

David Russell

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<https://github.com/russelldj>

EDUCATION

Carnegie Mellon University | Pittsburgh, PA

Master of Science in Robotics

August 2021 - August 2023

Clarkson University | Potsdam, NY

Bachelor of Science in Computer Science (Honors)

GPA: 4.0 / 4.0

September 2016 - May 2020

WORK EXPERIENCE

Research & Development Engineer

Computer Vision Group, Kitware Inc. | Clifton Park, NY

June 2020 - July 2021

- Characterized quality of 3D reconstruction from aerial imagery under various design choices
- Explored strategies for registering reconstructed 3D models to other models and reference satellite imagery
- Ported and refined code for onscreen text detection and 3D reconstruction using C++ and the VXL library
- Explored segmentation strategies for sea lions in low-resolution aerial imagery with limited annotations
- Developed a Phase I demo to allow interactive search of an archive of satellite data
- Conducted experiments on camera distortion models and helped write a successful submission for WACV22

Intern

Computer Vision Group, Phantom AI | Burlingame, CA

May 2019 - August 2019

- Tested and debugged open source code for extrinsic calibration of multiple-camera rigs while driving
- Developed vehicle tracking algorithms for autonomous driving using cheap object detection features
- Created visualization and assessment scripts and implemented the most successful methods in C++

Research & Development Intern

Computer Vision Group, Kitware Inc. | Clifton Park, NY

January 2018 - May 2018

- Trained classification and detection models in PyTorch and TensorFlow and analyzed the results
- Wrote Python scripts to understand annotated satellite imagery and create partitions for low-shot detection
- Tested an in-house structure from motion (SfM) program and compared it to competing methods

Teaching Assistant, Introduction to Programming

Clarkson University | Potsdam, NY

Sept. 2017 - Dec. 2017 & Jan. 2019 - May 2020

- Revised and delivered lectures on programming fundamentals and MATLAB usage
- Assisted students in office hours and individually
- Graded homework and projects

Makerspace Mentor

Clarkson University | Potsdam, NY

March 2019 - May 2020

- Assisted students and staff with projects using a variety of hand- and computer-aided tools
- Helped develop best practices and determine which equipment to purchase

Shop Assistant

Dartmouth Thayer School of Engineering Machine Shop | Hanover, NH

June 2015 - August 2015

- Worked with graduate students to teach material science labs for ENGs 3: Substances of Civilization
- Kept the shop clean, safe, and productive

RESEARCH

Graduate Research Assistant

Prof. David Wettergreen, Carnegie Mellon University | Pittsburgh, PA

October 2021 - present

- Develop perception approaches for semantic mapping of forests to facilitate fire prevention

- Prepare data and train semantic segmentation models using the MMSegmentation framework
- Explore 3D semantic approaches including different map representations

Undergraduate Researcher

October 2019 - December 2020

Prof. Kathleen Kavanagh, Clarkson University | Potsdam, NY

- Developed an optimization method for smoke detector placement on the International Space Station
- Conducted quantitative experiments and generate visualizations for high-dimensional results

Summer Scholar, Research Assistant

June 2018 - December 2018

The Robotics Institute, Carnegie Mellon University | Pittsburgh, PA

- Researched object tracking under the advisement of Prof. Martial Hebert, Robotics Institute Director
- Developed an approach for first-person video combining hand detection and visual object tracking
- Experimented with a tracking-by-detection approach and characterized the failure modes

Summer Scholar

June 2017 - August 2017

The Robotics Institute, Carnegie Mellon University | Pittsburgh, PA

- Developed an optimization-based shape sensing strategy for soft robots that used radio-frequency ID tags
- Collected and analyzed data from un-actuated soft robot models that I designed and built

Undergraduate Researcher

June 2016 - May 2019

Profs. Sean & Natasha Banerjee, Clarkson University | Potsdam, NY

- Used computer vision and statistical methods to analyze pianists' technique
- Created and analyzed thermally-textured point clouds to understand cookware warming patterns
- Improved a retrofit kit to synchronize multiple Xbox Kinects for low-cost 3D motion capture

PROJECTS

Computer Vision Developer

September 2019 - December 2019

Autonomous Path Mapping Robot

- Conceptualize and implement the perception system to facilitate path following and map building
- Write Python nodes within a ROS environment on an NVIDIA Xavier embedded GPU platform

Team Lead

November 2018 - April 2019

Winner, Clarkson Internet of Things President's Challenge

- Organized a team of four to conceptualize and implement a system for understanding makerspace utilization
- Used keypoint detection on an embedded platform to infer and visualize people's location in the space
- Gave the final presentation and won out of 16 teams to obtain the grand prize of \$7,000

