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## Education

University of Georgia	ATHENS, GA
Master's of Science in Computer Science	2020
University of Georgia	ATHENS, GA
Bachelor's of Science in Computer Science	2018

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## Experience

University of Georgia Small Satellite Research Laboratory	ATHENS, GA
<b>Thesis: High Performance Computation with Small Satellites and Small Satellite Swarms for 3D Reconstruction</b>	January '18 – May 2020

Here I focus on the design and usage of computer systems in small satellites. The custom computer vision library SSRLCV is developed. The Nvidia TX2i GPU accelerated SoC is modified for use in a Cube Satellite. Results show accurate 3D reconstruction of the surface of Earth feasible within 15 to 100 meters.

<b>Co-Founder, Program Manager, Systems Engineer</b>	January '16 – May 2020
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The University of Georgia Small Satellite Research Laboratory (UGA SSRL) was founded when I decided to form a team to build a small 1U cube satellite. The UGA SSRL now includes over 40 undergraduate researchers, 5 graduate students, several faculty researchers, a space act agreement with NASA Ames, a partnership with the Air Force Research Laboratory (AFRL), and more.

<b>6U CubeSat - MOCI</b>	January '16 – present
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The Multiview Onboard Computational Imager (MOCI) is a 6U cube satellite funded by the Air Force Research Laboratory's (AFRL) University Program (UNP) NS-9. The MOCI satellite shall use advanced computer vision algorithms and specialized computational hardware, based off of the Nvidia TX2i GPU/SoC, to generate 3D digital surface models of the earth in real time. The MOCI satellite is scheduled for handoff in Q2 of 2020.

<b>3U CubeSat - SPOC</b>	January '16 – present
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The Spectral Ocean Color (SPOC) satellite is a 3U cube satellite funded by NASA's Undergraduate Student Instrument Project (USIP) and was selected for NASA's Cube Satellite Launch Initiative (CSLI) for a handoff in Q4 of 2019. The SPOC satellite shall use a custom hyperspectral sensor to analyze the coastal ecosystems of the Georgia coast.

NASA, National Aeronautics and Space Administration	HOUSTON, TX
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<b>Core Flight Software Programmer</b>	April '15 – August '15
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I helped develop Core Flight Software (CFS) to handle audio telemetry and communication for the Orion spacecraft in a simulated lab setting. I also worked in an audio lab with embedded systems for audio equipment.

<b>Human Systems Integration</b>	April '15 – August '15
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While working in the Human Integrated Vehicles and Environments (HIVE) Lab I assisted with internal telemetry systems and general networking systems throughout Johnson Space Center. These systems were needed for future Graphic User Interfaces (GUIs) used while training astronauts.

Hodgson Glass Research Laboratory	ATHENS, GA
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<b>Undergraduate Researcher</b>	August '14 – April '15
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I assisted Dr. Johnson Turner with technical advice and programmed/designed environments for digital music systems.

<b>Google Glass Development</b>	August '14 – April '15
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I helped develop the first [musical score viewing application](#) for Google Glass. This application was used in concert across multiple Google Glass units.

<b>Smart Podium Development</b>	August '14 – April '15
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I developed a digital smart podium for the use of a band director. The goal was to allow synchronized music editing and notation.

## The Home Depot Innovation Center

ATLANTA, GA

### Research & Development Intern

April '14 – August '14

I worked as a software developer intern at The Home Depot's Innovation Center. I was part of the Center's first group of interns and helped to justify its existence within the company.

### Google Glass Research & Development

April '14 – August '14

I developed an Augmented Reality Google Glass application using a low level OpenCV libraries and data structures. The goal was to assist with product recognition, allow for barcode scanning, and quick product searches.

### Virtual Reality Research & Development

April '14 – August '14

I developed a Virtual Reality application with Google Cardboard using low level OpenCV libraries and data structures. The goal was to display heat maps of various product data over store shelves to assist with product placement.

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## Research

Thesis: ; Conference Paper: ; Conference Presentation: ; Conference Poster: 

### High Performance Computation with Small Satellites and Small Satellite Swarms for 3D Reconstruction

#### Master's Thesis - The University of Georgia

Athens GA, 2020

Caleb Adams, Committee: Dr. Ramviyas Parasuraman, Dr. David Cotten, Dr. Michael E. Cotterell, Dr. WenZhan Song

### The Spectral Ocean Color Imager (SPOC) - An Adjustable Multispectral Imager

#### The AIAA/Utah State Small Satellite Conference - Small Sat

Logan UT, 2019

David L Cotten, Nicholas Neel, Deepak Mishra, Marguerite Madden, Caleb Adams, Susanne Ullrich, Adrian Burd, Malcolm Adams, Kaitlyn Summey, Casper Versteeg, Jackson Parker, Fred Beyette

