# Chushan Zhang

Home addr: U82/20 Allara Street
City, ACT 2601

Tel: (+61) 435045929
Email: IsaacZhang11@gmail.com

## EDUCATION

**Doctor of Philosophy**
Australia National University
ANU College of Engineering, Computing and Cybernetics Mar 2024-Jul 2027

**Master of Machine Learning and Computer Vision**
Australia National University
ANU College of Engineering, Computing and Cybernetics Aug 2021-Jul 2023
GPA:6.5/7
Completed a Master's Thesis (High Distinction) on 'PMVC: Promoting Multi-View Consistency for 3D Scene Reconstruction.'

**Bachelor of Science with Specialization in Computing Science**
University of Alberta Sep 2017-Jul 2021
Faculty of Science, Computing Science department
GPA: 3.3/4

## RESEARCH

### First Author, WACV 2024 Paper Submission: PMVC: Promoting Multi-View Consistency for 3D Scene Reconstruction

Jan-May 2023

In this paper, we underscore the vital role of multi-view consistency in 3D reconstruction, an aspect often neglected by leading contemporary methods. We show how supplementary priors can be deduced from RGB images, given they uphold multi-view consistency beyond mere photometric data.

- We propose multi-level cues that serve as intermediate image features, with the high level representing semantic information.
- Identified that the Signed Distance Function (SDF) and Multilayer Perceptron (MLP) frequently induce over-smoothing. To address this, we introduced an adaptive sampling method.
- Developed a novel semantic generation pipeline.
- Our result outperformance the current state-of-arts

### Research Assistant, In-door 3D Reconstruction, Prof. Li Hongdong's Group

Aug 2022-Aug 2023

The goal of this research is to reconstruct a complete 3D scene or object shape from a set of photos and achieve the state-of-arts. We mainly focus on RGB images as inputs only, i.e., the 3D mesh can be reconstructed from any photos from smartphones cameras etc.

- Aided Prof. Li's group in replicating research focusing on the latest advancements in the 3D reconstruction field.
- Concentrated on Multiview reconstruction from 2D images to lend the model some physical interpretation, improving performance. Used the most classic method of extracting sparse point clouds and camera poses from Structure from Motion (SfM)
- Discovered that supplementing normal priors to the NeRF/NeuS model can exceed state-of-the-art outcomes.
- Explored different geometry expressions, such as substituting volume density of the NeRF model with SDF (NeuS).

### Independent Research Project: Background Subtraction Algorithm

Jan-May 2022

This project, initiated independently, aimed to make the model distinguish between background and foreground motion patterns via mathematical modelling. The algorithm is applicable to moving cameras and demonstrates resilience to variations in lighting conditions.

- Devised a novel algorithm that functions independently of neural networks but achieves superior results.

- Applicable for both static and moving cameras.
- Stable and reliable model requiring only the initial frames for background detection across the entire scene.
- Applicable for background subtraction and tracking of moving objects.
- Ensures high confidence interval classification of each pixel using the epipolar constraint.

## INTERNSHIP EXPERIENCE

**Research Assistant, Super Map GIS Co., Ltd**
Sep-Dec 2023

- Responsible for utilizing NeRF models and advanced neural rendering techniques to synthesize novel viewpoints and enhance visual experiences.

**Data Analyst, H3C Technologies Co., Ltd**
Aug-Oct 2020

- Cleansed and processed data, and constructed models to extract valuable insights.
- Aided in making strategic decisions by organizing and visualizing data.

**Front-end Developer, CIB Digital Financial Service Co., Ltd**
Jun-Jul 2020

- Developed front-end webpages and back-end databases in accordance with company requirements.
- Contributed to the development of a banking operation system using Java.

## EXTRACURRICULAR ACTIVITIES

**Hackathon**, Major League Hacking Oct 2019

Participated in a 2-3 day intensive "marathon programming" project with a team of five, tasked with organizing, classifying, and compressing satellite images.

- Implemented the bag-of-words model to images: segmented each image into patches to extract SIFT points for each block as feature vectors.
- Stored all feature vectors and utilized K-means clustering to create a Vocabulary.
- Treated each image as a query, calculating the L2 distance between the query image vector and each cluster of Vocabulary, assigning the nearest cluster center as the class. Optimized Vocabulary construction time using PCA for vector dimension reduction and probability distribution for K-means initialization.

## AWARDS & HONORS

| | |
|---|---|
| International Student Scholarship (Honor Entrance) | 2017 |
| Continuing International Award, 1st class | 2018 - 2021 |
| Certificate of Course Representative | 2022 |
| HDR Dee Remission Merit Scholarship | 2024 - 2027 |
| Postgraduate Research Scholarship | 2024 - 2027 |
| Data61, CSIRO PhD Scholarship | 2024 - 2027 |

## Technical Skills

- Machine Learning Frameworks - TensorFlow, Pytorch, NumPy, Pandas
- Development & Frameworks - Flask, Vue, React, Android Studio, IntelleJ, VS Code, PyCharm
- Programing Languages: - Python, Java, C, Lisp, SQL, JavaScript

## Referees

**Dr. HongDong Li, Tenured Professor, Australian National University (ANU)**
Notable positions: ICCV 2021, ECCV 2020, CVPR 2021, CVPR 2022, ECCV 2022, and an Associate Editor for PAMI, and the ACCV 2022 General Co-Chair
Email: hongdong.li@anu.edu.au
Contact: +61 0401 482 421