

ZIWEN CHEN

Publish also as Chen Ziwen

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RESEARCH INTERESTS

- 3D reconstruction, scene understanding

EDUCATION

- **Oregon State University**, 2020 - 2025 (Expected), GPA: 3.98/4.0
Ph.D., Computer Science, Awards: *Provost Scholarship, EECS Progression Scholarship*
- **Grinnell College**, 2016 - 2020, GPA: 3.9/4.0
B.A., Mathematics, Computer Science (*with honors*), Honors: *Phi Beta Kappa Member*

TECHNICAL SKILLS

Languages Python, C/C++, CUDA, Swift, Javascript, HTML/CSS, Ruby, Scheme, Bash, SQL, JAVA, R, MATLAB, Prolog**AI/ML/CV** PyTorch, Numpy, OpenCV, OpenGL, NLTK, Cairo, TensorFlow, Scikit-learn, Matplotlib, Pandas**App Development** Flask, Xcode, Node.js, React.js, Rails, Apache, jQuery, Google Cloud, SQL, MongoDB, Docker**General** Vim, Git, Linux/Unix

RESEARCH EXPERIENCE

PointRecon: Online Point-based MVS via Ray-based 2D-3D Matching **Deep Machine Vision Lab, Oregon State University**Publication: [1]. Project page: arthurhero.github.io/projects/pointrecon*August 2023 to May 2024*

- Proposed and developed PointRecon, an online, point-based MVS method supporting unlimited input sequence length, removing the grid and scene size limitations of voxel-based models, and ensuring view consistency absent in depth map-based approaches
- Introduced a novel ray-based 2D-3D matching technique for robust feature alignment between incoming images and the scene, improving resilience to positional errors in the scene points
- Achieved SOTA mesh reconstruction quality among online MVS methods, preserving finer details compared to the volumetric approaches

Long-LRM: Scaling up Feed-forward 3D GS**Adobe Inc.**Publication: [2]. Project page: arthurhero.github.io/projects/llrm*April 2024 to November 2024*

- Led the development of Long-LRM, a feed-forward Gaussian splatting approach for wide-coverage scene reconstruction, matching rendering quality to optimization-based 3D GS while reducing processing time from 13 minutes to 1.3 seconds
- Designed an architecture combining transformer and Mamba2 blocks, enabling the processing of up to 32 high-resolution input views, significantly surpassing previous feed-forward methods, which are limited to 1-4 views

AutoFocusFormer: Image Segmentation off the Grid**Apple Inc.**Publication: [3]. Code: [apple/ml-autofocusformer](https://github.com/apple/ml-autofocusformer)*June 2022 to June 2023*

- Led the development of AFF, a general-purpose image encoder capable of importance-based feature selection over the traditional grid-based downsampling, thus retaining more details and important features pertaining to the task objective
- Developed a clustering algorithm based on space-filling curves to efficiently aggregate local neighborhoods for irregularly spaced features
- Achieved SOTA performance for image classification and segmentation tasks, with a particular strength in small-object recognition, while significantly reducing computational complexity, outperforming baseline models with up to 4x fewer parameters

ZbuffDepth: Self-supervised Monocular Depth Prediction with Z-buffer**Jerod Weinman's Lab, Grinnell College**Publication: [4]. Code: [arthurhero/ZbuffDepth](https://github.com/arthurhero/ZbuffDepth)*Feb 2020 to Aug 2020*

- Developed an efficient z-buffering algorithm to identify the closest 3D point to an image pixel, reducing pixel matching errors from occlusion during the calculation of color reconstruction loss in self-supervised monocular depth prediction training
- Achieved SOTA performance for monocular depth prediction on KITTI

PC-IGOS: Explaining Point Cloud Classifiers**Deep Machine Vision Lab, Oregon State University**Publication: [5]. Code: [arthurhero/PC-IGOS](https://github.com/arthurhero/PC-IGOS)*May 2019 to Sep 2019*

- Proposed the first gradient-based visualization technique for finding the minimal saliency map on 3D point clouds
- Proposed a curvature smoothing algorithm capable of gradually "removing" features such as corners and edges on point clouds
- Achieved SOTA results for both "deletion" and "insertion" metrics on ShapeNet40 dataset

Training Data Curator For Text Recognizer**Jerod Weinman's Lab, Grinnell College**Publication: [6]. Code: [arthurhero/MapTextSynthesizer](https://github.com/arthurhero/MapTextSynthesizer)*Jun 2018 to Aug 2018*


- Built a synthetic training data generator (>100Hz) in C++ using Cairo graphics library for training a historical map text recognizer
- Reduced word error by >22% compared SOTA

