Crane Chen

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Education

The Johns Hopkins University — *Baltimore, MD*

PH.D. CANDIDATE IN COMPUTER GRAPHICS — *2018-2023*

Advisor: Misha Kazhdan
Topics: surface reconstruction, geometric data processing, geometric machine learning, 3D computer vision
Thesis: Feature-Preserving Neural Surface Reconstruction Using Dirichlet Energy of Gauss Map

The Johns Hopkins University — *Baltimore, MD*

MASTER OF SCIENCE IN COMPUTER SCIENCE — *2023*

Work Experience

The Johns Hopkins University — *Baltimore, MD*

GRADUATE STUDENT RESEARCHER — *Dec 2020 - ongoing*

Supervised by Misha Kazhdan.
Doing research in developing new tools for geometric data processing.
Doing research in feature preserving neural surface reconstruction.
Attended ICCV2021, Capital Graphics 2022, SGP 2022, SIGGRAPH 2022.
Member of Hopkins Computer Graphics Lab.

Apple — *Cupertino, CA*

RESEARCH INTERN — *June 2021 - June 2022*

Supervised by Joerg Liebelt.
Worked with Ming Chuang, Feng Tang, Samson Huang.
Did applied research in neural surface reconstruction.
Worked on the ARKit API (RoomPlan), released at WWDC2022, check out (Click here)
Co-organized an event with Leah Gum, the reading discussion session,"How Culture Takes Roots".
Member of Spatial Computer Vision Org.

Honda Research Institute — *Mountain View, CA*

RESEARCH INTERN — *Feb 2021 - April 2021*

Supervised by Chiho Choi.
Did applied research in human activity prediction.

The Johns Hopkins University — *Baltimore, MD*

GRADUATE STUDENT RESEARCHER — *July 2018 - Dec 2020*

Supervised by Greg Chirikjian.
Did research in 3D computer vision and machine learning.
Attended CVPR2019, ECCV2020.
Member of Hopkins Laboratory for Computational Sensing and Robotics (LCSR).

Publications

Estimating Discrete Total Curvature with Per Triangle Normal Variation

SIGGRAPH 2023

Crane Chen
(project supervised by Misha Kazhdan, funded by departmental fellowship)

Towards Undoing Smoothness Bias for RGB Neural Surface Reconstruction

ICCV UNDER REVIEW, 2023

Crane Chen, Joerg Liebelt
(project supervised by Misha Kazhdan, funded by Apple Inc.)

Towards Efficient Graph Convolutional Networks for Point Cloud Handling
ICCV, 2021
Yawei Li*, Crane Chen*, Zhaopeng Cui, Radu Timofte, Marc Pollefeys, Gregory Chirikjian, Luc Van Gool
* means equal contributors

Multi-person 3D Pose Estimation in Crowded Scenes Based on Multi-View Geometry
ECCV, 2020 (SPOTLIGHT)
Crane Chen*, Pengfei Guo*, Pengfei Li, Gim Hee Lee, Gregory Chirikjian
* means equal contributors

Curvature: A Signature for Action Recognition in Video Sequences
CVPR 2020, WORKSHOP OF DIFFERENTIAL GEOMETRY IN CVML
Crane Chen, Gregory Chirikjian

Software

* means waiting for approval of owners of the github repos

***libigl - A simple C++ geometry processing library**
New feature estimating total curvature, for triangle mesh and point cloud.

***Open3D: A Modern Library for 3D Data Processing**
New feature estimating total curvature, for triangle mesh and point cloud.

Patents

Image Compression Techniques
Inventors: Samson Huang, Crane Chen
Patent filed by Apple Inc.

Skills

Programming	Python, C++
Tools and Libraries (Python)	Pytorch, Pymeshlab, Open3D, OpenCV, Trimesh
Tools and Libraries (C++)	Libigl, CGAL, PCL, Polyscope, Geometry Central, OpenMP, Trimesn2
Languages	English (bilingual proficiency), Mandarin(bilingual proficiency)

Invited Talks

Geometric Computing Seminar *New York City, NY*
June 2023
Host: Daniele Panozzo at NYU Courant Institute of Mathematical Sciences.
Gave a talk about discrete total curvature estimation method. Presented applications of this new tool including surface reconstruction and geometry simplification.

Capital Graphics 2023 *College Park, MD*
May 2023
Organizer: Yotam Gingold at George Mason University.
Host: Mattias Zwicker at University of Maryland College Park.
Gave a talk about discrete total curvature estimation method using the Dirichlet energy of Gauss map.

Shape Analysis Seminar *Baltimore, MD*
Dec 2022
Host: Laurent Younes at Hopkins Center for Imaging Sciences.
Gave a talk about using total curvature to handle the spectral bias in neural surface reconstruction.

Graphics and Geometry Seminar *Baltimore, MD*
Dec 2022

Host: Alan Yuille at Hopkins CCVL.
Gave a talk about using total curvature to handle the spectral bias in neural surface reconstruction.

