Alex Stoken

Curriculum Vitae

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EDUCATION

University of Texas at Austin | Austin, Texas May 2022
M.S. in Computer Science
Thesis - DexV2A: Vision Pretraining for Dexterous Manipulation, *advised by* Dr. Kristen Grauman

University of Arizona Honors College | Tucson, Arizona May 2019
B.S. in Physics w/ Honors | B.S. in Mathematics | B.A. in Economics | Minors in Spanish, Astronomy
Thesis – Background Characterization in the 4Top Search at the ATLAS Experiment, *advised by* Dr. Erich Varnes

RESEARCH AND WORK EXPERIENCE

NASA's Astromaterials and Exploration Science Division, JETS contract | Houston, TX June 2019 – Present
Data Scientist

- Created novel technique to automate the localization and georeferencing of daytime and nighttime astronaut photography, transforming 150,000+ (out of 4.5 million) photographs into a usable, science-ready dataset.
- Build, train and deploy machine learning models (1) to enhance Gateway to Astronaut Photography of Earth database with geographic metadata (2) detect surface features in remotely sensed lunar imagery (3) estimate roughness where elevation model data is unavailable (4) identify and track ISS objects of interest
- Trained for and supported Imagery Data console operations for the during Artemis 1 mission
- Software lead for Crew Lunar Observations team, designing tools and operations flows for handheld photography during lunar missions.
- Built interactive website to explore localized astronaut photos (https://eol.jsc.nasa.gov/ExplorePhotos/)
- Represent group at internal and external conferences and events, including ISS Imagery Working Group
- Developed software tools to automate operational workflows for (1) daily ISS payload operations (2) hazard analysis in lunar imagery (3) image analysis for ISS surveys (4) Artemis mission backroom operations
- Contribute to concept development and writing of proposals for competitive funding calls
- Wrote 28 "Image of the Day" articles on astronaut photographs for NASA Earth Observatory

NASA's Technology and Innovation Data Analytics Team | Washington, D.C. June 2018 – August 2018
Data Science Intern

- Designed and built usable 3D immersive network visualization tool as lone developer (C#/Unity)
- Document findings, lessons learned, and final codebase; showcase with Chief Information Officer Senior Staff

NASA/Arizona Space Grant Consortium | Tucson, AZ August 2017 – May 2018
Student Researcher in the Dept. of Physics

- Improved vector-like quark detection by 10% over traditional methods using machine learning and Bayesian statistics in Python with scikit-learn and CERN's ROOT package
- Performed feature selection, hyperparameter optimization, and algorithm comparison to find the best model

US Dept. of Energy - Italian Natl Institute for Nuclear Physics | Univ. of Bari Aldo Moro, Italy June – July 2017
High Energy Physics Summer Student Researcher

- Applied multivariate analysis techniques (python) to test dark matter models for consistency with current physics
- Collaborated with international partners on formal written summary of findings for CERN internal publication

University of Arizona Dept. of Systems Engineering | Tucson, AZ January 2016 – May 2016
IBM Watson Sports Analyst

- Examined MLB data with IBM Watson to find trends between player performance and game scheduling
- Developed tutorial for students to learn the software; completed Watson Fundamentals course on Big Data Univ.

University of Arizona Dept. of Mathematics | Tucson, AZ January 2016 – May 2016
Student Researcher

- Analyzed sparse collegiate golf data with R to find trends for individual UArizona golf players
- Presented individual and team recommendations to head golf coach

TEACHING AND SERVICE

Teaching Assistant | University of Texas at Austin Spring 2022
Online Learning and Optimization (Graduate Course)
- Hosted office hours and exam review sessions, answered student content and logistics questions

Preceptor | University of Arizona Spring 2017-Spring 2019
Physics I, Physics II
- Mentored 150 students per semester in building physical intuition and developing problem solving skills

Professional Service

- Reviewer: *CVPR 2024, NASA SBIR Phase I Proposals (2024)*
- Intern Mentor (3x)

Community Service

- STEM Judge*: Houston Science Fair (3x), FIRST Lego League (2x), Tucson Science Fair (2x), Conroe Challenge (1x)*
- Letters to a Pre-Scientist Pen Pal (2x)
- Open-Source Contributions: *Image-Matching-Models, Keras-SWA, Yolov5*