### Towards an Integrated GPU Accelerated SoC as a Flight Computer for Small Satellites

#### IEEE Aerospace Conference

Big Sky MT, 2019

Caleb Adams, Allen Spain, Jackson Parker, Matthew Hevert, James Roach, David Cotten

### Towards an Integrated GPU Accelerated SoC as a Flight Computer for Small Satellites

#### IEEE Aerospace Conference

Big Sky MT, 2019

Caleb Adams, Allen Spain, Jackson Parker, Matthew Hevert, James Roach, David Cotten

### Selected Software Demonstrations from the Multiview Onboard Computational Imager Satellite

#### Space Innovations Symposium

Atlanta GA, 2018

Caleb Adams, Jackson Parker

### GPU Accelerated SoCs as Flight Computers for Small Satellites

#### Space Innovations Symposium

Atlanta GA, 2018

Caleb Adams, Allen Spain, Jackson Parker, David L. Cotten

### What are Cubesats? A look at UGA Space Exploration

#### UGA Physics and Astronomy Colloquium - Invited Speaker

Athens GA, 2018

Caleb Adams, Katie Summey, Nicholas Heavner

### A Near Real Time Space Based Computer Vision System for Accurate Terrain Mapping

#### The AIAA/Utah State Small Satellite Conference - Small Sat

Logan UT, 2018

Caleb Adams, David L. Cotten

### Batch Analytical Comparisons of on Orbit Multiview Stereo

#### Space Innovations Symposium

Atlanta GA, 2017

Caleb Adams, Nicholas Neel, David L. Cotten

### Feature Matching from Orbiting Vehicles

#### Space Innovations Symposium

Atlanta GA, 2017

Nicholas Neel, Caleb Adams, David L. Cotten

### Concept of Operations in Small Satellite Functionality

#### Space Innovations Symposium

Atlanta GA, 2017

Bjorn Leicher, Paige Copenhaver, Caleb Adams, James Roach, David L. Cotten, Deepak Mishra

### The Feasibility of Structure from Motion over Planetary Bodies with Small Satellites

#### The AIAA/Utah State Small Satellite Conference - Small Sat

Logan UT, 2017

Caleb Adams, Nicholas (Hollis) Neel, David Cotten

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-  **Structure from Motion from a Constrained Orbiting Platform**  
**NASA/CASIS ISS Research and Development Conference** *Washington D.C., 2017*  
 Caleb Adams, Nicholas (Hollis) Neel
-  (SP)ectral (O)cean (C)olor Satellite,  **Video Link**  
**Cubesat Developers Conference - Cal Poly** *San Luis Obispo CA, 2017*  
 Caleb Adams, David Cotten, Deepak Mishra, Nicholas (Hollis) Neel, Graham Grable, Khoa Ngo
-  **Accuracy of Dense Point Clouds Given Varying Image Quality**  
**UGA CURO Symposium** *Athens GA, 2017*  
 Nirav Ilango, David Cotten, Caleb Adams, Nicholas (Hollis) Neel, Margerite Madden, Deepak Mishra
-  **The Feasibility of Structure from Motion over Planetary Bodies with Small Satellite Systems**  
**UGA CURO Symposium** *Athens GA, 2017*  
 Caleb Adams
-  **STEM Opportunities for Undergraduates Building Nanosatellites: the NASA CubeSat Program**  
 Georgia  
**IGTF/ASPRS** *Baltimore MD, 2017*  
 D. Cotten, C. Adams, D. Mishra, M. Madden, S. Bernardes, K. Ngo, N. Neel, N. Ilango, M. Le Corre, G. Grable, A. King
-  **Building a Small Satellite Research Program at the University of Georgia: UGA Payload Development for CubeSats**  
**IGTF/ASPRS** *Baltimore MD, 2017*  
 D. Cotten, C. Adams, D. Mishra, M. Madden, S. Bernardes, K. Ngo, N. Neel, N. Ilango, M. Le Corre, G. Grable, A. King
-  **The SPECTral Ocean Color (SPOC) Small Satellite Mission: From Payload to Ground Station Development and Everything in Between**  
**AGU** *San Francisco CA, 2016*  
 David L. Cotten, Sergio Bernardes, Deepak Mishra, Caleb Adams, Hollis Neel, Khoa Ngo, Megan LeCorre, Paige Copenhaver, Nirav Ilango, Adam King, Graham Grable, Paul Hwang
-  **Enhancing STEM Education through CubeSats: Using Satellite Integration as a Teaching Tool at a Non-Tech School**  
**AGU** *San Francisco CA, 2016*  
 David L. Cotten, Sergio Bernardes, Deepak Mishra, Caleb Adams, Hollis Neel, Khoa Ngo, Megan LeCorre, Paige Copenhaver, Nirav Ilango, Adam King, Graham Grable, Paul Hwang
-  **Feasibility of Structure from Motion over Planetary Bodies using Small Satellites**  
**Georgia Scientific Computing Symposium** *Athens GA, 2016*  
 Caleb Adams, David L. Cotten, Nicholas (Hollis) Neel, Kyle Hamilton, Jacob Conley, Deepak Mishra