Amazon-WSE Research Festival *Baltimore, MD*
Aug 2022

Host: Sanjeev Khudanpur at Hopkins CLSP.
Presented at the festival, my research about surface reconstruction, and post processing of the reconstructed triangle meshes.

CS M.S.E. Orientation *Baltimore, MD*
Aug 2022

Host: Revelie Niles and Scott Smith at Hopkins Department of Computer Science.
Gave a talk on behalf of GRACE about department's effort to advocate for a welcoming work atmosphere for female students.

Capital Graphics 2022 *Washington DC*
May 2022

Organizer: Yotam Gingold at George Mason University.
Host: James Hahn at George Washington University.
Gave a talk and presented a demo that incrementally reconstructs surface with data captured by the mobile phone.

Teaching Experience

Sole Instructor, EN.500.111 Exploring the Laplacian in Computer Graphics *Baltimore, MD*
fall 2023

Undergrad course at JHU.
Instructor for the 10-week course, offering two sessions.
Designed the course, including course plan, syllabus, rubrics.
Created the slides and active teaching process.
Created math and coding exercises.

Teaching Academy Fellow, JHU CTEI Teaching Academy Training *Baltimore, MD*
summer 2023

Earned a certificate.
Learned theories of pedagogy in a three-day intensive training.
Wrote short essays about learning objectives, assessment strategies, learning activities, and learning environment.
Completed Phase II of Future Faculty Training.

Co-Instructor, Python Programming (TReND in Africa, 30 students) *Baltimore, MD*
summer 2022

Organizer: Artemis Koumoundourou.
Gave a lecture.
Paired live coding and debugging homework with students in Africa through zoom.

Course Assistant, EN.601.661 Computer Vision (85 students) *Baltimore, MD*
fall 2020

Supervised by Greg Hager.
Graded coding homework and jupyter notebook exercise for the class.
Answered questions on Piazza and hosted weekly office hours.

Teaching Assistant, EN.530.646 Robot DKDC (89 students) *Baltimore, MD*
fall 2019, spring 2020

Supervised by Jin Seob Kim.
Graded written and coding homework for the class.
Answered questions on Piazza and hosted weekly office hours.
Mentored pre-designed labs and self-proposed projects for students using UR5 robot.

Side Projects

Augmented Reality Suggestive Contours for Brain Surgery *Baltimore, MD*

April 2019 - June 2019

Supervised by Nassir Navab, mentored by Sing Chun Lee.
Developed two apps for Microsoft Hololens with Unity, which involved features including gesture control, voice control, and gaze tracking.
Calculated suggestive contour of CAD models using OpenGL libraries. Applied the Vuforia marker to detect the 3D model position and overlay suggestive contours on a 3D printed model.
To see the demo, click here

Occlusion R-CNN for Pedestrian Detection *Baltimore, MD*

April 2019 - June 2019

Supervised by Mathias Unberath, mentored by Chenglin Yang.
Appeared on the news of CS department at JHU. (Click here)
Provided a solution for occlusion situation in pedestrian detection.
Generated heat-map masks representing the probability of occlusion using a multi-modal gaussian model.

UR5 Robot Arm Playing Piano *Baltimore, MD*

Nov 2018 - Dec 2018

Supervised by Jin Seob Kim, mentored by Minsung Chris Hong.
Developed an app with MATLAB and ROS, which enables UR5 automatically read-understand-play any encoded music score (i.e. a data set encoding notes).
To see the demo, click here.

Service

Reviewer

NeurIPS, IEEE VR

GRACE (social chair) *Baltimore, MD*

2022-ongoing

Led the stduent group together with Farnaz Yousefi, Alexandra Delucia, Kelly Marchisio, Gopika Ajaykumar.
Organized monthly social events, luch with female faculty, and regular bring your own lunch for female graduate students in CS and ECE.
Encouraged females in tech to share their own research/career stories to inspire and support each other.

WiCS (mentor) *Baltimore, MD*

2023-ongoing

Mentees: Sophia Lovulo, Divya Ravindra.
Provide academic and career advice to female undergrads in CS.

LCSR (lab tour guide) *Baltimore, MD*

fall 2022

Supervised by Ashley Moriarty.
Demoed the repositioning of soft tissue using the da Vinci surgical robot.
Guided an informative robotics tour for undergraduate students in engineering school with undecided majors, showcasing potential opportunities in the field.

Center for Initiatives in Jewish Education (judge) *Baltimore, MD*

June 2022-July 2022

Supervised by Joseph Saltzman.
Provide feedback and advice for innovation day projects, where high schoolers research, build, demo, and commercialize their cool ideas (e.g. smart bike helmet, sunscreen reminder).

Personal

Exercise	hot yoga, mountain biking, swimming, hiking
Photography	photos of wildlife animals, check the photos: `http://cranehechen.com/photography.html`
Painting	acrylic mini-portraits of pets