TECHNICAL SKILLS

- | | | | |
|-------------------|---------|-------------|------------|
| •Computer Vision | •Python | •SciPy | •Git |
| •Machine Learning | •C++ | •Matplotlib | •Linux |
| •Optimization | •MATLAB | •OpenCV | •GPU Stack |
| •Robotics | •C | •PyTorch | •Scripting |

ACTIVITIES

Co-Assistant Managing Editor

June 2018 - September 2018

RISS Working Papers Journal

- Orchestrated the peer review process for the Robotics Institute Summer Scholars Working Papers Journal
- Organized events for students to get writing assistance from peers, graduate students, and the writing center
- Developed guidelines for timelines, requirements, and best practices for future journal teams

Journal Team Member

June 2017 - August 2017

RISS Working Papers Journal

- Helped organize events and determine timelines in addition to serving as a peer reviewer

Volunteer

July 14th - 16th 2018

Robotics Science and Systems (RSS) Conference

- Checked in attendees, provided assistance to participants, and helped the conference run smoothly

Rower

Clarkson University Crew Team

January 2019 - March 2020

- Elected men's team co-captain for the 2020 spring semester

Co-Webmaster

Clarkson Honors Program

Jan. 2017 - Dec. 2017 & Jan. 2019 - Dec. 2019

- Maintained and improved the Clarkson Honors Program website using PHP, MySQL, and security protocols

AWARDS & SCHOLARSHIPS

Barry Goldwater Scholarship

National undergraduate research award, 2018

James Lynch/Jan Searleman Sophomore Award for Computer Science

Clarkson University, 2018

Presidential Scholar

Clarkson University, All semesters

Clarkson School Award: Early college achievement award

Clarkson University, 2017

The Clarkson School Scholars Award

Clarkson University, 2017

Clarkson Merit Scholarship

Clarkson University, 2016

Honors Scholarship

Clarkson University, 2016

PUBLICATIONS

M. Leotta, **D. Russell**, and A. Matrai (2022). "On the Maximum Radius of Polynomial Lens Distortion." Winter Conference on Applications of Computer Vision. (WACV22)

I. Grasso, **D. Russell**, A. Matthews, J. Matthews, and N.R. Record (2020). "Applying Algorithmic Accountability Frameworks with Domain-specific Codes of Ethics: A Case Study in Ecosystem Forecasting for Shellfish Toxicity in the Gulf of Maine." The ACM-IMS Foundations of Data Science Conference. (FODS-2020).

Y. Jiang, **D. Russell**, T. Godisart, N. K. Banerjee, and S. Banerjee (2018). "Hardware Synchronization of Multiple Kinects and Microphones for 3D Audiovisual Spatiotemporal Data Capture." IEEE International Conference on Multimedia and Expo (ICME).

WORKING PAPERS

M. Leotta, E. Smith, and **D. Russell** (2018). "TeleSculptor: Dense 3D Models from Uncalibrated FMV." Proceedings of the Military Sensing Symposium National Symposium on Passive Sensors. (Classified)

V. Roy, **D. Russell**, S. Chakrobarati, and M. Hebert (2018). "Using Convolutional Neural Networks on Optical Flow for Visual Object Tracking." Robotics Institute Summer Scholars Working Papers Journal.

D. Russell, J. Bern, and S. Coros (2017). "Generalizable Pose Estimation for Soft Robots Using RFID Sensing." Robotics Institute Summer Scholars Working Papers Journal.

PROPOSALS

M. Leotta (PI), **D. Russell**, E. Borovikov (2021). "Obstacle Telesculptor: Mapping Battlespace Obstacles in 3D." Army Small Business Innovation Research (SBIR) Program Phase II Award.

- Primary contributor to proposal and Phase I technical work
- Selected for funding: \$1.1M over two years

PRESENTATIONS

"Hardware Synchronization of Multiple Kinects and Microphones for 3D Audiovisual Spatiotemporal Data Capture." Oral presentation delivered at IEEE International Conference on Multimedia and Expo (ICME). San Diego, CA. 2018.

"Using Optical Flows and a CNN for Visual Object Tracking." Poster co-presented at the Robotics Institute Summer Scholars program concluding presentation. Carnegie Mellon University. 2018.

"Generalizable Pose Estimation for Plush Robots Using RFID Sensing." Poster presented at the Robotics Institute Summer Scholars program concluding presentation. Carnegie Mellon University. 2017.

"Kintient: A Hardware Synchronized Multi-Sensor Capture Facility." Oral presentation delivered at Research and

Project Showcase. Clarkson University. 2017.

"Synchronizing Xbox Kinects to Capture Human Motion and Other 3D Temporal Changes in Form." Oral presentation delivered at the Symposium for Undergraduate Research Experience. Clarkson University. 2016