

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

Software Engineer II, AI Perception and Mixed Reality Group

Oct 2017 - Present

- Collaborated with Microsoft Research (MSR) to develop volumetric capture research into commercially available holographic content for HoloLens 2. Specialized in computer vision software engineering.
- Contributions:
 - Dense 3D surface reconstruction system based on stereo matching. Wrote core mathematics, image rectification, disparity estimation, point cloud processing (triangulation, fusion, filtering, & normals estimation) in C++. Equaled MSR's point cloud quality state-of-the-art in < 10% the number of lines of code. Implementation became the team's reference standard. Created a CPU version in C++ for research purposes and a GPU version in CUDA for production use.
 - Image segmentation system for holographic capture applications. Surpassed MSR's state-of-the-art in the problem domain by applying statistical learning and deep learning. Wrote statistical learning mathematics in C++ and trained neural networks in Python. Authored and filed patent application "Segmentation for Holographic Images" under review by the USPTO. Achieved production use.
 - > 50% reduction in hardware cost of holographic capture system achieved by re-designing sensor array and re-writing calibration software infrastructure. Achieved production use.
 - Removal of > 4,000,000 lines of code from holograms repos without affecting production throughput.

DroneDeploy ([dronedeploy.com](https://www.dronedeploy.com))

San Francisco Bay Area, CA

Software Engineer, Computer Vision Group

May 2016 - June 2017

- Worked on a C++ 3D mapping engine that creates centimeter-accurate 3D models using 2D imagery.
- Contributions:
 - 3D mapping reliability increase from < 50% to 99.9% on real-world customer datasets in 6 months. This work unblocked the launch of the company's core technology to a customer base of > 3000.
 - Mapping preview capability using feature detection, feature matching, and 2D image stitching. This prototype later became a core product feature that accounted for 10% of the company's revenue.
 - Machine learning based image classification proof-of-concept. This work motivated the company's pivot into delivering AI-generated insights alongside 2D and 3D data.

NASA ([nasa.gov](https://www.nasa.gov))

Hampton, VA & Remote

Research Intern, Autonomy Incubator Group

May 2015 - May 2016

- Developed the vision-based localization software aboard NASA's Mars exploration UAV in C++ on a Linux OS & ARM CPU. Achieved real-time localization accurate to 1cm on live, flying prototype.
- Demonstrated system to NASA senior leadership which led to full funding of my graduate research into novel forms of 3D reconstruction applied to data captured by autonomous drones.

Institute for Robotics & Intelligent Machines @ Georgia Tech (robotics.gatech.edu)

Atlanta, GA

Graduate Research Assistant (Advisor: Frank Dellaert)

Aug 2014 - May 2016

- Developed a novel 3D reconstruction system based on frame-to-frame region-of-interest tracking and 3D planar region pose optimization. Implemented tracking, optimization mathematics, data collection and visualization pipeline in C++ and GTSAM. Presented results at AIAA conference.
- Implemented obstacle avoidance, mapping, and Kalman Filter localization for autonomous UAVs in C++.

EDUCATION

Georgia Institute of Technology

Atlanta, GA

M.Sc. in Computer Science

(GPA: 3.8, Full Scholarship, Dean's List)

Dec 2016

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.

RECENT 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, > 90% unit test coverage, > 150 stars, > 100 unique solutions implemented ([link](#)).