LEADERSHIP AND EXTRACURRICULAR ACTIVITIES

JETS Educational Outreach Group 2020-Present
Leadership Team
- Coordinating STEM outreach activities between local schools and JETS Contract workforce
- Volunteering at multiple activities per year with local middle and elementary schools
- Build team for AR sandbox education tool

Johnson Space Center (JSC) Hackathon 2021-2023
Co-Director
- Redesigned hackathon as an external facing event attended by over 300 people, including community partners, students, and members of the JSC workforce.
- Hosted (1) workshop on computer vision at NASA and (2) tutorial on how to get started in deep learning
- Coordinated talks from NASA subject matter experts and developed challenges focused on JSC & Artemis missions

Johnson Space Center EMERGE Early Career Resource Group 2020-2022
Leadership Team
- Initiated Lightning Talk series to develop member's public speaking skills and foster community engagement
- Organized and hosted bimonthly personal and professional development activities and lectures

Arizona Model United Nations | Tucson, AZ
President May 2018 – March 2019
- Remodeled fundraising strategy to reduce membership costs by 35% for 75 students
- Selected by U.S. Consulate in Hermosillo, MX to speak to 300 high school students on leadership and diplomacy

Director of Internal Affairs August 2016 – May 2018
- Led recruitment and retention efforts which resulted in a 18% increase in club membership
- Best Delegate Award at American Model United Nations 2016 Conference (representing Kazakhstan)

HackArizona | Tucson, AZ January 2017/2018/2019
Project: *HERE* 1st place Overall Hack
- Acted as project lead, presenter, and UX designer for Android location-based driver assist app

Project: *DisasterRelief* 1st place Best use of VR/AR to Help Others
- Built and presented Android AR app to help Emergency Medical Services locate and prioritize victim care at disaster sites

Project: *Neural Network Visualizer* 2nd Place in Best Use of Data
- Built and presented Unity VR visualization showcasing differences between convolutional neural network and human image understanding

Camp Wildcat | Tucson, AZ October 2016 – April 2018
Auction Director

- Co-chaired annual fundraising auction for more than 80 guests; raised $6,500 for local Title 1 students to go on empowerment and self-betterment camping trips

Other Activities and Memberships

- IEEE/CVF Member
- Mortarboard Honor Society
- SMORES Honorary
- Arizona Sports Analysis Assoc.

PUBLICATIONS AND PRESENTATIONS

Conference Papers (Peer Reviewed)

[CVPRW 2024] A Stoken, P Ilhardt, M Lambert, K Fisher. "(Street) Lights Will Guide You: Georeferencing Nighttime Astronaut Photography of Earth". IEEE/CVPR EarthVision Workshop, 2024.

[CVPRW 2023] A Stoken, K Fisher. "Find My Astronaut Photo: Automated Localization and Georectification of Astronaut Photography". IEEE/CVPR Image Matching Workshop, 2023.

[CVPR 2024] G Berton, A Stoken, B Caputo, C Masone. "EarthLoc: Astronaut Photography Localization by Indexing Earth from Space". IEEE/Computer Vision and Pattern Recognition (CVPR), 2024.

[CVPRW 2024] G Berton, G Goletto, G Trivigno, A Stoken, B Caputo, C Masone. "EarthMatch: Iterative Coregistration for Fine-Grained Localization of Astronaut Photography". IEEE/Computer Vision and Pattern Recognition Image Matching Workshop (CVPRW), 2024.

Conference Abstracts (Peer Reviewed)

A Stoken, P Ilhardt, A Britton. "Learning Terrain Ruggedness from LROC NAC Image Data". Lunar and Planetary Science Conference, 2024.
A Stoken, A Britton, M Lambert, A Turner, M Rubio. "Automated Boulder Counting: Deep Learning for Boulder Detection and Height Estimation". Lunar and Planetary Science Conference, 2023.
C Lawson, P Ilhardt, A Stoken, M Evans. "Surface Gravimetry Using Rover Navigation Systems". Lunar and Planetary Science Conference, 2024.

M Rubio, P Ilhardt, A Stoken, S Walton. "Characterizing Small Craters in the Lunar South Pole Using the Crater Morphology Profile Tool (CAMEO)". Lunar and Planetary Science Conference, 2024.

