

ALEX HAGIOPOL

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EXPERIENCE

Microsoft ([microsoft.com/en-us/mixed-reality](https://www.microsoft.com/en-us/mixed-reality)) San Francisco Bay Area, CA
Oct 2017 - Present
Software Engineer, AI Perception and Mixed Reality Group

- Collaborated with Microsoft Research (MSR) to develop computer vision research papers into production features for HoloLens 2. Contributed R&D in areas of geometric computer vision and machine learning based computer vision in addition to making general software engineering contributions. Used modern C++, CUDA, and Python.
- Designed and implemented a GPU-accelerated, dense 3D point cloud reconstruction system for 360° human hologram capture. Wrote core mathematics, image processing, image rectification, disparity estimation, point cloud processing (triangulation, fusion, filtering, and normals estimation) in pure C++ and CUDA based on research papers. This work replaced a legacy point cloud generator in < 10% the number of lines of code. Current work is CPU and GPU performance optimization as well as algorithm-level improvements to output quality as the system is used for hologram reconstruction on real-world, multi-thousand image datasets in the Microsoft Azure cloud.
- Designed and implemented an image segmentation system for human hologram capture based on research in statistical learning and deep learning. Implemented statistical learning mathematics in C++ and implemented neural network structure and training in Python and TensorFlow. This work advanced the group's state-of-the-art in the problem domain and led to first-authoring a patent application, "*Segmentation for Holographic Images*", currently under review by the U.S. Patent and Trademark Office.
- Maintained, refactored, and unit tested multiple MSR algorithm codebases as the code moved from research to production. Created the first unit testing system, refactored out over 3 million lines of C++ and CUDA code, and converted the codebases' version control systems from deprecated internal tools to Git.

DroneDeploy (dronedeploy.com) San Francisco Bay Area, CA
May 2016 - June 2017
Software Engineer, Computer Vision Group

- Contributed to a C++ 3D mapping engine that computes 3D maps using 2D aerial imagery captured by drones.
- Contributed software improvements yielding a 3D mapping reliability increase from < 50% to 99.9% in 8 months. This work unblocked the launch of the company's core technology launch to > 3000 customers and included contributions in areas such as point cloud generation, mesh generation, and mesh texturing.
- Contributed to new product features: (1) neural network based classifier for map regions of interest, and (2) fast 2D map preview using feature detection, feature matching, and image transformations. Both implemented in Python.

NASA ([nasa.gov](https://www.nasa.gov)) Hampton, VA & Remote
May 2015 - May 2016
Research Intern, Autonomy Incubator Group

- Investigated computer vision based localization techniques applied to NASA's prototype UAV for Mars exploration. Contributed implementation improvements, literature research, and visualization tools for performance evaluation.
- Integrated and adapted visual odometry and visual SLAM algorithms into the UAV's navigation system, performed performance evaluations, and reported results and recommendations to technical leadership.

Institute for Robotics & Intelligent Machines @ Georgia Tech (robotics.gatech.edu) Atlanta, GA
Aug 2014 - May 2016
Graduate Research Assistant (Advisor: Frank Dellaert)

- Researched and implemented computer vision and artificial intelligence algorithms applied to robotics.
 - Collaborated with NASA researchers to develop a 3D reconstruction system based on frame-to-frame region-of-interest tracking and 3D planar region pose optimization. Implemented region-of-interest detection, region tracking, optimization mathematics, visualization pipeline in C++, MATLAB, and GTSAM. Presented results at AIAA conference.
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EDUCATION

Georgia Institute of Technology Atlanta, GA
Dec 2016
M.Sc. in Computer Science (GPA: 3.8, Full Scholarship, Dean's List)
Studied Computer Vision, Machine Learning, Computational Photography, Advanced Algorithm Design & Analysis, and Robotics.

B.Sc. in Mechanical Engineering (GPA: 3.9, Full Scholarship, Dean's List, Vice President of Tau Beta Pi) May 2012
Studied Linear Algebra, Calculus, Statistics, Numerical Methods, Data Structures, Algorithm Design & Analysis, and Robotics.

PERSONAL PROJECTS

- Open source mathematics and programming tutorial for applying Gaussian Mixture Models to image segmentation. Wrote a 7 page paper in LaTeX and a Python reference implementation ([link](#)).
- Open source solutions to *Cracking the Coding Interview* in Python and C++. Appears on first page of GitHub search results for the book title, > 120 unique solutions implemented, > 90% unit test coverage, > 200 stars received ([link](#)).
- Open source Python implementation of the 2016 paper *End to End Learning for Self-Driving Cars* by Bojarski et al. Trained and tested the neural network described in the paper in a driving simulator ([link](#)).