*Please visit my [website](#), or click the links above, for more details on my research*

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## Grants Funded

- UNP NS-9, Phase B  
**University Nanosatellite Program, Nano-Sat 9 Phase B – \$600,000** *2018*  
 The Air Force Research Lab's Nano Satellite Program funded the UGA SSRL, as the winner of phase A, \$600,000 to build and operate the MOCI satellite.
- UGA: CTL  
**The Design and Construction of Equipment for Ground to Space Communications – \$23,586** *2017*  
 An internally awarded by the Center for Teaching and Learning for the construction of a space ready ground station at UGA.
- UGA: Parents Leadership Council  
**Providing Undergraduate Students Equipment for Ground to Space Communications – \$5,000** *2017*  
 An internally awarded by the Parents Leadership Council to help obtain ground support equipment for the Small Satellite Research Lab.
- NASA USIP  
**The NASA Undergraduate Student Instrument Project – \$200,000** *2016*  
 The NASA Undergraduate Student Instrument Project funded the UGA SSRL \$200,000 for the design, construction, and launch of the SPOC satellite.

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## UNP NS-9, Phase A

### University Nanosatellite Program, Nano-Sat 9 Phase A – \$180,000

2016

The Air Force Research Lab's Nano Satellite Program funded the UGA SSRL for \$180,000 to design and prove the mission architecture for the MOCI satellite.

*Grants listed above have me listed as an **author**, significant contributor, and/or essential personnel.*

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## Awards, Honors & Fellowships

### Georgia Space Grant Consortium

#### Fellowship

2018

I was selected to receive a fellowship from the Georgia Space Grant Consortium. I was awarded 10k in total funding, this was used to further develop the UGA SSRL's high performance processing units.

### UNP Phase B

#### Phase A Winner

2018

The MOCI satellite was selected as the winner of the 9th iteration of the University Nanosatellite Program, selected first out of 10 competing programs, and awarded over \$600,000 dollars in phase B funding.

### TEDx UGA

#### TEDx UGA Student Idea Showcase

2016

I was selected as a presenter at TEDx UGA's student idea showcase. I spoke about the importance of space exploration, citizen science, and the democratization of space with small satellites.

### HackGT

#### Top 8

2016

I led a team that won top 8 at Georgia Tech's Major League Hacking (MLH) Hackathon. We built a drone from scratch that planted seeds. We were selected among 500 of our peers.

### NASA Johnson EV3

#### Team Excellence

2015

While working at NASA's Johnson Space Center I was awarded for going above and beyond requirements by staying late nights, and over night, to perform thermal vacuum tests on a payload.

### VT Hacks

#### Winner

2015

I lead a team that won Virginia Tech's 2015 Major League Hacking (MLH) Hackathon. We built a remote operated telescope and competed with 1000 of our peers.

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## Leadership Experience

### UGA Small Satellite Research Laboratory

ATHENS, GA

#### Co-Founder, Program Manager

2016 – 2020

With two of my friends, I created the foundations of the UGA SSRL. I have since lead it to receive almost a million dollars in funding as it constructs UGA's first satellites.

### Space Innovations Symposium

ATLANTA, GA

#### Session Chair, Organizer

2019

I helped organize the 3rd Space Innovations Symposium in Atlanta Georgia at Georgia Tech, where I chaired a session of the symposium. I also helped by getting students and organizations in the Athens area to attend the symposium.

### Head TA - CS 1302 Software Programming

ATHENS, GA

#### Head TA

2018 – 2020

The CS 1302 class at UGA is when most Computer Science students first experience significant programming. It takes them from simple terminal applications to complex GUI-based applications with large codebases. I manage a team of about 10 other TAs (varies by semester) who help run this class of 300+ students. I manage grading criteria, rubrics, coding projects, auto-grading systems, and hold office hours to help students understand the subject.

### Hyve Robotics and AstroVisual

ATHENS, GA

#### Co-Founder

2015 – 2018

I Co-Founded two companies, Hyve Robotics and AstroVisual. AstroVisual began by selling smart-phone enabled telescopes for astrophotography. AstroVisual ceased operation when its members founded the UGA Small Satellite Research Laboratory. Hyve robotics created food delivery robots and was acquired by Cosmic Delivery in Q1 2018.

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UGA Hacks

ATHENS, GA

**Co-Founder**

2015 – 2016

With two of my friends, I helped to create UGA's official Major League Hacking (MLH) Hackathon program, which still exists today. The organization helps get Computer Science students excited about programming by presenting them with difficult, relevant challenges.

UGA Redcoat Band

ATHENS, GA

**Section Leader**

2014 – 2015

I led the UGA Redcoat Band's trombone section. I helped organize events, conduct rehearsals, arrange and teach music.