Internal Publications (Peer Reviewed)

N De Filippis, G Miniello, D Burns, M Mulhearn, H Prosper, S Tentindo, R Mohamed Aly, S Elgammal, A Stoken, [3 others] (2016) "Search for Dark Matter Produced in Association with a Higgs Boson in the four lepton final state at 13 TeV" *CMS Analysis EXO-18-009*.

Presentations

Venue	**Title**
International Workshop on AI Powered Space ('23)	*"Improving Spaceflight Imagery with Machine Learning"*
Payload Ops and Integ. Working Group Mtg #52 ('23)	*"CEO: What's new in Astronaut Photography"*
3rd NASA AI and Data Science Workshop ('23)	*Panelist, "AI at NASA Centers"*
ISS Research and Development Conference ('22)	*"Find My Astronaut Photo: Automated Localization of Imagery"*
Jacobs Sci Dept. Seminar Series ('20)	*"Understanding ISS Imagery through the Lens of Machine Learning"*
UArizona Math Department Poster Session ('19)	*"Efficacy of Super-Modeling in Climate Systems"*
NASA/Arizona Space Grant Symposium ('18)	*"Machine Learning Applications in HEP: Search for Vector-like Quarks"*
UArizona Honors Engagement Expo ('16)	*"Reading Between the Strokes: Collegiate Golf Analytics"*
Lucy Engel Physics Symposium ('16, '17, '18)	*various*

HONORS AND AWARDS

Professional

- **JSC Director's Commendation** (2x) | *EAISD Directorate, NASA Johnson Space Center*
- **Annual Award for Continuous Improvement** ('23)| *JETS Contract*
- **NASA On the Spot –** *NASA Johnson Space Center*
- **Quarterly Individual Award** ('22)| *JETS Contract*
- **Quarterly Team Award** ('20, '21, '22) | *JETS Contract*
- **ROCS Award** ('19, '22, '23) | *JETS Science and Exploration Department*

Scholastic

National

- **United States Presidential Scholar** ('15) | *U.S. Dept. of Edu.* – Two students per state for scholastic achievement
- **Coca-Cola Scholar** ('15) | *CCSF* – Merit award to 150/80,000 applicants for scholarship, service, and leadership

State

- **Flinn Scholar** ('15) | *Flinn Foundation* – $150k scholarship & prof. development for top 20 AZ high school seniors

Institutional

- **Galileo Circle Scholar** ('19) | *College of Science* – Recognition for top students in academics, research, outreach
- **Weaver Award** ('18) | *Dept. of Physics* – Outstanding record in physics/math; demonstrated promise in research
- **Purviance Award** ('16) | *Dept. of Physics* – End of year award for outstanding underclassman in physics
- **Dr. Jim McBreaty Scholarship** ('16) | *Dept. of Economics* – Top student in lower division economics

GRANTS

Internal Research and Development Grant, 2021-24 | *NASA JSC* - $100k/year to train machine learning models to label spaceflight imagery to enhance operational efficiency

SABRE Grant, 2022 | *JETS Contract* - $10k to build deep learning model to identify boulders in the lunar South Pole

SABRE Grant, 2021 | *JETS Contract* – (Project Lead) $10k to prototype water segmentation via satellite imagery for transfer to astronaut photography

Internal Research and Development Grant, 2021 | *NASA JSC* - $100k to identify astronaut pose during intravehicular activities and on spacewalks

NASA/Arizona Space Grant, 2018 | *Arizona Space Grant Consortium* – applied machine learning in high energy physics

Professional Development Grant , 2018 | *Honors College* – trip to Coca-Cola Leadership Development Conf.

Travel Grant, 2017 | *Honors College* – Funding to attend intl. Model United Nations conference

Spirit of Inquiry Research Grant, 2016 | *Honors College* – Funding for promising undergraduate research (sports science)

TECHNICAL SKILLS

Programming Proficiency

Python, including:
ML - PyTorch, TF/Keras, Transformers, Lightning
Imagery - OpenCV, skimage, PIL, COLMAP
Data Analysis - numpy, pandas, scipy
Geospatial - rasterio, geopandas
Visualization - matplotlib, pyvista, rerun
GUI – pyQT, streamlit, Gradio

C#
MATLAB
JS
Java
LaTeX
Bash

Technical Programs

ArcGIS
Git
Microsoft Office Suite
Photoshop
Unity
STK

Language

English *native*
Spanish *conversational*
Italian *beginner*

Interests

Travel
Automation
Arizona/Chicago Sports
Fantasy Football
Running