIGGRAPH Asia 2021)

Boundary-Sampled Halfspaces: A New Representation for Constructive Solid Modeling

XINGYI DU, QINGNAN ZHOU, NATHAN CARR, TAO JU

ACM Transactions on Graphics (Proc. SIGGRAPH 2021)

Lifting Simplicies to Find Injectivity

XINGYI DU, NOAM AIGERMAN, QINGNAN ZHOU, SHAHAR KOVALSKY, YAJIE YAN, DANNY M. KAUFMAN, TAO JU

ACM Transactions on Graphics (Proc. SIGGRAPH 2020)

Field-Aligned Isotropic Surface Remeshing

XINGYI DU, XIAOHAN LIU, DONG-MING YAN, CAIGUI JIANG, JUNTAO YE, HUI ZHANG

Computer Graphics Forum (Proc. Eurographics 2018)

Quad Mesh Generation via Field-Aligned Centroidal Voronoi Tessellation

XINGYI DU, DONG-MING YAN, JUNTAO YE, HUI ZHANG

China CAD&CG (Proc. China CAD&CG 2017)

Research Experience

Solid Modeling representations and algorithms

COLLABORATION: WASHU, ADOBE RESEARCH

2020 - ongoing

- Proposed a novel representation of solid shapes based on half-spaces and sample points. The representation is easy for human to understand and edit.
- Designed an algorithm to convert shapes represented in meshes into our representation.
- Paper "Boundary-Sampled Halfspaces: A New Representation for Constructive Solid Modeling" is accepted and presented at Siggraph 2021.

Constrained injective mappings from non-injective initialization

COLLABORATION: WASHU, ADOBE RESEARCH, FACEBOOK REALITY LABS AND DUKE UNIVERSITY

2018 - ongoing

- Proposed a novel energy whose minimization can recover locally injective mapping from a non-injective initial mapping in the case where the boundary is fixed. The formulation works for both 2D and 3D meshes, has theoretical guarantee for global minimum, and shows high success rate in practice.
- Implemented quasi-Newton and projected-Newton solvers to optimize this energy.
- Constructed a benchmark dataset of 2D/3D meshes for evaluating locally injective mapping methods.
- Paper "Lifting Simplicies to find Injectivity" is accepted and presented at Siggraph 2020.
- Paper "Optimizing Global Injectivity for Constrained Parameterization" is accepted at Siggraph Asia 2021.

Remeshing via field-aligned Centroidal Voronoi Tessellations(CVT)

COLLABORATION: TSINGHUA UNIVERSITY, CHINESE ACADEMY OF SCIENCES

2016 - 2018

- Proposed a novel approach for isotropic triangular remeshing by augmenting CVT with an energy term that fosters alignment of mesh edges to user-defined directional field.
- Extended the approach to quad-dominant mesh generation and further improved mesh quality using a novel algorithm to match mesh edges and field direction.
- Paper "Quad Mesh Generation via Field-Aligned Centroidal Voronoi Tessellation" is accepted and presented at China CAD&CG 2017.
- Paper "Field-Aligned Isotropic Surface Remeshing" is accepted and presented at Eurographics 2018.

Morphable human face reconstruction from RGB-D images

MEGVII RESEARCH (FACE++)

2017

- Designed and implemented a pipeline to reconstruct a morphable human face model from RGB-D input. The pipeline includes Iterative Closest Point (ICP)-based rigid alignment, least square fitting to face shapes and expressions, correspondence estimation and deformation.

Interactive quad-mesh design using topology patterns

TSINGHUA UNIVERSITY

2016

- Simplified the topology patterns in the pattern database proposed in the paper "Data-driven Interactive Quadrangulation"(DDQ). Reduced the size of the database by more than half.
- To further simplify the patterns, designed an algorithm to identify equivalent topology patterns up to rotation and mirror symmetry.
- Implemented a GUI program (shared on GitHub) to visualize and edit topology patterns in the database.

Simulation of surface adsorption of U-Ti alloys

TSINGHUA UNIVERSITY

2015

- Explored the adsorption behavior of H_2 and O_2 on the surface of U_2Ti using ab-initio quantum mechanics simulation.
- Wrote Linux shell scripts to automate computation task management and experiment analysis.
- Won the Outstanding Bachelor Thesis award.

Service

ACADEMIC

- 2020 **Reviewer**, Computers & Graphics
- 2020 **Reviewer**, SPM (Solid and Physical Modeling)

TEACHING

- 2020 **TA**, CSE554: Geometric Computing for Bio-medicine *WashU*
- 2019 **TA**, CSE546: Computational Geometry *WashU*
- 2016 **TA**, Digital Media I: Graphics and Animation *Tsinghua*

Skills

- Programming** Mathematica, C++, Python, Matlab
- Math** Linear Algebra, Real Analysis, Functional Analysis, Measure Theory, Topology
- Languages** Chinese, English