SceneSlicer: Scene Photo Layer Separator**Personal Fun**Code: [arthurhero/SceneSlicer](https://github.com/arthurhero/SceneSlicer)*Mar 2019 to May 2019*

- Designed an algorithm to separate a single scene image into different layers of front-ground objects and the background
- Wrote and trained a Mask-RCNN to segment front-ground objects, and a hole-inpainting GAN to restore occluded background

SOFTWARE ENGINEERING EXPERIENCE

Director of Grinnell AppDev Club


Code: GrinnellAppDev

- Led a team of 10+ students and published 4 iOS apps in 3 years for the college community
- Guided team members through developing the front-end UI using **Swift** and **Objective-C** in **Xcode**
- Guided team members through writing back-end web services (RESTful API) in **Node.js**, **Rails**, **Flask**, etc.

Grinnell AppDev Club

Sep 2017 to May 2020

Mayflower Dining

Code: CSC322-Grinnell/mayflower-dining

- Developed a web app for the dining service of a local senior community using **Ruby on Rails**
- Designed and implemented the back-end data-tracking for menus, dishes, etc. using **PostgreSQL** and wrote tests using **Minitest**

Mayflower Community

Feb 2020 to May 2020

PUBLICATIONS

- [1] "PointRecon: Online Point-based 3D Reconstruction via Ray-based 2D-3D Matching".
Chen Ziwen, Zexiang Xu and Li Fuxin.
ArXiv 2410.23245. October, 2024.
- [2] "Long-LRM: Long-sequence Large Reconstruction Model for Wide-coverage Gaussian Splats".
Chen Ziwen, Hao Tan, Kai Zhang, Sai Bi, Fujun Luan, Yicong Hong, Li Fuxin and Zexiang Xu.
ArXiv 2410.12781. October, 2024.
- [3] "AutoFocusFormer: Image Segmentation off the Grid".
Chen Ziwen, Kaushik Patnaik, Shuangfei Zhai, Alvin Wan, Zhile Ren, Alex Schwing, Alex Colburn and Li Fuxin.
Computer Vision and Pattern Recognition Conference (CVPR). June, 2023.
- [4] "Improved Point Transformation Methods For Self-Supervised Depth Prediction".
Chen Ziwen, Zixuan Guo and Jerod Weinman.
18th Conference on Robots and Vision (CRV). May, 2021.
- [5] "Visualizing point cloud classifiers by curvature smoothing".
Chen Ziwen, Wenxuan Wu, Zhongang Qi and Li Fuxin.
The British Machine Vision Conference (BMVC). September, 2020.
- [6] "Deep Neural Networks for Text Detection and Recognition in Historical Maps".
Jerod Weinman, **Ziwen Chen**, Ben Gafford, Nathan Gifford, Abyaya Lamsal and Liam Niehus-Staab.
International Conference on Document Analysis and Recognition (ICDAR). September, 2019.

TALKS

- [1] "A firewall that modifies incoming packets". In: *The Missouri, Iowa, Nebraska, and Kansas Women in Computing (MINK WIC) Conference Lightning Talk*. October, 2017.

TEACHING AND MENTORING EXPERIENCE

Grinnell College

- iOS Development - Fall 2017 to Spring 2020 (AppDev Club iOS Lead)
- CSC 341: Automata, Formal Languages, and Computational Complexity - Spring 2019, Fall 2019 (TA)

Oregon State University

- CS 325: Analysis of Algorithms - Summer 2023, Winter 2024 (TA)
- CS 514: Algorithms - Fall 2024 (TA)

COURSEWORK HIGHLIGHT

Oregon State University Partial Differential Equations, Ordinary Differential Equations, General Topology and Fundamental Groups, Convex Optimization, Matrix Analysis, Functional Analysis, Natural Language Processing, Reinforcement Learning, Human Control Systems, Parallel Programming, Computer Graphics, Geometric Modeling, Differential Geometry, Probabilistic Graphical Models, Quantum Computing

Grinnell College Information Retrieval, Sensation and Perception, Electronics, Applied Game Theory, Neuroscience, Differential Equations, Abstract Algebra, Real Analysis, Geometric Analysis, Behavioral Economics

Online Open Course / Self-taught Topology & Geometry, SLAM, Knowledge Representation, Intro to Linguistics

HONORS AND AWARDS

- *EECS Progression Scholarship*, Oregon State University, 2020
- *Provost Scholarship*, Oregon State University, 2020
- *Phi Beta Kappa Member*, Grinnell College, 2020
- *Grace Hopper Conference Student Scholarship*, 2018
- *Fifth Rank in North Central America Regional of ACM-ICPC*, 2017

OTHER SKILLS

Natural Languages English, Mandarin, Japanese, Spanish