

# ZIWEN CHEN

Publish also as Chen Ziwen

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## RESEARCH INTERESTS

- Computer Vision
- Adaptive point-based vision models, 3D reconstruction / SLAM, Vision for interactive robots

## EDUCATION

- **Oregon State University**, 2020 - 2025 (Expected), GPA: 3.97/4.0  
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

### AutoFocusFormer: Image Segmentation off the Grid

**Apple Inc.**Publication: [1]. Code: [github.com/apple/ml-autofocusformer](#)*June 2022 to June 2023*

- Developed AutoFocusFormer (AFF), the first end-to-end **adaptive** point-based network capable of **dense** prediction tasks on high-resolution inputs, which performs importance-based feature selection instead of the traditional grid downsampling
- Designed a novel balanced clustering algorithm to efficiently gather local neighborhoods on irregularly spaced features, and a novel adaptive downsampling module that enables end-to-end learning of importance scores of the features
- Achieved state-of-the-art results for both image classification and segmentation tasks with drastically fewer FLOPs, outperforming baseline models with almost 4 times more parameters on Cityscapes

### ZbuffDepth: Self-supervised Monocular Depth Prediction with Z-buffer

**Jerod Weinman's Lab, Grinnell College**Publication: [2]. Code: [github.com/arthurhero/ZbuffDepth](#)*Feb 2020 to Aug 2020*

- Devised an efficient z-buffering algorithm for identifying the closest 3D point to an image pixel, solving the occlusion issue in the traditional self-supervised monocular depth prediction training paradigm
- Improved the performance of a SOTA depth-prediction network on KITTI

### PC-IGOS: Explaining Point Cloud Classifiers

**Deep Machine Vision Lab, Oregon State University**Publication: [3]. Code: [github.com/arthurhero/PC-IGOS](#)*May 2019 to Sep 2019*

- Invented the first gradient-based visualization technique for finding the minimal saliency map on 3D point clouds
- Invented 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: [4]. Code: [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: [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

**Grinnell AppDev Club**Code: [github.com/GrinnellAppDev](#)*Sep 2017 to May 2020*

- 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.

### Mayflower Dining

**Mayflower Community**Code: [github.com/CSC322-Grinnell/mayflower-dining](#)*Feb 2020 to May 2020*

- 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**

## PUBLICATIONS

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- [1] **Chen Ziwen**, Kaushik Patnaik, Shuangfei Zhai, Alvin Wan, Zhile Ren, Alex Schwing, Alex Colburn and Li Fuxin. "AutoFocusFormer: Image Segmentation off the Grid". In: *Computer Vision and Pattern Recognition Conference (CVPR)*. June, 2023.
- [2] **Chen Ziwen**, Zixuan Guo and Jerod Weinman. "Improved Point Transformation Methods For Self-Supervised Depth Prediction". In: *18th Conference on Robots and Vision*. May, 2021.
- [3] **Chen Ziwen**, Wenxuan Wu, Zhongang Qi and Li Fuxin. "Visualizing point cloud classifiers by curvature smoothing". In: *The British Machine Vision Conference (BMVC)*. September, 2020.
- [4] Jerod Weinman, **Ziwen Chen**, Ben Gafford, Nathan Gifford, Abyaya Lamsal and Liam Niehus-Staab. "Deep Neural Networks for Text Detection and Recognition in Historical Maps". In: *International Conference on Document Analysis and Recognition (ICDAR)*. September, 2019.

## TALKS

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- [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

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### 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 (TA)

## COURSEWORK HIGHLIGHT

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**Oregon State University** 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, Linguistics

## HONORS AND AWARDS

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- *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

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**Natural Languages** English, Mandarin, Japanese, Spanish