# Kiyohiro (George) Nakayama

w4756677@stanford.edu | +1(626) 231-6047

---

## OBJECTIVE

I am currently an undergraduate student at Stanford University of class of 2024. I major in mathematics, with the plan of pursuing a master's degree in computer science. My research interests lie in computer vision and graphics and other machine learning areas that intersect interesting mathematical tools.

## EDUCATION

**Stanford University**                                         Stanford, California, USA
*Mathematics, Expected 2024*                 GPA: 4.02/4.00                      2019 - Present

**La Salle College Preparatory**                               Pasadena, California, USA
*High School Diploma*                         GPA: 4.60/4.00                      2017 - 2019

## RESEARCH EXPERIENCE

**Point Cloud Completion Network using Diffusion**             Tsinghua University, China
*Visiting Student, Professor Shimin Hu's Computer Vision Lab*          Janurary, 2022 − Present
- I am working on designing a novel diffusion based network for point cloud completion tasks. Compared to the previous diffusion based networks, this method specifically exploits the geometric structure of point cloud datum. This diffusion network also has the potentiality to be utilized in many tasks that use point clouds models

**2D Object Detection**                                        Tsinghua University, China
*Visiting Student, Professor Shimin Hu's Computer Vision Lab*          Janurary, 2022 − Present
- I worked on designing and testing a novel feature extraction method using attenional mechanisms that gathers features from the backbone to the RoI heads. We are able to improve the current 2D object detection benchmarks. The work is planned to be submitted to CVPR 2023.

**Visiting Student at Yau Mathematical Science Center**        Tsinghua University, China
*Visiting Student, Yau Mathematical Science Center*              October, 2021 − Janurary 2022
- I am a visiting student at Yau Mathematical Science Center of Tsinghua University since October 2021. I am working with Professor Pin Yu on nonlinear dispersive equations. In particular, we studied the low regularity, including mass critical/subcritical and energy critical/subcritical, local wellposedness theory of power-type semilinear Schrödinger's equations.

**Stanford University**                                                          Online
*Undergraduate Researcher, Mathematics Department*                June, 2020 − August, 2020
- I collaborated with two other students in studying the Allen-Cahn partial differential equation for ten weeks under the guidance of Jared Marx-Kuo. We investigated general properties of solutions to the Allen-Cahn equation and constructed of solutions to the Allen-Cahn equation on $\mathbb{R}, \mathbb{R}^2$ and $S^n$. Our work is summarized in the following writeup: `https://surim.stanford.edu/sites/g/files/sbiybj9281/f/projects/surim_allen_cahn_project.pdf`.

**Directed Reading Program at Stanford University**           Stanford University, USA
*Student*                       September, 2021 − December, 2021; March, 2021 − June, 2021
- I worked with Benjamin Foster on nonlinear dispersive equation. We read chapters of Terrence Tao's "Nonlinear Dispersive Equations".
- I worked with Joey Zou on studying introductory distribution theory. We read chapters of Friedlander and Joshi's "Introduction to the theory of distribution".

**Research in Industrial Projects for Students (RIPS) 2021**   University of California, Los Angeles, USA
*Undergraduate Researcher, Mathematics Department*                June, 2021 − August, 2021
- I have worked under the sponsorship of HRL Laboratories, LLC, on "Predicting Start-Up Behavior of Heat Pipes and Vapor Chambers from Frozen State" using MOOSE, a C++ framework that simulates PDEs using a transient finite element method. We studied numerical simulation, multi-phase flow and free boundary problems.

**Stanford University**                                                          Online
*Undergraduate Researcher, Mathematics Department*                June, 2020 − August, 2020
- I collaborated with two other students in studying the Allen-Cahn partial differential equation for ten weeks under the guidance of Jared Marx-Kuo. We investigated general properties of solutions to the Allen-Cahn equation and constructed of solutions to the Allen-Cahn equation on $\mathbb{R}, \mathbb{R}^2$ and $S^n$. Our work is summarized in the following writeup: `https://surim.stanford.edu/sites/g/files/sbiybj9281/f/projects/surim_allen_cahn_project.pdf`.

**Ross Mathematics Program**                                                     Online
*Counselor*                                                       June, 2020 − August, 2020
- Led daily lectures about elementary number theoretic topics. Graded students' problem sets and offered feedback on their work. Developed my leadership communication skills in mathematics.

## PROJECTS
**Deep Reinforcement Learning with a Multi-headed Model in Solving Rubik's Cube**  March, 2021 − June, 2021
- This is a research project for Stanford's Machine Learning (CS 229) class. I collaborated with two other students to solve the Rubik's Cube without human knowledge. We used deep reinforcement learning with a multi-headed model to build a layer-by-layer slover that achieves a 100 percent solving rate. Furthermore, by only slightly compromising on solving rate, we were able to reduce our training time three-fold. Finally, our model has more interpretability, and our solver can potentially be commercialized as a Rubik's Cube solving trainer. The paper is available upon request.

**PonyExpress**                                                                                      June, 2020 − March 2021
- We developed a free-to-use platform to lower the risk involved in getting groceries during the COVID-19 pandemic. PonyExpress is a volunteer-based delivery service that seeks to minimize trips to grocery stores, thereby promoting social distancing efforts while ensuring access to essential resources. Our service allows people to rely on others in their community to deliver groceries, thus reducing the risk of infection.

## ACADEMIC ACHIEVEMENTS
**Qualification of USA Math Olympaid**                                                                    Spring 2017

## SELECTED COURSEWORK AND LAGUAGES
**Computer Science and Applied Math**
- Linear and Quadratic Optimization, Computer Systems, Parallel Computing, Computer Graphics and Animation, Machine Learning.

**Mathematics**
- Algebraic Topology, Differential Topology, Riemannian Geometry, Harmonic Analysis, Functional Analysis, PDEs, Measure Theory and Lebesgue Integration, Probability Theory, Groups And Rings, Galois Theory, and Representation Theory

**Languages:** Mandarin, Japanese, English (All native levels), C++, C, Python, Pytorch, Jittor, LaTeX

*References available upon request.*

---